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# Westinghouse Hanford Company Environmental Surveillance Annual Report--200/600 Areas Calendar Year 1987

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Prepared for the U.S. Department of Energy  
Assistant Secretary for Defense Programs



Westinghouse  
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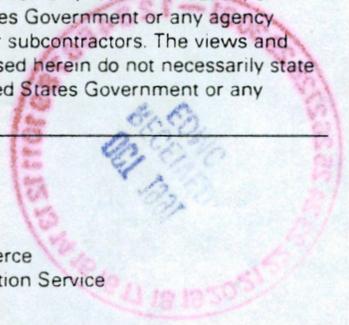
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226-250	A11	526-550	A23
251-275	A12	551-575	A24
276-300	A13	576-600	A25

Printed in the United States of America

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**Westinghouse Hanford Company  
Environmental Surveillance  
Annual Report--200/600 Areas  
Calendar Year 1987**

R. E. Elder  
G. W. Egert  
A. R. Johnson  
W. L. Osborne

Date Published  
April 1988

Prepared for the U.S. Department of Energy  
Assistant Secretary for Defense Programs



**Westinghouse  
Hanford Company**

P.O. Box 1970  
Richland, Washington 99352

Hanford Operations and Engineering Contractor for the  
U.S. Department of Energy under Contract DE-AC06-87RL10930

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**Document Title: Westinghouse Hanford Company  
Environmental Surveillance  
Annual Report--200/600 Areas  
Calendar Year 1987**

*R E Elder*

**R. E. Elder  
Author**

*4/26/88*

**Date**

*R.E. Wheeler*

**R. E. Wheeler  
Issuing Manager**

*4/26/88*

**Date**

*G. D. Carpenter*

**G. D. Carpenter  
Concurring Approval**

*4/26/88*

**Date**

*V. W. Hall*

**V. W. Hall  
Activity Engineer**

*4/26/88*

**Date**

*K. A. Gasper*

**K. A. Gasper  
Program Office**

*4/26/88*

**Date**

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## EXECUTIVE SUMMARY

Near-field environmental surveillance of the Operations Area of the Hanford Site is performed by Westinghouse Hanford Company (Westinghouse Hanford) to assess and control the impacts of operations on the worker and the local environment. The results and conclusions of this program are presented in two reports: one for the 100 Areas and this report, covering the 200 and 600 Areas.

Surveillance activities in the 200 and 600 Areas include sampling and analysis of ambient air, surface water, groundwater, sediments, soil, and biota. External radiation measurements and radiological surveys of waste disposal sites, radiological control areas, and roads are also performed. The 1987 data are summarized below.

### REGULATORY CONTROLS

Radiation exposure to workers and the offsite population are regulated by a tiered system of controls. The U.S. Department of Energy (DOE) has established the occupational exposure limit at 5,000 mrem/yr. The exposure limits for any member of the public were set by the DOE at 500 mrem/yr for occasional annual exposures and at 100 mrem/yr for occasional annual exposure expected to last longer than 5 yr. An administrative action level of 25 mrem/yr (to the maximum individual member of the public) has been identified by the DOE to ensure that these exposure limits are not exceeded.

Derived concentration guidelines (DCGs) corresponding to the 100 mrem/yr effective dose equivalent standard are used for comparison purposes only in this report. It should be noted that the DCGs are applicable at the point of actual exposure to members of the public (off the Hanford Site) and are, therefore, not applicable onsite. In keeping with Westinghouse Hanford's philosophy to keep exposures to workers (and thereby the public) as low as reasonably achievable (ALARA), Westinghouse Hanford establishes ALARA goals called administrative control limits (ACLs), which are used as guidance in maintaining operations below applicable regulatory standards.

### AMBIENT AIR MONITORING

The concentrations of airborne radionuclides measured in the 200 Areas were many times less than the DCG. Results of a trend analysis using data collected since 1979 demonstrated a continued decline overall in airborne  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$ , and  $^{239}\text{Pu}$  in the 200 Areas. Only one individual site demonstrated an upward trend with any radionuclide concentration. With the exception of  $^{90}\text{Sr}$  in air at Station N962, all other individual stations for all radionuclides have been showing a generally downward trend.

### GROUNDWATER MONITORING

The groundwater beneath five waste sites exceeded the DCGs on an annual average for 1987. Two sites were in use and three were inactive. None of the sites have projected offsite doses that exceed the DOE limits.

- The 1987 annual average for tritium in the groundwater at both active 216-A-36B and -37-1 Cribs was 3 times the DCG. The inactive 216-A-10 Crib had an annual average of 2.5 times the DCG. Nearby wells at both sites have shown increases, indicating plume movement.

- The annual average  $^{90}\text{Sr}$  concentration beneath the inactive 216-B-5 Reverse Well was 6 times the DCG in 1987.
- The  $^{234}\text{U}$  and  $^{238}\text{U}$  in the groundwater at the inactive 216-U-1 and -2 Cribs exceeded the DCGs by factors of 7 and 5.5, respectively. Concentration changes in the surrounding wells indicate plume movement towards the east.

The groundwater beneath nine sites exceeded the ACLs on an annual average.

- The  $^{90}\text{Sr}$  ACL was exceeded beneath the inactive 216-A-25 (Gable Mountain) Pond and 216-B-5 Reverse Well.
- Uranium isotopes in the groundwater exceeded the ACLs at the active 216-B-62 Crib, the decommissioned 216-U-10 Pond, and the inactive 216-U-1, -2, and -17 Cribs.
- The  $^{137}\text{Cs}$  concentration exceeded the ACL beneath the inactive 216-B-5 Reverse Well.
- The ACL for  $^{129}\text{I}$  was exceeded beneath the active 216-A-36B Crib and the inactive 216-A-10 Crib.
- The  $^{99}\text{Tc}$  concentration was greater than the ACL at the unused 216-U-17 Crib and the inactive 216-U-1 and -2 and 216-B-48, -49, and -50 Cribs.

## SOIL AND BIOTA MONITORING

In 1987, the concentrations of radionuclides in surface soils throughout the 200/600 Area environment were well below all Westinghouse Hanford soil standards (established to ensure compliance with DOE standards). The 200 East Area average soil concentration of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and  $^{239}\text{Pu}$  was only 0.21%, 1.2%, and 0.04% of the soil standards, respectively. The 200 West Area average soil concentration of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and  $^{239}\text{Pu}$  was only 0.20%, 2.1%, and 0.45% of the soil standards, respectively. Trend analysis revealed no overall increase in any radionuclide concentration in soil since 1978.

The only gamma-emitting radionuclide in vegetation samples collected from the grid sites that exceeded background levels (as established by Battelle's Pacific Northwest Laboratory (PNL) at the Hanford Site perimeter) was  $^{137}\text{Cs}$ . The  $^{137}\text{Cs}$  levels were slightly elevated above background at 11 of the 34 sites sampled. The average  $^{137}\text{Cs}$  concentration in vegetation samples collected in the 200 East and 200 West Areas was 0.58 pCi/g and 0.96 pCi/g, respectively. The mean concentration of  $^{137}\text{Cs}$  in vegetation at the site perimeter was 0.39 pCi/g (PNL 1988\*). With the exception of 1978, the concentration of  $^{137}\text{Cs}$  in vegetation has remained constant over the past 9 yr.

\*PNL, 1988, Environmental Monitoring at Hanford for 1987, PNL-6464, Pacific Northwest Laboratory, Richland, Washington.

## EXTERNAL RADIATION MONITORING

Exposure rates from penetrating radiations, primarily gamma rays, were measured in the general 200 Area environment and were found to be consistent with background levels. The environmental thermoluminescent dosimeters measured exposure rates from all external radiation sources: cosmic, naturally occurring radioactivity in air and soil, fallout from nuclear weapons testing, as well as any contribution from 200 Area activities. In 1987, operations in the 200 Area did not contribute significantly to the external exposure rate (as measured by PNL) in the general environment. Consequently, the exposure rate in the 200 Area environment was not significantly different from the exposure rate received offsite from natural sources of radiation. As expected, external radiation levels were elevated at certain grid sites, radiological control areas, and facilities, reflecting the proximity to radioactive waste management activities.

## POND AND DITCH MONITORING

While there were some increases in radioactivity observed in the ponds and ditches in 1987, none of these levels exceeded the applicable standards. All surface waters associated with 200 Area operations were below the DCG for all measured radionuclides. The analytical results of vegetation samples taken at the ponds and ditches revealed that physiological uptake of radionuclides was relatively insignificant. Sediment samples taken demonstrated elevated levels of mainly  $^{137}\text{Cs}$ . However, all ponds and ditches that receive potentially contaminated water are within posted radiological control areas.

## INVESTIGATIVE SAMPLING

Investigative sampling is carried out to identify specific areas requiring action or mitigation. Trends in radionuclide contamination noted from special sampling results indicate that operational control over much of the 200 Areas has continued to improve. This was particularly evident in vegetation control, although improvements are still ongoing. For example, ground application of herbicides is being replaced where possible by aerial application.

There were four cases of radionuclide transport by mammals (two contaminated feces and two contaminated mice) found in 1987. Other samples of biological interest included two contaminated bird nests, both from the Plutonium-Uranium Extraction (PUREX) Plant railroad cut. Also noted was a decrease (from seven to zero) in the number of contaminated pigeons captured in 1987 compared to 1986. Environmental Technologies captured 694 pigeons from Hanford Site facilities in 1987: 394 from the 200 Areas, 101 from the 200 Areas, and 199 from the 1100 Area.

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9 2 1 2 5 6 2 0 5 4 3

## CONTENTS

1.0	Introduction .....	1-1
1.1	Background .....	1-1
1.2	Objectives of the Operational Environmental Surveillance Program .....	1-1
1.3	Regulatory Basis .....	1-5
1.4	Site Characteristics .....	1-5
2.0	Ambient Air Monitoring .....	2-1
2.1	Introduction .....	2-1
2.2	Air Sampling Results, 1987 .....	2-1
2.3	Conclusions .....	2-2
3.0	Groundwater Monitoring .....	3-1
3.1	Introduction .....	3-1
3.2	Monitoring Program Description .....	3-1
3.3	Concentration Summary .....	3-2
3.4	Trends .....	3-4
3.5	Conclusions .....	3-5
4.0	Soil and Biota Monitoring in the 200 Areas .....	4-1
4.1	Introduction .....	4-1
4.2	Soil Sampling Results, 1987 .....	4-1
4.3	Vegetation Sampling Results, 1987 .....	4-4
4.4	Grid Site Feces Sampling, 1987 .....	4-5
4.5	Conclusions .....	4-5
5.0	External Radiation Monitoring .....	5-1
5.1	Introduction .....	5-1
5.2	Results .....	5-1
5.3	Conclusions .....	5-2
6.0	Pond and Ditch Monitoring .....	6-1
6.1	Introduction .....	6-1
6.2	Results .....	6-1
6.3	Conclusions .....	6-2
7.0	Radiological Surveys .....	7-1
7.1	Introduction .....	7-1
7.2	Roads .....	7-1
7.3	Ponds and Ditches .....	7-1
7.4	Dry-Waste Disposal Sites .....	7-1
7.5	Low-Level Liquid-Waste Disposal Sites: Active and Inactive .....	7-2
7.6	Tank Farm Perimeters .....	7-2
7.7	BC Cribs and Controlled Area .....	7-3

9 2 1 2 5 6 2 0 5 4 4

**CONTENTS (continued)**

8.0	Investigative Sampling .....	8-1
8.1	Introduction .....	8-1
8.2	Sample Types .....	8-1
8.3	Methodology .....	8-1
8.4	Results .....	8-2
8.5	Conclusions and Observations .....	8-2
9.0	References .....	9-1
Appendixes:		
A.	Quality Assurance .....	A-1
B.	Glossary .....	B-1
C.	Ambient Air Monitoring Figures and Tables .....	C-1
D.	Groundwater Monitoring Figures and Tables .....	D-1
E.	Soil and Biota Monitoring Figures and Tables .....	E-1
F.	External Radiation Monitoring Figures and Tables .....	F-1
G.	Pond and Ditch Monitoring Figures and Tables .....	G-1
H.	Radiological Surveys Figures and Tables .....	H-1
I.	Investigative Sampling Tables .....	I-1
J.	Concentration Guidelines .....	J-1

9 2 1 2 1 5 2 1 7 6

**LIST OF FIGURES**

1-1	The Separations Area of the Hanford Site .....	1-2
1-2	The 200 East Area .....	1-3
1-3	The 200 West Area .....	1-4

9  
2  
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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Westinghouse Hanford Company (Westinghouse Hanford), as the Operations and Engineering Contractor (OEC) for the U.S. Department of Energy (DOE) at the Hanford Site, has, as a part of its mission, the responsibility to manage the fuel reprocessing and radioactive waste management facilities in the 200 East and West Areas. Westinghouse Hanford also maintains the retired radioactive dry-waste disposal sites in the 600 Area.

The Hanford Site is located within the Pasco Basin in south-central Washington State, approximately 170 mi southeast of Seattle and 125 mi southwest of Spokane. As shown in Figure 1-1, the 200 Areas are almost in the center of the Hanford Site, 7 mi south of the Columbia River. The locations of operating facilities, tank farms, solid waste burial grounds, and liquid disposal sites in the 200 Areas are shown in Figures 1-2 and 1-3.

Westinghouse Hanford conducts the 200/600 Area Operational Environmental Surveillance Program in the 200 Areas, the BC Crib Area, and the 600 Area to assess and control the impact of past and present operations on the local environment.

### 1.2 OBJECTIVES OF THE OPERATIONAL ENVIRONMENTAL SURVEILLANCE PROGRAM

The objectives of the 200/600 Area Operational Environmental Surveillance Program are to evaluate the following:

- Compliance with DOE radiation protection guides
- Performance of radioactive waste confinement systems
- Long-term trends of radioactive materials in the environment.

Environmental protection guides for use in the 200 Areas have been developed (Boothe 1987) using administrative control limits (ACLs) (Appendix J) to limit radionuclide concentrations. These control limits were established to implement a DOE policy to maintain occupational radiation exposures to levels that are as low as reasonably achievable (ALARA) (DOE 1986a). Operational environmental monitoring is an essential component to demonstrate compliance with these guides and policies. For these reasons, the scope of the Westinghouse Hanford 200/600 Area operational environmental monitoring program has been designed to meet the site-specific needs of the 200 and 600 Areas.

This report presents and interprets the results of the operational environmental surveillance activities performed by Westinghouse Hanford in the 200 and 600 Areas during 1987.

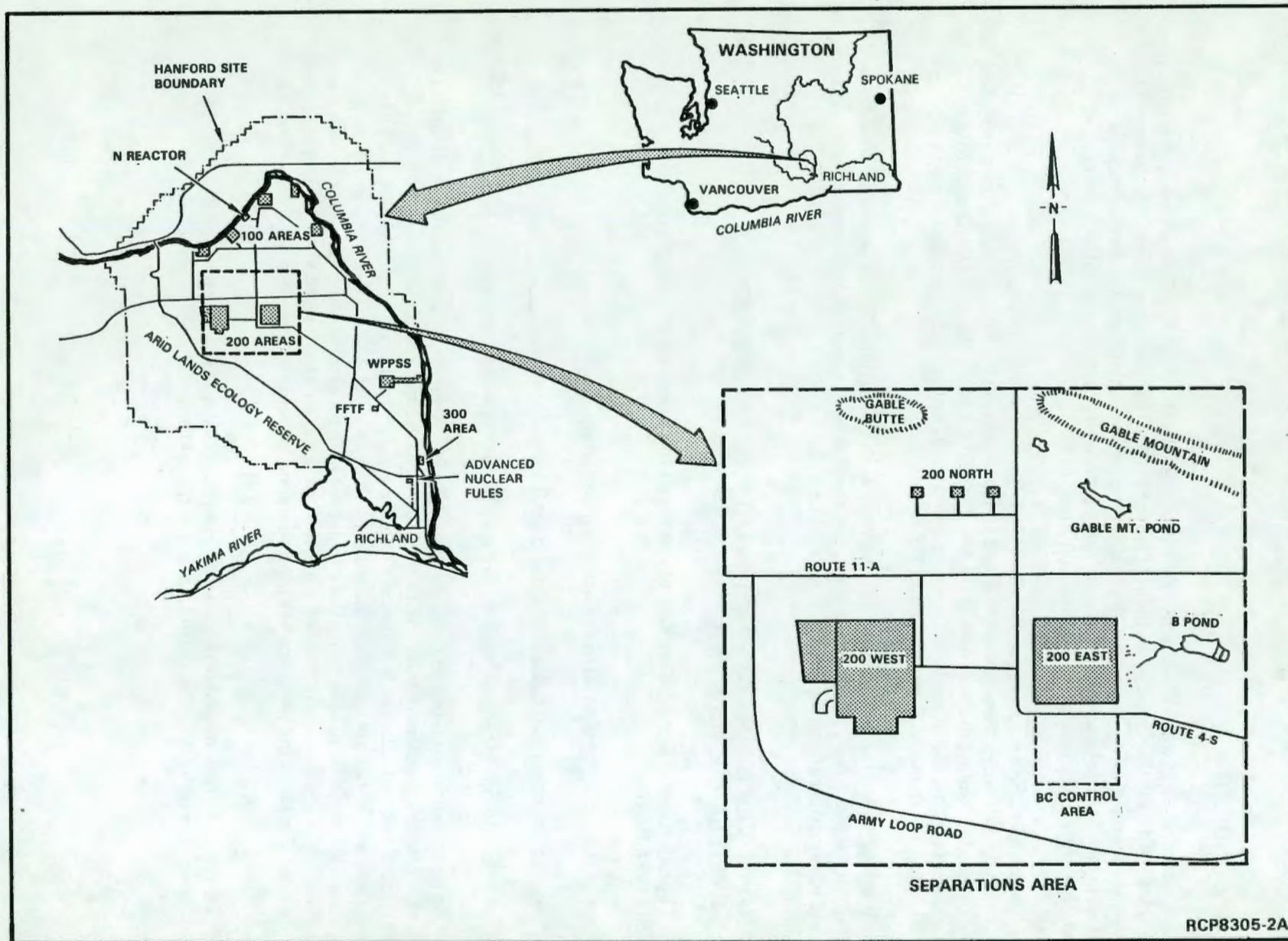


Figure 1-1. The Separations Area of the Hanford Site.



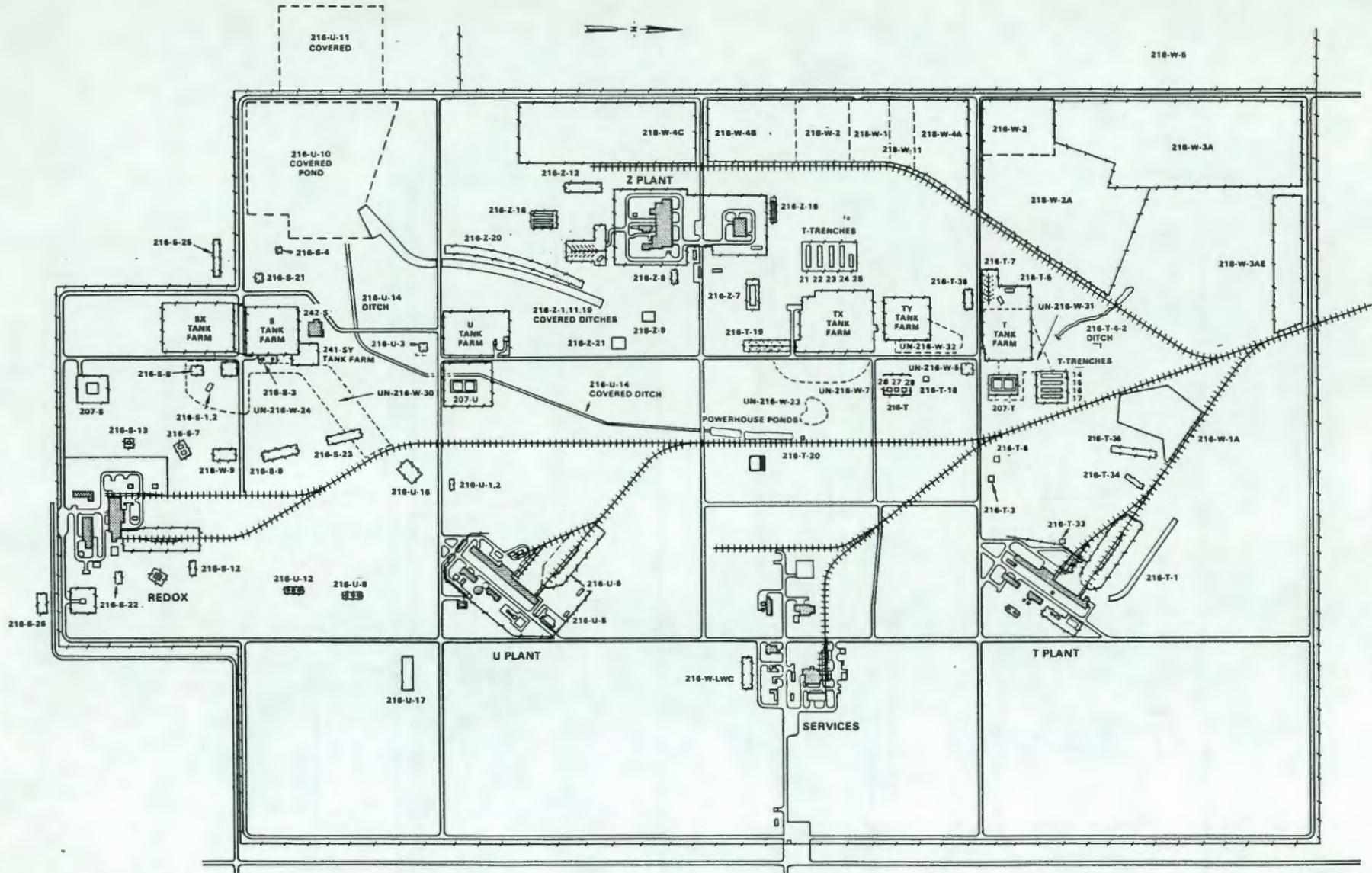


Figure 1-3. The 200 West Area.

### 1.3 REGULATORY BASIS

Radiation standards and regulations for protection of the worker and the environment are contained in DOE Order 5480.1B, "Environment, Safety, and Health Programs for DOE Operations" (DOE 1986). In 1985, DOE issued a memorandum that revised the radiation protection standards for protection of the public in the vicinity of DOE facilities. This memorandum became effective on July 1, 1985, and incorporated the radiation dose calculation methodology recommended by the International Commission on Radiological Protection (ICRP) in Publications 26 and 30 (ICRP 1977, 1979). The memorandum established the maximum allowable radiation exposure to the public at 500 mrem/yr for occasional annual exposure and at 100 mrem/yr for occasional annual exposure expected to last long than 5 yr. The radiation exposure from airborne effluents is limited to 25 mrem/yr whole body dose equivalent and 75 mrem/yr to any organ.

Derived concentration guidelines (DCGs) corresponding to the 100-mrem/yr effective dose equivalent standard are used as comparisons in this report. It should be noted that the DCGs are applicable at the point of actual exposure to members of the public (off the Hanford Site) and are, therefore, not applicable onsite. In keeping with Westinghouse Hanford's philosophy to keep exposures to workers ALARA, the DCGs, as well as Westinghouse Hanford's ACLs, are compared to onsite data.

Westinghouse Hanford has established ALARA goals called ACLs, which are used as guidance to maintain operations below applicable regulatory standards. These ACLs are slightly different for the different media monitored. For air, the ACLs are based on 500 mrem/yr using the methodology described in ICRP Publication 2 (ICRP 1959); for soil, the ACLs are the soil standards developed by Westinghouse Hanford for onsite application using soil particle resuspension model estimates based on radiation protection guides in DOE Order 5480.1B; for groundwater, the ACLs are based on meeting the Federal drinking water standard (DWS) in 2150 A.D. (which is assumed to be the end of operational control for planning purposes).

Westinghouse Hanford conducts ambient air monitoring to determine the baseline levels of radionuclides and to assess the impacts of site operations. These measurements are used to demonstrate compliance with applicable environmental protection criteria.

### 1.4 SITE CHARACTERISTICS

#### 1.4.1 Chemical Processing Facilities

1. PUREX Plant--The Plutonium Uranium Extraction (PUREX) Plant processes irradiated fuels from N Reactor to recover special materials (e.g., plutonium, neptunium, and uranium) and produces plutonium nitrate or plutonium oxide and uranyl nitrate. This process includes metal dissolution and solvent extraction. Supporting systems provide for the removal of nitric acid and organic compounds and the concentration and treatment of waste.

2. UO<sub>3</sub> Plant--The Uranium Oxide (UO<sub>3</sub>) Plant is used to produce UO<sub>3</sub> powder by calcining uranyl nitrate solutions from the PUREX Plant. The UO<sub>3</sub> powder is sealed in steel drums for shipment offsite.
3. PFPP--The Plutonium Finishing Plant (PFPP) is used to process and prepare plutonium products. At the PFPP, the Plutonium Reclamation Facility produces plutonium nitrate and the Plutonium Processing Facility converts plutonium nitrate to either plutonium oxide or metal.
4. T Plant--The T Plant was originally a fuel separation facility using the bismuth phosphate process. The facility is now used for decontamination and repair of equipment.

#### 1.4.2 Waste Management Facilities

1. Tank Farms--Liquid waste from chemical processing operations containing high concentrations of radionuclides is stored on an interim basis in underground tanks. The Hanford Site tank farms contain 177 tanks (149 single-shell tanks and 28 double-shell tanks) with capacities ranging from 50,000 to 1,000,000 gal. Since 1967, new liquid waste has been stored in double-shell tanks. The single-shell tanks are no longer receiving waste and are planned for disposal.

Associated with the tank farms are the evaporators. These facilities are used to remove water from the liquid waste, thereby reducing the total volume of waste stored by the tank farms. During 1987, the 242-A Evaporator was operational; the 242-S Evaporator was on standby; and the 242-T Evaporator was on standby (as an evaporator) but was used as a tank farm surveillance substation.

2. B Plant/WESF--The scope of work for B Plant and the Waste Encapsulation and Storage Facility (WESF) is in a state of change. Limited amounts of <sup>137</sup>Cs were shipped to customers in 1987; however, current encapsulation processes for <sup>90</sup>Sr and <sup>137</sup>Cs at WESF are on standby. Upgrades are under way at B Plant to prepare for supporting the vitrification and grout projects.
3. Cribs--Low-level liquid waste is discharged to the ground via structures called cribs. These subsurface systems allow the liquid component of the waste to percolate into the soil. Of the 97 cribs in the Separations Area, 12 were active in 1987. The 216-A-10 Crib was removed from service.
4. Ponds--Ponds are used to manage the large quantities of water (i.e., cooling water and steam condensate) associated with chemical processing operations. These liquid effluents are normally uncontaminated. The ponds function to promote percolation of the liquid effluent into the soil column. Of the 16 ponds in the Separations Area, 2 remained active by the end of 1987.
5. Ditches--A ditch is an open, unlined excavation used for disposing of liquid effluents or transporting liquid effluents to ponds for disposal. Of the 18 ditches in the Separations Area, 6 were active in 1987. The 216-B-2-3 Ditch was replaced by an underground pipeline.

6. French Drains and Reverse Wells--These are pipes or rock-filled encasements inserted into the ground. These subsurface systems are used for managing potentially contaminated liquid waste by promoting percolation into the soil. Of these 37 process facilities in the 200 Areas, 1 reverse well (216-C-2, which is a pipe extending 50 ft underground) and 5 French drains were active in 1987. These facilities terminate 200 or more feet above the groundwater. The 216-C-2 Reverse Well will be removed from service with the completion of Decontamination and Decommissioning of C Plant (Hot Semiworks) in 1988.
7. Solid Waste Disposal Sites--Contaminated solid waste is generated by various activities on the Hanford Site. This waste is buried in shallow trenches in the 200 Areas. The particular waste packaging procedures and burial practices depend on the type of waste (i.e., transuranic or nontransuranic). Of the 27 solid waste disposal sites in the 200 Areas, 7 remained active in 1987.

### 1.4.3 Decontamination and Decommissioning

Westinghouse Hanford activities in the 200 Areas also involve decontamination and decommissioning of retired facilities, equipment, and waste disposal sites. These activities are aimed at preventing the release or spread of contamination and/or reducing the number of Radiological Control Areas.

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## 2.0 AMBIENT AIR MONITORING

### 2.1 INTRODUCTION

Ambient air sampling is conducted to determine baseline concentrations of radionuclides in the 200 Areas and to assess the impact of operations on the local environment. These measurements also provide an indication of the 200 Areas facility performance and are used to demonstrate compliance with environmental protection criteria. The Westinghouse Hanford air sampling program in the 200/600 Area, as illustrated in Figures C-1, C-2, and C-3, takes into consideration prevailing and high wind directions, as well as potential source terms. Meteorological conditions are continuously monitored by Battelle's Pacific Northwest Laboratory (PNL) meteorology stations positioned around the Hanford Site.

In 1987, 8 duplicate air sampling stations were established and 1 permanent station was removed from service, bringing the total number of permanent stations to 46. The duplicate stations were set up next to existing stations: four each in 200 East and West Areas. These stations are only used for "emergency" purposes (to protect the record samples); thus, they are not considered record samples, and the data from these stations will not be routinely reported. Air samplers are operated at a flow rate of 2 ft<sup>3</sup>/min, drawing the sample through a 47-mm, open-face filter at about 3 ft above the ground.

The network of 46 air samplers operates on a continuous basis in and around the 200 Areas. Three of the 46 samplers are distant from the 200 Areas to provide background data: 1 each at the Yakima and Wye Barricades and 1 at the Hanford Townsite. All sample filters are exchanged weekly, held 1 wk (to allow for decay of the short-lived natural radioactivity), and then sent to the 222-S Laboratory for initial analysis of gross alpha and gross beta activity. These initial analyses serve as an indicator of potential environmental problems. After the initial analysis, the filters are stored until the end of the calendar quarter, at which time they are composited by sample location (or as deemed appropriate) and sent to the U.S. Testing Company, Inc. (UST) Laboratory for specific radionuclide analysis. Of the analyses performed, four are routinely reported: <sup>137</sup>Cs, <sup>90</sup>Sr, <sup>239</sup>Pu, and total uranium. The compositing of the air filters by sample location provides a larger sample size and, thus, a more accurate measurement of the concentration of airborne radionuclides resulting from operations in the 200 Areas. To help assess the impact of operations, the results obtained must be compared to background data. Because of the sensitivity of air monitoring to the sampling techniques, direct comparisons to background data from PNL cannot be made (e.g., PNL collects a larger sample per filter and composites multiple sites). Therefore, Westinghouse Hanford set up the three distant stations to obtain background data using sampling techniques identical to the rest of the program.

### 2.2 AIR SAMPLING RESULTS, 1987

#### 2.2.1 Summary

No noteworthy airborne events occurred during 1987 in the 200 Areas. The 1987 air sampling results are summarized in Table C-1. Annual average radionuclide concentration since 1979 are illustrated in Figures C-4 through C-9. All sites were below the applicable DOE guidelines (DCGs--Appendix J) in 1987. The following are brief discussions of the results of the isotopic analysis.

**2.2.1.1 Strontium-90 Results.** The highest annual average result for  $^{90}\text{Sr}$  was located at N962, southeast of the 218-W-4B Burial Ground in 200 West Area. The result was  $0.0036 \text{ pCi/m}^3$ , or only 0.04% of the DCG and is therefore insignificant. However, this site has been exhibiting a slightly upward trend since 1982 (Figure C-10). This trend, albeit small and localized, is of some concern and will be closely monitored. For comparison purposes, this was 15 times greater than the overall average for  $^{90}\text{Sr}$  and 58 times greater than background at Westinghouse Hanford sites. It should also be noted that the overall  $^{90}\text{Sr}$  trend (since 1979) for both 200 West and 200 East Areas continues downward.

**2.2.1.2 Cesium-137 Results.** The highest annual average result for  $^{137}\text{Cs}$  was at N159, located near B Plant in 200 East Area. The result was  $0.0076 \text{ pCi/m}^3$ , about 0.002% of the DCG. For comparison purposes, this was 11 times greater than the overall average for  $^{137}\text{Cs}$  and 85 times greater than background at Westinghouse Hanford sites. This slightly elevated result was influenced by a ten-fold increase in the third-quarter composite (as compared to previous as well as subsequent quarters) to  $0.026 \text{ pCi/m}^3$ . This increase is attributed to work being performed on the B Plant sand filter located near this air sample station. These values immediately returned to normal levels following completion of the work. No discernable trend has been evident at this site.

**2.2.1.3 Plutonium-239 Results.** The highest annual average for  $^{239}\text{Pu}$  was  $0.0002 \text{ pCi/m}^3$  at site N165, near the decommissioned 216-Z-19 Ditch in 200 West Area. This was only 1% of the DCG and is therefore insignificant. The average was 13 times greater than the overall average and 56 times greater than background at Westinghouse Hanford sites. However, the overall trend (since 1979) for  $^{239}\text{Pu}$  in air continues downward in both 200 East and 200 West Area.

**2.2.1.4 Total Uranium Results.** The highest annual average for total uranium was at site N168, located in the U Plant area near the stack in 200 West Area. The result of  $0.00017 \text{ pCi/m}^3$  was 7 times greater than the overall average for total uranium and 18 times greater than the measured background at Westinghouse Hanford sites. These slightly elevated concentrations are attributed to  $\text{UO}_3$  Plant operations, and any potential impact is considered insignificant.

**2.2.1.5 Other Radionuclide Results.** Although no other gamma-emitting radionuclides were found at levels significantly greater than background,  $^{106}\text{Ru}$  results were scrutinized. The  $^{106}\text{Ru}$  was selected because of its relationship to the PUREX Plant process and its relatively short half-life. Because of the shutdown of the PUREX Plant for most of 1987, the concentration of  $^{106}\text{Ru}$  in air ranged from less than, to equal to, the detection limit (detection limit is approximately  $0.03 \text{ pCi/m}^3$ ).

## 2.3 CONCLUSIONS

Activities in the 200 Areas contributed to average radionuclide concentrations in air only slightly above background. Trends over the past 8 yr have generally been downward for both 200 East and 200 West Area, and all radionuclide concentrations were all below the DCGs in 1987. With the exception of  $^{90}\text{Sr}$  in air at N962, all individual stations for all measured radionuclides have been showing a generally downward trend as well.

### 3.0 GROUNDWATER MONITORING

#### 3.1 INTRODUCTION

This section presents the status of the groundwater quality beneath the 200 Areas and associated waste sites in comparison to the DCGs and to the Westinghouse Hanford's ACLs. Included are a brief description of Westinghouse Hanford's groundwater monitoring program, concentration summaries for active and inactive waste sites, and a summary of significant concentration trends that began in, or continued into, 1987. Comprehensive data from all monitored wells in the separations area will appear in a separate groundwater monitoring annual report to be issued by the Environmental Technology Group, Defense Waste Engineering.

Westinghouse Hanford conducts the 200 Area groundwater monitoring program to determine the compliance status of 200 Area facilities and operations with Westinghouse Hanford's administrative controls pertaining to groundwater quality. The objectives of the program are as follows.

- Evaluate the quality of groundwater beneath the 200 Areas.
- Determine the impact of waste disposal operations on the groundwater.
- Assess the performance of disposal and storage sites in the 200 Areas.
- Provide data for hydrologic analysis and model application.

#### 3.2 MONITORING PROGRAM DESCRIPTION

The groundwater monitoring network for 1987 consisted of 149 wells in the unconfined aquifer and 13 wells in the confined aquifer underlying the liquid-waste disposal and storage sites in the 200 Areas. Monitoring well locations for the unconfined aquifer are shown in Figures D-1 through D-3.

Samples were collected for Westinghouse Hanford by PNL. Wells monitoring active waste disposal sites were sampled monthly. Those monitoring inactive sites were sampled either monthly, quarterly, or semiannually, depending on the operating history or radiological condition of the waste site. Most wells are equipped with dedicated submersible pumps; the remainder are sampled by bailing.

Laboratory analyses of groundwater samples were conducted by UST. Routine analytical parameters in 1987 included total alpha, total beta,  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{106}\text{Ru}$ ,  $^3\text{H}$ , total uranium, and nitrate. Water samples from wells were selectively analyzed for these parameters based on effluent inventories and historical groundwater monitoring results. Sampling quality control is discussed in Environmental Monitoring at Hanford for 1987 (PNL 1988).

Analytical results are reported by UST to both the 200/600 Areas Environmental Protection Section and the Environmental Technology Group. The data are analyzed and reported monthly.

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Westinghouse Hanford has established ACLs pertaining to radionuclide concentrations in groundwater, which are specified in RHO-MA-139, Part L (Boothe 1987). The intent of the ACLs is to ensure that at the end of institutional control (assumed to be the year 2150 A.D. for planning purposes), the groundwater beneath the site will meet Federal DWS for radioactivity (maximum contaminant levels in 40 CFR 141) prior to migration to the site boundary. Thus the ACLs serve as operating limits regulating discharges to liquid disposal sites and, as such, are more restrictive than the DCGs. Inactive liquid-waste disposal sites, i.e., those no longer receiving waste water, continue to be monitored to detect changes that could indicate a potential problem.

### 3.3 CONCENTRATION SUMMARY

The annual average concentration of radionuclides in groundwater beneath the 200 Area waste sites was compared to the ACLs. The data were compared also to the DCGs, as directed by DOE-RL (DOE 1985). It should be noted that the DCGs are applicable only at the point of actual exposure to members of the public (off the Hanford Site) and are, therefore, not applicable onsite. Table J-2 presents a comparison of the current RHO-MA-139 ACLs and the DCGs. Liquid-waste disposal sites that exceeded the ACLs or the DCGs are summarized below according to the contaminant involved.

#### 3.3.1 Strontium-90

No active waste sites exceeded the DCG or ACL for  $^{90}\text{Sr}$ .

Three inactive waste sites have elevated concentrations of  $^{90}\text{Sr}$  in the groundwater. The annual average concentration of  $^{90}\text{Sr}$  at Gable Mountain Pond continued to be in excess of the ACL in 1987. The DCG was not exceeded. At the 699-53-47A and -47B Wells, the annual average concentrations were approximately equal to the new ACL and have not changed significantly since 1985. The average  $^{90}\text{Sr}$  concentration at the 699-53-48B well was approximately four times the ACL and showed an increase during 1987. The average concentration at the 699-54-48 and -49 Wells also showed slight increases. The changing concentration in these wells surrounding Gable Mountain Pond demonstrates movement of the plume to the north, and not an increase in the plume concentration, since the pond no longer is receiving waste water.

The groundwater beneath the inactive 216-B-5 Reverse Well had an annual average  $^{90}\text{Sr}$  concentration of approximately 6 times the DCG and 83 times the ACL. This is unchanged from 1986. The continued elevated  $^{90}\text{Sr}$  concentration at this site is due to the direct discharge of contaminants to the water table. Except for 216-B-5, all reverse wells previously discharged into the vadose zone. This site, however, discharged directly into the water table from 1945 through 1947 (Law and Allen 1984). The high  $^{90}\text{Sr}$  concentration was due to residual contamination from that period of operation. Characterization has demonstrated that the radionuclides are sorbed on the sediments and that the contamination is localized (Smith 1980).

The groundwater beneath the inactive 216-S-1 and -2 Cribs has also historically demonstrated elevated  $^{90}\text{Sr}$  concentrations. In 1987, the annual average concentration was below the new ACL, as well as the DCG, and has continued to decrease since the first quarter of 1985, indicating plume dilution and movement. This groundwater  $^{90}\text{Sr}$  contamination is also due to past operations.

### 3.3.2 Uranium

The DCGs for uranium isotopes were not exceeded in the groundwater beneath any active waste sites in 1987. However, the groundwater beneath one active site exceeded the ACLs. The 216-B-62 Crib had annual average concentrations of  $^{234}\text{U}$  and  $^{238}\text{U}$  that were 2 times the respective ACLs. The uranium was determined to be from the nearby inactive 216-B-12 Crib. The results of a study by Environmental Technology has shown no indication of vadose zone transport of uranium between the 216-B-12 and -62 Cribs; thus, it has been shown that the contamination is independent of the disposal site operation and that continued use of the 216-B-62 Crib should not cause an increase in uranium concentration in the groundwater. This is supported by data which shows a decrease in uranium groundwater concentration beneath 216-B-62 Crib.

In 1986, the groundwater beneath the 216-S-25 Crib and 216-U-14 Ditch were reported to be above the ACL for  $^{238}\text{U}$ . With the revision of the groundwater ACLs, the  $^{238}\text{U}$  concentrations at the two sites during 1987 were below the new ACL.

The groundwater beneath three inactive sites had concentrations of uranium isotopes that exceeded the ACLs. The 216-U-1 and -2 Cribs exceeded the DCGs for  $^{234}\text{U}$  and  $^{238}\text{U}$ . The well with the highest concentrations (299-W19-03) had an average of 7 times the DCG for  $^{234}\text{U}$  and 5.5 times the DCG for  $^{238}\text{U}$ . Remedial pumping of the groundwater beneath this crib was conducted from June to November 1985, by which time more than 8 million gallons of water had been pumped and treated by ion exchange with 687 kg of uranium removed. An evaluation is currently being performed to determine additional remedial strategies.

Another inactive site, 216-U-10 Pond, has  $^{234}\text{U}$  and  $^{238}\text{U}$  concentrations at the ACL. The concentration remained unchanged in two wells, but increased in the third well during 1987, indicating plume movement.

Beneath the 216-U-17 Crib, which is planned to receive the  $\text{UO}_3$  process condensate effluent during upcoming years, the concentration of  $^{234}\text{U}$ ,  $^{235}\text{U}$ , and  $^{238}\text{U}$  were above the ACLs. The contamination is from other waste sites within the 200 West Area. A characterization of the plume is underway.

### 3.3.3 Technetium-99

Improved analytical procedures which resulted in a lower cost for  $^{99}\text{Tc}$  allowed some additional waste sites to be investigated for  $^{99}\text{Tc}$  in the groundwater during 1987. No active waste sites exceeded the DCG or ACL for  $^{99}\text{Tc}$ . The groundwater beneath three inactive waste sites was found to have  $^{99}\text{Tc}$  in excess of the ACL. These sites were the 216-U-1 and -2 Crib area, 216-U-17 Crib, and the 216-B-48, -49, and -50 Crib area. The source of the  $^{99}\text{Tc}$  is from past disposal to these sites. The highest concentration at the 216-U-1 and -2 Cribs was in the furthest downgradient well (299-W19-18) and was 2 times the ACL. The concentration beneath the 216-U-17 Crib was four times the ACL. This elevated  $^{99}\text{Tc}$  concentration in the 200 West Area coincides with the elevated uranium concentrations. The  $^{99}\text{Tc}$  concentration at the 216-B-48, -49, and -50 Cribs was 20% above the ACL.

### 3.3.4 Iodine-129

No waste sites exceeded the DCG for  $^{129}\text{I}$  during 1987. The groundwater beneath one active waste site exceeded the ACL. Seven wells were analyzed for  $^{129}\text{I}$  in 1987. Wells at 216-A-10, -36B, -45, -27, and a well east of REDOX (699-35-70) were sampled for  $^{129}\text{I}$ . With the decrease in the ACL in 1987 from 60 to 20 pCi/L, the concentration of  $^{129}\text{I}$  beneath 216-A-10 and -36B was in excess of the new ACL. The inactive 216-A-10 Crib was two times the ACL and the active 216-A-36B Crib was 40% above the ACL. The 216-A-36B Crib was deactivated by the end of 1987. The 216-A-45 Crib, which replaced the A-10 Crib, began receiving the suspected effluent and is being routinely sampled for  $^{129}\text{I}$ . The concentration of  $^{129}\text{I}$  in groundwater beneath the 216-A-45 Crib is at 50% of the ACL.

### 3.3.5 Tritium

The groundwater beneath three active waste sites exceeded the DCG for tritium in 1987. The 216-A-36B, -45, and -37-1 Crib, which receive PUREX Plant effluents, were approximately 3 times the DCG. Wells at sites in the vicinity of these cribs also showed  $^3\text{H}$  concentrations in excess of the DCG, including the highest beneath the unused 216-A-38 Crib of 7 times the DCG, which indicates plume movement.

### 3.3.6 Other Radionuclides

The average annual concentration of  $^{137}\text{Cs}$  at the inactive 216-B-5 Reverse Well was below the DCG but was nine times greater than the ACL. The concentration has been decreasing for the past 4 yr. No other radionuclides were detected in excess of the DCGs or ACLs in any groundwater wells monitoring the Separations Area waste sites.

### 3.3.7 Nitrate

Nitrate moves with the groundwater and therefore serves as a tracer. Monitoring was done principally for purposes of plume evaluation. Westinghouse Hanford does not have a standard for nitrate concentration in groundwater. The EPA drinking water standards (EPA 1976) were used for comparison purposes only. Generally, the same wells that exhibited elevated tritium concentrations also exhibited elevated nitrate concentrations.

## 3.4 TRENDS

All groundwater data are analyzed not only to determine compliance with internal guidelines, but also for trends to detect potential problems and to demonstrate the effectiveness of waste site decommissioning.

Concentration trends in groundwater were observed beneath two active waste sites and at four inactive waste site. The trends are summarized below and shown graphically in Figures D-4 through D-7.

- 216-B-62 Crib: In general, the concentration of uranium in groundwater beneath this active crib continued to decrease during 1987 (Figure D-4).

- 216-S-25 Crib: A slight increase in uranium concentration is evident (Figure D-5) in the 299-W23-10 Well and a slight decrease in the 299-W23-09 Well occurred during 1987 (Figure D-5) following pumping of treated groundwater from the 216-U-1 and -2 Cribs, which ended in November 1985.
- 216-A-25 Pond (decommissioned Gable Mountain Pond): The  $^{90}\text{Sr}$  concentrations in three wells (699-53-47A, -47B, and -48A) (Figures D-6 and D-7) remained unchanged from 1986 concentrations. Well 699-53-48B (Figure D-7) showed a 60% increase (comparing fourth quarter versus first quarter concentrations) in  $^{90}\text{Sr}$  during 1987. Plume movement may be indicated by the increase in  $^{90}\text{Sr}$  concentration in the 699-54-48 and -49 wells (Figure D-8).
- 216-U-1 and -2 Cribs: Of the seven wells surrounding the inactive crib area, the total uranium concentration at six wells showed decreases and one well showed no change during 1987 (Figure D-9). The well showing no change was the well furthest downgradient from the cribs. The other five wells are closer and upgradient to the cribs. This suggests movement of the plume and sorption on the soil sediments.
- 216-U-17 and -8 Cribs: Of the six wells adjacent to the new 216-U-17 Crib, four showed an increase in uranium during 1987. The increase in uranium in the region of 200 West Area coincides with a uranium increase beneath the inactive 216-U-8 Crib. A characterization of the plume is underway to determine the source and extent of the contamination beneath the 200 West Area.

### 3.5 CONCLUSIONS

The groundwater beneath five waste sites exceeded the DCGs on an annual average for 1987. Two sites were in use and three were inactive. None of the sites have projected offsite doses that exceed the DOE limits.

- The 1987 annual average for tritium in the groundwater beneath both the active 216-A-36B and -37-1 Cribs was 3 times the DCG. The groundwater beneath the inactive 216-A-10 Crib had an annual average of 2.5 times the DCG. Nearby wells at both sites have shown increases, indicating plume movement.
- The annual average  $^{90}\text{Sr}$  concentration beneath the inactive 216-B-5 Reverse Well was 6 times the DCG in 1987.
- The  $^{234}\text{U}$  and  $^{238}\text{U}$  in the groundwater at the inactive 216-U-1 and -2 Cribs exceeded the DCGs by factors of 7 and 5.5, respectively. Concentration changes in the surrounding wells indicate plume movement towards the east.

The groundwater beneath nine sites exceeded the ACLs on an annual average.

- The  $^{90}\text{Sr}$  ACL was exceeded beneath the inactive 216-A-25 (Gable Mountain) Pond and 216-B-5 Reverse Well.
- Uranium isotopes in the groundwater exceeded the ACLs at the active 216-B-62 Crib, the decommissioned 216-U-10 Pond, and the inactive 216-U-1, -2, and -17 Cribs.

- The  $^{137}\text{Cs}$  concentration exceeded the ACL beneath the inactive 216-B-5 Reverse Well.
- The ACL for  $^{129}\text{I}$  was exceeded in the groundwater beneath the active 216-A-36B Crib and the inactive 216-A-10 Crib.
- The  $^{99}\text{Tc}$  concentration was greater than the ACL in the groundwater beneath the unused 216-U-17 Crib and the inactive 216-U-1 and -2 and 216-B-48, -49, and -50 Crib.

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## 4.0 SOIL AND BIOTA MONITORING IN THE 200 AREAS

### 4.1 INTRODUCTION

The radionuclide content of soil, vegetation, and animal feces is measured to evaluate long-term trends in environmental accumulation of radioactivity in the 200 Areas. Soil samples are collected from a network of 78 grid sampling sites and 30 fenceline sampling plots. The grid sites are 10 by 10 m and are arranged in a grid pattern in 200 East and 200 West Areas. These sites are intended to monitor the overall 200 Area environment without being specific to any potential source. Locations of the grid sampling sites are illustrated in Figures E-1, E-2, E-3, and E-4. The 30 fenceline plots are each 1 by 5 m and were established in 1984 to monitor areas both upwind and downwind of potential sources where contamination, if present, might be expected to accumulate. Locations of the fenceline plots are illustrated in Figures E-5 and E-6. Each soil sample represents a composite of five plugs of soil 2.5 cm in depth by 10 cm in diameter collected from within each sampling site.

Early in the summer of each year, soil samples are collected and submitted for radionuclide analyses. The analyses include those radionuclides expected in the Separations Area (i.e., gamma-emitting radionuclides, strontium isotopes, uranium, and plutonium isotopes). The results are compared to regional background levels that are derived from PNL offsite monitoring data to determine the difference between contributions from 200 Area operations and contributions due solely to natural causes and worldwide fallout. The results are also compared to soil contamination standards (Appendix J) developed for use in the 200 Areas (Boothe 1987). These soil standards are based on radiation protection guides in DOE Order 5480.1A and were derived using soil particle resuspension model estimates. These soil standards represent permissible radionuclide concentrations in the soil above which radiological controls (e.g., cleanup, posting) are required. The soil standards are intended for use only in the 200 Areas.

When soil samples are collected from the grid sites, terrestrial vegetation samples (e.g., cutting from growing plants) are also collected to determine accumulation of radioactivity in plants. Analyses are performed for gamma-emitting radionuclides and at selected sites for <sup>90</sup>Sr and plutonium isotopes. Comparisons are made with regional background (PNL 1988) data for determining impact due to 200 Area operations.

When soil and vegetation samples are collected from the 78 grid sampling sites, animal feces (if present and less than 1 yr old) are also collected within the sampling area. The feces are analyzed as an indicator of animal-caused spreading of radioactive contamination in the 200/600 Areas. These measurements provide an indication of the potential transport of radioactive waste as a result of animal intrusion. Feces are analyzed for gamma-emitting radionuclides.

Special soil and biota (plant and animal) samples are collected for site-specific monitoring or when radiological contamination is known or suspected (see Section 8.0).

### 4.2 SOIL SAMPLING RESULTS, 1987

#### 4.2.1 Grid Site Soil Sampling

Of the 78 grid sampling sites, 43 were sampled in 1987. At eight sites replicate samples were taken for Quality Assurance (QA) purposes. Of these samples, 41 sites demonstrated radionuclide

concentrations (for at least one radionuclide) above regional background concentrations; however, none approached Westinghouse Hanford's soil standards (Appendix J). Radionuclide concentrations in soil are listed by area in Tables E-1 and E-2.

**4.2.1.1 Cesium-137 Results.** The highest  $^{137}\text{Cs}$  concentration was, as in previous years, found at grid site 2W8 east of the 241-T Tank Farm in 200 West Area. This site, along with 2W23 (adjacent to the 241-U Tank Farm in 200 West Area) has consistently shown the highest levels of  $^{137}\text{Cs}$  since the grid sampling program was initiated in 1978 (see Table E-3). However, no particular trend is evident (since 1980) in the historical data indicating that the elevated levels of  $^{137}\text{Cs}$  in soil are due to past operations of the U and T Tank Farms. The 1987 result for 2W8 was 52 pCi/g, which was approximately 87 times background and 13% of Westinghouse Hanford's soil standard for  $^{137}\text{Cs}$ .

The highest  $^{137}\text{Cs}$  concentration in 200 East Area was at grid site 2E10, located east of the 241-B Tank Farms. Samples from this site have shown concentrations among the highest for  $^{137}\text{Cs}$  in 200 East Area; however, no particular trend has been evident, indicating that the slightly elevated levels are not due to current operations. The 1987 result for 2E10 was 31 pCi/g, which was about 52 times background and 8% of the applicable Westinghouse Hanford's soil standard.

**4.2.1.2 Strontium-90 Results.** The highest  $^{90}\text{Sr}$  concentration was at grid site 2E17, located west of C Tank Farm in 200 East Area. Samples from this site have historically exhibited among the highest for concentrations of  $^{90}\text{Sr}$  (Table E-4). Since 1984 an upward trend has become evident at this site. This is believed to be due to residual low-level contamination from the 1985 C-151 Tank Farm incident (Elder et al. 1986). The  $^{90}\text{Sr}$  concentration at this site in 1987 was 5.2 pCi/g, which was about 32 times background and 1.3% of Westinghouse Hanford's soil standard.

The highest  $^{90}\text{Sr}$  concentration in 200 West Area was at 2W9, located to the east of T Plant. Samples from this site have not been among the highest for concentrations of  $^{90}\text{Sr}$  since 1978; the concentrations have been fairly consistent until this year, indicating that the slightly elevated results in 1987 may be due to a "flier;" however, data collected from this site will be closely monitored. The  $^{90}\text{Sr}$  result for 1987 for this site was only 3.2 pCi/g, about 21 times background and 0.8% of the Westinghouse Hanford's soil standard.

**4.2.1.3 Plutonium-239 Results.** Soil samples with  $^{239}\text{Pu}$  concentrations above background have been historically, as well as predominately, found in 200 West Area. The highest concentration found in 1987 was at 2W9, located east of T Plant. Samples from this site have consistently been among the highest for levels of  $^{239}\text{Pu}$  in soil since the grid site sampling program began in 1978 (Table E-5); however, with no discernible trend being evident, indications are that the slightly elevated (above background) concentrations are also due to past operations. The concentration at this site was 1.7 pCi/g, about 190 times background and 2.8% of Westinghouse Hanford's soil standard.

Other radionuclides were found in the grid site soil samples, but were not significant compared to background and the predominate radionuclides previously mentioned.

## 4.2.2 Fenceline Soil Sampling

Fenceline sampling sites have a different purpose than the grid sites in that they are designed to be site-specific to facilities where there is a greater potential for radionuclide buildup. Sample sites are located upwind and downwind with respect to the prevailing and high winds to detect any release of radioactive contamination from the facility. Of the 30 sites sampled in 1987, 29 demonstrated radionuclide concentrations for at least one radionuclide above regional background levels and only

one site approached Westinghouse Hanford's internal soil standard. Concentrations are listed in Table E-6.

**4.2.2.1 Cesium-137 Results.** The highest  $^{137}\text{Cs}$  concentration was again found at site U-TF-NE, northeast of the 241-U Tank Farm in 200 West Area. Samples from this site have exhibited elevated levels of  $^{137}\text{Cs}$  since initiation of the fence line sampling program in 1984 (Table E-7) but no discernable trend has been evident. The concentration measured in 1987 was 247 pCi/g, about 62% of the soil standard. This site has been a posted radiological control area.

The highest  $^{137}\text{Cs}$  concentration in 200 East Area was found at site C-TF-NE, located northeast of the 241-C Tank Farm. Samples from this site have not exhibited among the highest measurements of  $^{137}\text{Cs}$  and the 1987 concentration represents a significant increase over the previous years. This site will be closely monitored. The measured result was 82 pCi/g, approximately 21% of the Westinghouse Hanford soil standard.

**4.2.2.2 Strontium-90 Results.** The highest  $^{90}\text{Sr}$  result was also found at U-TF-NE. Samples from this site have also exhibited among the highest results for  $^{90}\text{Sr}$  (Table E-8), but no discernable trend is evident. The site is currently within a radiological control area. The measured result was 75 pCi/g, approximately 19% of Westinghouse Hanford's soil standard.

The highest concentration measured in 200 East Area was again at C-TF-SE, southeast of the 241-C Tank Farm. While samples from the sites downwind of the 241-C Tank Farm have historically displayed elevated levels of  $^{90}\text{Sr}$ , the 1987 concentration represents a significant decrease as compared to the 1986 levels. The concentration at this site was 15 pCi/g (as compared to 32 pCi/g in 1986), only 4% of Westinghouse Hanford's soil standard.

**4.2.2.3 Plutonium-239 Results.** The highest  $^{239}\text{Pu}$  concentration was found at U-TF-NE, northeast of the 241-U Tank Farm in 200 West Area. The concentration at this site was 0.4 pCi/g, about 0.67% of the soil standard (Table E-9).

### 4.2.3 Radionuclide Concentration Trends in Soil

Soil sample results were evaluated to determine radionuclide concentration trends for 1978 through 1987. Individual concentrations at each grid site are found in annual reports for these years (Wheeler et al. 1980, 1981; Conklin et al. 1982, 1983, 1984, 1985; Elder et al. 1986, 1987) and are summarized in Tables E-3, E-4, and E-5.

The radionuclide concentration data for soil from both the grid sites and the fence line sites were reviewed to discern trends of radioactivity in soil. Most sites (both grid and fence line) exhibited no real trend due to current operations. There were no statistically significant differences for the 200 Area averages in the levels of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and  $^{239}\text{Pu}$  in soil from 1978 to the present (averages are illustrated in Figures E-7, E-8, and E-9). However, some individual sites have shown a marked change and are summarized below. It should be noted, given the variability exhibited with the replicate sample analyses, that a potential exists for an individual site to show a large difference due only to variability resulting from the sampling.

**4.2.3.1 Grid Sites  $^{90}\text{Sr}$  Trends.** One site, 2E17, located west of the C Tank Farm in 200 East Area, has displayed an upward trend beginning in 1985. This trend shows only a slightly positive slope (about 1 pCi/g/yr), resulting in a 1987 concentration of  $^{90}\text{Sr}$  of 5.2 pCi/g. Given these low levels and the belief that these slightly elevated levels are a result of the 1985 C-151 incident and not current

operations, this trend is not believed to be of immediate concern. Results of future sampling will be closely monitored.

**4.2.3.2 Grid Sites Cesium-137 Trends.** One grid site, which displayed a large increase in 1986, was 2E14, located to the south of the 218-E-10 Burial Ground. The  $^{137}\text{Cs}$  concentration at this grid site has now returned to the previous years' levels, supporting the supposition that the 1986 data was indeed a statistical "flier".

**4.2.3.3 Fenceline Sites Trends.** Of the 30 Fenceline Sites, only 3 have shown a marked upward trend. At site A-TF-W1, upward trends were detected in  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$  and  $^{239}\text{Pu}$  levels. Concentrations of  $^{137}\text{Cs}$  have steadily increased from 0.093 to 3.7 pCi/g from 1984 to 1987. The  $^{90}\text{Sr}$  has increased from 0.055 to 1.8 pCi/g and  $^{239}\text{Pu}$  has increased from 0.00081 to 0.0051 pCi/g in the same time period. While this represents an upward trend, it is not of great concern, given the relatively low levels. It should be noted that the concentrations are only 0.92%, 0.45%, and 0.01% of the soil standards for  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$ , and  $^{237}\text{Pu}$ , respectively, and only 10, 10 and 0.73 times the measured background levels.

The second site showing an upward trend (for  $^{90}\text{Sr}$ ) is A-TF-E2. The concentration of  $^{90}\text{Sr}$  in soil there has increased from 0.46 to 4.3 pCi/g from 1984 to 1987. However, as with A-TF-W1, these levels, while representing a slightly positive upward trend, are not of great concern given its localized nature. The last site with a positive trend was at C-TF-NE. The  $^{90}\text{Sr}$  concentration there has increased from 1.6 to 11 pCi/g for the same time period. However, this site, while showing a greater slope, did not display the same degree of linearity as the previous sites.

## 4.3 VEGETATION SAMPLING RESULTS, 1987

### 4.3.1 Grid Site Vegetation Sampling

Of the 78 grid site sampling location, vegetation samples were collected at 34 in 1987. At eight sites replicate samples were taken for QA purposes. Of these samples, all 34 sites demonstrated radionuclide concentrations (for at least one radionuclide) above regional background levels (PNL 1988). Radionuclide concentrations are listed by area in Tables E-10 and E-11.

**4.3.1.1 Cesium-137 Results.** The highest  $^{137}\text{Cs}$  result was found at grid site 2W23, located east of the 241-U Tank farm in 200 West Area. The  $^{137}\text{Cs}$  concentration there was 5.2 pCi/g, about 100 times background (Table E-12).

**4.3.1.2 Strontium-90 Results.** Of the 34 vegetation samples taken, 13 were analyzed for  $^{90}\text{Sr}$ . The highest concentration was again found at 2E17, northwest of the 241-C Tank Farm in 200 East Area. The  $^{90}\text{Sr}$  concentration was 9.9 pCi/g, about 200 times background.

**4.3.1.3 Plutonium-239 Results.** Thirteen of the 53 samples taken were analyzed for  $^{239}\text{Pu}$ . The highest concentration detected was at 2W33, south of the 241-S Tank Farm, in 200 West Area. The concentration there was 0.089 pCi/g, about 400 times greater than background.

### 4.3.2 Radionuclide Concentration Trends in Vegetation

The radionuclide concentration data for vegetation were reviewed to discern upward trends for radioactivity in vegetation. Grid site vegetation concentrations have exhibited no real trend,

indicating that there has been no consistent or wide-spread accumulation of radioactivity in vegetation in the 200 Areas. There has been no statistically significant differences for the 200 Area averages for  $^{137}\text{Cs}$  in vegetation from 1979 to the present. The yearly averages are illustrated in Figure E-10.

#### 4.3.3 Vegetation Control

Several sites in the 200 Areas contain vegetation, primarily tumbleweeds, with the potential for root uptake of contamination from the soil; however, there has been a significant decrease in contaminated vegetation growth since a surface stabilization program was initiated in 1978. This program involves the following:

- Placing additional soil cover over waste sites, thus further isolating the waste from deep rooted vegetation
- Revegetating existing waste sites; tumbleweed growth is inhibited when forced to compete for moisture with other vegetation
- Applying herbicide to further hinder undesirable plant growth
- Providing clean surfaces that can be easily monitored for changes in radiological conditions.

The progress in contaminated vegetation control since 1977 is illustrated in Figure E-11.

#### 4.4 GRID SITE FECES SAMPLING, 1987

In 1984, the feces sampling procedure used for sampling at the grid sites was changed so that only fresh (about 1 yr old) feces would be collected. This helped ensure that only the impact for the previous year would be apparent. In 1987, all feces found were estimated to be greater than 1 yr old, therefore no grid site feces samples were taken. However, feces were collected from the nearby environment. The results are presented in Section 8.0.

#### 4.5 CONCLUSIONS

There are several potential sources of environmental contamination in the 200 Areas, including low-level waste disposal sites, tank farms, and processing facilities. Results from the fenceline sampling sites, in conjunction with the grid sampling sites and several animal transport incidents, continue to support a conclusion that most of the environmental contamination originates from tank farms and related facilities. The major mechanism influencing the migration of radioactive material introduced into the environment is the high winds from the southwest. The near-field Environmental Monitoring Program in the Separations Area has been realigned to stress tank farms, and to initiate corrective action (i.e., cleanup initiated as sources are identified), thereby minimizing adverse environmental impact.

Results from vegetation samples collected in the 200 Areas general environment demonstrated that radionuclide concentrations were slightly above regional background. These concentrations were attributed to root uptake from the contaminated soils and deposition. The surface stabilization

program, initiated in 1979, has significantly reduced the amount of contaminated vegetation and the levels of radionuclides in vegetation.

As a result of statistical analysis performed on the data, the following conclusions can be made.

- Most sites, both grid and fenceline, have exhibited no real trend, indicating that any contamination present is probably from activities prior to the initiation of the grid and fenceline sampling programs.
- There were no significant differences for the 200 Areas averages in the levels of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and  $^{239}\text{Pu}$  in soil from 1978 to the present.
- The highest levels of both  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  in soil were found at the fenceline sampling sites. However, the highest levels of  $^{239}\text{Pu}$  were found at the grid sites in 200 West Area, indicating that the source of the slightly elevated levels of  $^{239}\text{Pu}$  was not the tank farms but probably was historical plutonium operations.

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## 5.0 EXTERNAL RADIATION MONITORING

### 5.1 INTRODUCTION

A network of thermoluminescent dosimeters (TLDs) is positioned in and around the 200 Areas to monitor exposure rates from external radiation sources (primarily gamma rays). The TLD measurements are taken to determine baseline exposure rates in the 200 Area environment. From these baseline data, the contribution of Hanford Site activities can be discerned and the potential dose due to external exposure to employees can be assessed. The dosimeters measure dose-equivalent rates, reported in terms of mrem/yr, at a specific location.

The environmental TLDs measure exposure rates resulting from all types of external radiation sources. These include cosmic radiations, naturally occurring radioactivity in air and soil, fallout from nuclear weapons testing, as well as any contribution from Hanford Site activities.

Each TLD consists of three chips of calcium-fluoride/manganese (Harshaw TLD-400) encased in an opaque capsule lined with 0.025 cm of tantalum and 0.005 cm of lead. Each capsule is placed in a translucent, waterproof, plastic vial, and is mounted about 3 ft above the ground. The TLDs are placed at each of the active grid sites, at active and inactive surface-water disposal sites, and at PUREX Plant-related Facilities (tank farms, active cribs and the PUREX Plant fence line). Four batches of capsules are used (two for the grid and surface-water sites, and two for the PUREX-Plant related facilities) and are rotated each calendar quarter. Each quarterly measurement is an average of the three chips exposed in the same container. The response of the chips has been calibrated by the PNL Radiation Calibration Laboratory, and results are reported in terms of air dose. Results are compared, where appropriate, with background data collected by PNL at locations distant from the Hanford Site to determine impacts due to 200 Area Operations.

### 5.2 RESULTS

The TLD data are listed in Tables F-1 through F-4. Generally, all sites have shown an increase in 1987. This overall increase is due to refinement in analytical procedures at PNL, not an actual increase in exposure due to operations (PNL 1988).

#### 5.2.1 Grid Sites

All grid sites are located outside radiological control areas and represent the general environment. The exposure rate measured there did not change significantly from 1986. The range in 1987 was from 74 to 204 mrem/yr as compared to 69 to 190 mrem/yr in 1986 (Elder et al. 1987). The sites that had levels elevated above background were attributed to nearby waste site and/or low-level contamination in the environment.

### 5.2.2 Surface-Water Sites

All TLDs at surface-water sites, except for West Lake, are within radiologically controlled areas located at water-sampling sites (see Section 6.0). As a result of decontamination and decommissioning activities at the 216-A-25 Pond, 216-S-19 Pond, 216-U-14 Ditch, 216-U-10 Pond and 216-Z-19 Ditch, the exposure rate at these sites dropped to background levels. This resulted in only two sites being slightly above background: the 216-B-63 Ditch and the 216-B-3 Ditch. The highest exposure rate for surface-water sites in the Separations Area was at the 216-B-3 Ditch, with an exposure rate of 120 mrem/yr.

### 5.2.3 PUREX Plant-Related Facilities

In addition, TLDs are located at several sites associated with the PUREX Plant operation, including tank farms, active cribs, and the PUREX Plant fenceline. These locations are shown in Figure F-1. The only elevated exposure rate significantly higher than the general Separations Area environment that is attributable to the PUREX Plant operation was observed at the 241-A Tank Farm complex. This facility, which receives high-level liquid waste from the PUREX Plant, had external radiation levels ranging from 77 to 1,781 mrem/yr. These high levels are localized and therefore have minimal environmental impact. All other TLD measurements at PUREX Plant-related locations were consistent with levels seen in the general Separations Area environment.

### 5.2.4 External Radiation Trends

Since the TLD program was initiated in 1978, there has been no overall increase in radiation levels in the 200 Areas. In fact, there has been dramatic localized decreases due to decommissioning efforts. The average annual exposure rate at the grid sites in 200 East and West Area has remained consistent from year to year, as shown in Figure F-2. The annual average exposure rate at the grid sites for both 200 East and West Area was 96 mrem/yr.

## 5.3 CONCLUSIONS

In 1987, operations in the 200 Area did not contribute significantly to the external exposure rate (as measured by PNL) in the general environment. Consequently, the exposure rate in the general 200 Areas environment was not significantly different from the exposure rate received offsite from natural sources of radiation. As expected, external radiation levels were elevated at certain grid sites, radiological control areas, and facilities, reflecting the proximity to radioactive waste management activities.

## 6.0 POND AND DITCH MONITORING

### 6.1 INTRODUCTION

Water, vegetation, and sediment samples were collected from the active ponds and ditches in 1987. Ponds and ditches in the 200 Areas receive potentially contaminated waste water from the chemical processing plants and other facilities. All water is continuously sampled at the point of discharge to ensure compliance with RHO-MA-139 and applicable DOE standards. As an additional operational check, the 200/600 Area Operational Environmental Surveillance Program collects water samples at the ponds and ditches. Sampling locations are shown in Figures G-1 and G-2. Sources of liquid effluents are listed in Table G-1.

Water samples of 1 L are collected on a weekly basis from the active ponds and ditches. The pH is determined each week, then the samples are composited and analyzed monthly for total alpha, total beta, gamma-emitting radionuclides, and  $^{90}\text{Sr}$ . Each site has replicate samples taken for 1 mo (4 wk), on a rotating basis. Additionally, a 1 L sample is taken on a quarterly basis from each site for nitrate analysis. Samples of aquatic vegetation are collected from ponds and ditches yearly to determine root uptake of radionuclides from potentially contaminated sediments. Along with vegetation samples, sediment samples are collected to measure the accumulation of radionuclides. These samples consist of a composite of five plugs, each 900 cm<sup>2</sup> by 2.5 cm deep. Both the vegetation and sediments are analyzed for gamma-emitting radionuclides,  $^{90}\text{Sr}$ ,  $^{239}\text{Pu}$ , and uranium.

### 6.2 RESULTS

#### 6.2.1 Water

Results of water sampling at the ponds and ditches are summarized in Table G-2. Because a large percentage of the results are less than the analytical detection limit, only the maximum and minimum concentrations at each site are presented. The only elevated gamma-emitting radionuclide was  $^{137}\text{Cs}$ . The highest monthly  $^{137}\text{Cs}$  result of 0.19 pCi/mL was observed at the 216-T-4 Ditch. This is only 6.3% of the DCG (Appendix J). The highest  $^{90}\text{Sr}$  concentration, 0.12 pCi/mL, was found at the Powerhouse Pond and was only 12% of the DCG.

#### 6.2.2 Nonradiological Parameters

Results of nitrate and pH determinations are summarized in Table G-3. The pH annual averages ranged from neutral to slightly basic. The highest annual average pH of 9.5 was found at West Lake, a natural, stagnant seep that receives no effluent. Most of the nitrate results were less than the detection limit (approximately 1.2 p/m). The highest value above the detection limit, 2.7 p/m, was found in one quarterly sample at the 216-T-4-2 Ditch. This maximum quarterly samples was only 6% of the U.S. Environmental Protection Agency (EPA) drinking water standard (Appendix J).

### 6.2.3 Vegetation

Eleven vegetation samples were collected from eight ponds and ditches in 1987. Each sample consisted of growing stems and leaves from predominant plant species at each location. The vegetation was analyzed for gamma-emitting radionuclides, as well as  $^{90}\text{Sr}$ ,  $^{239}\text{Pu}$ , and uranium with the results reported in Table G-4. Five of the samples taken demonstrated a significant increase in  $^{137}\text{Cs}$  concentrations in 1987. These were in samples taken at the 216-A-25 Pond north, the 216-B-2-3 Ditch, the first overflow at 216-B-3 Pond, the 216-B-3-3 Ditch and the 215-B-63 Ditch. These sites increased, respectively, by 7, 4, 8, 17 and 7 times the previous sample result. Only one sample showed a significant increase in  $^{90}\text{Sr}$ , the 216-B-3-3 Ditch, which increased by a factor of 16. However, given the relatively low concentrations detected, any environmental impact is considered insignificant.

### 6.2.4 Sediment

The results from sampling pond and ditch sediments are provided in Table G-5. The highest  $^{137}\text{Cs}$  result was found at the 216-T-4 Ditch. The concentration measured in 1987 was 172 pCi/g, about 43% of Westinghouse Hanford's soil standard. However, two other sites demonstrated a significant increase in  $^{137}\text{Cs}$ : the 216-B-3-3 Ditch increased by a factor of 12 and the 216-B-3 Pond (south station) increased by a factor of 56. Two sites showed a significant decrease in  $^{137}\text{Cs}$  levels as well. The 1986 result at the 216-B-63 Ditch (2,600 pCi/g), which was determined to be a "flier," was shown to be just that with a sample result in 1987 of 9.3 pCi/g. The 216-B-2-3 Ditch, which was last sampled in 1985 and had a result of 350 pCi/g, had a 1987 concentration of only 11 pCi/g.

## 6.3 CONCLUSIONS

While there were some significant increases in radioactivity observed in ponds and ditches in 1987, none of these levels exceeded the applicable standards. All surface waters associated with Separations Area operations were below the DCG for all radionuclides. The analytical results of vegetation samples taken at the ponds and ditches revealed that physiological uptake of radionuclides was relatively insignificant. Sediment samples taken demonstrated elevated levels (above background) of mainly  $^{137}\text{Cs}$ . However, all ponds and ditches that receive potentially contaminated water are within posted radiological control areas.

## 7.0 RADIOLOGICAL SURVEYS

### 7.1 INTRODUCTION

Radiological surveys are conducted to determine changes in the radiological status of the 200/600 Area environment. Trends in radiation levels or radiological contamination may aid in assessing the adequacy of the waste containment of underground radioactive material, indicate movement of radioactive material away from radiological control areas, or detect releases that might otherwise go undetected. The survey schedule is outlined in Table H-1.

### 7.2 ROADS

A beta-gamma detector, mounted approximately 20 in. above the ground on the underside of a truck, is used to survey the Separations Area road surfaces. The detector consists of four 1B85 Geiger-Muller tubes connected to a count-rate meter in the cab of the truck. All frequently traveled blacktop and improved roads and parking lots in and around the 200 Areas are surveyed bimonthly to detect the presence of radioactive material. Roads less frequently traveled or with low contamination potential are surveyed either quarterly or semiannually. Other roads on the Hanford Site are surveyed by PNL. No new contamination was detected on the roads in 1987.

### 7.3 PONDS AND DITCHES

Open pond and ditch banks are routinely surveyed to identify contamination at these sites. The thin-window, pancake-type Geiger-Muller probe with the BNW-1 count-rate meter is the principal instrument used in these surveys. Noteworthy results at ponds and ditches are listed below.

- 216-T-1 Ditch--Spotty contamination on the sides and bottom of ditch from 1,000 to 2,000 counts/min. The contaminated section of the ditch has been decommissioned.
- 216-T-4-2 Ditch--Spotty contamination at outfall surface and sides of ditch from 200 to 3,000 counts/min. The contamination has been cleaned up.

### 7.4 DRY-WASTE DISPOSAL SITES

The retired dry-waste disposal sites are surveyed annually to detect radiological changes, primarily via biological intrusion (indicative of loss of control), from year to year. These sites are located in the 600 Area (Figure H-1) and in the 200 Areas (see Figures 1-1 and 1-3).

Spotty contamination and tumbleweed fragments were found on the 218-E-5 and -9 Burial Grounds (5,000 to 9,000 counts/min), 218-E-2A (maximum of 60,000 counts/min) 218-E-12A (maximum of 4,500 counts/min), 218-E-12B (2,000 to 4,000 counts/min), 618-2 and -3 Burial Grounds (maximum of 3,000 counts/min). The contamination on the 218-E-2A, -5, -9 and -12A burial grounds has been cleaned up. The contamination on the 218-E-12B and 618-2 and -3 Burial Grounds has been scheduled for cleanup.

## 7.5 LOW-LEVEL LIQUID-WASTE DISPOSAL SITES: ACTIVE AND INACTIVE

Low-level liquid-waste disposal sites, other than ponds and ditches, consist of cribs, french drains, reverse wells, trenches, and unplanned release sites. As with dry-waste disposal sites, liquid-waste sites are surveyed at least annually, and as often as quarterly, to detect changes in surface radiological conditions. The most significant results in 1987 are listed below.

### 7.5.1 216-A Sites

Four sites (216-A-6, 216-A-8, 216-A-24, and 216-A-40 Cribs) were found to be contaminated due to vegetation intrusion and release from risers to the environment. Dose rates, to a maximum of 12 mrad/h were found. The contamination at the 216-A-24 and -40 cribs has been cleaned up. Contamination at the 216-A-6 and -8 cribs is scheduled for cleanup.

### 7.5.2 216-C Sites

The most noteworthy contamination found on the 216-C sites was at the 216-C-1 Crib, with a maximum dose rate of 60 mrad/h found. This site will be cleaned up with the completion of decontamination and decommissioning of the Hot Semiworks.

### 7.5.3 Unplanned Release Sites

The most noteworthy contamination was found at the following unplanned release sites.

- Contamination (7 mrad/h maximum) was found east of the 241-TY Tank Farm. The contamination has been cleaned up.
- Contamination (30 mrad/h maximum) was found on the south side of 207-U Retention Basin. The area is scheduled to be cleaned up.
- Contamination (25 mrad/h maximum) was found on the east side of Semiworks. The area is scheduled to be cleaned up.

## 7.6 TANK FARM PERIMETERS

Tank farm perimeters and associated facilities are surveyed annually to detect any migration of contamination.

Tank farms and related facilities are sources of environmental contamination. Significant contamination was found along the perimeters of the following tank farms: 241-SX and -SY to a maximum of 20 mrad/h; 241-B Tank Farm to a maximum of 5 mrad/h; 241-AX Tank Farm to a maximum of 5 mrad/h. Because of the nature of the problem around Tank Farms (e.g., surface contamination within the Tank Farms migrating to the environment), the schedule for cleanup

of these areas has yet to be determined. It is planned that the interior of the tank farms will be cleaned up prior to these areas to prevent recontamination. Contamination from tank farms has been on the decrease due to ongoing isolation and surface cleanup inside of these areas.

### 7.7 BC CRIBS AND CONTROLLED AREA

The BC Cribs and trenches (Figure H-2) are a series of liquid-waste disposal sites that were active in the mid-1950s. In 1959, it was discovered that animals had burrowed into one trench and transported radioactivity over an area estimated to exceed 2,500 acres. In 1979, special survey plots were established throughout the Controlled Area to monitor for migration of the contamination. Data accumulated during the 8-yr period, including 1987, indicate that no significant migration of contamination away from the areas has occurred. The cribs and trenches were surface stabilized by 1982.

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## 8.0 INVESTIGATIVE SAMPLING

### 8.1 INTRODUCTION

Special investigative sampling is conducted in the operations area to augment the routine-sampling program, to support construction projects, and to verify near-field waste containment. Special sampling is often undertaken to help explain questions that result from analyses of the routine samples; however, it may also be the result of concerns about radiological waste as it affects or is affected by matters such as employee safety, biotic intrusion, and maintenance of containment systems. Special samples may be collected from the following.

- A broader area when analytical results from one of the routine sample sites show elevated radionuclide content.
- An area where scheduled construction activities in the vicinity of a waste site make it desirable to demonstrate the radiological condition of the area.
- A site where biotic intrusion, such as animal burrows or deep-rooted vegetation growth has created the potential for the spread of radionuclides.
- Sites where the integrity of radioactive waste maintenance systems is questioned.

These are examples, but certainly not an all-inclusive list, of instances when special investigative samples are needed to ensure employee safety at near-field operations as well as compliance with guidelines and regulations.

### 8.2 SAMPLE TYPES

Types of special investigative samples which accounted for the 81 physical samples included air, water, liquid effluents, sediment, soil, vegetation, and animals. Radioactivity was detected on 18 of these samples discovered during near-field radiation surveys (Table I-1). The remaining 63 samples were collected to determine the radiological status of specific areas or facilities (Table I-1).

### 8.3 METHODOLOGY

Field preparations of samples were done as outlined in routine-sample-collecting procedure manuals when applicable, or according to directions provided by the Environmental Protection field work coordinator. All samples that contained radioactivity above background levels, as determined by field survey instruments, were sent to the 222-S Laboratory, and those at or below background levels were sent to UST. Vegetation samples occasionally included the entire plant, including roots if required, and the wash from selected samples. Analyses of whole plant samples could be separated into woody portions, roots, and leafy matter; or they might be analyzed as a single sample, depending on needs. Animal samples included feces, nests, eggs, whole bodies and the wash from selected samples. Large whole-body samples were usually divided into smaller portions for separate analyses (e.g., birds were dissected into feather/skin, gastrointestinal, and muscle/bone sections).

## 8.4 RESULTS

Samples of special biological interest in 1987 included the following:

- Two contaminated fecal samples, one rabbit and one mouse, compared to one, from a coyote, in 1986
- Two contaminated mice, one inside a building and one outside, compared to none in 1986
- Two contaminated bird nests compared to three in 1986
- Five cases of contaminated vegetation compared to seven in 1986. These cases included one big sagebrush (Artemisia tridentata) and four russian thistle (Salsola kali), also known as tumbleweed.

The results of the radionuclide analyses for these biotic samples are included in Table I-2. The data, as presented, include sample type (including field instrument contamination values), sample location, and analytical results. It should be noted that, as compared to 1986, there were no contaminated pigeons, termite colonies, or spiders found in 1987.

## 8.5 CONCLUSIONS AND OBSERVATIONS

Investigative sampling is carried out to identify specific areas requiring remedial action or mitigation. Trends in radionuclide contamination noted from special sampling results indicate that operational control over much of the 200 Areas has continued to improve. This was particularly evident in vegetation control, although improvements are still ongoing. For example, ground application of herbicides is being replaced where possible by aerial application.

There were four cases of radionuclide transport by mammals (two contaminated feces and two contaminated mice) found in 1987. Other samples of biological interest included two contaminated bird nests, both from the 202-A railroad cut. Also noted was a decrease (from seven to zero) in the number of contaminated pigeons captured in 1987 compared to 1986. Environmental Technologies captured 694 pigeons from Hanford Site facilities in 1987: 394 from the 200 Areas, 101 from the 200 Areas, and 199 from the 1100 Area.

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**APPENDIX A**  
**QUALITY ASSURANCE**

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## QUALITY ASSURANCE

Quality Assurance (QA) may be defined as the actions necessary to ensure accuracy of a program. The Westinghouse Hanford Company (Westinghouse Hanford) environmental surveillance QA program consists of procedures and guides to demonstrate that environmental monitoring techniques and analyses are performed within established limits of acceptance. A sound QA program for environmental monitoring is essential in maintaining credibility.

Written operating procedures are an integral part of the Westinghouse Hanford environmental surveillance QA program. Procedures for field operations are provided in RHO-HS-MA-2, Environmental Surveillance and Control Manual (Conklin et al. 1982). Emergency response and other special procedures may be documented separately. This appendix briefly describes the essential components of the Westinghouse Hanford environmental surveillance QA program.

### DOCUMENTATION

Record keeping is a vital part of any environmental monitoring program. Maintenance of environmental data is not only important from a QA standpoint, but also from a regulatory point of view, for trend analysis, and for optimizing environmental monitoring procedures. For these reasons, each phase of the Westinghouse Hanford Operational Environmental Surveillance Program is documented. This documentation includes sampling logs, annual reports, and unusual occurrence reports.

### SAMPLE REPLICATION

Replicate sampling and subsequent analysis are the primary means of assessing sample variability. Duplicate samples of air, water, soil, sediment, and vegetation are collected as part of the routine Environmental Surveillance Program.

### DATA ANALYSIS

Environmental data are reviewed to determine compliance with applicable Federal and Company guides. The data are analyzed both graphically and by standard statistical tests to determine trends and impacts on the environment. Newly acquired data are compared with historical data and natural background levels. Routine environmental data are stored on both magnetic media (i.e., in a microcomputer environment) and on hard-copy printouts.

### TRAINING

To ensure quality and consistency in sample collection and handling, all personnel performing such work receive formal training. All Westinghouse Hanford Radiation Protection Technologists (RPTs) are required to complete a certification program through the Westinghouse Hanford Radiological Protection Department. In addition, those RPTs assigned to environmental programs receive special classroom orientation and on-the-job training by experienced personnel. Environmental Protection personnel receive training in such courses as "Radiation in the Environment," taught through the Tri-Cities University Center, courses taught at the Harvard School of Public Health, and various short courses.

## SAMPLE FREQUENCY

The frequency of sample collection varies according to the importance of the measurement. Media sampled more frequently are critical in determining immediate releases to, or impacts on, the environment. The routine monitoring schedule is contained in the Environmental Surveillance and Control Manual (Conklin et al. 1982). A brief description of the sampling program is presented below.

1. Ambient air sample filters and water samples from active ponds and ditches are collected weekly.
2. Radiological surveys of 200 East and 200 West Area roads are performed on a monthly or bimonthly basis, as stated in Section 7.0.
3. The TLDs at grid sites, ponds, and ditches are exchanged quarterly.
4. Radiological surveys of waste sites are performed quarterly, semi-annually, or annually depending on the importance, condition, and past history of the site.
5. The soil, vegetation, and fecal samples are collected at the grid sites on an annual basis. Mud and vegetation samples from active ponds and ditches are also collected on an annual basis.

## ANALYTICAL PROCEDURES

Three laboratories provide analytical support to the Westinghouse Hanford Environmental Surveillance Program; these are the United States Testing Company (UST), the Radiation Standards and Engineering Laboratory at Pacific Northwest Laboratory (PNL), and the Westinghouse Hanford 222-S Analytical Laboratory. The environmental samples are analyzed in accordance with prescribed procedures and quality control guides. The analytical procedures necessary to implement the environmental monitoring program are briefly described below and are listed according to the respective laboratory.

### United States Testing Company

Much of the Environmental Surveillance Program involves measuring radionuclide concentrations at or near background levels. These environmental measurements require a very low detection limit and are typically performed at UST. This analytical laboratory routinely performs analyses on soil, vegetation, animal feces, and air samples. Analyses are performed according to procedures and quality control guides described by the Environmental Measurements Laboratory (1972), the U.S. Atomic Energy Commission (1974), and the National Council on Radiation Protection and Measurements (1976).

1. Air Samples
  - a. Gamma Energy Analysis--Gamma-emitting radionuclides are measured by direct counting of the air sample filter with a lithium-drifted germanium [Ge(Li)] detector equipped with a multichannel pulse height analyzer.

- b. Strontium-90--Airborne  $^{90}\text{Sr}$  is determined by leaching the air sample filter with nitric acid and initially precipitating it as a nitrate. The sample is purified by repeated scavenging with barium chromate and precipitating with barium carbonate. The final precipitate, strontium carbonate, is then counted with a low-background gas flow proportional counter.
- c. Plutonium--The various plutonium isotopes are leached from the air sample filter with fuming nitric acid and passed through an ion-exchange resin. The plutonium is then eluted from the resin and electrodeposited on a planchet where it is counted using an alpha spectrometer.
- d. Uranium--The uranium is leached from the air sample filter and extracted as tetrapropyl ammonium uranyl trinitrate followed by back extraction into water. Following treatment with sodium and lithium fluoride, the aqueous sample is analyzed with a fluorometer.

## 2. Groundwater Samples

- a. Total Alpha and Beta Activity--The total activity due to alpha- and beta-emitting radionuclides is measured by directly counting the dried residue with a gas flow proportional counter.
- b. Strontium-90--The strontium is removed from the water sample by precipitating as a nitrate using nitric acid. The sample is purified by repeated scavenging with barium chromate and precipitating with barium carbonate. The strontium carbonate is then counted with a low-background gas flow proportional counter.
- c. Gamma Energy Analysis--Gamma-emitting radionuclides are analyzed by directly counting the water sample with a Ge(Li) detector equipped with a multichannel pulse height analyzer.
- d. Tritium--Water samples are analyzed for tritium with a liquid scintillation spectrometer.
- e. Total Uranium--The water samples are analyzed for uranium by first treating with sodium and lithium fluoride followed by analyzing with a fluorometer.

## 3. Soil Samples

- a. Gamma Energy Analysis--Gamma-emitting radionuclides in soil are measured using a Marinelli beaker and counting with a Ge(Li) detector equipped with a multichannel pulse height analyzer.
- b. Strontium-90--The  $^{90}\text{Sr}$  is removed from the soil sample by leaching the dried sample with nitric acid. The strontium in solution is converted to an oxalate followed by precipitation as strontium carbonate. The carbonate is deposited on a planchet and counted in the same manner as the  $^{90}\text{Sr}$  water samples.
- c. Technetium-99--The  $^{99}\text{Tc}$  is isolated from other elements using hydroxide carbonate coprecipitation leaving it in solution as the pertechnetate ion ( $\text{TcO}_4^-$ ). Further purification is achieved by an anion exchange column path, followed by liquid scintillation spectrometry.

4. Vegetation Samples

Gamma Energy Analysis--Gamma-emitting radionuclides in vegetation are measured by direct counting of the sample with a Ge(Li) detector equipped with a multichannel pulse height analyzer.

Westinghouse Hanford 222-S Analytical Laboratory

The Westinghouse Hanford 222-S Laboratory also provides analytical support to the 200/600 Area Environmental Surveillance Program. This laboratory is commonly utilized for emergency situations and for samples containing higher than normal environmental levels of radioactivity. Analytical procedures and quality control guides are described by the Environmental Measurements Laboratory (1972), the American Society for Testing and Materials (1976), the American Public Health Association (1980), and the U.S. Environmental Protection Agency (1979). A brief description of the routine analyses performed by the 222-S Laboratory is presented below.

1. Pond and Ditch Water

- a. Total Alpha and Beta--An aliquot of the pond or ditch water is added to a stainless steel dish and evaporated to dryness. The total alpha and beta activities are measured by direct counting with a gas flow proportional counter.
- b. Gamma Energy Analysis--The liquid sample is sealed inside a geometrically approved container. The gamma-emitting radionuclides are measured by direct counting with a Ge(Li) detector equipped with a multichannel analyzer.
- c. Strontium-90--The  $^{90}\text{Sr}$  is removed from the aqueous sample by precipitating the  $^{90}\text{Sr}$  out with barium carbonate. The strontium carbonate is purified by redissolving with nitric acid, precipitating as a nitrate, and finally precipitating once again as a carbonate. The  $^{90}\text{Sr}$  activity is determined by beta counting with a gas flow proportional counter.
- d. Plutonium--Actinides are removed from the aqueous sample by precipitation with iron. The precipitate is redissolved in hydrochloric acid and the plutonium separated from the other actinides by ion exchange. The plutonium is electrodeposited on a planchet and counted using alpha spectrometry.

2. Pond and Ditch Mud and Sediment

- a. Gamma Energy Analysis--The gamma-emitting radionuclides are measured by direct counting of the dried sediment sample using a Ge(Li) detector equipped with a multichannel analyzer.
- b. Soil Leach--Strontium, plutonium, americium, and other radionuclides are leached from the soil sample using a mixture of hydrochloric and nitric acids. The leachate is then analyzed for specific radionuclides as with the liquid samples.

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3. Pond and Ditch Vegetation

- a. Gamma Energy Analysis--The liquid sample is sealed inside a geometrically approved container. The gamma-emitting radionuclides are measured by direct counting with a Ge(Li) detector equipped with a multichannel analyzer.
- b. Vegetation Leach--The vegetation samples are dry ashed in a furnace and then leached with a mixture of hydrochloric and nitric acids. The leachate is analyzed for specific radionuclides as with the liquid samples.

Pacific Northwest Laboratory Radiation Standards and Engineering

External Radiation (Thermoluminescent Dosimeters)--External radiation levels are measured using TLDs. The TLDs are located at all grid sampling sites, water sampling sites, and active tank farms and cribs associated with the PUREX Plant operation. The TLDs (Harshaw TLD400) consist of three chips of calcium-fluoride/manganese encased in an opaque capsule lined with 0.025 cm of tantalum and 0.005 cm of lead. Details of the measurement of external radiation in the 200 Areas are provided in Conklin et al. (1982).

The TLDs are calibrated, packaged, and read by the PNL Radiation Calibration Laboratory, Radiation Standards and Engineering Department. All TLD work is performed in accordance with the procedures and specific guides from the American National Standards Institute (1975) and PNL (1978).

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**APPENDIX B**  
**GLOSSARY**

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**GLOSSARY**

ACL	administrative control limit
ALARA	as low as reasonably achievable
DCG	derived concentration guideline
DOE	U.S. Department of Energy
DWS	drinking water standard
EPA	U.S. Environmental Protection Agency
ICRP	International Commission on Radiological Protection
OEC	Operations and Engineering Contractor
PFP	Plutonium Finishing Plant
PNL	Battelle's Pacific Northwest Laboratories
PUREX	Plutonium Uranium Reduction Extraction (Plant)
QA	quality assurance
TLD	thermoluminescent dosimeter
UO <sub>3</sub>	Uranium Oxide (Plant)
UST	U.S. Testing Company, Inc.
WESF	Waste Encapsulation and Storage Facility
Westinghouse Hanford	Westinghouse Hanford Company

**Aquifer**--A subsurface formation consisting of sufficient saturated permeable material to yield significant quantities of water.

**Confined aquifer**--A subsurface water-bearing region having defined and relatively impermeable upper and lower boundaries.

**Unconfined aquifer**--An aquifer that has a water table or surface at atmospheric pressure.

**Biological transport**--Concerns one or more of the following processes:

- Movement of subsurface radioactivity to the surface by physiological plant processes
- Dispersion of such plants by the wind
- Contaminated urine and feces deposited by animals that have gained access to and ingested radioactivity
- Contaminated animals themselves that have ingested radioactivity directly or ingested other contaminated animals or plants
- Physical displacement of radioactivity by burrowing animals
- Nests built using contaminated materials.

**Background radiation**--Refers to regional levels of radioactivity produced by sources other than those of specific interest (e.g., the nuclear activities at the Hanford Site).

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**Biota**--The plant and animal life of a specific region.

**Burial ground**--An area specifically designated for the subsurface disposal and/or storage of solid, dry radioactive waste.

**Chemical processing**--Chemical treatment of material to selectively separate desired components. At the Hanford Site, plutonium, uranium, and fission products are chemically separated from irradiated fuels.

**Controlled area**--An area where access is controlled to protect individuals from extra exposure to radiation and radioactive materials.

**Crib**--A subsurface low-level liquid-waste disposal site that allows liquid waste to percolate into surrounding soil.

**Decommissioning**--The process of removing a facility or area from operation, often involving decontamination and/or disposal, plus incorporating appropriate controls and safeguards.

**Decontamination**--The removal of radioactivity from a surface or from within another material.

**Environmental surveillance**--A survey and sampling program designed to determine radiological impact due to site operations.

**Groundwater**--Water that exists below ground surface (i.e., within the zone of saturation).

**Less than detectable**--An analytical term for a radionuclide concentration in a sample that is lower than the minimum detection capabilities of that analytical equipment or process.

**Operations**--In this report this term loosely refers to Westinghouse Hanford activities including chemical processing, waste management, and decommissioning.

**Percolation**--Downward movement of water through the interstices of unsaturated rock or soil due to gravity or hydrostatic pressure.

**PUREX**--Plutonium Uranium Extraction (Plant).

**Quality assurance**--A program designed to maintain the quality of the results of a program within established limits of acceptance.

**Radiation survey**--Evaluation of an area or object with portable instruments to identify radioactive materials and radiation fields present.

**Radiological Control Area**--An area where access is controlled to protect individuals from exposure to radiation and/or radioactive materials. In the Separations Area, control areas include, but are not limited to, areas posted as Radiation Area, Surface Contamination, and Underground Radioactive Materials--all describing the radiological condition of the area within.

**Radiological posting**--Barriers in the form of signs and chains to prevent access into a radiological control area.

**Release from radiological posting**--Removal of signs and chain when access to an area no longer needs to be restricted for radiological protection purposes.

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**Release from radiological posting**--Removal of signs and chain when access to an area no longer needs to be restricted for radiological protection purposes.

**Retired waste site**--A waste site that is isolated and no longer available to receive waste in any form.

**Separations Area**--The primary area in the Hanford Site where chemical processing and most waste management activities are performed. It includes the 200 Areas and nearby 600 Area sites. Westinghouse Hanford is landlord of the Separations Area.

**Surface contamination**--A radiological control status that refers to radioactivity on the surface of the ground that exceeds the Soil Contamination Standard.

**Surface stabilization**--A remedial action program on waste disposal sites that includes the addition of at least 4 ft of clean soil followed by revegetation. It is designed to cover surface contamination and inhibit biological transport.

**Tank Farm**--An area of large underground tanks designed to store up to 1 million gal each of high-level liquid waste.

**Underground Radioactive Material**--A radiological posting status where subsurface radioactivity is present, but where surface contamination is not in excess of the Soil Standards.

**Unplanned Release Site**--An area that was contaminated due to an unplanned release of radioactive contamination from a nearby source, making it a radiological control area.

**Vadose zone**--The unsaturated region of soil or the zone of aeration between the ground surface and the water table.

**Thermoluminescent dosimeter**--A chip or series of chips used for measuring external gamma radiation. It consists of a material capable of absorbing energy imparted by ionizing radiation, then emitting light as a result of thermal stimulation. A measure of that light is proportional to the radioactivity absorbed.

**Waste Management**--The activity involved with storing, disposing, shipping, handling, and monitoring all radioactive waste.

**Water table**--The upper boundary of an unconfined aquifer below which saturated groundwater occurs.

**Wind rose**--A diagram illustrating the distribution of wind directions at a given location during a specific time. It illustrates the direction the wind blows from.

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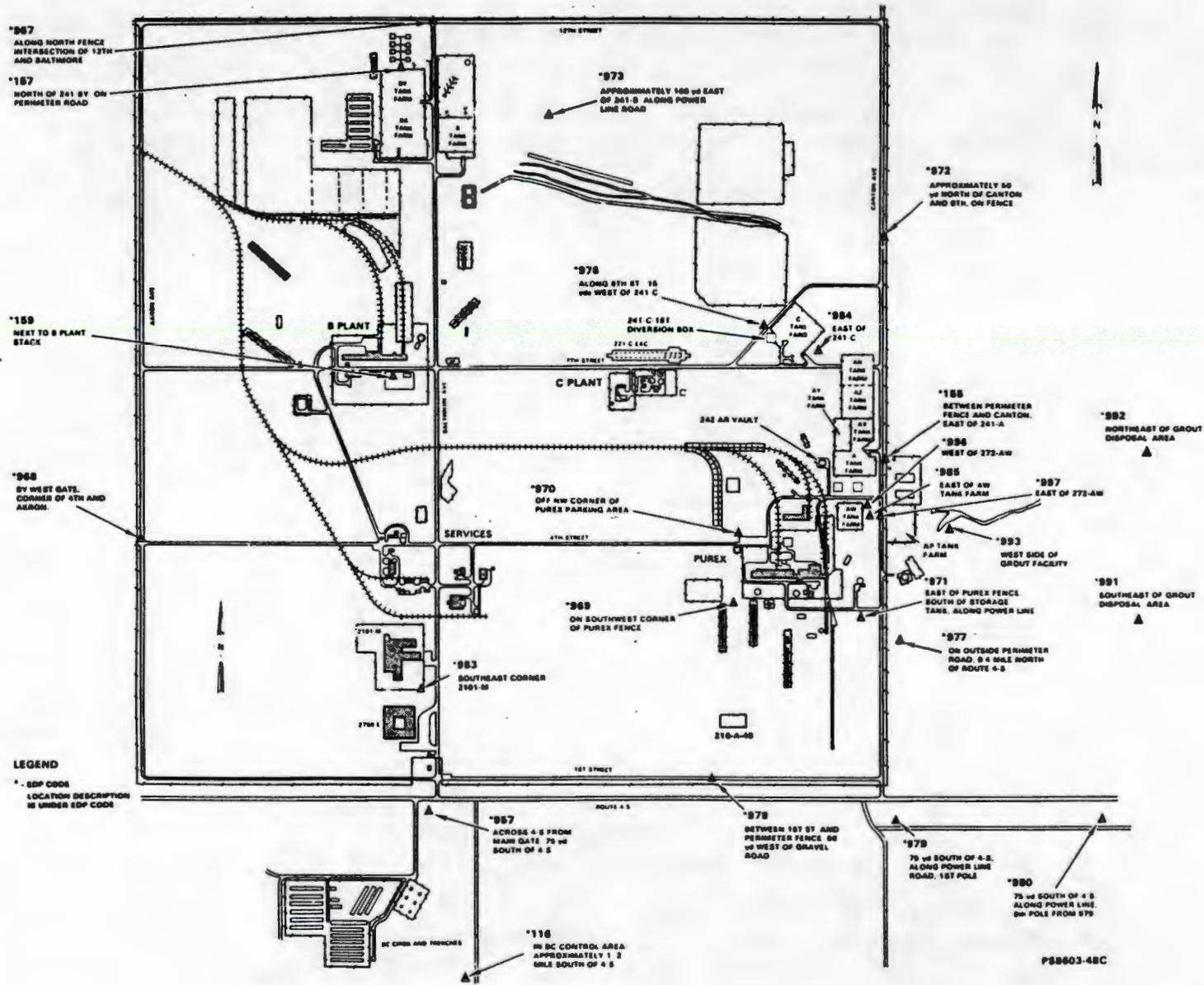
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**APPENDIX C**  
**AMBIENT AIR MONITORING FIGURES AND TABLES**

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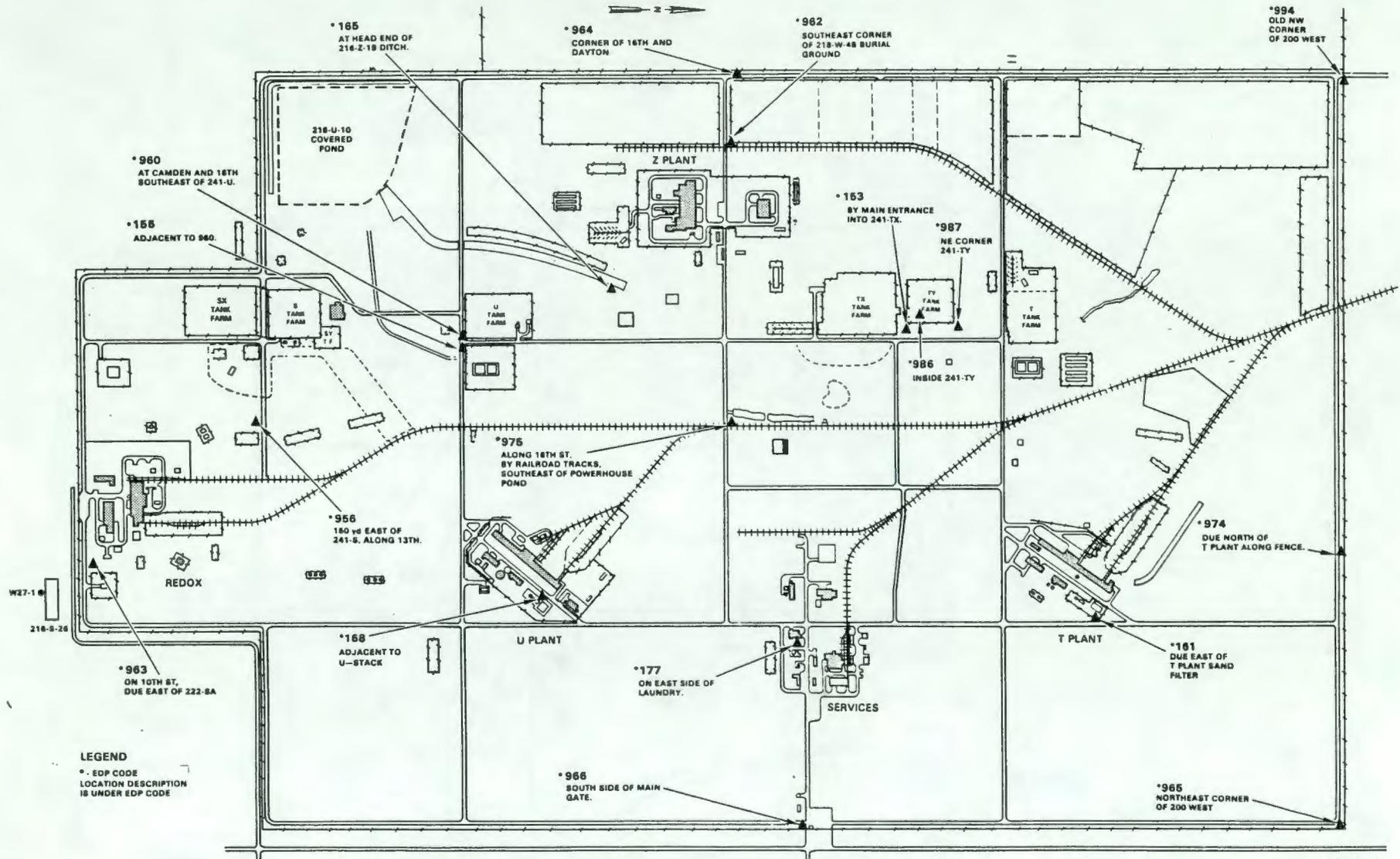


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Figure C-1. The 200 East Area Showing Locations of Air Samplers.

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Figure C-2. The 200 West Area Showing Locations of Air Samplers.

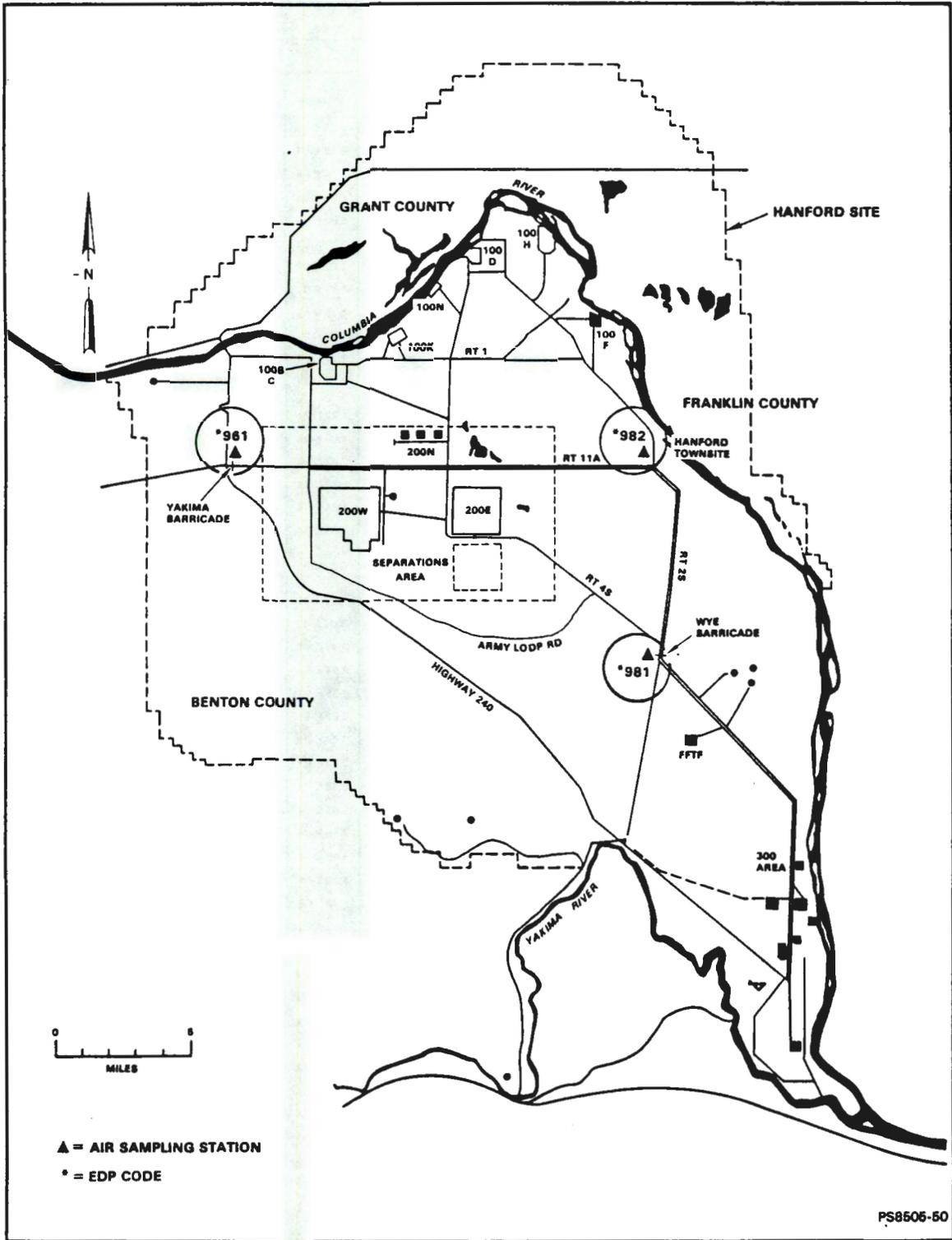


Figure C-3. Westinghouse Hanford Company Air Sampling Stations Away from the Separations Area.

Table C-1. Air Sampling Results for 1987 (pCi/m<sup>3</sup>). (Sheet 1 of 2)

Map location	Site	Quarters sampled	<sup>90</sup> Sr			<sup>137</sup> Cs		
			Quarter maximum	Quarter minimum	Annual Average ± 2SD*	Quarter maximum	Quarter minimum	Annual Average ± 2SD*
N116	N of BC Criba	1, 2, 3, 4	4.42 E-04	2.73 E-04	3.33 E-04 ± 1.52 E-04	2.35 E-04	-1.59 E-04	8.00 E-06 ± 3.97 E-04
N153	241-TX Tank Farm	1, 2, 3, 4	3.36 E-04	1.92 E-04	2.47 E-04 ± 1.35 E-04	9.42 E-03	2.87 E-03	5.34 E-03 ± 5.69 E-03
N155	241-U Tank Farm	1, 2, 3, 4	1.50 E-04	-1.13 E-05	6.46 E-05 ± 1.38 E-04	7.79 E-04	-2.34 E-04	3.14 E-04 ± 8.35 E-04
N960	Replicate to site N155	1, 2, 3, 4	1.53 E-04	-3.94 E-06	8.39 E-05 ± 1.50 E-04	6.63 E-04	-2.04 E-04	3.47 E-04 ± 8.06 E-04
N157	241-BY Tank Farm	1, 2, 3, 4	2.45 E-04	4.06 E-05	1.35 E-04 ± 1.79 E-04	5.00 E-03	2.75 E-03	3.61 E-03 ± 2.00 E-03
N158	241-AX Tank Farm	1, 2, 3, 4	5.44 E-04	1.49 E-04	3.55 E-04 ± 3.44 E-04	3.16 E-03	2.81 E-04	1.64 E-03 ± 2.36 E-03
N159	H Plant	1, 2, 3, 4	3.85 E-04	3.70 E-05	1.46 E-04 ± 3.26 E-04	2.62 E-02	9.69 E-04	7.60 E-03 ± 2.48 E-02
N161	T Plant	1, 2, 3, 4	5.75 E-05	3.95 E-05	4.63 E-05 ± 1.71 E-05	5.47 E-04	-6.02 E-05	2.75 E-04 ± 5.77 E-04
N165	216-Z-19 Ditch (covered)	1, 2, 3, 4	7.34 E-05	-1.88 E-05	3.53 E-05 ± 9.15 E-05	1.10 E-03	-2.98 E-04	3.45 E-04 ± 1.39 E-03
N168	U Plant	1, 2, 3, 4	1.27 E-04	1.31 E-05	5.75 E-05 ± 9.75 E-05	1.29 E-03	-1.00 E-04	3.48 E-04 ± 1.31 E-03
N177	Laundry	1, 2, 3, 4	2.22 E-04	7.65 E-05	1.49 E-04 ± 1.51 E-04	7.24 E-04	1.58 E-04	3.90 E-04 ± 5.27 E-04
N956	E of 241-S and -SX Tank Farm	1, 2, 3, 4	2.03 E-04	9.74 E-05	1.40 E-04 ± 9.61 E-05	2.58 E-03	-4.02 E-04	1.46 E-03 ± 2.58 E-03
N957	BC Criba 1	1, 2, 3, 4	3.17 E-04	3.96 E-05	1.21 E-04 ± 2.64 E-04	4.22 E-04	0.00 E+00	1.77 E-04 ± 4.02 E-04
N962	SE corner W-4B	1, 2, 3, 4	1.06 E-02	-1.82 E-04	3.57 E-03 ± 9.71 E-03	1.00 E-03	4.58 E-04	7.33 E-04 ± 5.05 E-04
N963	SE of REDOX	1, 2, 3, 4	1.07 E-04	9.31 E-06	5.99 E-05 ± 8.30 E-05	2.37 E-04	-4.12 E-04	-1.15 E-04 ± 5.70 E-04
N964	W of W-4B	1, 2, 3, 4	1.77 E-04	1.06 E-05	7.43 E-05 ± 1.45 E-04	5.88 E-04	0.00 E+00	2.04 E-04 ± 5.55 E-04
N965	NE corner 200 West Area	1, 2, 3, 4	7.06 E-05	2.92 E-05	4.48 E-05 ± 3.89 E-05	5.34 E-04	-4.35 E-04	-2.24 E-05 ± 8.08 E-04
N966	S of 200 West Area Main Gate	1, 2, 3, 4	3.96 E-04	-9.10 E-06	1.41 E-04 ± 3.52 E-04	7.06 E-04	-3.43 E-04	9.92 E-05 ± 8.93 E-04
N967	N of 241-B and -BY Tank Farm	1, 2, 3, 4	1.10 E-04	2.14 E-05	5.96 E-05 ± 8.57 E-05	9.25 E-04	2.64 E-04	5.34 E-04 ± 5.59 E-04
N968	W gate 200 East Area	1, 2, 3, 4	9.28 E-05	1.14 E-05	6.53 E-05 ± 7.48 E-05	5.02 E-04	1.83 E-04	3.49 E-04 ± 2.74 E-04
N969	SW of PUREX Plant	1, 2, 3, 4	2.73 E-04	1.28 E-05	9.22 E-05 ± 2.45 E-04	-5.06 E-05	-4.33 E-04	2.56 E-04 ± 3.31 E-04
N970	NW of PUREX Plant	1, 2, 3, 4	2.80 E-04	-2.26 E-05	8.76 E-05 ± 2.74 E-04	3.82 E-04	0.00 E+00	1.60 E-04 ± 3.41 E-04
N971	SE of PUREX Plant	1, 2, 3, 4	4.20 E-04	2.30 E-05	1.35 E-04 ± 3.82 E-04	6.94 E-04	2.35 E-04	5.43 E-04 ± 4.16 E-04
N972	NE of 241-C Tank Farm	1, 2, 3, 4	2.72 E-04	1.39 E-04	1.91 E-04 ± 1.19 E-04	1.08 E-03	1.34 E-04	5.61 E-04 ± 7.82 E-04
N973	E of T Tank Farm	1, 2, 3, 4	1.99 E-04	7.89 E-05	1.37 E-04 ± 1.02 E-04	2.09 E-03	2.56 E-04	9.92 E-04 ± 1.57 E-03
N974	N of T Plant	1, 2, 3, 4	1.17 E-04	1.14 E-05	3.75 E-05 ± 1.20 E-04	3.00 E-04	-2.80 E-04	1.55 E-04 ± 2.92 E-04
N975	E of Z Plant	1, 2, 3, 4	1.14 E-04	3.27 E-05	7.81 E-05 ± 6.81 E-05	2.35 E-04	1.34 E-04	1.91 E-04 ± 1.02 E-04
N976	2E17, 241-C Tank Farm	1, 2, 3, 4	2.98 E-04	1.46 E-04	2.51 E-04 ± 1.41 E-04	5.54 E-04	2.06 E-04	4.07 E-04 ± 3.02 E-04
N977	Grid Site 2E30	1, 2, 3, 4	2.90 E-04	3.62 E-05	1.23 E-04 ± 2.28 E-04	7.03 E-04	3.91 E-04	5.51 E-04 ± 2.57 E-04
N978	Grid Site 2E35	1, 2, 3, 4	1.97 E-04	-2.73 E-05	7.97 E-05 ± 2.04 E-04	5.88 E-04	-5.28 E-05	2.65 E-04 ± 5.58 E-04
N979	Grid Site 2E36	1, 2, 3, 4	8.12 E-04	7.06 E-05	2.87 E-04 ± 7.07 E-04	4.48 E-04	-3.01 E-05	2.41 E-04 ± 3.98 E-04
N980	Grid Site 2EA	1, 2, 3, 4	9.50 E-05	2.59 E-05	7.34 E-05 ± 6.50 E-05	5.29 E-04	-2.19 E-04	1.23 E-04 ± 6.25 E-04
N983	SE of 2101-M	1, 2, 3, 4	5.51 E-05	6.53 E-06	2.78 E-05 ± 4.29 E-05	8.82 E-05	-3.68 E-04	4.19 E-05 ± 4.39 E-04
N984	SE 241-C Tank Farm	1, 2, 3, 4	7.88 E-03	1.18 E-04	2.11 E-03 ± 7.70 E-03	3.12 E-03	4.48 E-04	1.58 E-03 ± 2.23 E-03
N985	E of 241-AW Tank Farm	1, 2, 3, 4	5.48 E-04	1.43 E-04	3.19 E-04 ± 3.43 E-04	4.08 E-04	3.02 E-04	6.85 E-05 ± 7.43 E-04
N986	241-TY Tank Farm SE	1, 2, 3, 4	2.15 E-04	-2.66 E-05	8.38 E-05 ± 2.00 E-04	1.15 E-03	0.00 E+00	5.87 E-04 ± 9.45 E-04
N987	241-TY Tank Farm NE	1, 2, 3, 4	1.05 E-04	4.32 E-05	7.85 E-05 ± 5.52 E-05	7.11 E-04	-1.85 E-04	1.62 E-04 ± 8.37 E-04
N991	Grout SE	1, 2, 3, 4	1.05 E-04	8.84 E-06	5.31 E-05 ± 9.64 E-05	4.58 E-04	-1.13 E-05	2.55 E-04 ± 3.91 E-04
N992	Grout NE	1, 2, 3, 4	1.33 E-04	3.79 E-05	8.52 E-05 ± 8.78 E-05	8.88 E-04	-7.54 E-04	1.87 E-04 ± 1.64 E-03
N993	Grout NW	1, 2, 3, 4	1.66 E-04	4.28 E-05	1.02 E-04 ± 1.19 E-04	1.28 E-03	-4.92 E-05	8.65 E-04 ± 1.23 E-03
N994	Old NW Corner 200 Wes.	1, 2, 3, 4	8.61 E-05	-7.60 E-06	4.33 E-05 ± 8.64 E-05	5.52 E-05	-6.29 E-04	-2.95 E-04 ± 6.35 E-04
N996	W Air Intake 272-AW	1, 2, 3, 4	8.43 E-04	1.89 E-05	2.72 E-04 ± 7.67 E-04	4.64 E-04	-3.25 E-04	9.02 E-05 ± 8.03 E-04
N997	E Air Intake 272-AW	1, 2, 3, 4	7.17 E-04	4.77 E-05	2.51 E-04 ± 6.25 E-04	1.23 E-03	-2.64 E-04	3.31 E-04 ± 1.30 E-03
N961	Yakima Barricade	1, 2, 3, 4	7.43 E-05	4.16 E-05	5.62 E-05 ± 3.00 E-05	3.45 E-04	-4.89 E-04	3.90 E-05 ± 7.05 E-04
N981	Wye Barricade	1, 2, 3, 4	7.21 E-05	2.19 E-05	4.20 E-05 ± 4.89 E-05	1.78 E-04	-1.58 E-04	2.93 E-05 ± 3.23 E-04
N982	Hanford Townsite	1, 2, 3, 4	1.14 E-04	5.94 E-05	8.66 E-05 ± 5.49 E-05	5.88 E-04	-1.81 E-04	2.00 E-04 ± 8.27 E-04
N950	Quality Assurance Blank	1, 2, 3, 4	2.02 E-04	3.42 E-06	7.41 E-05 ± 1.76 E-04	6.87 E-04	-7.64 E-05	2.08 E-04 ± 7.18 E-04
N951	Quality Assurance Blank	1, 2, 3, 4	6.13 E-05	-4.57 E-06	2.66 E-05 ± 5.70 E-05	3.02 E-04	-2.10 E-04	-6.05 E-05 ± 4.86 E-04
	Derived concentration guides <sup>b</sup>				9.00 E+00			4.00 E+02

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Table C-1. Air Sampling Results for 1987 (pCi/m<sup>3</sup>). (Sheet 2 of 2)

Map location	Site	Quarters sampled	<sup>239</sup> Pu			Uranium (total)		
			Quarter maximum	Quarter minimum	Annual Average ± 2SD <sup>a</sup>	Quarter maximum	Quarter minimum	Annual Average ± 2SD <sup>a</sup>
N116	N of BC Cribs	1, 2, 3, 4	5.75 E-06	5.96 E-08	2.27 E-06 ± 4.93 E-06	2.06 E-06	4.25 E-06	1.36 E-05 ± 1.37 E-05
N153	241-TX Tank Farm	1, 2, 3, 4	8.28 E-05	3.80 E-06	3.72 E-05 ± 6.66 E-05	4.65 E-06	1.54 E-05	3.00 E-05 ± 3.01 E-05
N155	241-U Tank Farm	1, 2, 3, 4	3.60 E-05	1.48 E-05	2.40 E-05 ± 2.09 E-05	3.45 E-05	2.04 E-05	2.74 E-05 ± 1.39 E-05
N960	Replicate to site N155	1, 2, 3, 4	7.06 E-05	1.59 E-05	3.77 E-05 ± 4.82 E-05	4.02 E-05	1.02 E-05	2.59 E-05 ± 2.89 E-05
N157	241-BY Tank Farm	1, 2, 3, 4	1.38 E-05	1.07 E-06	7.72 E-06 ± 1.05 E-05	2.52 E-05	2.07 E-06	1.36 E-05 ± 2.02 E-05
N158	241-AX Tank Farm	1, 2, 3, 4	1.21 E-05	3.56 E-06	6.56 E-06 ± 7.66 E-06	3.50 E-05	1.94 E-05	2.63 E-06 ± 1.31 E-05
N159	B Plant	1, 2, 3, 4	4.00 E-05	3.10 E-06	1.89 E-05 ± 3.53 E-05	1.47 E-05	2.13 E-08	9.11 E-06 ± 1.32 E-05
N161	T Plant	1, 2, 3, 4	2.67 E-05	9.73 E-06	1.63 E-05 ± 1.45 E-05	1.88 E-05	2.54 E-06	1.00 E-05 ± 1.57 E-05
N165	216-Z-19 Ditch (covered)	1, 2, 3, 4	3.41 E-04	6.49 E-05	1.98 E-04 ± 2.96 E-04	3.20 E-05	9.05 E-06	1.86 E-05 ± 1.93 E-05
N168	U Plant	1, 2, 3, 4	2.67 E-05	6.25 E-06	1.42 E-05 ± 1.88 E-05	3.25 E-04	8.64 E-05	1.70 E-04 ± 2.15 E-04
N177	Laundry	1, 2, 3, 4	6.48 E-05	1.22 E-06	3.08 E-05 ± 5.29 E-05	9.80 E-05	6.35 E-05	7.83 E-05 ± 3.21 E-05
N956	E of 241-Sand SX Tank Farm	1, 2, 3, 4	8.77 E-06	3.12 E-06	5.29 E-06 ± 4.95 E-06	2.47 E-05	1.38 E-06	1.05 E-05 ± 2.51 E-05
N957	BC Cribs 1	1, 2, 3, 4	3.31 E-06	1.10 E-06	2.03 E-06 ± 1.85 E-06	3.18 E-05	9.49 E-06	1.85 E-05 ± 1.93 E-05
N962	SE corner W-4B	1, 2, 3, 4	1.24 E-04	3.02 E-05	6.75 E-05 ± 8.04 E-05	5.40 E-05	1.57 E-05	2.90 E-05 ± 3.47 E-05
N963	SE of REDOX	1, 2, 3, 4	3.82 E-05	6.38 E-06	2.01 E-05 ± 2.83 E-05	4.93 E-05	1.67 E-06	3.33 E-05 ± 4.43 E-05
N964	W of W-4B	1, 2, 3, 4	1.08 E-04	4.95 E-06	4.10 E-05 ± 9.44 E-05	3.60 E-05	1.02 E-05	2.35 E-05 ± 2.22 E-05
N965	NE corner 200 West Area	1, 2, 3, 4	8.39 E-06	2.20 E-06	4.33 E-06 ± 5.77 E-06	1.84 E-05	2.72 E-06	6.44 E-06 ± 1.91 E-05
N966	S of 200 West Area Main Gate	1, 2, 3, 4	1.04 E-05	7.13 E-06	8.93 E-06 ± 3.34 E-06	4.03 E-05	6.96 E-06	2.22 E-05 ± 2.90 E-05
N967	N of 241-B and -BY Tank Farm	1, 2, 3, 4	6.68 E-06	1.12 E-06	4.55 E-06 ± 4.95 E-06	4.87 E-05	3.50 E-06	1.75 E-05 ± 4.51 E-05
N968	W gate 200 East Area	1, 2, 3, 4	3.12 E-05	5.31 E-07	1.69 E-05 ± 2.93 E-05	4.99 E-05	2.03 E-05	3.21 E-05 ± 2.62 E-05
N969	SW of PUREX Plant	1, 2, 3, 4	9.10 E-06	6.29 E-07	4.82 E-06 ± 7.19 E-06	3.69 E-05	4.37 E-06	2.47 E-05 ± 2.86 E-05
N970	NW of PUREX Plant	1, 2, 3, 4	1.25 E-05	3.04 E-06	7.70 E-06 ± 8.88 E-06	4.08 E-05	1.07 E-05	2.28 E-05 ± 2.72 E-05
N971	SE of PUREX Plant	1, 2, 3, 4	1.35 E-05	3.57 E-06	6.54 E-06 ± 9.45 E-06	3.02 E-05	1.03 E-05	2.01 E-05 ± 1.66 E-05
N972	NE of 241-C Tank Farm	1, 2, 3, 4	5.15 E-06	3.89 E-06	4.57 E-06 ± 1.05 E-06	9.11 E-05	2.97 E-05	5.81 E-05 ± 6.29 E-05
N973	E of B Tank Farm	1, 2, 3, 4	1.01 E-05	5.86 E-07	4.81 E-06 ± 9.77 E-06	3.48 E-05	1.38 E-06	1.74 E-05 ± 2.74 E-05
N974	N of T Plant	1, 2, 3, 4	2.66 E-06	1.23 E-06	1.03 E-06 ± 3.27 E-06	1.08 E-05	2.60 E-06	4.87 E-06 ± 1.16 E-05
N975	E of Z Plant	1, 2, 3, 4	2.10 E-05	9.06 E-06	1.30 E-05 ± 1.11 E-05	4.18 E-05	2.17 E-05	3.08 E-05 ± 1.90 E-05
N976	2E17, 241-C Tank Farm	1, 2, 3, 4	6.83 E-06	1.90 E-06	3.88 E-06 ± 4.21 E-06	6.01 E-05	1.65 E-05	3.39 E-05 ± 3.71 E-05
N977	Grid Site 2E30	1, 2, 3, 4	7.66 E-06	5.31 E-07	3.56 E-06 ± 7.39 E-06	4.27 E-05	1.03 E-05	2.41 E-05 ± 2.95 E-05
N978	Grid Site 2E35	1, 2, 3, 4	3.80 E-06	5.31 E-07	1.38 E-06 ± 3.59 E-06	3.53 E-05	5.48 E-06	1.87 E-05 ± 2.47 E-05
N979	Grid Site 2E36	1, 2, 3, 4	3.81 E-06	5.31 E-07	2.18 E-06 ± 4.03 E-06	2.72 E-05	1.25 E-05	1.83 E-05 ± 1.25 E-05
N980	Grid Site 2EA	1, 2, 3, 4	4.99 E-06	5.31 E-07	1.89 E-06 ± 4.63 E-06	3.00 E-05	7.14 E-06	1.59 E-05 ± 2.09 E-05
N983	SE of 2101-M	1, 2, 3, 4	4.56 E-06	5.31 E-07	1.46 E-06 ± 4.35 E-06	2.62 E-06	3.46 E-06	1.54 E-06 ± 1.92 E-05
N984	SE 241-C Tank Farm	1, 2, 3, 4	3.43 E-06	6.76 E-07	2.12 E-06 ± 2.44 E-06	1.51 E-05	6.76 E-06	1.11 E-05 ± 7.09 E-06
N985	E of 241-AW Tank Farm	1, 2, 3, 4	5.25 E-06	9.41 E-07	3.15 E-06 ± 3.63 E-06	3.14 E-05	1.34 E-05	2.32 E-05 ± 1.48 E-05
N986	241-TY Tank Farm SE	1, 2, 3, 4	9.03 E-05	7.24 E-06	4.40 E-05 ± 6.88 E-05	2.11 E-05	1.09 E-06	1.19 E-06 ± 1.97 E-05
N987	241-TY Tank Farm NE	1, 2, 3, 4	2.34 E-05	5.31 E-07	7.00 E-06 ± 2.24 E-05	1.94 E-05	1.88 E-06	1.16 E-05 ± 1.54 E-05
N991	Grout SE	1, 2, 3, 4	3.64 E-06	4.66 E-08	1.62 E-06 ± 3.02 E-06	2.84 E-05	1.23 E-06	1.35 E-05 ± 2.24 E-05
N992	Grout NE	1, 2, 3, 4	3.65 E-06	7.38 E-07	2.10 E-06 ± 2.64 E-06	2.06 E-05	1.77 E-05	8.62 E-06 ± 3.57 E-05
N993	Grout NW	1, 2, 3, 4	7.48 E-06	3.05 E-06	5.48 E-06 ± 4.53 E-06	1.42 E-04	2.46 E-05	6.05 E-05 ± 1.10 E-04
N994	Old NW Corner 200 West	1, 2, 3, 4	5.31 E-06	2.17 E-07	3.03 E-06 ± 4.23 E-06	2.04 E-05	8.65 E-06	1.57 E-05 ± 1.00 E-05
N996	W Air Intake 272-AW	1, 2, 3, 4	1.95 E-05	1.98 E-06	7.26 E-06 ± 1.66 E-05	7.40 E-05	2.45 E-05	4.14 E-05 ± 4.58 E-05
N997	E Air Intake 272-AW	1, 2, 3, 4	3.70 E-05	1.44 E-06	1.47 E-05 ± 3.22 E-05	2.51 E-05	2.04 E-06	1.31 E-05 ± 2.10 E-05
N961	Yakima Barricade	1, 2, 3, 4	2.81 E-05	3.00 E-07	8.46 E-06 ± 2.63 E-05	1.62 E-05	5.35 E-07	7.18 E-06 ± 1.38 E-06
N981	Wye Barricade	1, 2, 3, 4	3.11 E-06	5.31 E-08	8.64 E-07 ± 3.00 E-06	1.54 E-05	7.84 E-07	6.56 E-06 ± 1.49 E-05
N982	Hanford Townsite	1, 2, 3, 4	3.12 E-06	2.45 E-08	1.37 E-06 ± 2.57 E-06	3.40 E-05	4.33 E-06	1.44 E-05 ± 2.69 E-05
N950	Quality Assurance Blank	1, 2, 3, 4	6.71 E-06	5.31 E-07	2.24 E-06 ± 6.44 E-06	9.25 E-06	1.50 E-05	2.45 E-06 ± 1.99 E-05
N951	Quality Assurance Blank	1, 2, 3, 4	2.24 E-06	5.31 E-07	6.96 E-07 ± 2.30 E-06	7.28 E-06	1.45 E-05	3.42 E-06 ± 1.79 E-05
	Derived concentration guides <sup>b</sup>				2.00 E-02			3.00 E+00

<sup>a</sup>Standard deviation of the mean of quarterly composites. Does not reflect analytical error.

<sup>b</sup>Boothe 1987.

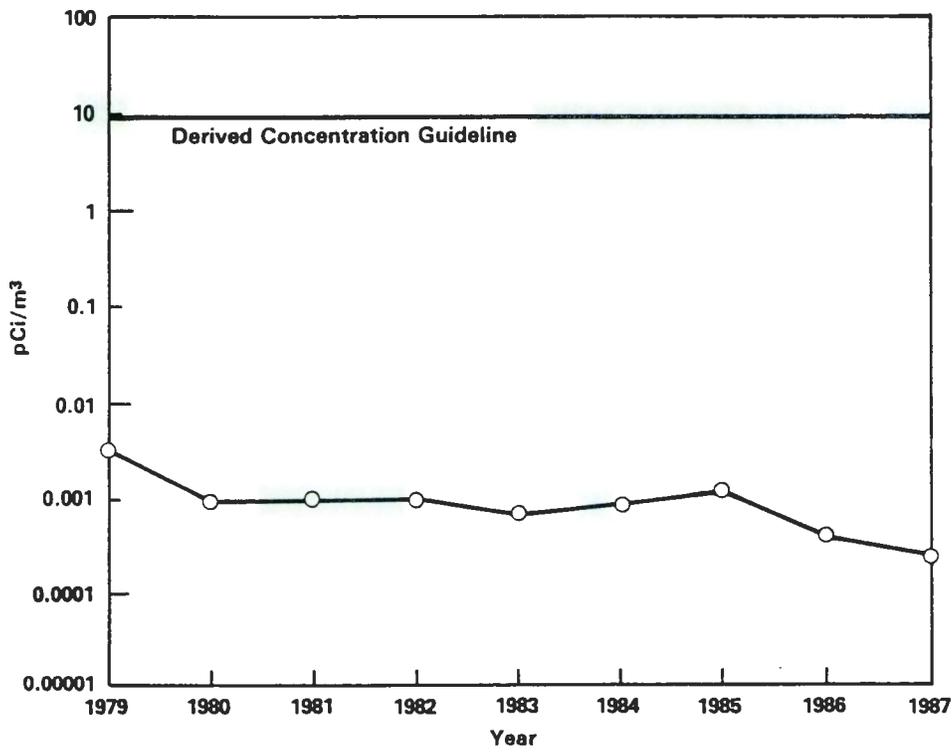


Figure C-4. The <sup>90</sup>Sr in the Air, 200 East Area.

28803-050.8

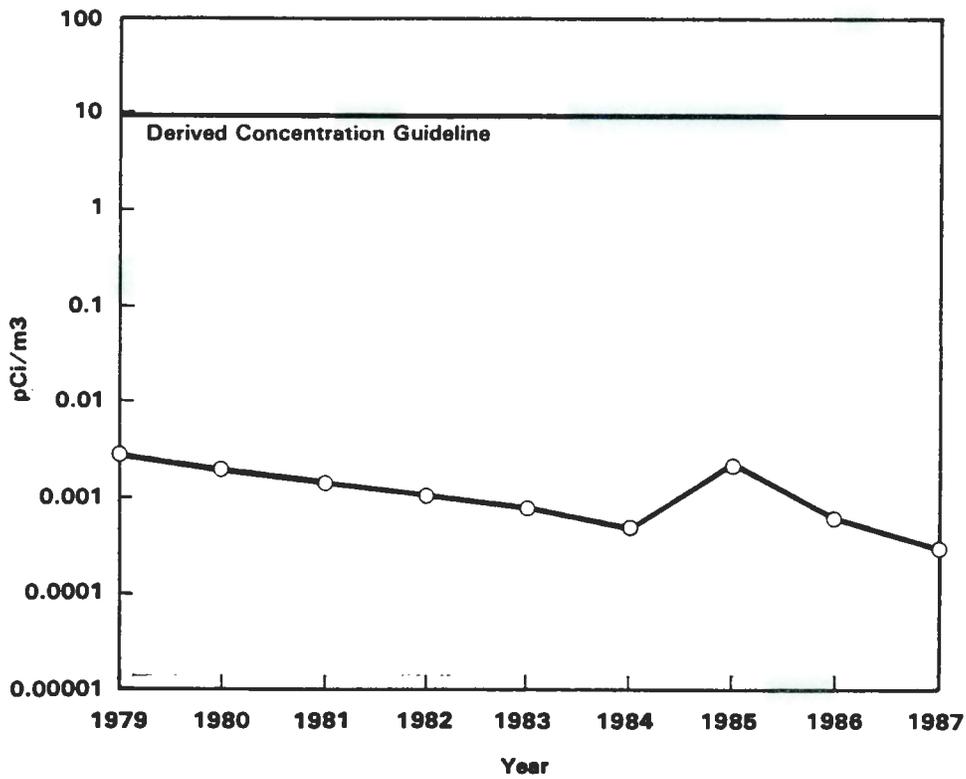
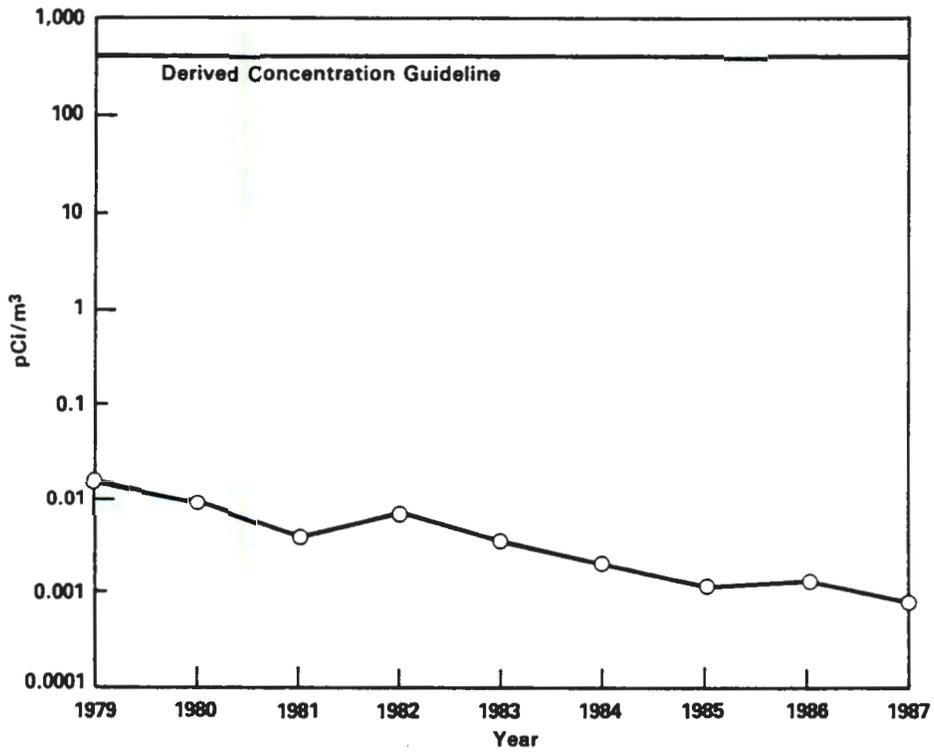


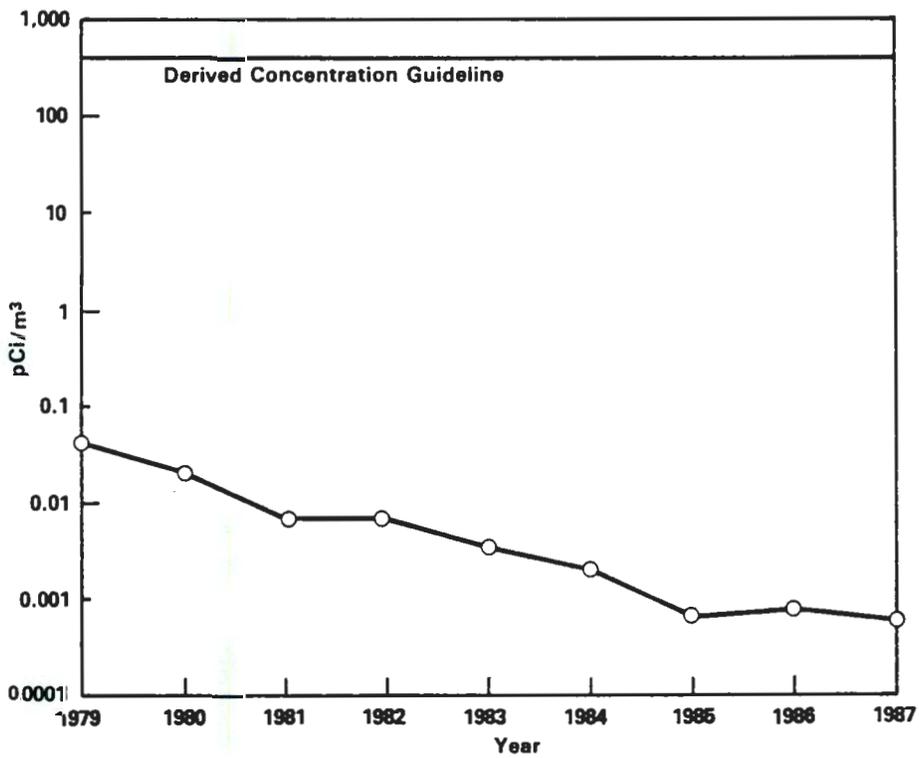
Figure C-5. The <sup>90</sup>Sr in the Air, 200 West Area.

9 2 1 0 5 2 5 1 3



28803-050.3

Figure C-6. The <sup>137</sup>Cs in the Air, 200 East Area.



28803-050.4

Figure C-7. The <sup>137</sup>Cs in the Air, 200 West Area.

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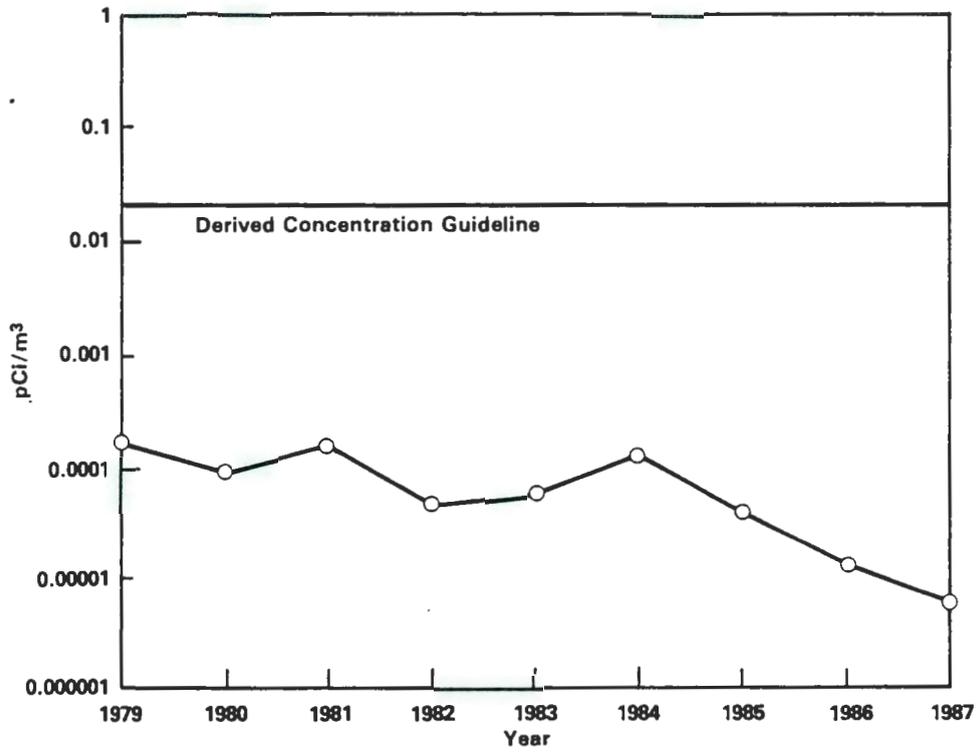


Figure C-8. The <sup>239</sup>Pu in the Air, 200 East Area. 28803-050.5

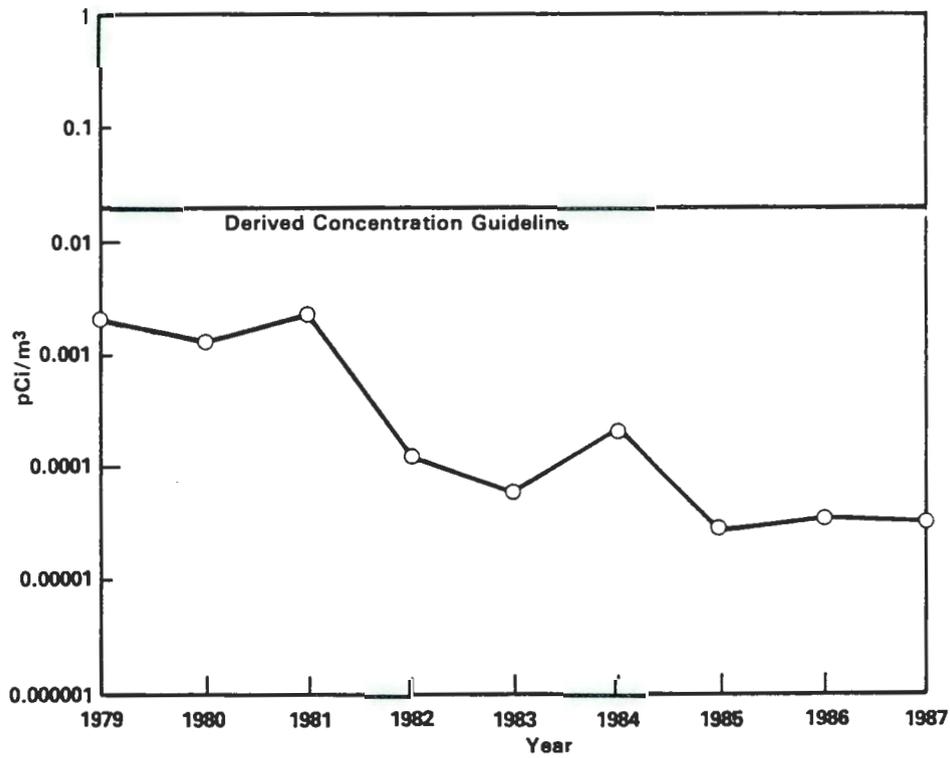
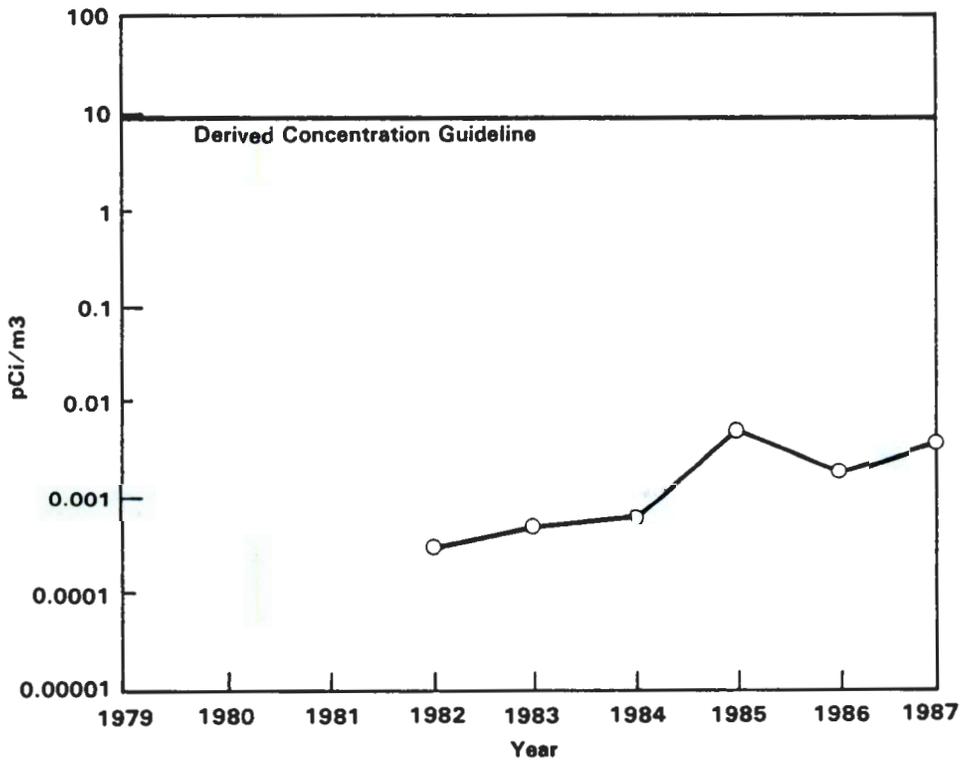


Figure C-9. The <sup>239</sup>Pu in the Air, 200 West Area. 28803-050.6

9213 02 05 15



28803-060.7

Figure C-10. The <sup>90</sup>Sr in Air at Station N962, 200 West Area.

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**APPENDIX D**  
**GROUNDWATER MONITORING FIGURES AND TABLES**

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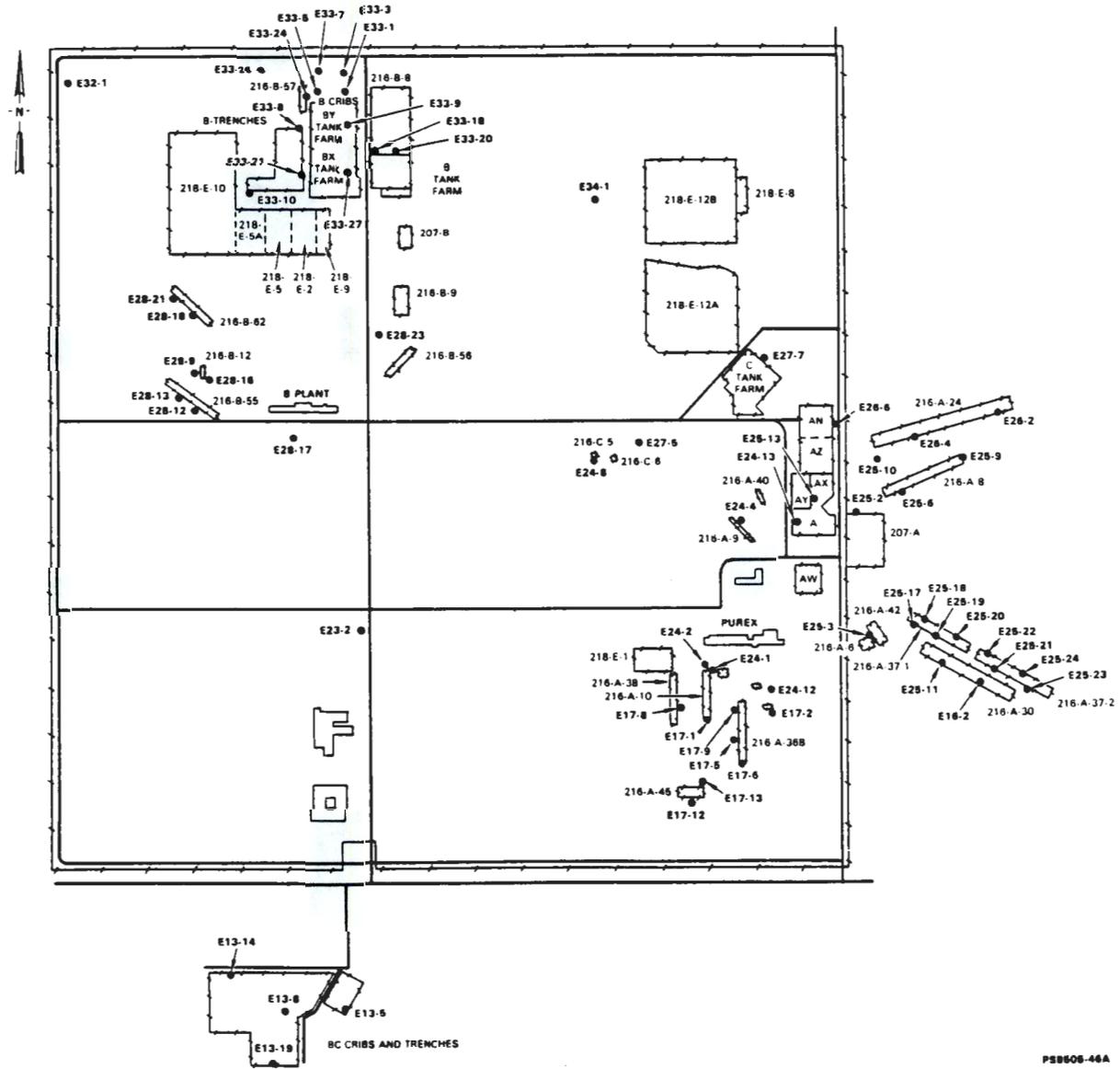
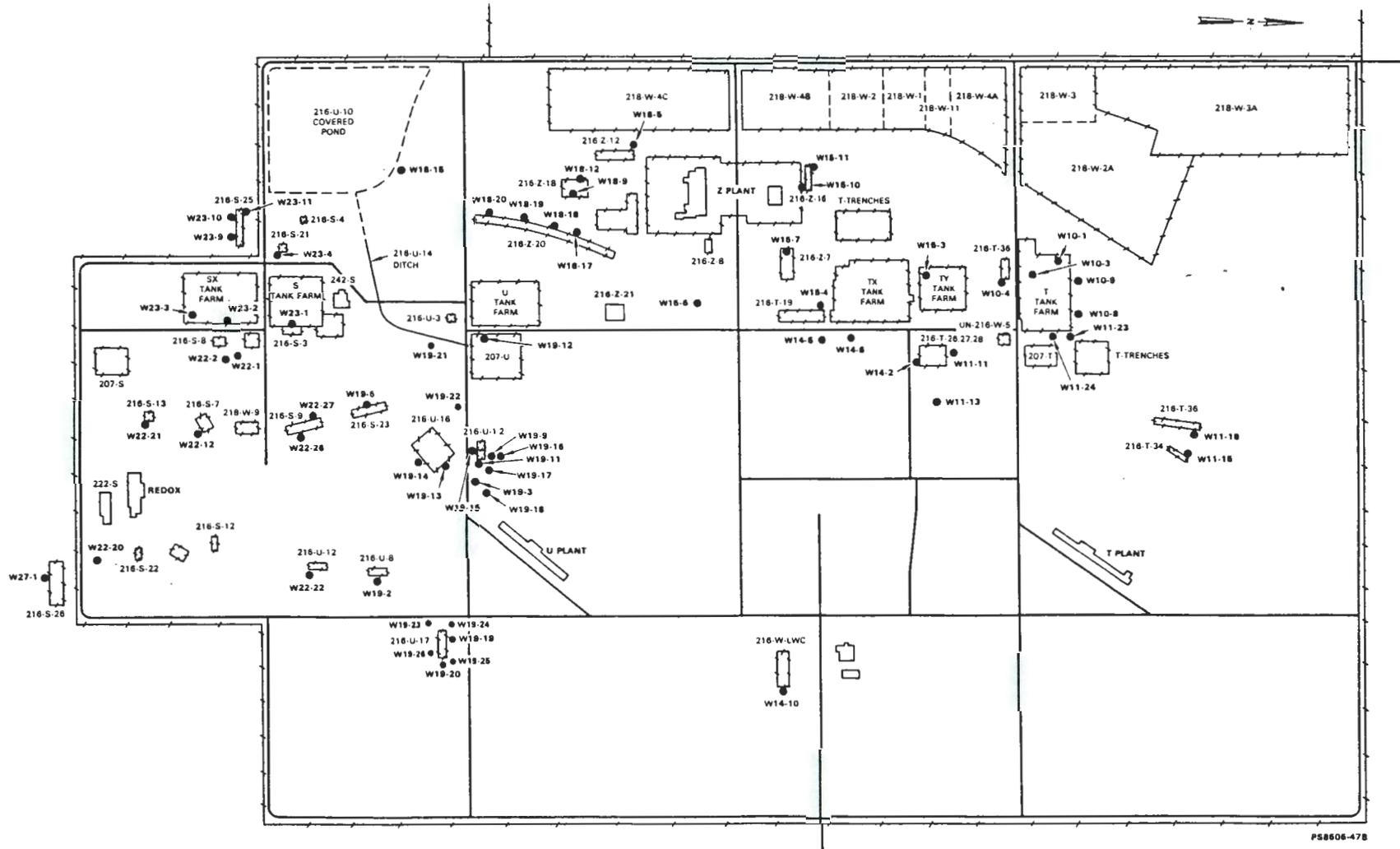


Figure D-1. Groundwater Monitoring Wells in the 200 East Area.

D-4



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PS8606-478

Figure D-2. Groundwater Monitoring Wells in the 200 West Area.

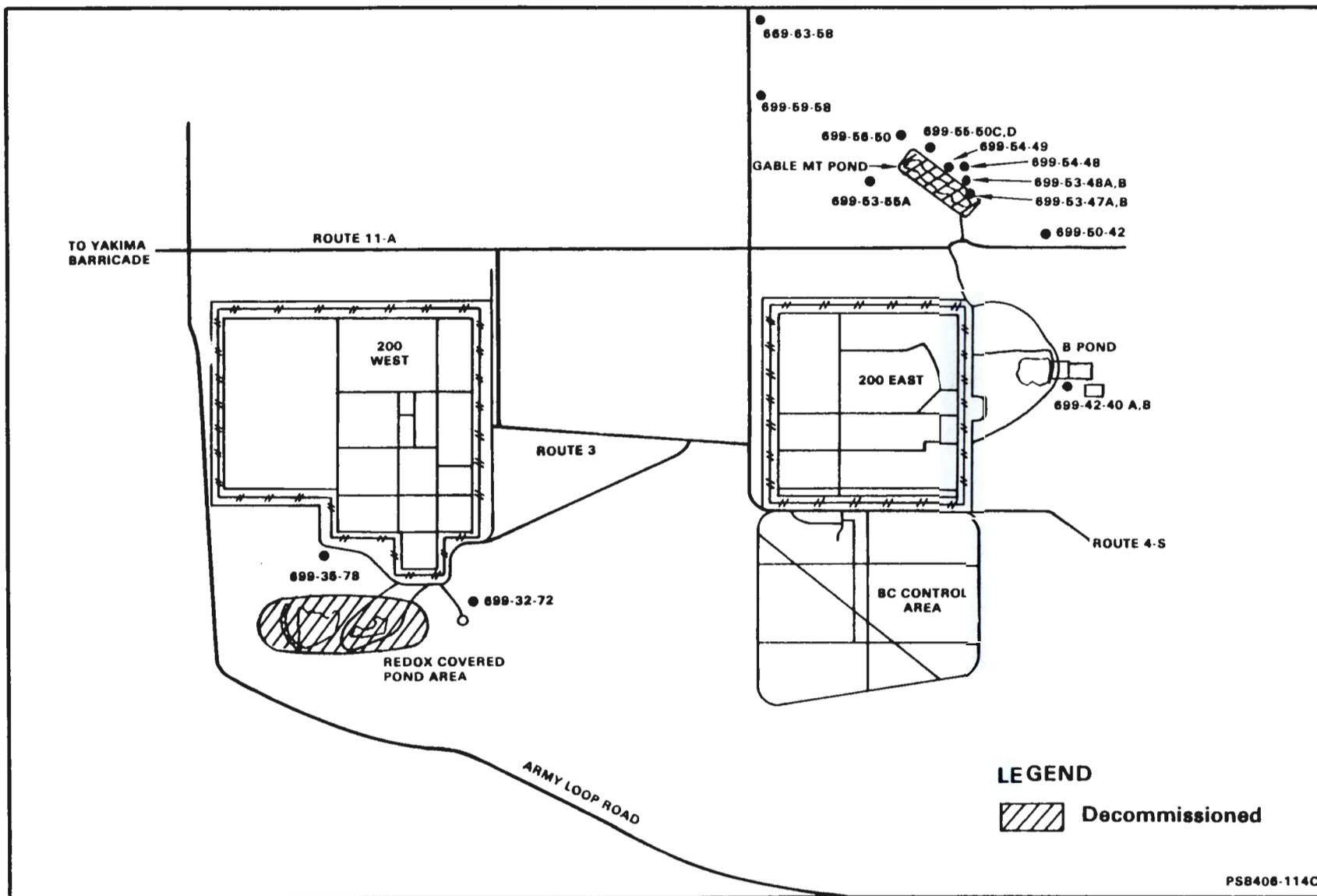
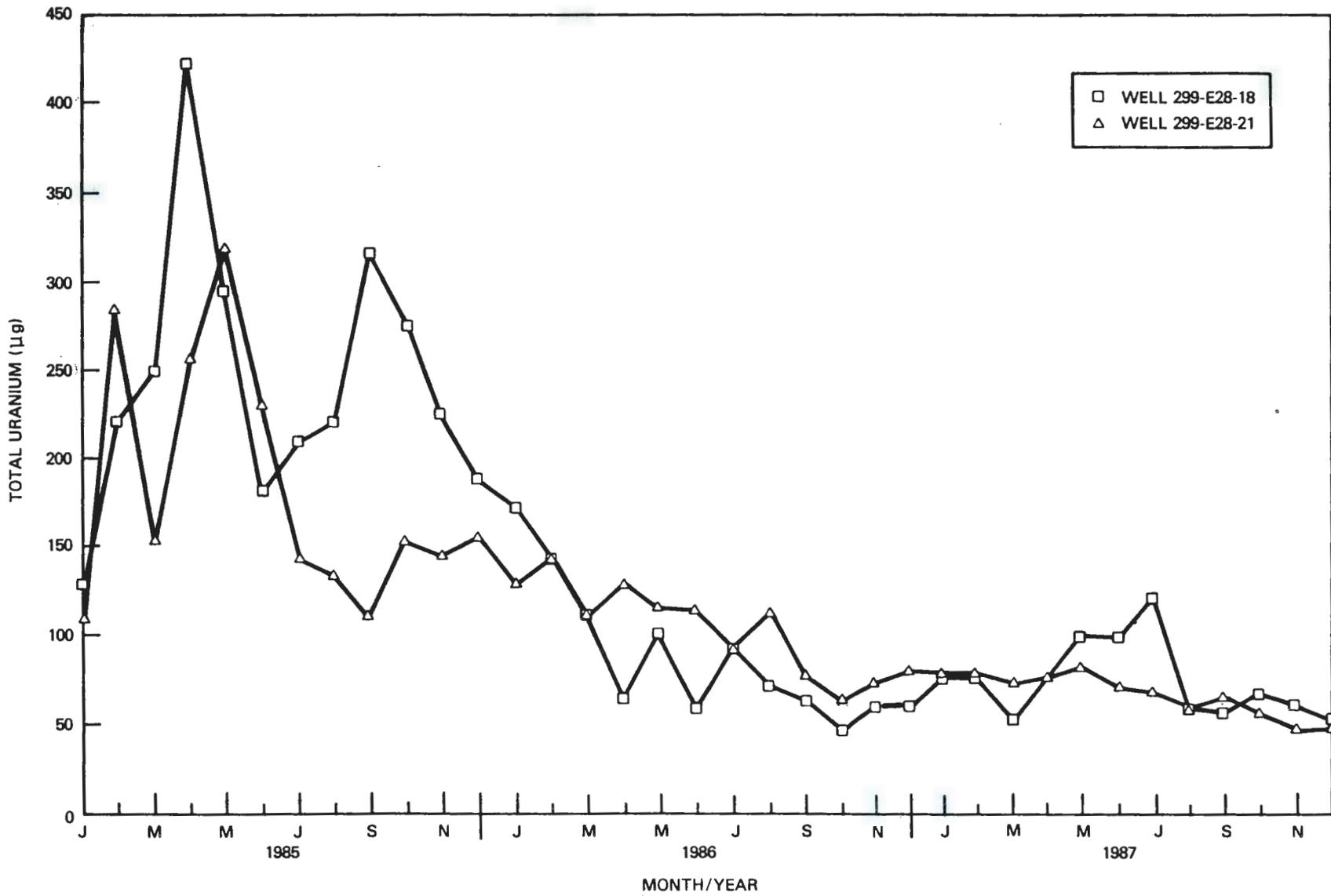


Figure D-3. Location of the 600 Area Monitoring Wells Used in the Separations Area Groundwater Monitoring Program During 1987.

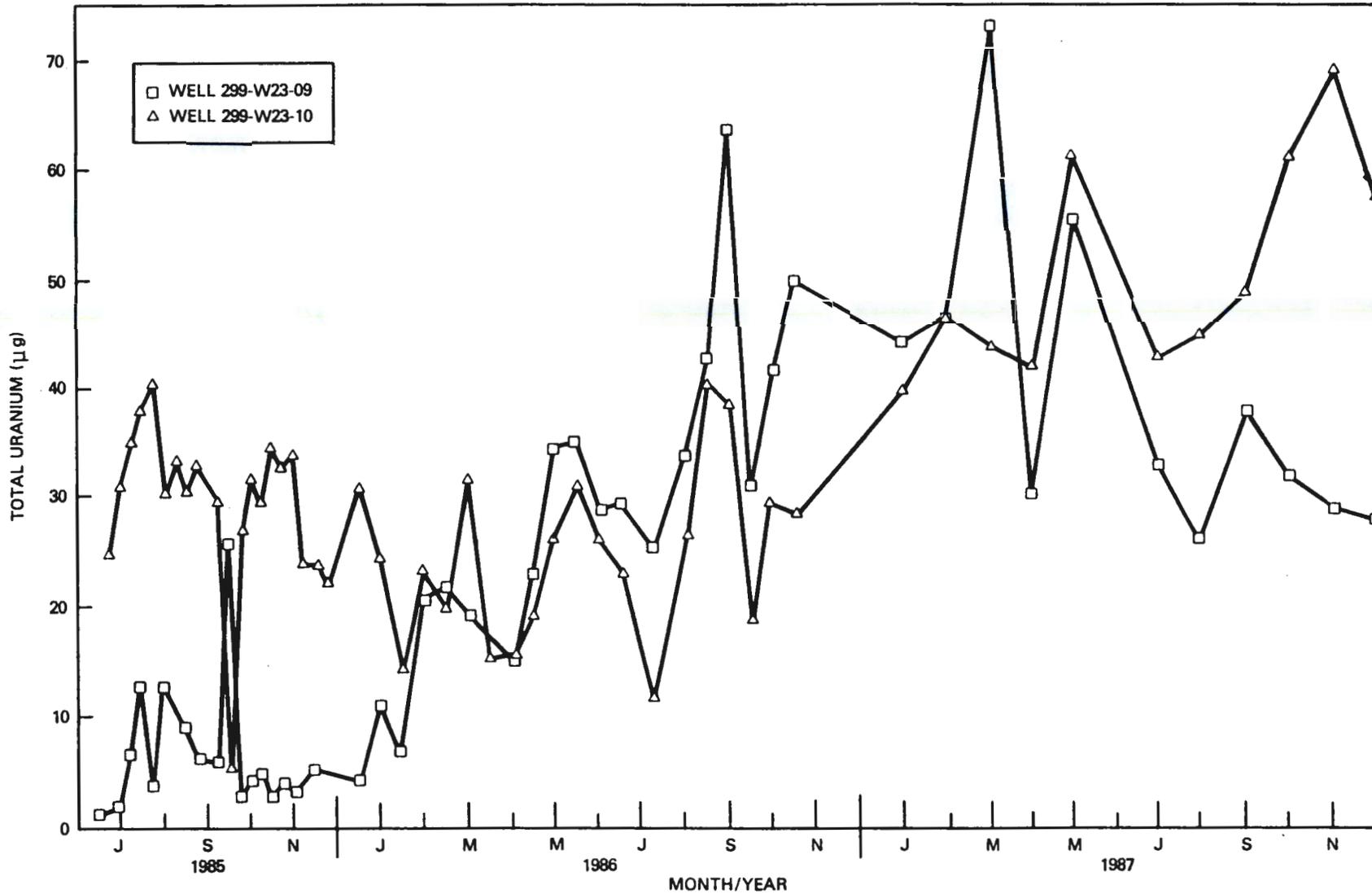
D-6



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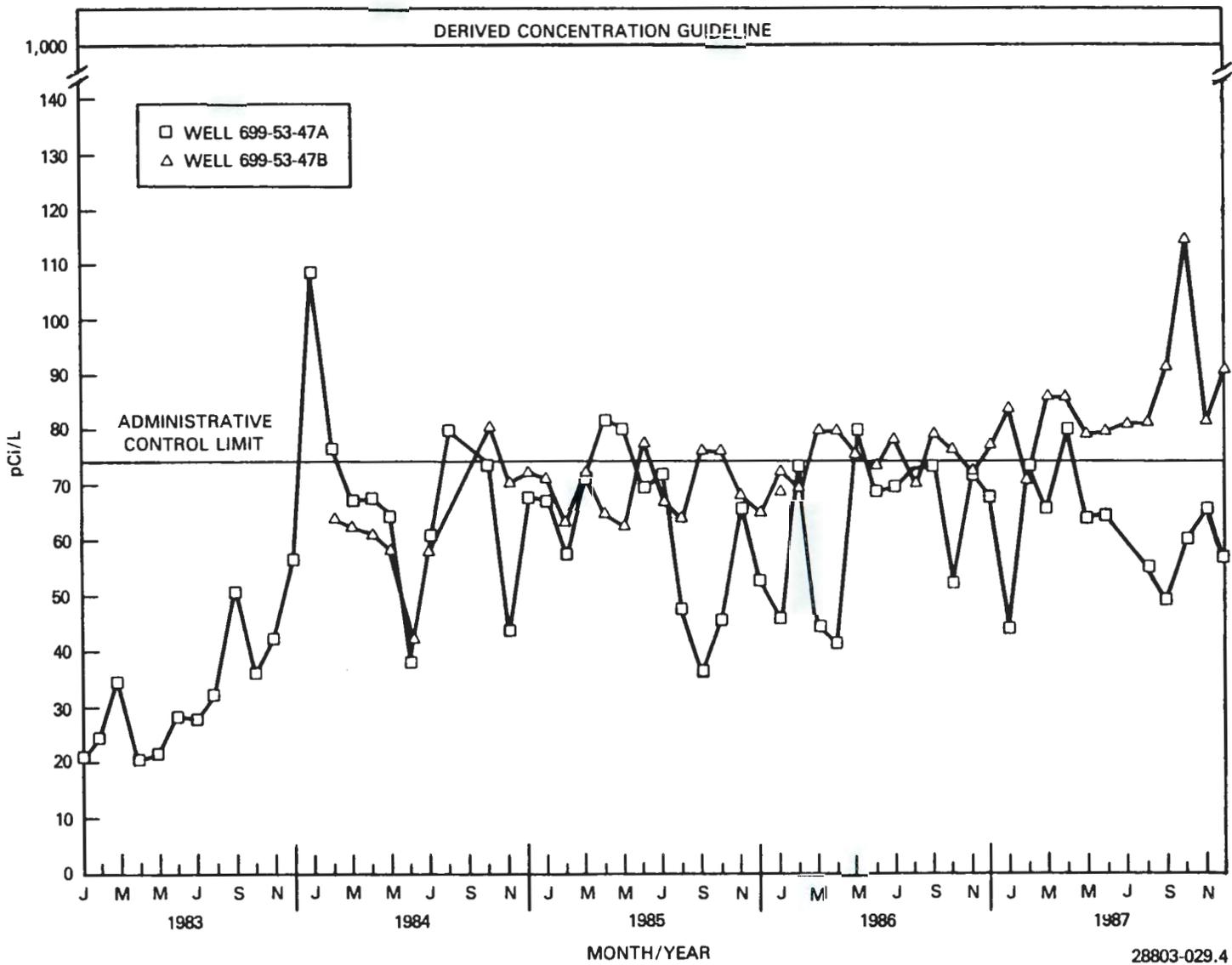
Figure D-4. Total Uranium in Groundwater at the 216-B-62 Crib.

D-7



WHC-EP-0145

Figure D-5. Total Uranium in Groundwater at the 216-S-25 Crib.



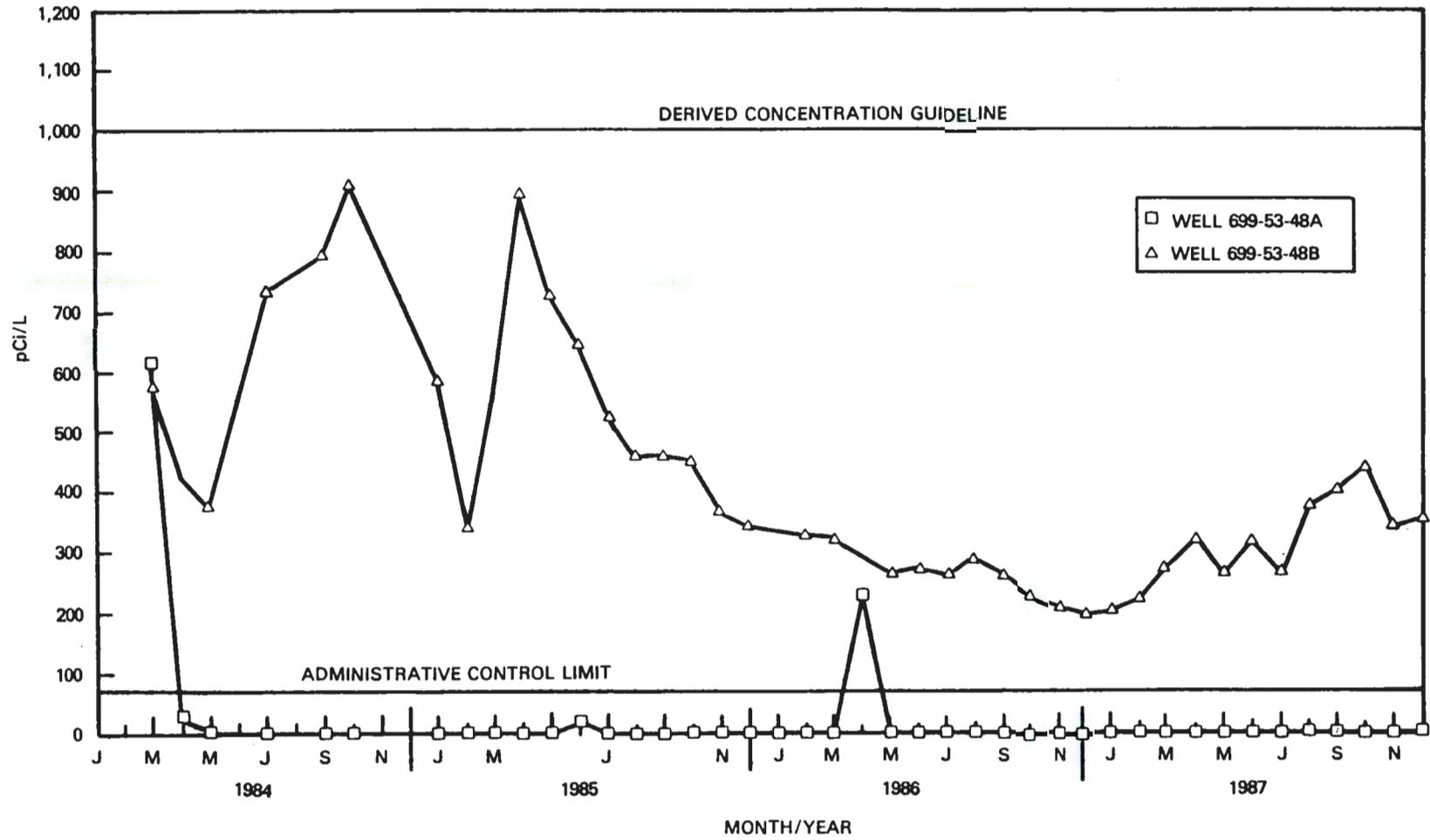
D-8

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Figure D-6. The <sup>90</sup>Sr in Groundwater at the 216-A-25 (Gable Mountain) Pond, Wells 699-53-47A and -47B.

28803-029.4

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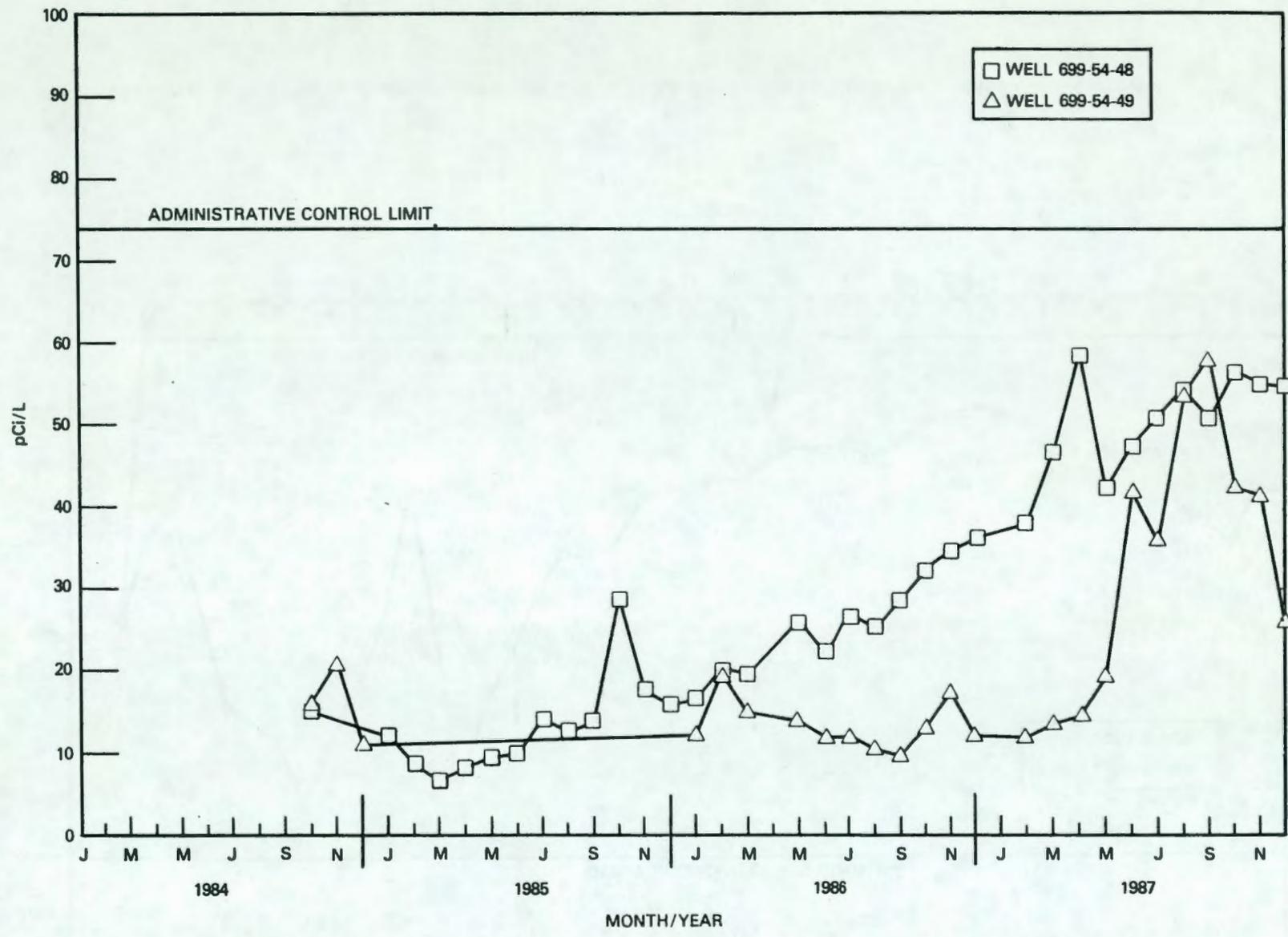
D-9

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Figure D-7. The <sup>90</sup>Sr in Groundwater at the 216-A-25 (Gable Mountain) Pond, Wells 699-53-48A and -48B.

D-10

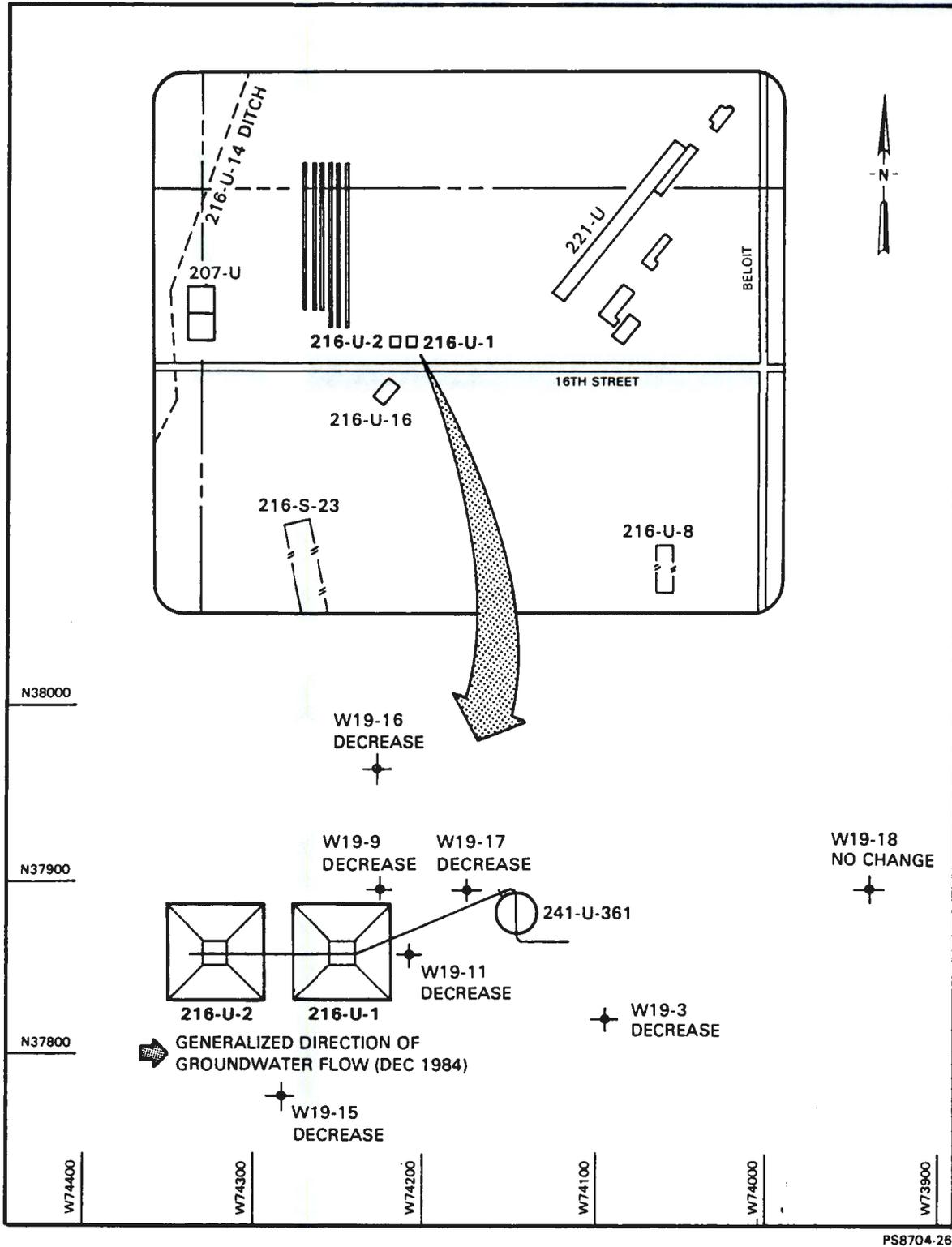


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Figure D-8. The <sup>90</sup>Sr in Groundwater at the 216-A-25 (Gable Mountain) Pond, Wells 699-54-48 and -49.

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PS8704-26

Figure D-9. Well Locations at the 216-U-1 and -2 Cribs (showing the general trend in uranium concentration during 1987).

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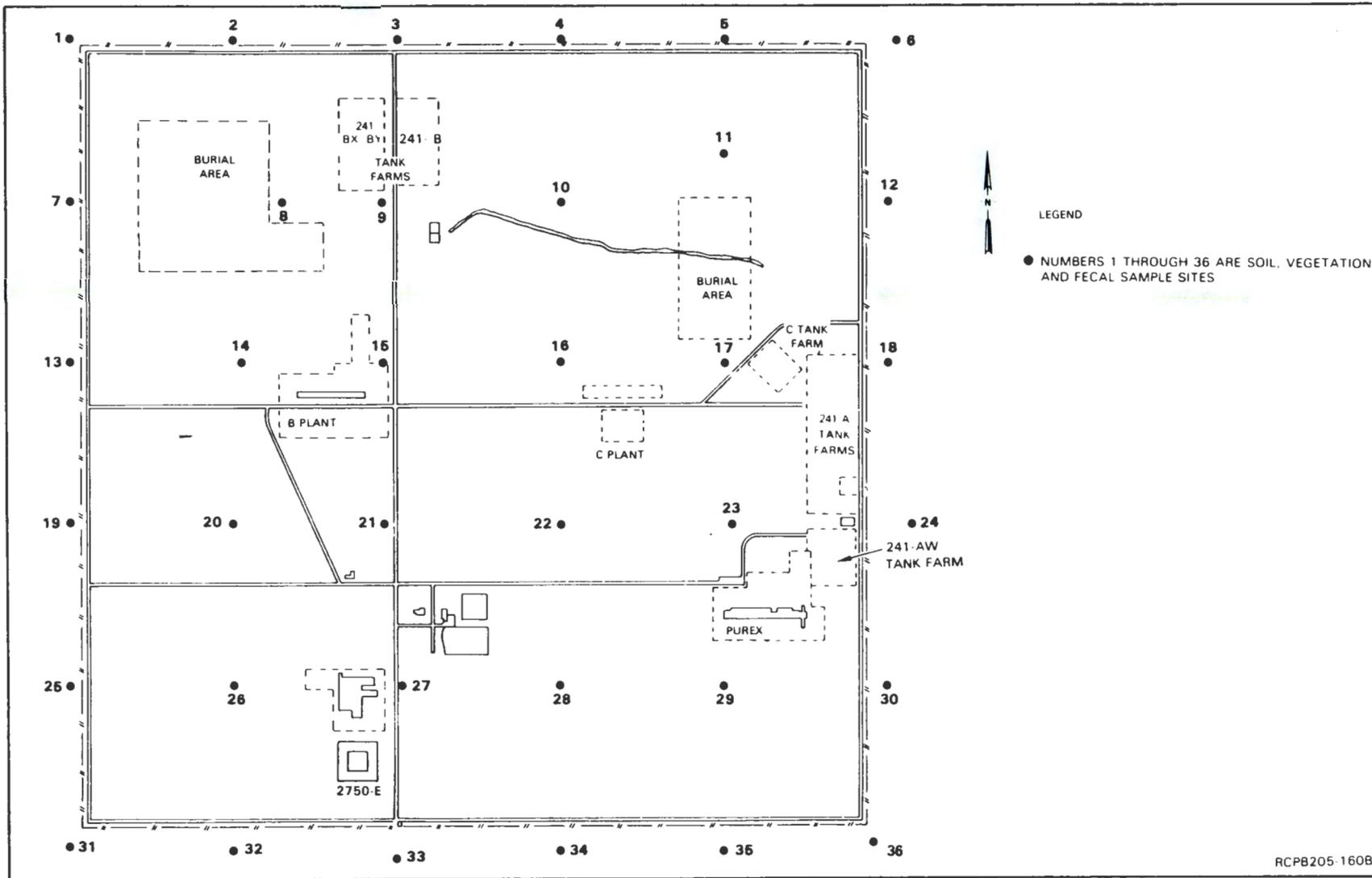
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**APPENDIX E**  
**SOIL AND BIOTA MONITORING FIGURES AND TABLES**

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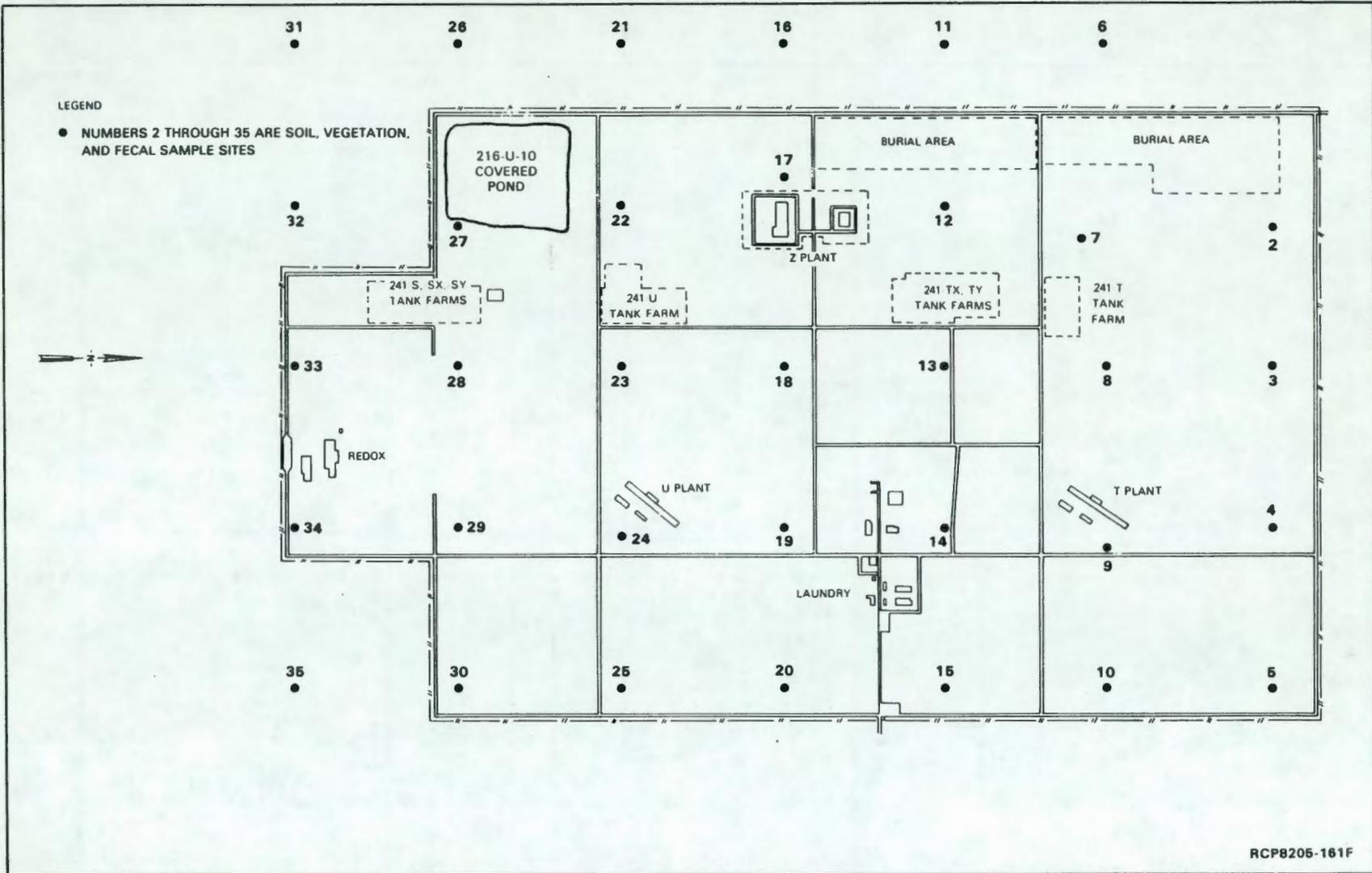
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E-3

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Figure E-1. The 200 East Area Grid Sampling Sites.



E-4

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Figure E-2. The 200 West Area Grid Sampling Sites.

E-5

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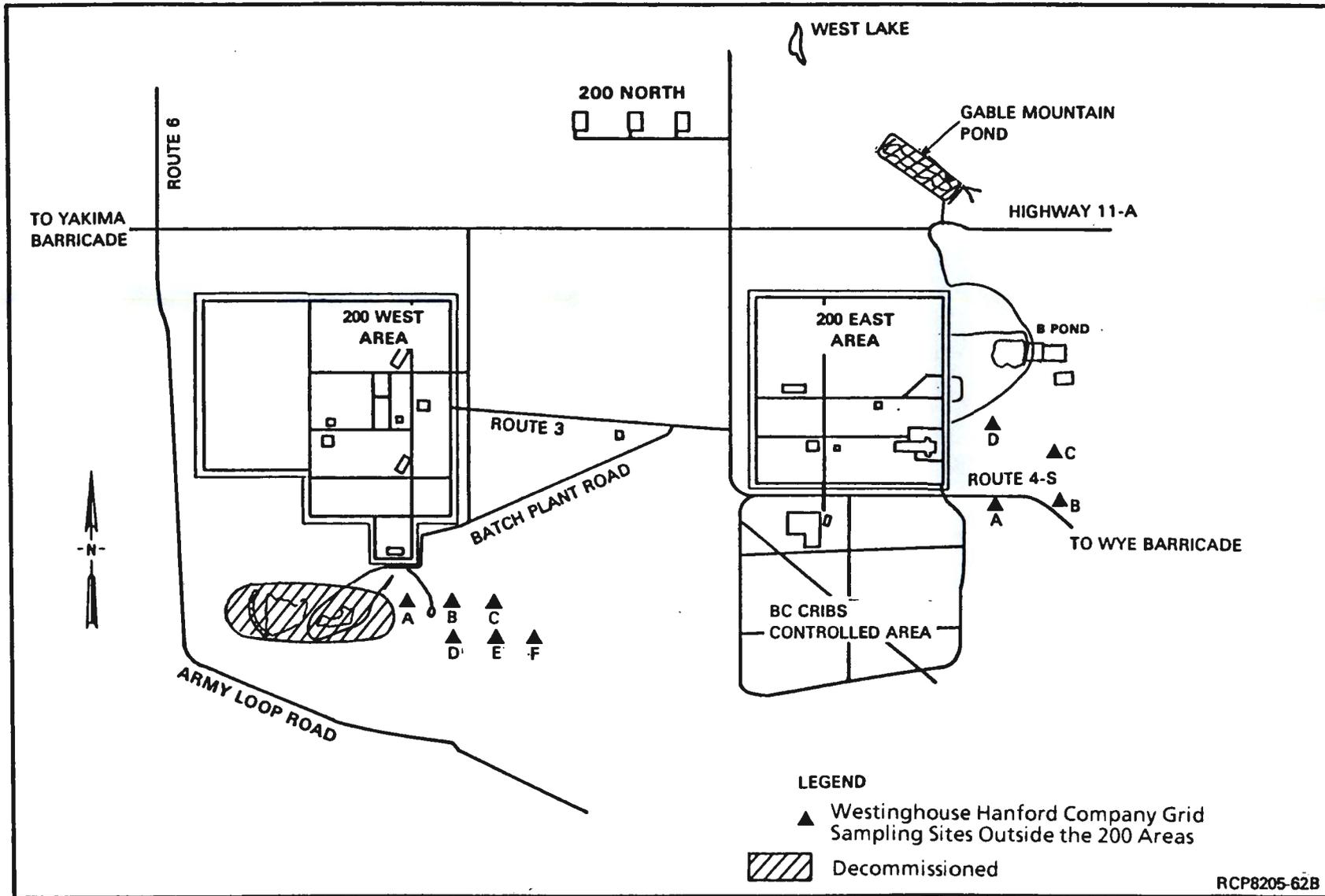
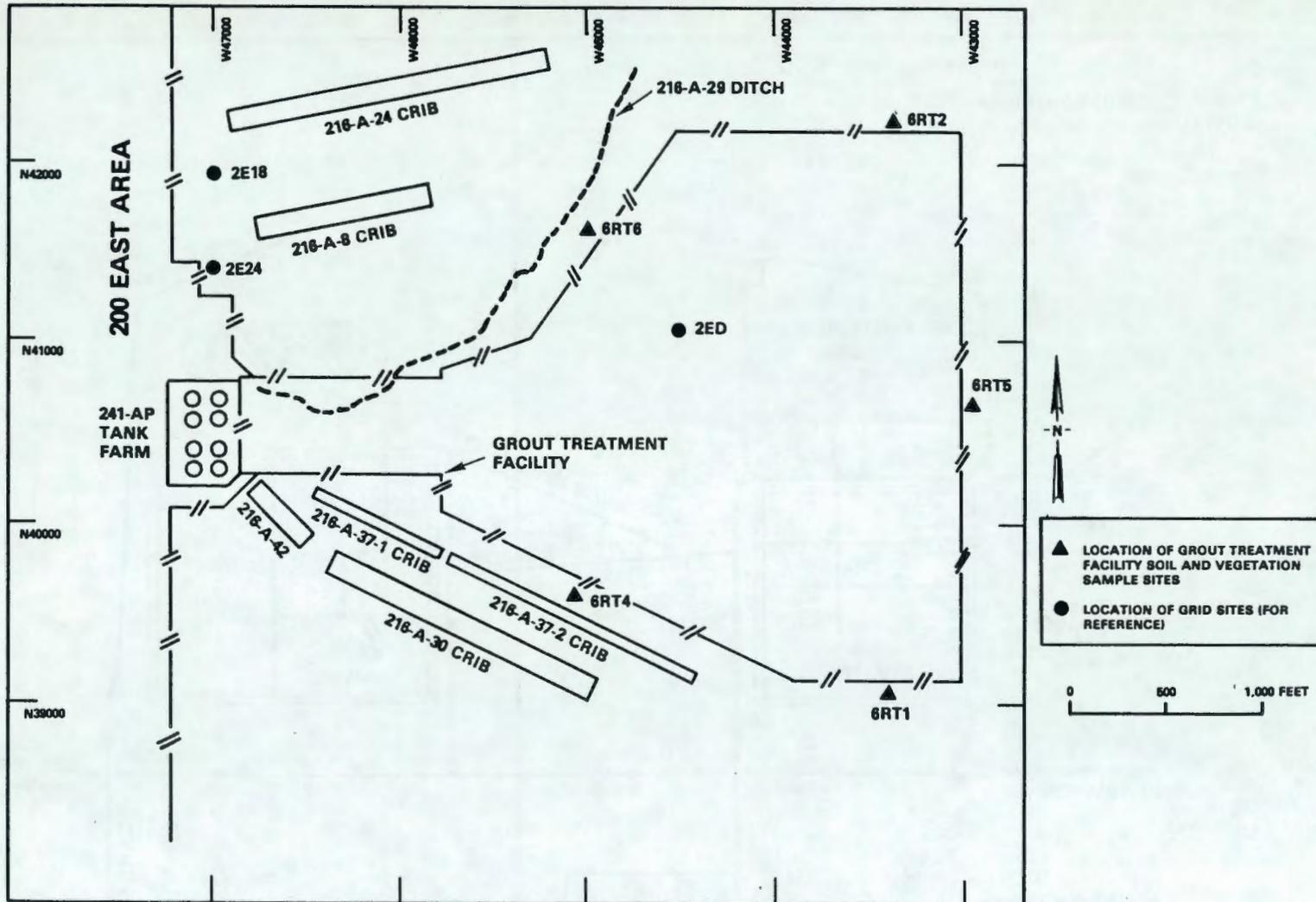


Figure E-3. Grid Sampling Outside the 200 Area Perimeter Fences.

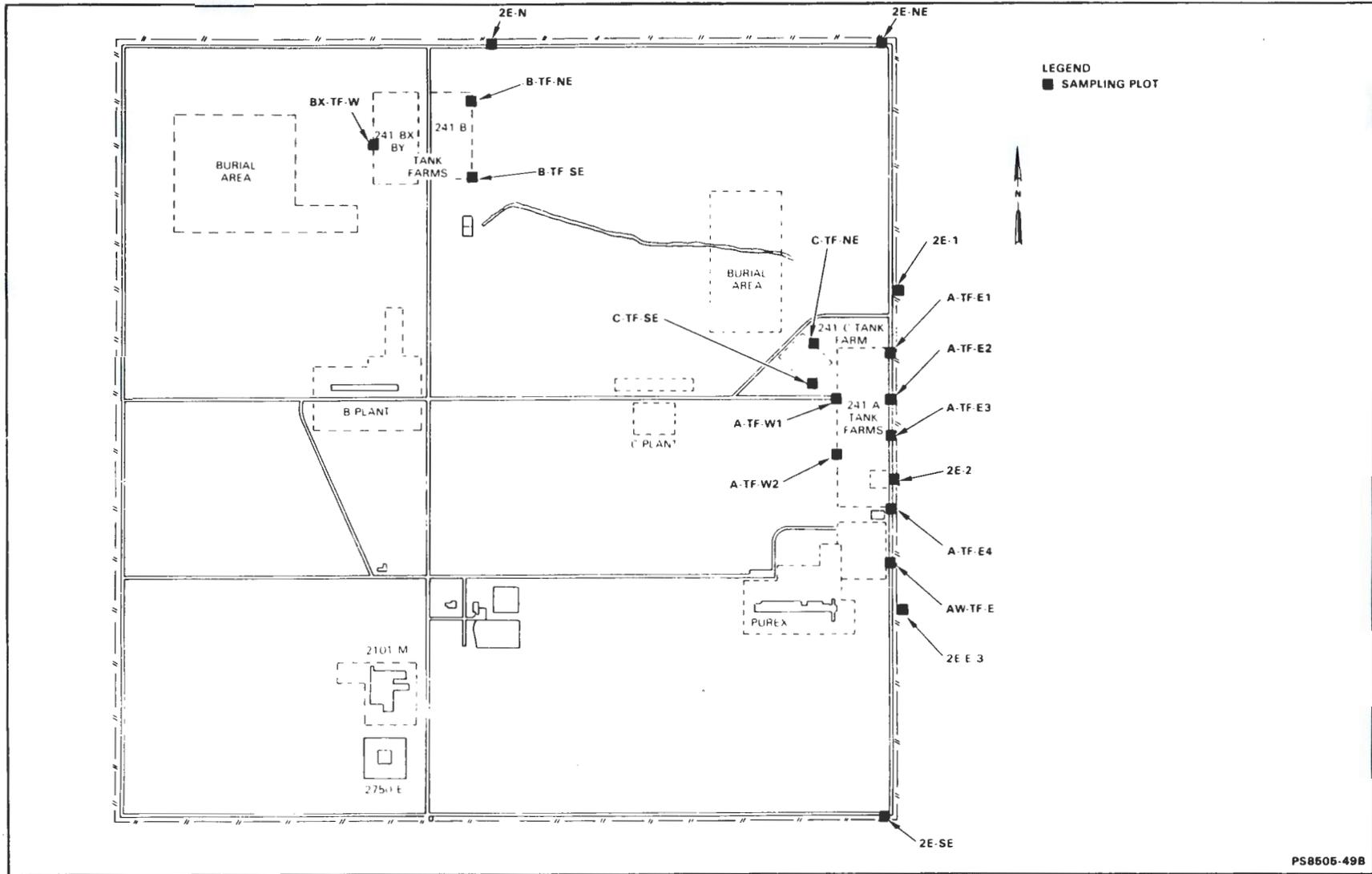
RCP8205-62B



28803-048.1

Figure E-4. Location of Grout Treatment Facility Sample Sites.

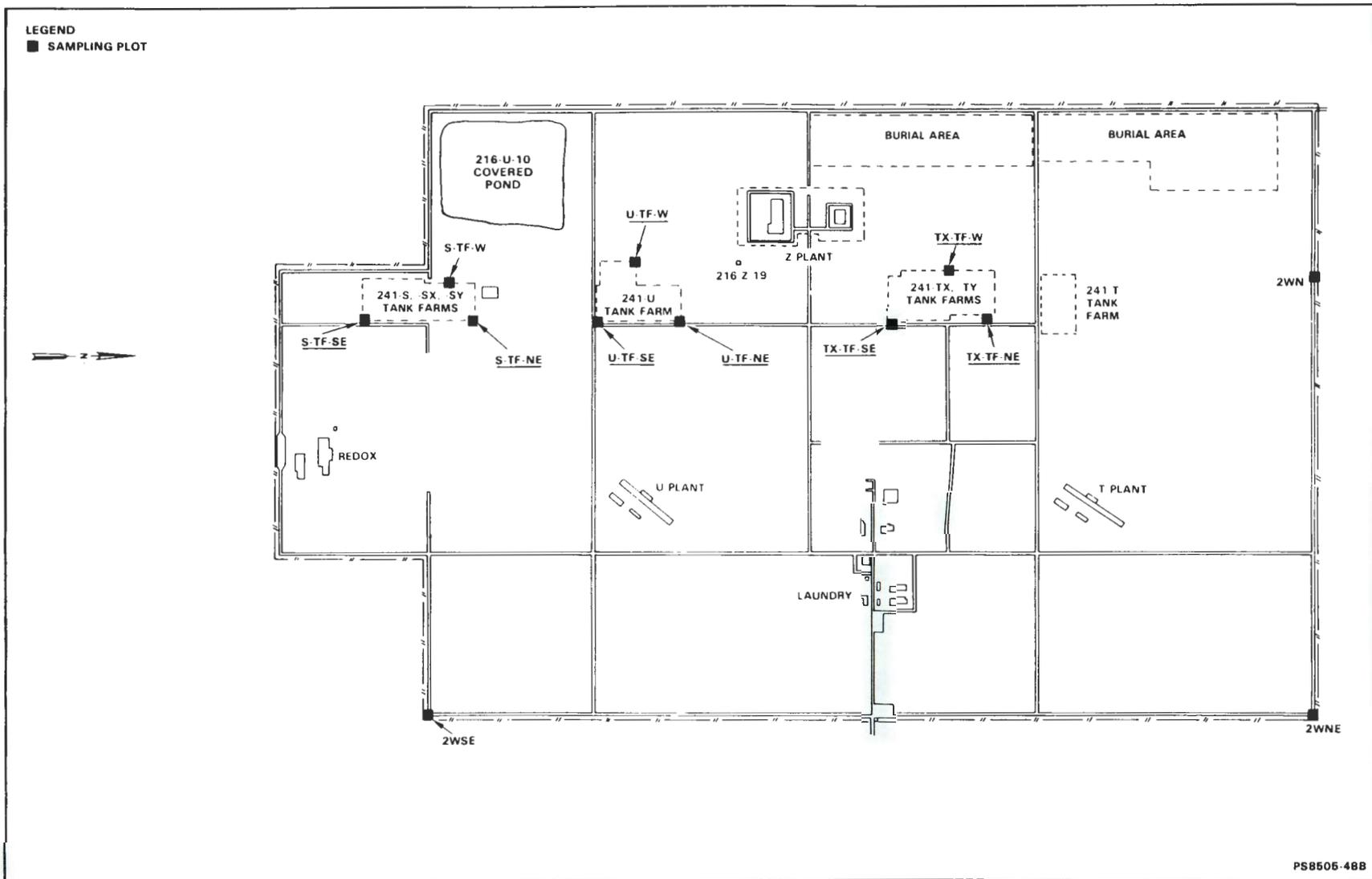
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B-7

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Figure E-5. Fenceline Soil Sampling Plots in the 200 East Area.



E-8

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Figure E-6. Fenceline Soil Sampling Plots in the 200 West Area.

Table E-1. Grid Site Soil Results for 200 East Area for 1987 (pCi/g dry weight). (sheet 1 of 3)

Location	Mn-54 ± Error	Co-58 ± Error	Co-60 ± Error	Zn-65 ± Error	Sr-90 ± Error	Zr-95 ± Error	Tc-99 ± Error
2E 1	< 8.6E-3 ± 1.5E-2	< 3.4E-3 ± 1.5E-2	< -8.0E-3 ± 1.6E-2	< 1.4E-2 ± 3.1E-2	2.4E-1 ± 6.1E-2	< -9.0E-3 ± 3.3E-2	a
2E 3	< 1.9E-2 ± 1.7E-2	< 1.2E-2 ± 1.7E-2	< 3.0E-3 ± 1.5E-2	< -3.6E-2 ± 4.6E-2	7.8E-1 ± 2.0E-1	< -2.3E-3 ± 3.6E-2	a
2E 4	< 1.3E-2 ± 2.1E-2	< 1.2E-2 ± 2.0E-2	< -2.5E-2 ± 2.4E-2	< 1.6E-2 ± 4.8E-2	9.3E-1 ± 2.3E-1	< 1.1E-2 ± 4.0E-2	< -4.1E-1 ± 9.6E-1
2E 4B	< -3.9E-3 ± 2.3E-2	< -2.7E-2 ± 2.5E-2	< -5.0E-3 ± 2.3E-2	< -8.8E-3 ± 5.4E-2	5.9E-1 ± 1.5E-1	< 3.6E-2 ± 4.4E-2	< 4.2E-1 ± 1.1E+0
2E 8	< 2.3E-2 ± 1.5E-2	< -8.7E-3 ± 1.6E-2	< 1.2E-2 ± 1.7E-2	< -2.4E-2 ± 3.8E-2	4.0E-1 ± 9.9E-2	< 2.0E-2 ± 2.9E-2	< 4.7E-1 ± 1.1E+0
2E10	< 6.4E-3 ± 1.9E-2	< -1.0E-2 ± 1.9E-2	< 0.0E+0 ± 1.5E-2	< 2.9E-2 ± 4.3E-2	2.3E+0 ± 5.7E-1	< 3.7E-2 ± 3.2E-2	a
2E12	< 2.2E-2 ± 1.5E-2	< -6.4E-3 ± 1.8E-2	< -2.6E-3 ± 2.0E-2	< -3.2E-2 ± 4.7E-2	4.1E-1 ± 1.0E-1	< 5.0E-2 ± 2.9E-2	a
2E14	< 1.3E-2 ± 1.5E-2	< 1.6E-3 ± 1.4E-2	< 1.9E-2 ± 1.6E-2	< -9.6E-3 ± 3.7E-2	5.0E-1 ± 1.2E-1	< 8.1E-3 ± 3.3E-2	< 4.0E-1 ± 1.1E+0
2E14B	< -6.0E-3 ± 2.0E-2	< 1.5E-2 ± 1.8E-2	< -3.1E-3 ± 1.6E-2	< -7.8E-2 ± 5.2E-2	5.1E-1 ± 1.3E-1	< 2.6E-2 ± 3.7E-2	< -4.2E-2 ± 9.8E-1
2E16	< 2.6E-2 ± 1.5E-2	< -1.7E-2 ± 2.0E-2	< 9.9E-3 ± 1.6E-2	< -2.2E-2 ± 4.5E-2	1.7E+0 ± 4.1E-1	< 2.4E-2 ± 3.6E-2	a
2E17	< 1.9E-3 ± 1.9E-2	< 2.3E-2 ± 1.4E-2	< -1.2E-2 ± 1.9E-2	< -9.6E-2 ± 5.4E-2	5.2E+0 ± 1.3E+0	< 1.1E-2 ± 3.6E-2	a
2E18	< 3.1E-2 ± 1.5E-2	< 1.4E-3 ± 1.6E-2	< 1.0E-2 ± 1.4E-2	< 3.2E-2 ± 3.6E-2	1.2E+0 ± 3.0E-1	< -4.8E-4 ± 3.1E-2	a
2E19	< -1.4E-2 ± 1.7E-2	< -2.1E-2 ± 1.7E-2	< 1.5E-2 ± 1.4E-2	< 2.2E-3 ± 3.5E-2	1.9E-1 ± 4.9E-2	< 3.7E-2 ± 2.7E-2	a
2E21	< 3.0E-2 ± 1.4E-2	< 7.4E-3 ± 1.6E-2	< -9.1E-4 ± 1.7E-2	< 2.6E-2 ± 3.7E-2	2.0E-1 ± 5.2E-2	< 6.9E-2 ± 2.9E-2	< 4.6E-1 ± 1.1E+0
2E23	< 1.7E-3 ± 2.1E-2	< -2.7E-3 ± 1.9E-2	< 2.9E-2 ± 2.0E-2	< -6.1E-2 ± 5.7E-2	1.6E+0 ± 3.9E-1	< 3.2E-2 ± 3.7E-2	a
2E24	< -3.8E-3 ± 1.4E-2	< -8.1E-3 ± 1.6E-2	< 9.0E-3 ± 1.1E-2	< -2.2E-2 ± 4.0E-2	1.2E+0 ± 3.0E-1	< 4.1E-2 ± 2.7E-2	< 7.6E-3 ± 7.7E-1
2E26	< 1.0E-2 ± 1.8E-2	< 1.3E-3 ± 1.7E-2	< -1.1E-2 ± 2.1E-2	< 1.5E-3 ± 3.8E-2	2.1E-1 ± 5.3E-2	< -5.7E-4 ± 3.4E-2	a
2E28	< -2.0E-2 ± 1.8E-2	< -1.2E-3 ± 1.5E-2	< 3.6E-3 ± 1.6E-2	< -1.4E-3 ± 3.2E-2	2.3E-1 ± 5.8E-2	< 2.9E-2 ± 3.0E-2	a
2E28B	< -1.6E-2 ± 1.8E-2	< -1.5E-3 ± 1.6E-2	< 4.8E-3 ± 1.8E-2	< 1.6E-2 ± 3.8E-2	2.3E-1 ± 5.8E-2	< 1.6E-2 ± 2.8E-2	a
2E30	< -1.3E-2 ± 1.8E-2	< -7.3E-3 ± 1.5E-2	< 5.0E-3 ± 1.7E-2	< 6.2E-3 ± 3.3E-2	2.0E-1 ± 5.0E-2	< 3.5E-3 ± 3.1E-2	a
2E32	< 2.1E-2 ± 1.6E-2	< -9.0E-3 ± 1.6E-2	< -2.0E-2 ± 2.0E-2	< -2.4E-2 ± 4.3E-2	1.2E-1 ± 3.1E-2	< -3.6E-2 ± 3.6E-2	a
2E34	< 8.3E-3 ± 1.7E-2	< 5.6E-3 ± 1.6E-2	< -1.9E-2 ± 1.9E-2	< -4.6E-2 ± 4.7E-2	5.6E-1 ± 1.4E-1	< 1.5E-2 ± 3.5E-2	a
2E35	< 1.9E-2 ± 1.4E-2	< 7.7E-3 ± 1.6E-2	< 3.1E-3 ± 1.2E-2	< 4.9E-3 ± 3.5E-2	4.8E-1 ± 1.2E-1	< 2.3E-2 ± 3.0E-2	a
2EA	< 1.9E-2 ± 1.4E-2	< 8.4E-3 ± 1.6E-2	< -1.1E-3 ± 1.6E-2	< -1.1E-2 ± 3.9E-2	1.5E-1 ± 3.9E-2	< 1.4E-2 ± 2.8E-2	a
2EB	< 7.8E-3 ± 1.6E-2	< -8.6E-3 ± 1.8E-2	< 1.1E-2 ± 1.5E-2	< -1.1E-2 ± 4.0E-2	2.6E-1 ± 6.6E-2	< 4.9E-2 ± 3.1E-2	a
2EC	< -6.1E-4 ± 1.8E-2	< -9.3E-3 ± 1.9E-2	< -1.8E-3 ± 1.7E-2	< -2.7E-2 ± 4.5E-2	3.8E-1 ± 9.5E-2	< 3.9E-2 ± 3.3E-2	a
2ED	< 1.8E-2 ± 1.5E-2	< 8.7E-3 ± 1.7E-2	< 2.5E-2 ± 1.5E-2	< 4.6E-2 ± 3.8E-2	7.0E-1 ± 1.7E-1	< 2.2E-2 ± 3.4E-2	< 2.2E-2 ± 9.8E-1
2EDB	< 1.7E-2 ± 1.6E-2	< 7.6E-3 ± 1.3E-2	< 8.4E-3 ± 1.6E-2	< 4.0E-3 ± 3.6E-2	6.6E-1 ± 1.6E-1	< -2.0E-3 ± 3.2E-2	< 5.2E-1 ± 1.1E+0
GRT1	< 3.9E-2 ± 1.6E-2	< -1.4E-2 ± 1.8E-2	< -2.3E-2 ± 2.0E-2	< 4.8E-2 ± 3.9E-2	4.4E-1 ± 1.1E-1	< 4.1E-2 ± 3.7E-2	< 5.2E-1 ± 8.6E-1
GRT2	< 1.1E-2 ± 1.7E-2	< -7.1E-3 ± 1.8E-2	< 1.8E-2 ± 1.7E-2	< 8.2E-2 ± 3.9E-2	3.9E-1 ± 1.0E-1	< -3.1E-2 ± 4.1E-2	< 5.3E-1 ± 1.1E+0
GRT4	< 2.3E-2 ± 1.7E-2	< -3.1E-3 ± 1.8E-2	< -2.3E-2 ± 2.0E-2	< 1.8E-3 ± 4.0E-2	3.4E-1 ± 8.5E-2	< 1.8E-2 ± 3.2E-2	< 2.4E-1 ± 8.5E-1
GRT5	< 1.3E-2 ± 1.5E-2	< 9.2E-4 ± 1.7E-2	< 1.2E-3 ± 1.7E-2	< 8.4E-3 ± 4.1E-2	2.2E-1 ± 5.5E-2	< 2.1E-3 ± 3.3E-2	< 2.7E-1 ± 8.5E-1
GRT6	< -7.1E-3 ± 2.0E-2	< 8.8E-3 ± 1.8E-2	< -2.5E-3 ± 2.1E-2	< 2.3E-2 ± 4.2E-2	4.1E-1 ± 1.0E-1	< 3.2E-2 ± 3.7E-2	< 2.5E-1 ± 8.5E-1
Maximum	3.9E-2	2.3E-2	2.9E-2	8.2E-2	5.2E+0	6.9E-2	5.3E-1
Minimum	-2.0E-2	-2.7E-2	-2.5E-2	-9.6E-2	1.2E-1	-3.6E-2	-4.1E-1
Mean	9.5E-3	-1.1E-3	8.6E-4	-4.4E-3	7.2E-1	1.9E-2	2.6E-1
Background (b)					1.5E-1		
Soil standards (c)			3.0E+2		4.0E+2		2.0E+3

E-9

WHC-EP-0145

Table E-1. Grid Site Soil Results for 200 East Area for 1987 (pCi/g dry weight). (sheet 2 of 3)

Location	Ru-106 ± Error	I-129 ± Error	Cs-134 ± Error	Cs-137 ± Error	Ce-141 ± Error	Ce-144 ± Error	Eu-152 ± Error
2E 1	< 2.0E-2 ± 1.3E-1	a	3.7E-2 ± 1.9E-2	1.7E+0 ± 1.8E-1	< -9.4E-3 ± 3.0E-2	< -1.3E-2 ± 9.0E-2	1.0E-1 ± 6.0E-2
2E 3	< 1.5E-1 ± 2.0E-1	a	4.8E-2 ± 2.1E-2	1.3E+1 ± 1.3E+0	< -1.2E-3 ± 4.8E-2	< -5.1E-2 ± 1.5E-1	< 4.8E-2 ± 6.9E-2
2E 4	< -3.6E-2 ± 2.4E-1	< -4.3E-1 ± 7.2E-1	< 2.3E-2 ± 2.7E-2	1.8E+1 ± 1.8E+0	< -5.5E-2 ± 6.5E-2	< -2.4E-1 ± 2.2E-1	< 4.8E-2 ± 9.6E-2
2E 4B	< 1.6E-1 ± 3.4E-1	< -4.0E-1 ± 6.1E-1	4.8E-2 ± 2.9E-2	1.6E+1 ± 1.6E+0	< -8.2E-3 ± 7.8E-2	< -2.2E-1 ± 2.6E-1	< -5.9E-2 ± 1.3E-1
2E 8	< 8.2E-2 ± 1.5E-1	< -2.6E-1 ± 4.2E-1	4.9E-2 ± 2.0E-2	3.8E+0 ± 3.9E-1	< -9.0E-3 ± 3.1E-2	< -9.3E-3 ± 1.0E-1	8.9E-2 ± 7.2E-2
2E10	< -8.3E-2 ± 2.8E-1	a	4.6E-2 ± 2.1E-2	3.1E+1 ± 3.1E+0	< -4.1E-2 ± 6.2E-2	< 3.2E-2 ± 2.1E-1	1.2E-1 ± 7.1E-2
2E12	< 2.1E-2 ± 1.3E-1	a	4.5E-2 ± 2.0E-2	1.5E-1 ± 3.0E-2	< -4.4E-3 ± 3.5E-2	< -7.0E-3 ± 9.7E-2	1.1E-1 ± 8.8E-2
2E14	< -9.8E-2 ± 1.5E-1	< 2.9E-1 ± 3.2E-1	4.5E-2 ± 2.0E-2	2.9E+0 ± 3.0E-1	< 9.5E-3 ± 3.4E-2	< -4.7E-2 ± 1.2E-1	< -4.5E-2 ± 8.9E-2
2E14B	< -4.1E-2 ± 2.0E-1	4.6E-1 ± 2.9E-1	4.5E-2 ± 2.4E-2	2.9E+0 ± 3.0E-1	< -6.3E-3 ± 4.7E-2	< -6.4E-2 ± 1.6E-1	< 1.3E-2 ± 9.0E-2
2E16	2.3E-1 ± 1.3E-1	a	< 1.9E-2 ± 2.2E-2	4.3E+0 ± 4.4E-1	< 6.7E-3 ± 3.6E-2	< 1.0E-2 ± 1.2E-1	< 8.0E-2 ± 8.2E-2
2E17	2.6E-1 ± 1.7E-1	a	3.7E-2 ± 2.1E-2	5.7E+0 ± 5.9E-1	4.1E-2 ± 3.8E-2	< -8.4E-2 ± 1.3E-1	< -5.5E-2 ± 9.8E-2
2E18	< -4.6E-2 ± 1.6E-1	a	3.2E-2 ± 1.9E-2	4.6E+0 ± 4.7E-1	< -2.4E-2 ± 3.9E-2	< -2.6E-2 ± 1.1E-1	7.6E-2 ± 6.6E-2
2E19	< -9.2E-2 ± 1.3E-1	a	4.2E-2 ± 2.0E-2	7.3E-1 ± 8.3E-2	< -1.8E-2 ± 3.2E-2	1.4E-1 ± 9.6E-2	9.3E-2 ± 6.3E-2
2E21	< -2.4E-3 ± 1.6E-1	< -9.1E-2 ± 5.1E-1	3.1E-2 ± 2.2E-2	6.4E-1 ± 7.8E-2	< -4.7E-2 ± 4.0E-2	< 1.5E-2 ± 1.3E-1	1.0E-1 ± 7.9E-2
2E23	< 1.4E-1 ± 2.4E-1	a	< 1.7E-2 ± 2.6E-2	1.1E+1 ± 1.1E+0	< 2.0E-2 ± 5.1E-2	< -1.1E-1 ± 1.8E-1	< 6.9E-2 ± 8.6E-2
2E24	< 1.5E-1 ± 1.6E-1	< -3.2E-1 ± 3.7E-1	3.5E-2 ± 1.9E-2	6.8E+0 ± 6.9E-1	< 2.2E-2 ± 3.6E-2	< -5.0E-2 ± 1.2E-1	1.0E-1 ± 6.5E-2
2E26	< 1.3E-1 ± 1.3E-1	a	5.0E-2 ± 2.3E-2	6.8E-1 ± 8.2E-2	< -1.1E-2 ± 3.5E-2	< -5.7E-3 ± 1.2E-1	< -5.1E-2 ± 1.0E-1
2E28	< 8.7E-2 ± 1.4E-1	a	3.2E-2 ± 2.0E-2	6.0E-1 ± 7.3E-2	< -1.6E-2 ± 3.0E-2	< 2.4E-2 ± 9.3E-2	< -3.8E-2 ± 9.2E-2
2E28B	< 1.1E-1 ± 1.3E-1	a	4.5E-2 ± 1.9E-2	4.0E-1 ± 5.1E-2	< 9.4E-3 ± 2.8E-2	< -3.2E-2 ± 9.2E-2	1.6E-1 ± 6.8E-2
2E30	5.0E-1 ± 1.7E-1	a	4.7E-2 ± 1.8E-2	2.2E-1 ± 3.3E-2	< -1.9E-2 ± 2.8E-2	< 2.4E-2 ± 9.6E-2	< 5.7E-2 ± 6.2E-2
2E32	< -4.6E-2 ± 1.3E-1	a	3.4E-2 ± 2.0E-2	4.7E-1 ± 5.9E-2	< 2.5E-2 ± 3.2E-2	1.4E-2 ± 1.0E-1	9.1E-2 ± 7.2E-2
2E34	< 2.4E-2 ± 1.4E-1	a	4.8E-2 ± 2.2E-2	2.2E-1 ± 4.1E-2	< -6.7E-3 ± 3.6E-2	< 7.6E-3 ± 1.1E-1	1.3E-1 ± 7.6E-2
2E35	< -4.7E-2 ± 1.3E-1	a	4.4E-2 ± 1.7E-2	6.1E-1 ± 7.2E-2	< -2.0E-2 ± 3.1E-2	< -1.1E-2 ± 8.6E-2	< -1.7E-2 ± 8.3E-2
2EA	< 7.4E-2 ± 1.2E-1	a	4.0E-2 ± 1.9E-2	3.8E-1 ± 4.8E-2	< -2.4E-3 ± 2.6E-2	< 3.9E-2 ± 8.6E-2	8.4E-2 ± 6.4E-2
2EB	< -1.1E-1 ± 1.3E-1	a	4.2E-2 ± 2.0E-2	1.0E+0 ± 1.1E-1	< 2.2E-2 ± 3.1E-2	1.1E-1 ± 1.0E-1	1.3E-1 ± 6.4E-2
2EC	< -1.2E-1 ± 1.5E-1	a	5.0E-2 ± 2.1E-2	8.3E-1 ± 9.6E-2	< 4.1E-3 ± 3.6E-2	< 8.5E-3 ± 1.2E-1	1.8E-1 ± 7.4E-2
2ED	< 2.7E-2 ± 1.5E-1	5.6E-1 ± 3.2E-1	4.3E-2 ± 2.2E-2	2.8E+0 ± 2.9E-1	3.8E-2 ± 3.3E-2	< -1.5E-2 ± 1.1E-1	< 5.5E-2 ± 7.8E-2
2EDB	< 1.0E-1 ± 1.3E-1	< 1.0E-1 ± 3.4E-1	6.6E-2 ± 2.1E-2	2.8E+0 ± 2.9E-1	< 1.9E-2 ± 3.1E-2	< 9.2E-3 ± 1.1E-1	1.5E-1 ± 6.8E-2
GRT1	< -1.8E-1 ± 1.7E-1	< -1.4E-1 ± 3.4E-1	3.9E-2 ± 2.2E-2	1.8E+0 ± 1.9E-1	< -1.5E-2 ± 3.5E-2	< -9.3E-2 ± 1.2E-1	1.3E-1 ± 8.1E-2
GRT2	< 1.2E-1 ± 1.6E-1	< 1.8E-1 ± 3.3E-1	3.2E-2 ± 2.4E-2	2.3E+0 ± 2.4E-1	< -1.5E-2 ± 4.4E-2	< -2.5E-2 ± 1.4E-1	9.2E-2 ± 8.6E-2
GRT4	< -2.7E-3 ± 1.8E-1	< -1.1E+0 ± 6.5E-1	6.5E-2 ± 2.4E-2	1.3E+0 ± 1.4E-1	< -3.4E-2 ± 4.4E-2	< -2.3E-2 ± 1.3E-1	1.1E-1 ± 7.4E-2
GRT5	< -2.0E-1 ± 1.5E-1	3.6E-1 ± 3.0E-1	6.3E-2 ± 2.0E-2	1.2E+0 ± 1.3E-1	< -7.2E-3 ± 3.1E-2	< -6.0E-2 ± 1.0E-1	9.3E-2 ± 7.2E-2
GRT6	< -1.3E-2 ± 1.5E-1	3.9E-1 ± 2.9E-1	3.8E-2 ± 2.3E-2	2.3E+0 ± 2.5E-1	< -3.6E-3 ± 3.9E-2	< -2.9E-2 ± 1.3E-1	< 4.6E-2 ± 8.3E-2
Maximum	5.0E-1	5.6E-1	6.6E-2	3.1E+1	4.1E-2	1.4E-1	1.8E-1
Minimum	-2.0E-1	-1.1E+0	1.7E-2	1.5E-1	-5.5E-2	-2.4E-1	-5.9E-2
Mean	3.8E-2	-2.5E-2	4.2E-2	4.3E+0	-4.8E-3	-2.4E-2	6.9E-2
Background (b)				6.0E-1			
Soil standards (c)		2.0E+3		4.0E+2			8.0E+2

E-10

WHC-EP-0145

**Table E-1. Grid Site Soil Results for 200 East Area for 1987 (pCi/g dry weight). (sheet 3 of 3)**

Location	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error	U-Total ± Error
2E 1	< -4.1E-2 ± 5.0E-2	< 2.4E-2 ± 4.9E-2	4.7E-4 ± 2.7E-4	2.6E-2 ± 3.2E-3	1.8E-1 ± 5.5E-2
2E 3	< 3.2E-2 ± 4.7E-2	< 7.4E-2 ± 8.2E-2	8.0E-4 ± 4.2E-4	2.3E-2 ± 3.0E-3	2.3E-1 ± 7.1E-2
2E 4	< 4.4E-2 ± 6.8E-2	< -2.2E-2 ± 1.2E-1	5.1E-4 ± 3.7E-4	3.6E-2 ± 4.3E-3	3.2E-1 ± 9.2E-2
2E 4B	< -3.9E-2 ± 7.1E-2	< 8.3E-2 ± 1.4E-1	8.2E-4 ± 6.9E-4	3.5E-2 ± 5.7E-3	2.4E-1 ± 7.2E-2
2E 8	< -4.4E-2 ± 5.7E-2	< 6.1E-2 ± 5.6E-2	6.8E-4 ± 3.1E-4	2.4E-2 ± 3.0E-3	2.7E-1 ± 8.1E-2
2E10	< -6.2E-2 ± 6.4E-2	< 1.0E-2 ± 1.1E-1	5.4E-4 ± 5.3E-4	4.3E-2 ± 5.8E-3	2.1E-1 ± 6.4E-2
2E12	< 4.6E-2 ± 5.0E-2	< 7.0E-2 ± 5.4E-2	4.5E-4 ± 2.5E-4	7.4E-3 ± 1.2E-3	1.3E-1 ± 4.3E-2
2E14	< -8.1E-2 ± 6.4E-2	< 4.6E-2 ± 6.8E-2	4.0E-4 ± 2.6E-4	1.3E-2 ± 1.8E-3	2.0E-1 ± 6.2E-2
2E14B	< 4.4E-2 ± 6.2E-2	< 1.4E-1 ± 8.7E-2	7.5E-4 ± 3.4E-4	1.6E-2 ± 2.2E-3	1.8E-1 ± 5.8E-2
2E16	< 3.3E-2 ± 5.2E-2	< -3.0E-2 ± 5.5E-2	1.2E-3 ± 3.9E-4	1.2E-1 ± 1.2E-2	3.1E-1 ± 9.0E-2
2E17	< 4.4E-2 ± 5.4E-2	< -2.8E-2 ± 7.5E-2	4.6E-4 ± 3.9E-4	1.7E-2 ± 2.8E-3	1.6E-1 ± 5.2E-2
2E18	< 7.1E-2 ± 4.2E-2	< 3.9E-3 ± 6.1E-2	< 2.1E-5 ± 1.1E-4	6.8E-3 ± 1.2E-3	2.6E-1 ± 7.7E-2
2E19	< -2.4E-2 ± 5.7E-2	< 3.0E-2 ± 5.9E-2	4.3E-4 ± 2.7E-4	2.0E-2 ± 2.7E-3	1.4E-1 ± 4.5E-2
2E21	< 3.4E-2 ± 4.4E-2	< 8.4E-2 ± 7.5E-2	4.1E-4 ± 2.5E-4	2.3E-2 ± 2.8E-3	2.1E-1 ± 6.4E-2
2E23	< 4.8E-2 ± 6.8E-2	< 1.5E-1 ± 1.0E-1	1.5E-1 ± 1.5E-2	3.9E-2 ± 4.7E-3	2.9E-1 ± 8.7E-2
2E24	< -3.9E-2 ± 5.2E-2	< -1.3E-2 ± 6.9E-2	4.1E-4 ± 3.3E-4	2.5E-2 ± 3.2E-3	2.1E-1 ± 6.4E-2
2E26	< 3.2E-2 ± 5.4E-2	< 4.6E-2 ± 7.0E-2	4.6E-4 ± 2.5E-4	1.5E-2 ± 2.0E-3	1.7E-1 ± 5.4E-2
2E28	< 3.9E-2 ± 5.0E-2	< 2.2E-2 ± 4.4E-2	< 8.6E-5 ± 1.3E-4	2.1E-2 ± 2.6E-3	3.0E-1 ± 9.0E-2
2E28B	< -5.4E-2 ± 5.9E-2	< 5.0E-2 ± 5.1E-2	4.6E-4 ± 2.5E-4	1.3E-2 ± 1.7E-3	3.5E-1 ± 1.0E-1
2E30	< 4.3E-2 ± 4.9E-2	< 3.8E-2 ± 5.5E-2	5.9E-4 ± 2.7E-4	1.7E-2 ± 2.1E-3	5.1E-2 ± 2.3E-2
2E32	< -2.5E-2 ± 6.0E-2	< 5.6E-2 ± 6.1E-2	< -2.6E-5 ± 7.2E-5	2.7E-3 ± 6.0E-4	1.3E-1 ± 4.4E-2
2E34	< 4.2E-2 ± 5.6E-2	< 1.7E-2 ± 6.0E-2	2.8E-4 ± 2.1E-4	8.8E-3 ± 1.4E-3	2.9E-1 ± 8.5E-2
2E35	< -2.5E-2 ± 5.0E-2	< 5.7E-2 ± 4.6E-2	2.5E-4 ± 1.8E-4	1.0E-2 ± 1.4E-3	2.3E-1 ± 6.8E-2
2EA	< 3.0E-2 ± 4.9E-2	< -1.2E-2 ± 5.0E-2	< 9.0E-5 ± 1.3E-4	7.2E-3 ± 1.1E-3	2.0E-1 ± 6.0E-2
2EB	< 4.1E-2 ± 5.1E-2	< 7.5E-3 ± 6.2E-2	2.8E-4 ± 2.0E-4	2.0E-2 ± 2.5E-3	1.7E-1 ± 5.3E-2
2EC	< 1.2E-3 ± 5.3E-2	< 1.3E-1 ± 6.9E-2	< 1.4E-4 ± 1.6E-4	2.0E-2 ± 2.5E-3	2.3E-1 ± 7.1E-2
2ED	< 8.4E-2 ± 4.7E-2	< 6.0E-2 ± 6.2E-2	6.5E-4 ± 2.9E-4	4.5E-2 ± 5.1E-3	3.4E-1 ± 9.8E-2
2EDB	< -3.9E-2 ± 6.1E-2	< 5.8E-2 ± 5.5E-2	5.0E-4 ± 2.4E-4	4.0E-2 ± 4.4E-3	3.7E-1 ± 1.1E-1
GRT1	< -4.6E-2 ± 6.0E-2	< 4.0E-2 ± 5.9E-2	3.9E-4 ± 2.5E-4	1.7E-2 ± 2.2E-3	2.2E-1 ± 6.9E-2
GRT2	< 2.3E-2 ± 5.7E-2	< -6.7E-3 ± 8.4E-2	7.7E-4 ± 2.9E-4	7.1E-2 ± 7.5E-3	3.2E-1 ± 9.4E-2
GRT4	< -1.5E-2 ± 6.3E-2	< 7.5E-2 ± 7.6E-2	3.4E-4 ± 1.9E-4	1.6E-2 ± 1.9E-3	3.1E-1 ± 9.1E-2
GRT5	< 2.1E-2 ± 5.9E-2	< 2.4E-2 ± 5.6E-2	2.6E-4 ± 1.8E-4	6.9E-3 ± 1.0E-3	3.5E-1 ± 1.0E-1
GRT6	< 4.4E-2 ± 5.7E-2	< 5.6E-2 ± 7.3E-2	8.5E-4 ± 3.5E-4	1.6E-2 ± 2.2E-3	3.5E-1 ± 1.0E-1
Maximum	8.4E-2	1.5E-1	1.5E-1	1.2E-1	3.7E-1
Minimum	-8.1E-2	-3.0E-2	-2.6E-5	2.7E-3	5.1E-2
Mean	8.0E-3	4.2E-2	4.9E-3	2.5E-2	2.4E-1
Background (b)				9.0E-3	3.7E-1
Soil standards (c)	2.0E+2	2.0E+2	6.0E+1	6.0E+1	

(a) Not analyzed for this radionuclide

(b) Derived from PNL 1987 data (PNL 1988). Background numbers represent mean + 2 SE.

(c) Boothe 1987.

Table E-2. Grid Site Soil Results for 200 West Area for 1987 (pCi/g dry weight). (sheet 1 of 3)

Location	Mn-54 ± Error	Co-58 ± Error	Co-60 ± Error	Zn-65 ± Error	Sr-90 ± Error	Zr-95 ± Error	Tc-99 ± Error
2W 4	< 7.4E-3 ± 1.7E-2	< 9.2E-3 ± 1.8E-2	< -4.6E-3 ± 1.8E-2	< -2.2E-2 ± 4.5E-2	4.6E-1 ± 1.1E-1	< 2.0E-3 ± 3.9E-2	a
2W 8	< 6.6E-4 ± 1.9E-2	< -1.6E-2 ± 2.2E-2	1.1E-1 ± 3.2E-2	< 1.7E-2 ± 4.1E-2	1.1E+0 ± 2.8E-1	< 5.0E-2 ± 3.9E-2	< 5.6E-1 ± 8.6E-1
2W 9	< 7.2E-3 ± 1.7E-2	< -5.1E-3 ± 2.0E-2	2.0E-2 ± 1.5E-2	< -1.7E-3 ± 4.1E-2	3.2E+0 ± 8.0E-1	< 4.9E-2 ± 3.7E-2	< 2.0E-1 ± 9.9E-1
2W13	< 3.4E-3 ± 2.2E-2	2.2E-2 ± 2.2E-2	< -1.6E-2 ± 2.3E-2	< 1.3E-2 ± 5.4E-2	1.9E+0 ± 4.7E-1	< -8.1E-4 ± 4.0E-2	< -1.1E-1 ± 9.8E-1
2W13B	< -1.1E-2 ± 1.7E-2	< -9.5E-3 ± 1.8E-2	< -8.1E-3 ± 1.8E-2	< -2.4E-2 ± 3.9E-2	4.6E+0 ± 1.1E+0	< -3.4E-2 ± 4.0E-2	< 5.3E-1 ± 1.1E+0
2W15	< -1.1E-2 ± 2.2E-2	< -4.6E-4 ± 2.2E-2	< 9.1E-3 ± 2.0E-2	< -1.5E-2 ± 5.2E-2	8.9E-1 ± 2.2E-1	< -8.1E-3 ± 4.3E-2	a
2W16	< 1.0E-2 ± 1.6E-2	< -1.1E-2 ± 1.7E-2	2.5E-2 ± 1.3E-2	< 4.1E-3 ± 3.4E-2	1.9E-1 ± 5.2E-2	< 4.4E-3 ± 3.3E-2	< 4.0E-1 ± 1.1E+0
2W17	< -2.7E-3 ± 2.1E-2	< 2.4E-3 ± 2.0E-2	< -1.8E-2 ± 2.0E-2	< -1.7E-3 ± 3.9E-2	1.6E-1 ± 4.2E-2	< 3.0E-2 ± 3.9E-2	a
2W19	2.5E-2 ± 1.7E-2	< -7.9E-4 ± 2.1E-2	< 1.7E-2 ± 2.2E-2	< -5.0E-3 ± 4.1E-2	6.3E-1 ± 1.6E-1	< 6.9E-4 ± 4.2E-2	a
2W19B	< -1.2E-2 ± 2.2E-2	< 5.9E-3 ± 2.2E-2	< 1.9E-2 ± 2.2E-2	< -5.7E-2 ± 5.0E-2	5.8E-1 ± 1.5E-1	< -1.4E-2 ± 4.5E-2	a
2W21	< 8.8E-3 ± 1.7E-2	< 9.0E-3 ± 1.6E-2	< -1.0E-2 ± 1.9E-2	< -3.2E-2 ± 4.3E-2	1.5E-1 ± 4.0E-2	< 8.7E-3 ± 3.6E-2	a
2W23	< 1.1E-2 ± 1.6E-2	< -6.4E-3 ± 2.1E-2	< 6.0E-3 ± 2.3E-2	< -1.8E-2 ± 4.8E-2	2.3E+0 ± 5.8E-1	< -1.2E-2 ± 4.1E-2	a
2W24	< -5.5E-3 ± 1.7E-2	< -3.7E-3 ± 1.9E-2	< -5.0E-3 ± 1.8E-2	< -3.7E-2 ± 4.2E-2	2.1E-1 ± 5.4E-2	< -2.3E-2 ± 4.1E-2	< 4.4E-1 ± 1.1E+0
2W25	1.6E-2 ± 1.3E-2	1.9E-2 ± 1.2E-2	1.6E-2 ± 1.5E-2	< -3.1E-2 ± 3.3E-2	3.1E-1 ± 7.8E-2	4.0E-2 ± 2.7E-2	a
2W27	< 7.9E-3 ± 1.7E-2	< -3.8E-3 ± 1.9E-2	< -4.6E-3 ± 1.8E-2	< 7.5E-4 ± 4.1E-2	7.7E-1 ± 1.9E-1	< 6.1E-4 ± 3.3E-2	< 4.1E-1 ± 8.5E-1
2W28	< -1.3E-3 ± 1.6E-2	< -5.2E-3 ± 2.1E-2	< -2.4E-3 ± 1.5E-2	3.9E-2 ± 3.7E-2	1.0E+0 ± 2.5E-1	< -1.7E-2 ± 3.7E-2	a
2W29	< -2.9E-3 ± 1.9E-2	< 5.2E-3 ± 1.6E-2	2.6E-2 ± 1.5E-2	< -6.8E-3 ± 4.4E-2	4.6E-1 ± 1.2E-1	< -2.6E-2 ± 3.8E-2	a
2W31	2.4E-2 ± 1.7E-2	< 5.4E-3 ± 1.5E-2	1.7E-2 ± 1.4E-2	< -3.5E-2 ± 4.5E-2	1.6E-1 ± 4.2E-2	< 1.2E-3 ± 3.3E-2	< -1.3E-1 ± 9.8E-1
2W31B	< 4.2E-3 ± 1.7E-2	< -1.5E-2 ± 1.9E-2	< 1.3E-3 ± 1.5E-2	< -3.3E-2 ± 4.2E-2	1.8E-1 ± 4.8E-2	< -1.3E-2 ± 3.5E-2	< -3.9E-2 ± 9.8E-1
2W33	< 4.6E-3 ± 1.6E-2	< -6.0E-3 ± 1.6E-2	< -3.6E-3 ± 1.4E-2	< -7.8E-3 ± 3.6E-2	5.6E-1 ± 1.4E-1	< 2.0E-2 ± 3.4E-2	< 4.5E-2 ± 9.8E-1
2W34	< -5.8E-3 ± 1.7E-2	< 6.2E-4 ± 1.6E-2	< 9.0E-3 ± 1.6E-2	< 3.4E-3 ± 3.8E-2	4.7E-1 ± 1.2E-1	< 6.5E-3 ± 3.1E-2	a
2WB	< 5.3E-3 ± 1.8E-2	< -1.5E-3 ± 1.9E-2	< 1.3E-2 ± 1.8E-2	< -2.8E-2 ± 4.9E-2	2.7E-1 ± 6.8E-2	< -2.0E-3 ± 3.6E-2	< 3.6E-1 ± 1.1E+0
2WBB	< -1.3E-3 ± 1.5E-2	< -3.3E-3 ± 1.6E-2	< 2.1E-3 ± 1.2E-2	< 2.4E-2 ± 3.0E-2	2.7E-1 ± 6.7E-2	< 3.1E-3 ± 3.3E-2	< 2.4E-1 ± 1.1E+0
Maximum	2.5E-2	2.2E-2	1.1E-1	3.9E-2	4.6E+0	5.0E-2	5.6E-1
Minimum	-1.2E-2	-1.6E-2	-1.8E-2	-5.7E-2	1.5E-1	-3.4E-2	-1.3E-1
Mean	3.5E-3	-3.7E-4	9.4E-3	-1.1E-2	9.1E-1	2.7E-3	2.4E-1
Background (b)					1.5E-1		
Soil standards (c)			3.0E+2		4.0E+2		2.0E+3

E-12

WHC-EP-0145

Table E-2. Grid Site Soil Results for 200 West Area for 1987 (pCi/g dry weight). (sheet 2 of 3)

Location	Ru-106 ± Error	I-129 ± Error	Cs-134 ± Error	Cs-137 ± Error	Ce-141 ± Error	Ca-144 ± Error	Eu-152 ± Error
2W 4	1.6E-1 ± 1.6E-1	a	1.8E-2 ± 2.4E-2	1.9E+0 ± 2.0E-1	1.4E-2 ± 4.3E-2	2.8E-2 ± 1.1E-1	6.3E-2 ± 7.3E-2
2W 8	0.0E+0 ± 3.5E-1	< -2.0E+0 ± 1.1E+0	2.8E-2 ± 2.3E-2	5.2E+1 ± 5.2E+0	< -3.6E-2 ± 1.1E-1	< -2.0E-1 ± 3.0E-1	< 5.8E-2 ± 8.2E-2
2W 9	< -1.7E-1 ± 1.8E-1	< -1.5E+0 ± 6.6E-1	< 2.5E-3 ± 2.4E-2	5.9E+0 ± 6.0E-1	< -2.3E-2 ± 4.9E-2	< 3.5E-2 ± 1.3E-1	< 1.1E-1 ± 7.6E-2
2W13	< -6.2E-1 ± 3.7E-1	< -1.7E+0 ± 9.0E-1	5.6E-2 ± 2.6E-2	2.7E+1 ± 2.7E+0	< -2.2E-2 ± 9.4E-2	< -6.6E-2 ± 2.6E-1	< 5.1E-2 ± 1.1E-1
2W13B	< 1.5E-1 ± 2.3E-1	< 8.3E-2 ± 1.0E+0	6.8E-2 ± 1.9E-2	2.1E+1 ± 2.1E+0	< 4.8E-3 ± 6.2E-2	< 5.8E-2 ± 1.6E-1	< 1.2E-1 ± 7.3E-2
2W15	< -1.1E-1 ± 1.9E-1	a	6.2E-2 ± 2.3E-2	3.5E+0 ± 3.6E-1	< 6.5E-3 ± 4.8E-2	< 2.6E-2 ± 1.3E-1	< 1.6E-1 ± 8.5E-2
2W16	< 1.2E-2 ± 1.1E-1	< -2.0E-1 ± 3.1E-1	2.0E-2 ± 2.0E-2	5.1E-1 ± 6.3E-2	< -1.7E-3 ± 3.1E-2	< -3.3E-2 ± 8.8E-2	< 6.6E-2 ± 7.2E-2
2W17	< 1.3E-1 ± 1.5E-1	a	5.2E-2 ± 2.3E-2	4.6E-1 ± 6.1E-2	< -6.9E-3 ± 4.1E-2	< -2.7E-2 ± 1.1E-1	< 1.3E-1 ± 6.6E-2
2W19	< -1.0E-1 ± 2.0E-1	a	4.4E-2 ± 2.1E-2	7.7E+0 ± 7.9E-1	< -2.7E-2 ± 5.3E-2	< 8.6E-2 ± 1.3E-1	< 1.0E-1 ± 8.5E-2
2W19B	< -1.2E-1 ± 2.0E-1	a	3.3E-2 ± 2.6E-2	5.6E+0 ± 5.8E-1	< -3.3E-2 ± 5.5E-2	< -1.0E-1 ± 1.4E-1	< 1.2E-1 ± 1.0E-1
2W21	< -1.3E-1 ± 1.5E-1	a	4.9E-2 ± 2.0E-2	4.8E-1 ± 6.0E-2	< 2.5E-2 ± 3.8E-2	< 1.1E-1 ± 8.8E-2	< -1.2E-2 ± 8.7E-2
2W23	< -4.3E-1 ± 3.9E-1	a	5.0E-2 ± 2.3E-2	4.2E+1 ± 4.2E+0	< -1.5E-1 ± 1.1E-1	< 2.0E-1 ± 2.7E-1	< 4.9E-2 ± 9.2E-2
2W24	< 8.9E-2 ± 1.8E-1	< -7.1E-2 ± 3.2E-1	5.1E-2 ± 2.0E-2	2.5E+0 ± 2.6E-1	< -1.2E-2 ± 4.0E-2	< -1.6E-2 ± 1.1E-1	< -2.9E-2 ± 9.6E-2
2W25	< -1.4E-2 ± 1.1E-1	a	2.7E-2 ± 1.6E-2	8.1E-1 ± 9.1E-2	< -2.2E-2 ± 3.1E-2	< -4.7E-2 ± 8.7E-2	< 1.2E-1 ± 6.1E-2
2W27	2.3E-1 ± 1.2E-1	3.3E-1 ± 3.3E-1	5.9E-2 ± 2.0E-2	2.6E+0 ± 2.8E-1	< -7.6E-3 ± 4.0E-2	< -1.1E-2 ± 1.1E-1	< 1.1E-1 ± 5.8E-2
2W28	< -6.5E-2 ± 1.8E-1	a	2.9E-2 ± 2.0E-2	5.8E+0 ± 5.9E-1	< 7.6E-3 ± 4.4E-2	< 7.4E-3 ± 1.3E-1	< 1.2E-1 ± 7.6E-2
2W29	< 2.5E-2 ± 1.4E-1	a	< 1.6E-2 ± 2.1E-2	1.1E+0 ± 1.2E-1	< -1.8E-2 ± 4.2E-2	< -7.6E-2 ± 1.0E-1	< 1.0E-1 ± 6.9E-2
2W31	1.5E-1 ± 1.2E-1	< -8.3E-2 ± 4.9E-1	2.6E-2 ± 2.0E-2	3.5E-1 ± 4.7E-2	< -7.8E-3 ± 3.7E-2	< -6.0E-2 ± 1.0E-1	< 1.6E-2 ± 7.3E-2
2W31B	< 5.8E-2 ± 1.4E-1	< 3.5E-1 ± 4.8E-1	4.1E-2 ± 2.3E-2	6.8E-1 ± 8.1E-2	< -6.9E-3 ± 3.7E-2	< 7.6E-2 ± 9.7E-2	< 1.2E-1 ± 6.6E-2
2W33	< 4.0E-3 ± 1.3E-1	< -3.1E-1 ± 5.6E-1	5.5E-2 ± 2.0E-2	2.0E+0 ± 2.1E-1	< 2.3E-2 ± 3.5E-2	< 5.3E-2 ± 9.5E-2	< 1.4E-1 ± 6.4E-2
2W34	< -5.2E-2 ± 1.3E-1	a	3.7E-2 ± 1.8E-2	9.1E-1 ± 1.0E-1	< 4.0E-2 ± 3.7E-2	< 6.2E-2 ± 8.8E-2	< 1.1E-1 ± 6.4E-2
2WB	< -1.8E-2 ± 1.6E-1	< 4.8E-2 ± 3.0E-1	3.8E-2 ± 2.0E-2	6.2E-1 ± 7.5E-2	< -6.5E-3 ± 3.8E-2	< 1.1E-1 ± 1.0E-1	< 9.3E-3 ± 8.3E-2
2WBB	< -3.5E-2 ± 1.2E-1	8.4E-1 ± 4.3E-1	3.3E-2 ± 1.9E-2	5.5E-1 ± 6.6E-2	< -3.2E-3 ± 3.2E-2	< -5.1E-2 ± 8.9E-2	< 1.1E-1 ± 6.2E-2
Maximum	2.3E-1	8.4E-1	6.8E-2	5.2E+1	4.0E-2	2.0E-1	1.6E-1
Minimum	-6.2E-1	-2.0E+0	2.5E-3	3.5E-1	-1.5E-1	-2.0E-1	-2.9E-2
Mean	-3.7E-2	-3.5E-1	3.9E-2	8.0E+0	-1.2E-2	6.9E-3	8.4E-2
Background (b)				6.0E-1			
Soil standards (c)		2.0E+3		4.0E+2			8.0E+2

E-13

WHC-EP-0145

Table E-2. Grid Site Soil Results for 200 West Area for 1987 (pCi/g dry weight). (sheet 3 of 3)

Location	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error	U-Total ± Error
2W 4	< 3.2E-2 ± 5.9E-2	6.5E-2 ± 6.1E-2	1.6E-3 ± 4.6E-4	1.0E-1 ± 1.1E-2	2.3E-1 ± 7.0E-2
2W 8	9.0E-2 ± 5.5E-2	< 7.8E-2 ± 1.6E-1	3.8E-3 ± 1.3E-3	1.3E-1 ± 1.5E-2	2.4E-1 ± 7.3E-2
2W 9	< 1.1E-2 ± 6.0E-2	< 3.8E-2 ± 6.9E-2	1.6E-2 ± 2.3E-3	1.7E+0 ± 1.7E-1	3.2E-1 ± 9.6E-2
2W13	< 1.5E-3 ± 6.5E-2	< 8.4E-3 ± 1.4E-1	2.6E-3 ± 9.8E-4	1.1E-1 ± 1.3E-2	3.8E-1 ± 1.1E-1
2W13B	< 2.7E-2 ± 5.0E-2	< 5.5E-2 ± 8.3E-2	1.3E-3 ± 7.3E-4	8.0E-2 ± 9.4E-3	3.8E-1 ± 1.1E-1
2W15	< -1.5E-3 ± 5.8E-2	< 6.6E-2 ± 7.1E-2	1.1E-2 ± 1.7E-3	1.0E+0 ± 1.1E-1	5.9E-1 ± 1.7E-1
2W16	< -2.8E-2 ± 5.7E-2	< 3.9E-2 ± 4.7E-2	7.2E-4 ± 2.9E-4	2.0E-2 ± 2.4E-3	2.6E-1 ± 7.8E-2
2W17	< 1.2E-2 ± 4.6E-2	6.1E-2 ± 5.8E-2	6.2E-3 ± 1.0E-3	1.1E-1 ± 1.2E-2	3.1E-1 ± 9.2E-2
2W19	7.4E-2 ± 5.2E-2	< 3.8E-2 ± 7.0E-2	9.9E-3 ± 1.7E-3	5.0E-1 ± 5.0E-2	3.6E-1 ± 1.1E-1
2W19B	< -5.2E-2 ± 6.3E-2	< 6.7E-2 ± 7.3E-2	7.6E-3 ± 1.4E-3	3.4E-1 ± 3.5E-2	4.0E-1 ± 1.2E-1
2W21	< -8.0E-2 ± 5.9E-2	< 4.3E-2 ± 5.0E-2	6.5E-4 ± 3.9E-4	1.4E-2 ± 2.3E-3	1.9E-1 ± 5.9E-2
2W23	< 1.5E-2 ± 6.0E-2	< -4.3E-2 ± 1.6E-1	1.9E-2 ± 4.1E-3	1.1E+0 ± 1.1E-1	3.5E-1 ± 1.0E-1
2W24	< -2.7E-2 ± 5.8E-2	< 2.2E-3 ± 6.7E-2	1.2E-3 ± 4.2E-4	5.0E-2 ± 5.7E-3	1.1E+0 ± 2.9E-1
2W25	< 7.7E-3 ± 4.5E-2	6.4E-2 ± 4.2E-2	7.6E-4 ± 3.3E-4	2.9E-2 ± 3.5E-3	8.4E-1 ± 2.3E-1
2W27	< -2.5E-2 ± 5.4E-2	6.8E-2 ± 5.8E-2	1.4E-3 ± 4.2E-4	2.9E-2 ± 3.4E-3	2.4E-1 ± 7.2E-2
2W28	< 5.4E-2 ± 5.5E-2	< 6.4E-2 ± 7.3E-2	1.5E-3 ± 5.6E-4	2.0E-2 ± 2.7E-3	2.4E-1 ± 7.2E-2
2W29	< 4.1E-2 ± 5.5E-2	< 1.2E-2 ± 5.6E-2	2.4E-3 ± 6.1E-4	5.0E-2 ± 5.8E-3	2.7E-1 ± 8.0E-2
2W31	7.4E-2 ± 4.8E-2	< 1.3E-2 ± 6.3E-2	1.4E-3 ± 4.1E-4	4.8E-2 ± 5.2E-3	2.6E-1 ± 7.8E-2
2W31B	< 4.0E-2 ± 4.5E-2	< -2.5E-2 ± 5.6E-2	3.3E-3 ± 6.7E-4	1.2E-1 ± 1.3E-2	2.5E-1 ± 7.7E-2
2W33	< 2.6E-2 ± 4.9E-2	< 3.2E-2 ± 4.8E-2	3.1E-3 ± 6.7E-4	1.2E-1 ± 1.2E-2	2.4E-1 ± 7.4E-2
2W34	5.4E-2 ± 4.5E-2	< 1.2E-2 ± 5.3E-2	3.9E-1 ± 4.3E-2	6.1E-2 ± 7.2E-3	2.7E-1 ± 8.0E-2
2WB	5.5E-2 ± 5.5E-2	< 2.6E-2 ± 6.5E-2	9.1E-4 ± 3.2E-4	1.9E-2 ± 2.3E-3	2.1E-1 ± 6.5E-2
2WBB	< 3.9E-2 ± 4.9E-2	5.0E-2 ± 4.6E-2	1.9E-3 ± 4.9E-4	2.1E-2 ± 2.6E-3	2.3E-1 ± 7.1E-2
Maximum	9.0E-2	7.8E-2	3.9E-1	1.7E+0	1.1E+0
Minimum	-8.0E-2	-4.3E-2	6.5E-4	1.4E-2	1.9E-1
Mean	1.9E-2	3.6E-2	2.1E-2	2.5E-1	3.5E-1
Background (b)				9.0E-3	3.7E-1
Soil standards (c)	2.0E+2	2.0E+2	6.0E+1	6.0E+1	

(a) Not analyzed for this radionuclide

(b) Derived from PNL 1987 data (PNL 1988). Background numbers represent mean + 2 SE.

(c) Boothe 1987.

Table E-3. The <sup>137</sup>Cs Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 1 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2E 1	4.2E+0 ± 2.6E-1	1.3E+0 ± 1.0E-1	3.4E+0 ± 1.6E-1	5.7E-2 ± 4.6E-2	1.6E+0 ± 1.2E-1	1.3E+0 ± 1.1E-1	b	b	b	1.7E+0 ± 1.8E-1
2E 2	2.0E+1 ± 5.6E-1	3.7E+0 ± 1.7E-1	2.1E-1 ± 4.2E-2	1.9E+0 ± 1.7E-1	1.9E+0 ± 1.1E-1	1.6E-1 ± 4.2E-2	b	6.8E+0 ± 4.6E-1	1.1E-1 ± 3.2E-2	b
2E 3	5.1E+1 ± 8.9E-1	3.4E+0 ± 1.6E-1	7.4E+0 ± 2.4E-1	1.6E+1 ± 5.2E-1	5.5E+0 ± 2.2E-1	1.2E+1 ± 3.1E-1	1.8E+1 ± 3.0E-1	3.2E+1 ± 1.9E+0	1.7E+1 ± 1.7E+0	1.3E+1 ± 1.3E+0
2E 4	2.3E+1 ± 5.9E-1	5.0E+0 ± 2.0E-1	2.3E+0 ± 1.2E-1	1.0E+1 ± 3.9E-1	4.7E+0 ± 2.0E-1	2.9E+0 ± 1.6E-1	1.2E+1 ± 2.5E-1	1.7E+1 ± 1.1E+0	1.9E+1 ± 2.0E+0	1.8E+1 ± 1.8E+0
2E 5	5.5E+0 ± 3.0E-1	2.2E+0 ± 1.3E-1	1.4E+0 ± 1.0E-1	1.4E+0 ± 1.2E-1	5.0E-1 ± 7.4E-2	1.7E+0 ± 1.1E-1	3.5E+0 ± 1.4E-1	6.5E+0 ± 4.3E-1	6.4E+0 ± 6.5E-1	b
2E 6	5.5E+0 ± 2.9E-1	2.1E+0 ± 1.3E-1	1.7E+0 ± 1.2E-1	1.8E+0 ± 1.6E-1	2.0E+0 ± 1.4E-1	7.3E-1 ± 7.8E-2	5.0E+0 ± 1.7E-1	4.5E+0 ± 3.2E-1	b	b
2E 7	3.4E+0 ± 2.3E-1	1.0E+0 ± 9.3E-2	1.3E+0 ± 9.9E-2	2.2E+0 ± 1.9E-1	1.5E-1 ± 2.7E-2	1.7E+0 ± 1.3E-1	1.2E+0 ± 7.0E-2	b	b	b
2E 8	1.3E+1 ± 4.6E-1	4.6E+0 ± 1.9E-1	1.9E+0 ± 1.2E-1	2.4E+0 ± 1.8E-1	9.6E+0 ± 3.2E-1	1.7E-1 ± 4.3E-2	3.9E+0 ± 1.3E-1	1.2E+1 ± 7.8E-1	5.8E+0 ± 6.0E-1	3.8E+0 ± 3.9E-1
2E 9	3.8E+1 ± 7.8E-1	b	3.6E+0 ± 1.6E-1	3.0E+1 ± 7.0E-1	1.3E+1 ± 3.3E-1	8.3E+0 ± 2.6E-1	1.0E+1 ± 2.3E-1	1.3E+1 ± 8.1E-1	1.7E+1 ± 1.7E+0	b
2E10	4.3E+1 ± 8.2E-1	8.6E+0 ± 2.6E-1	8.6E+0 ± 2.8E-1	3.1E+0 ± 2.0E-1	3.9E+0 ± 1.1E-1	3.1E+0 ± 1.6E-1	1.2E+1 ± 2.4E-1	2.2E+1 ± 1.4E+0	1.0E+1 ± 1.0E+0	3.1E+1 ± 3.1E+0
2E11	1.3E+1 ± 4.1E-1	7.4E+0 ± 2.4E-1	7.9E+0 ± 2.6E-1	2.7E+0 ± 2.1E-1	3.3E+0 ± 1.6E-1	2.2E+1 ± 5.9E-1	8.5E+0 ± 2.2E-1	1.3E+1 ± 8.3E-1	1.4E+1 ± 1.4E+0	b
2E12	3.5E+1 ± 7.9E-1	3.2E-1 ± 5.5E-2	6.7E+0 ± 2.4E-1	1.6E+1 ± 4.4E-1	3.5E+1 ± 9.3E-1	3.0E+1 ± 2.7E-1	1.5E+1 ± 3.1E-1	1.2E+1 ± 7.8E-1	2.6E+1 ± 2.6E+0	1.5E-1 ± 3.0E-2
2E13	1.5E+0 ± 1.5E-1	2.9E-1 ± 5.2E-2	2.6E-1 ± 5.3E-2	2.1E+0 ± 1.6E-1	8.8E-1 ± 7.8E-2	3.5E-1 ± 5.3E-2	b	1.2E+0 ± 1.2E-1	1.0E+0 ± 1.2E-1	b
2E14	8.7E-1 ± 1.2E-1	6.7E-1 ± 7.6E-2	8.4E-1 ± 8.2E-2	6.7E-1 ± 1.1E-1	1.0E+0 ± 5.7E-2	1.5E+0 ± 1.0E-1	1.6E+0 ± 8.7E-2	1.4E+0 ± 1.2E-1	2.3E+1 ± 2.3E+0	2.9E+0 ± 3.0E-1
2E15	2.0E+0 ± 1.7E-1	1.4E+0 ± 1.1E-1	1.3E+0 ± 9.2E-2	2.8E+0 ± 1.8E-1	3.7E+0 ± 2.3E-2	1.4E+0 ± 9.4E-2	b	3.3E+0 ± 2.3E-1	2.1E+0 ± 2.4E-1	b
2E16	9.8E+0 ± 3.8E-1	1.8E+0 ± 1.2E-1	1.7E+0 ± 1.1E-1	1.6E+0 ± 1.4E-1	9.8E-1 ± 9.6E-2	2.4E+0 ± 1.3E-1	1.7E+0 ± 9.3E-2	3.1E+0 ± 2.2E-1	4.3E+0 ± 4.6E-1	4.3E+0 ± 4.4E-1
2E17	8.7E+0 ± 3.6E-1	2.0E+0 ± 1.3E-1	3.0E+0 ± 1.7E-1	2.3E+0 ± 1.6E-1	4.5E+0 ± 1.2E-1	1.2E+0 ± 9.8E-2	4.4E+0 ± 1.4E-1	3.4E+0 ± 2.5E-1	2.2E+0 ± 2.5E-1	5.7E+0 ± 5.9E-1
2E18	1.3E+1 ± 4.5E-1	3.4E+0 ± 1.7E-1	5.3E+0 ± 2.0E-1	4.6E+0 ± 2.3E-1	9.8E+0 ± 1.7E-1	8.2E+0 ± 2.3E-1	5.8E+0 ± 1.7E-1	5.2E+0 ± 3.5E-1	1.0E+1 ± 1.1E+0	4.6E+0 ± 4.7E-1
2E19	2.1E+0 ± 1.8E-1	2.4E-1 ± 4.8E-2	7.9E-1 ± 9.0E-2	9.4E-1 ± 1.2E-1	2.6E-1 ± 4.7E-2	1.7E+0 ± 1.2E-1	1.1E+0 ± 7.6E-2	b	b	7.3E-1 ± 8.3E-2
2E20	1.4E+0 ± 1.4E-1	7.1E-1 ± 7.8E-2	6.3E-1 ± 7.3E-2	7.3E-1 ± 1.1E-1	7.5E-1 ± 8.6E-2	6.8E-1 ± 7.8E-2	b	1.9E+0 ± 1.5E-1	1.5E+0 ± 1.7E-1	b
2E21	1.1E+0 ± 1.3E-1	2.5E-1 ± 4.9E-2	6.8E-1 ± 7.7E-2	1.2E+0 ± 1.2E-1	9.5E-1 ± 8.3E-2	8.5E-1 ± 8.5E-2	8.5E-1 ± 7.0E-2	1.0E+0 ± 9.4E-2	b	6.4E-1 ± 7.8E-2
2E22	2.8E+0 ± 2.0E-1	5.4E-1 ± 6.9E-2	2.2E+0 ± 1.4E-1	1.5E+0 ± 1.3E-1	2.0E+0 ± 1.2E-1	2.1E+0 ± 1.2E-1	b	2.3E+0 ± 1.9E-1	3.1E+0 ± 3.2E-1	b
2E23	1.1E+1 ± 4.1E-1	6.6E+0 ± 2.3E-1	8.9E-1 ± 8.5E-2	1.1E+1 ± 5.1E-1	8.3E+0 ± 2.7E-1	5.6E+0 ± 2.2E-1	4.3E+0 ± 1.4E-1	9.3E+0 ± 6.1E-1	1.0E+1 ± 1.0E+0	1.1E+1 ± 1.1E+0
2E24	1.6E+1 ± 5.0E-1	9.7E+0 ± 2.8E-1	5.1E+0 ± 2.1E-1	1.2E+1 ± 4.2E-1	6.7E+0 ± 2.0E-1	4.9E+0 ± 1.8E-1	1.1E+1 ± 2.1E-1	4.9E+0 ± 3.5E-1	9.0E+0 ± 9.2E-1	6.8E+0 ± 6.9E-1
2E25	1.5E+0 ± 1.4E-1	4.5E-1 ± 6.4E-2	5.5E-1 ± 6.6E-2	6.1E-1 ± 8.1E-2	7.9E-1 ± 7.4E-2	5.9E-1 ± 7.3E-2	b	b	b	b
2E26	1.4E+0 ± 1.4E-1	5.1E-1 ± 6.7E-2	4.2E-1 ± 6.4E-2	1.2E+0 ± 1.3E-1	9.6E-1 ± 9.7E-2	6.9E-1 ± 7.7E-2	b	b	b	6.8E-1 ± 8.2E-2
2E27	5.6E-1 ± 8.9E-2	5.8E-1 ± 7.1E-2	3.8E-1 ± 5.5E-2	4.6E-1 ± 8.9E-2	2.3E-1 ± 5.2E-2	2.8E-1 ± 5.3E-2	2.4E-1 ± 4.4E-2	3.2E-1 ± 5.2E-2	3.2E-1 ± 5.1E-2	b
2E28	1.0E+0 ± 1.2E-1	3.0E-1 ± 5.3E-2	3.7E-1 ± 6.3E-2	7.1E-1 ± 9.4E-2	3.3E-1 ± 6.0E-2	4.3E-1 ± 6.4E-2	b	9.4E-1 ± 9.9E-2	b	6.0E-1 ± 7.3E-2
2E29	3.3E+0 ± 2.2E-1	b	1.3E+0 ± 1.0E-1	3.5E+0 ± 2.2E-1	1.0E+0 ± 1.4E-1	3.9E-1 ± 5.4E-2	2.2E+0 ± 1.0E-1	3.0E+0 ± 2.3E-1	2.4E+0 ± 2.6E-1	b
2E30	2.9E+0 ± 2.1E-1	2.7E+0 ± 1.5E-1	5.3E-1 ± 7.4E-2	5.9E-1 ± 9.3E-2	1.1E+0 ± 9.9E-2	b	1.9E-1 ± 3.4E-2	2.3E-1 ± 4.2E-2	b	2.2E-1 ± 3.3E-2
2E31	5.6E-1 ± 9.2E-2	5.3E-1 ± 6.8E-2	3.3E-1 ± 5.4E-2	3.6E-1 ± 6.9E-2	3.2E-1 ± 5.9E-2	3.5E-1 ± 5.8E-2	4.5E-1 ± 5.7E-2	4.3E-1 ± 6.3E-2	5.0E-1 ± 7.1E-2	b
2E32	1.1E+0 ± 1.3E-1	7.7E-1 ± 8.1E-2	3.7E-1 ± 5.4E-2	2.3E-1 ± 5.8E-2	5.7E-1 ± 6.3E-2	8.3E-1 ± 8.8E-2	3.4E-1 ± 4.8E-2	1.4E+0 ± 1.0E-1	7.7E-1 ± 1.0E-1	4.7E-1 ± 5.9E-2
2E33	9.8E-2 ± 4.1E-2	1.1E-1 ± 3.7E-2	1.1E-1 ± 3.7E-2	-6.7E-3 ± 2.9E-2	1.0E-1 ± 3.9E-2	5.0E-2 ± 3.0E-2	4.5E-2 ± 2.2E-2	5.8E-2 ± 2.4E-2	b	b
2E34	1.9E+0 ± 1.6E-1	8.7E-1 ± 8.5E-2	1.2E+0 ± 1.0E-1	6.0E-1 ± 9.1E-2	8.3E-1 ± 9.1E-2	7.5E-1 ± 7.6E-2	1.0E+0 ± 7.1E-2	1.1E+0 ± 9.0E-2	1.6E+0 ± 1.8E-1	2.2E-1 ± 4.1E-2
2E35	1.1E+0 ± 1.2E-1	5.2E-1 ± 6.7E-2	6.3E-1 ± 7.2E-2	3.0E-1 ± 6.2E-2	7.1E-1 ± 7.2E-2	5.8E-1 ± 6.8E-2	7.1E-1 ± 6.4E-2	8.6E-1 ± 6.8E-2	b	6.1E-1 ± 7.2E-2
2E36	1.3E+0 ± 1.4E-1	6.7E-1 ± 7.6E-2	5.0E-1 ± 6.4E-2	4.3E-1 ± 7.6E-2	1.1E+0 ± 8.6E-2	5.0E-1 ± 6.2E-2	8.0E-1 ± 5.8E-2	6.6E-1 ± 6.2E-2	5.3E-1 ± 7.2E-2	b
2EA	5.7E-1 ± 9.4E-2	2.1E-1 ± 4.6E-2	3.7E-1 ± 6.0E-2	2.7E-1 ± 6.3E-2	4.8E-1 ± 4.0E-2	3.5E-1 ± 5.7E-2	3.9E-1 ± 4.6E-2	3.3E-1 ± 4.0E-2	6.0E-1 ± 7.7E-2	3.8E-1 ± 4.8E-2
2EB	2.5E+0 ± 2.0E-1	4.9E-1 ± 6.6E-2	4.6E-1 ± 6.4E-2	1.1E+0 ± 1.3E-1	1.9E+0 ± 7.5E-2	4.2E-1 ± 6.1E-2	8.1E-1 ± 7.0E-2	2.9E+0 ± 1.9E-1	9.8E-1 ± 1.2E-1	1.0E+0 ± 1.1E-1
2EC	1.3E+0 ± 1.4E-1	1.2E+0 ± 9.9E-2	1.2E+0 ± 1.4E-1	8.1E-1 ± 1.0E-1	1.2E+0 ± 8.9E-2	2.0E+0 ± 1.3E-1	1.7E+0 ± 8.2E-2	1.8E+0 ± 1.3E-1	1.8E+0 ± 1.9E-1	8.3E-1 ± 9.6E-2
2ED	6.7E+0 ± 3.1E-1	2.8E+0 ± 1.5E-1	2.6E+0 ± 1.4E-1	1.6E+0 ± 1.3E-1	5.4E+0 ± 2.1E-1	1.6E+0 ± 1.2E-1	2.3E+0 ± 1.0E-1	8.2E+0 ± 5.1E-1	2.3E+0 ± 2.5E-1	2.8E+0 ± 2.9E-1
Mean (a)	8.8E+0 ± 4.0E+0	2.1E+0 ± 8.0E-1	2.0E+0 ± 7.3E-1	3.5E+0 ± 1.9E+0	3.4E+0 ± 1.9E+0	3.2E+0 ± 1.9E+0	4.2E+0 ± 1.8E+0	5.7E+0 ± 2.4E+0	6.6E+0 ± 2.8E+0	4.6E+0 ± 3.0E+0

E-15

WHC-EP-0145

Table E-3. The <sup>137</sup>Cs Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 2 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2W 1	9.0E-1 ± 1.2E-1	5.7E-1 ± 7.0E-2	7.1E-1 ± 7.4E-2	2.7E+0 ± 1.6E-1	4.5E-1 ± 4.1E-2	5.3E-1 ± 7.0E-2	b	b	b	b
2W 2	1.6E+1 ± 5.0E-1	1.5E+0 ± 1.1E-1	1.8E+1 ± 3.7E-1	5.7E-1 ± 8.3E-2	6.4E+0 ± 1.6E-1	7.0E+0 ± 2.4E-1	b	b	b	b
2W 3	1.7E+0 ± 1.6E-1	1.2E+0 ± 9.9E-2	8.3E-1 ± 8.1E-2	1.4E+0 ± 1.3E-1	9.2E-1 ± 9.1E-2	3.8E-1 ± 5.9E-2	1.2E+0 ± 9.0E-2	3.1E+0 ± 3.0E-1	8.7E-1 ± 1.1E-1	b
2W 4	2.8E+0 ± 2.0E-1	1.7E+0 ± 1.2E-1	1.5E+0 ± 1.2E-1	1.4E+0 ± 1.3E-1	1.7E+0 ± 1.2E-1	1.1E+0 ± 1.0E-1	9.9E-1 ± 1.0E-1	2.6E+0 ± 2.6E-1	1.4E+0 ± 1.6E-1	1.9E+0 ± 2.0E-1
2W 5	2.8E+0 ± 2.1E-1	5.0E-1 ± 6.6E-2	2.3E+0 ± 1.6E-1	2.8E+0 ± 2.1E-1	6.0E-1 ± 5.0E-1	7.6E-1 ± 7.5E-2	b	3.3E+0 ± 3.0E-1	1.6E+0 ± 1.8E-1	b
2W 6	7.5E-1 ± 1.1E-1	2.2E-1 ± 4.7E-2	3.7E-1 ± 5.5E-2	2.9E-1 ± 6.1E-2	3.3E-1 ± 3.6E-2	3.9E-1 ± 5.7E-2	1.0E-1 ± 3.2E-2	b	1.1E-1 ± 3.1E-2	b
2W 7	1.7E+1 ± 5.1E-1	2.6E+0 ± 1.4E-1	6.0E+0 ± 2.3E-1	5.1E+0 ± 2.5E-1	2.0E+0 ± 8.4E-2	5.0E+0 ± 2.0E-1	7.4E+0 ± 4.9E-1	9.9E+0 ± 7.0E-1	4.5E+0 ± 4.8E-1	b
2W 8	9.5E+1 ± 1.2E+0	3.2E+1 ± 5.0E-1	2.1E+1 ± 3.7E-1	7.3E+1 ± 8.8E-1	7.4E+1 ± 4.9E-1	3.6E+1 ± 5.1E-1	6.0E+1 ± 3.7E+0	5.9E+1 ± 3.7E+0	3.9E+1 ± 3.9E+0	5.2E+1 ± 5.2E+0
2W 9	4.5E+0 ± 2.6E-1	b	2.0E+0 ± 1.3E-1	4.1E+0 ± 2.1E-1	2.4E+0 ± 1.6E-1	5.3E+0 ± 2.1E-1	4.3E+0 ± 3.0E-1	3.9E+0 ± 3.3E-1	4.9E+0 ± 5.0E-1	5.9E+0 ± 6.0E-1
2W10	5.1E-1 ± 9.0E-2	1.3E+0 ± 1.0E-1	1.2E+0 ± 1.0E-1	2.1E+0 ± 1.6E-1	1.1E+0 ± 9.1E-2	1.3E+0 ± 1.1E-1	2.3E+0 ± 1.8E-1	1.8E+0 ± 2.0E-1	1.1E+0 ± 1.2E-1	b
2W11	3.2E-1 ± 7.2E-2	3.9E-1 ± 6.0E-2	2.5E-1 ± 4.6E-2	3.0E-1 ± 6.9E-2	2.0E-1 ± 5.2E-2	4.6E-1 ± 6.2E-2	b	b	b	b
2W12	1.3E+0 ± 1.4E-1	1.2E+0 ± 1.0E-1	1.4E+0 ± 9.6E-2	9.8E-1 ± 1.0E-1	1.1E+0 ± 8.9E-2	1.4E+0 ± 1.1E-1	9.4E-1 ± 9.2E-2	1.2E+0 ± 1.5E-1	9.2E-1 ± 1.1E-1	b
2W13	4.0E+1 ± 7.8E-1	2.1E+1 ± 4.1E-1	1.8E+1 ± 3.5E-1	1.4E+1 ± 4.7E-1	3.4E+1 ± 4.9E-1	2.5E+1 ± 4.5E-1	1.7E+1 ± 2.9E-1	1.2E+1 ± 8.1E-1	2.2E+1 ± 2.3E+0	2.7E+1 ± 2.7E+0
2W14	3.4E+0 ± 2.3E-1	5.3E-1 ± 6.8E-2	1.0E+0 ± 9.6E-2	1.8E+0 ± 1.7E-1	2.5E+0 ± 1.6E-1	1.9E+0 ± 1.1E-1	2.7E+0 ± 2.0E-1	2.4E+0 ± 2.3E-1	3.2E+0 ± 3.5E-1	b
2W15	3.7E+0 ± 2.4E-1	1.6E+0 ± 1.1E-1	7.9E-1 ± 8.0E-2	6.9E-1 ± 9.8E-2	1.7E+0 ± 8.3E-2	7.1E-1 ± 7.5E-2	b	4.7E+0 ± 4.0E-1	6.6E-1 ± 8.5E-2	3.5E+0 ± 3.6E-1
2W16	7.3E-1 ± 1.1E-1	2.9E-1 ± 5.2E-2	2.1E-1 ± 4.2E-2	3.7E-1 ± 6.9E-2	4.5E-1 ± 4.1E-2	4.8E-1 ± 6.5E-2	6.2E-1 ± 7.4E-2	b	5.9E-1 ± 7.9E-2	5.1E-1 ± 6.3E-2
2W17	2.8E+0 ± 2.1E-1	1.6E+0 ± 1.1E-1	4.8E-1 ± 7.3E-2	5.5E-1 ± 9.2E-2	3.3E-1 ± 3.4E-2	3.2E-1 ± 5.8E-2	6.1E-1 ± 7.1E-2	9.6E-1 ± 1.4E-1	5.0E-1 ± 7.9E-2	4.6E-1 ± 6.1E-2
2W18	1.7E+0 ± 1.6E-1	2.6E+0 ± 1.5E-1	7.0E-1 ± 7.1E-2	1.8E+0 ± 2.0E-1	6.6E-1 ± 7.5E-2	1.6E+0 ± 1.1E-1	1.8E+0 ± 9.5E-2	1.7E+0 ± 1.8E-1	1.8E+0 ± 2.0E-1	b
2W19	9.7E+0 ± 3.9E-1	8.4E+0 ± 2.6E-1	3.9E+0 ± 1.7E-1	6.7E+0 ± 2.9E-1	1.0E+1 ± 3.5E-1	8.0E+0 ± 2.6E-1	b	7.3E+0 ± 5.4E-1	6.2E+0 ± 6.5E-1	7.7E+0 ± 7.9E-1
2W20	1.9E+0 ± 1.7E-1	4.6E-1 ± 6.4E-2	7.8E-1 ± 8.4E-2	1.0E+0 ± 1.1E-1	7.6E-1 ± 7.6E-2	9.2E-1 ± 8.9E-2	1.1E+0 ± 1.1E-1	3.0E+0 ± 2.7E-1	1.1E+0 ± 1.3E-1	b
2W21	6.8E-1 ± 1.0E-1	3.1E-1 ± 5.4E-2	3.3E-1 ± 5.6E-2	5.3E-1 ± 8.1E-2	3.4E-1 ± 3.7E-2	7.1E-1 ± 7.6E-2	b	1.4E+0 ± 1.7E-1	6.3E-1 ± 8.2E-2	4.8E-1 ± 6.0E-2
2W22	1.6E+0 ± 1.6E-1	7.4E-1 ± 8.0E-2	5.4E-1 ± 6.9E-2	5.8E-1 ± 8.9E-2	1.5E+0 ± 7.0E-2	1.1E+0 ± 8.9E-2	1.1E+0 ± 9.7E-2	1.5E+0 ± 1.6E-1	8.3E-1 ± 1.0E-1	b
2W23	1.4E+2 ± 1.5E+0	1.4E+2 ± 1.0E+0	5.0E+1 ± 5.7E-1	4.4E+1 ± 7.5E-1	9.6E+1 ± 8.1E-1	5.7E+1 ± 6.5E-1	4.6E+1 ± 2.8E+0	7.7E+1 ± 4.7E+0	5.8E+1 ± 5.8E+0	4.2E+1 ± 4.2E+0
2W24	3.4E+0 ± 2.3E-1	4.2E+0 ± 1.8E-1	2.4E+0 ± 1.3E-1	2.5E+0 ± 1.8E-1	4.7E+0 ± 1.8E-1	4.5E+0 ± 1.8E-1	4.5E+0 ± 3.1E-1	2.5E+0 ± 2.4E-1	2.8E+0 ± 3.0E-1	2.5E+0 ± 2.6E-1
2W25	2.9E+0 ± 2.1E-1	5.0E-1 ± 6.6E-2	7.5E-1 ± 7.8E-2	3.9E-1 ± 6.9E-2	1.4E+0 ± 7.2E-2	7.1E-1 ± 7.4E-2	b	8.8E-1 ± 1.2E-1	b	8.1E-1 ± 9.1E-2
2W26	1.6E+0 ± 1.6E-1	3.0E-1 ± 5.3E-2	2.6E-1 ± 4.6E-2	7.4E-1 ± 9.4E-2	3.3E-1 ± 3.5E-2	5.9E-1 ± 6.9E-2	1.9E-1 ± 3.5E-2	b	b	b
2W27	1.0E+1 ± 4.0E-1	2.6E+0 ± 1.4E-1	2.2E+0 ± 1.3E-1	9.5E+0 ± 3.6E-1	3.4E+0 ± 1.5E-1	1.0E+1 ± 2.5E-1	6.6E+0 ± 1.7E-1	b	1.7E+0 ± 1.8E-1	2.6E+0 ± 2.8E-1
2W28	8.1E-1 ± 1.1E-1	3.6E-1 ± 5.7E-2	1.0E+0 ± 8.5E-2	4.0E+0 ± 2.8E-1	4.7E+0 ± 2.2E-1	3.9E+0 ± 1.6E-1	3.7E+0 ± 2.5E-1	2.1E+1 ± 1.3E+0	3.7E+0 ± 3.9E-1	5.8E+0 ± 5.9E-1
2W29	2.3E+0 ± 1.9E-1	9.8E-1 ± 9.0E-2	1.0E+0 ± 9.4E-2	1.7E+0 ± 1.8E-1	1.2E+0 ± 9.4E-2	2.1E+0 ± 1.4E-1	b	2.4E+0 ± 2.3E-1	1.5E+0 ± 1.8E-1	1.1E+0 ± 1.2E-1
2W30	2.2E+0 ± 1.9E-1	4.0E-2 ± 2.9E-2	9.3E-1 ± 8.7E-2	1.2E+0 ± 1.2E-1	9.0E-1 ± 5.9E-2	1.2E+0 ± 1.0E-1	7.6E-1 ± 8.2E-2	2.0E+0 ± 2.0E-1	b	b
2W31	9.0E-1 ± 1.2E-1	7.2E-1 ± 7.8E-2	2.9E-1 ± 5.2E-2	1.1E+0 ± 1.4E-1	7.1E-1 ± 7.8E-2	4.9E-1 ± 6.3E-2	b	b	b	3.5E-1 ± 4.7E-2
2W32	1.1E+0 ± 1.3E-1	9.0E-1 ± 8.7E-2	4.2E-1 ± 5.8E-2	1.2E+0 ± 1.3E-1	1.4E+0 ± 1.2E-1	6.9E-1 ± 7.6E-2	b	b	b	b
2W33	1.6E+0 ± 1.6E-1	1.3E+0 ± 1.0E-1	1.6E+0 ± 1.0E-1	1.4E+0 ± 1.6E-1	1.7E+1 ± 3.2E-1	2.1E+0 ± 1.3E-1	2.2E+0 ± 1.7E-1	1.9E+0 ± 1.9E-1	1.3E+0 ± 1.4E-1	2.0E+0 ± 2.1E-1
2W34	2.7E+0 ± 2.0E-1	1.3E+0 ± 1.0E-1	1.5E+0 ± 1.1E-1	1.4E+0 ± 1.4E-1	9.1E-1 ± 5.7E-2	1.9E+0 ± 1.2E-1	1.3E+0 ± 8.4E-2	1.9E+0 ± 2.0E-1	1.6E+0 ± 1.8E-1	9.1E-1 ± 1.0E-1
2W35	1.5E+0 ± 1.5E-1	7.2E-1 ± 7.8E-2	6.0E-1 ± 6.8E-2	8.7E-1 ± 1.2E-1	6.2E-1 ± 4.8E-2	7.5E-1 ± 7.8E-2	b	6.8E-1 ± 1.0E-1	b	b
2WA	1.1E+0 ± 1.3E-1	2.7E-2 ± 2.7E-2	2.1E-1 ± 4.6E-2	2.8E-1 ± 6.4E-2	4.2E-1 ± 6.1E-2	1.0E+0 ± 9.3E-2	4.8E-1 ± 6.3E-2	b	4.6E-1 ± 6.0E-2	b
2WB	1.9E+0 ± 1.7E-1	8.0E-1 ± 8.3E-2	4.8E-1 ± 6.2E-2	2.0E-1 ± 5.7E-2	7.1E-1 ± 8.5E-2	4.8E-1 ± 6.5E-2	b	b	b	6.2E-1 ± 7.5E-2
2WC	5.2E-1 ± 9.2E-2	4.3E-1 ± 6.2E-2	2.6E-1 ± 4.5E-2	3.2E-1 ± 6.0E-2	5.4E-1 ± 6.8E-2	4.5E-1 ± 6.0E-2	b	b	b	b
2WD	6.7E-1 ± 1.0E-1	2.1E-1 ± 4.6E-2	3.5E-1 ± 6.0E-2	6.9E-1 ± 1.0E-1	4.9E-1 ± 4.2E-2	4.3E-1 ± 6.6E-2	b	b	b	b
2WE	4.2E-1 ± 8.1E-2	3.7E-1 ± 5.8E-2	3.7E-1 ± 5.6E-2	4.5E-1 ± 7.7E-2	1.0E-1 ± 4.0E-2	4.5E-1 ± 6.3E-2	b	b	b	b
2WF	1.7E-1 ± 5.4E-2	1.3E-1 ± 5.5E-2	1.3E-1 ± 3.9E-2	1.8E-1 ± 5.1E-2	6.3E-1 ± 7.2E-2	4.4E-1 ± 6.3E-2	b	b	b	b
Mean (a)	9.3E+0 ± 8.0E+0	5.9E+0 ± 7.0E+0	3.6E+0 ± 2.8E+0	4.7E+0 ± 4.0E+0	6.8E+0 ± 5.9E+0	4.6E+0 ± 3.4E+0	7.0E+0 ± 6.1E+0	8.8E+0 ± 7.1E+0	6.0E+0 ± 5.1E+0	8.3E+0 ± 6.9E+0

(a) Individual results ±2 sigma overall error. Means ±2 standard error of the calculated mean.

(b) Site not sampled.

Table E-4. The <sup>90</sup>Sr Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 1 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2E 1	7.7E-1 ± 4.0E-2	2.5E-1 ± 2.7E-2	3.4E-1 ± 6.3E-2	1.8E-1 ± 2.9E-2	1.6E-1 ± 4.3E-2	9.8E-2 ± 3.1E-2	b	b	b	2.4E-1 ± 6.1E-2
2E 2	1.5E+0 ± 4.7E-2	5.2E-1 ± 3.6E-2	2.2E-2 ± 2.9E-2	3.4E-1 ± 2.9E-2	1.2E-1 ± 3.1E-2	4.7E-2 ± 1.7E-2	b	3.9E-1 ± 8.3E-2	5.1E-2 ± 1.7E-2	b
2E 3	3.1E+0 ± 6.8E-2	4.7E-1 ± 3.2E-2	6.1E-1 ± 3.2E-2	4.2E-1 ± 2.9E-2	4.5E-1 ± 9.0E-2	3.2E-1 ± 5.1E-2	2.5E+0 ± 1.1E-1	7.6E-1 ± 1.5E-1	7.2E-1 ± 1.8E-1	7.8E-1 ± 2.0E-1
2E 4	1.0E+0 ± 3.8E-2	4.7E-1 ± 3.0E-2	3.4E-1 ± 6.8E-2	6.0E-1 ± 3.0E-2	2.6E-1 ± 6.1E-2	3.6E-1 ± 3.8E-2	1.0E+0 ± 8.7E-2	8.6E-1 ± 1.6E-1	8.6E-1 ± 1.6E-1	9.3E-1 ± 2.3E-1
2E 5	7.7E-1 ± 4.1E-2	5.2E-1 ± 3.4E-2	6.0E-2 ± 2.8E-2	3.5E-1 ± 2.9E-2	2.2E-1 ± 3.9E-2	1.3E-1 ± 2.3E-2	6.6E-1 ± 5.1E-2	6.1E-1 ± 1.2E-1	8.4E-1 ± 1.6E-1	b
2E 6	1.4E+0 ± 4.6E-2	8.5E-1 ± 4.3E-2	5.5E-1 ± 2.8E-2	6.8E-1 ± 3.2E-2	4.4E-1 ± 9.7E-2	1.2E-1 ± 1.6E-2	8.6E-1 ± 6.1E-2	7.0E-1 ± 1.4E-1	b	b
2E 7	4.5E-1 ± 3.1E-2	4.7E-1 ± 3.2E-2	3.1E-1 ± 2.5E-2	3.3E-1 ± 2.9E-2	8.3E-2 ± 2.8E-2	2.9E-1 ± 3.1E-2	2.9E-1 ± 3.9E-2	b	b	b
2E 8	1.4E+0 ± 4.8E-2	9.6E-1 ± 4.4E-2	1.7E-1 ± 3.2E-2	5.3E-1 ± 2.9E-2	7.9E-1 ± 7.6E-2	7.0E-2 ± 1.6E-2	2.4E+0 ± 9.7E-2	6.9E-1 ± 1.3E-1	7.6E-1 ± 1.4E-1	4.0E-1 ± 9.9E-2
2E 9	6.9E+0 ± 9.9E-2	b	8.9E-1 ± 3.3E-2	3.2E+0 ± 6.8E-2	1.5E+0 ± 1.0E-1	8.9E-1 ± 5.5E-2	2.1E+0 ± 1.8E-1	2.6E+0 ± 4.7E-1	1.6E+0 ± 3.0E-1	b
2E10	1.4E+0 ± 4.4E-2	6.2E-1 ± 3.6E-2	4.6E-1 ± 1.6E-1	9.5E-1 ± 3.7E-2	2.3E-1 ± 4.2E-2	3.2E-1 ± 3.8E-2	1.1E+0 ± 1.0E-1	1.1E+0 ± 2.0E-1	5.4E-1 ± 1.0E-1	2.3E+0 ± 5.7E-1
2E11	3.3E+0 ± 6.9E-2	1.6E+0 ± 5.7E-2	2.1E+0 ± 5.3E-1	7.7E-1 ± 3.3E-2	8.4E-1 ± 7.6E-2	1.9E+0 ± 9.2E-2	2.0E+0 ± 8.5E-2	2.2E+0 ± 4.0E-1	8.9E-1 ± 1.7E-1	b
2E12	2.4E+0 ± 5.9E-2	2.0E-1 ± 2.7E-2	1.3E+0 ± 5.0E-2	1.7E+0 ± 4.8E-2	2.5E+0 ± 1.3E-1	2.5E+0 ± 1.3E-1	1.6E+0 ± 8.1E-2	1.4E+0 ± 2.5E-1	2.1E+0 ± 3.8E-1	4.1E-1 ± 1.0E-1
2E13	7.6E-2 ± 1.4E-2	2.4E-1 ± 2.7E-2	1.7E-1 ± 2.9E-2	1.7E-1 ± 2.9E-2	2.3E-1 ± 4.8E-2	5.7E-1 ± 4.7E-2	b	2.7E-1 ± 5.4E-2	2.8E-1 ± 5.8E-2	b
2E14	1.5E-1 ± 1.6E-2	2.4E-1 ± 2.7E-2	1.8E-1 ± 2.9E-2	1.4E-1 ± 2.9E-2	1.2E-1 ± 3.6E-2	5.1E-1 ± 6.4E-2	2.8E-1 ± 5.4E-2	2.4E-1 ± 5.0E-2	1.5E+0 ± 2.8E-1	5.0E-1 ± 1.2E-1
2E15	6.4E-1 ± 3.1E-2	1.6E+0 ± 5.9E-2	2.4E+1 ± 1.4E+0	1.6E+0 ± 4.9E-2	1.0E+0 ± 8.4E-2	5.5E-1 ± 6.3E-2	b	9.9E-1 ± 1.9E-1	1.3E+0 ± 2.3E-1	b
2E16	3.2E+0 ± 6.9E-2	1.7E+0 ± 6.9E-2	8.2E-1 ± 3.6E-2	2.1E+0 ± 5.6E-2	5.4E-1 ± 7.1E-2	2.7E+0 ± 1.5E-1	1.4E+0 ± 9.2E-2	1.7E+0 ± 3.1E-1	2.7E+0 ± 5.0E-1	1.7E+0 ± 4.1E-1
2E17	2.6E+0 ± 1.2E+0	1.6E+0 ± 5.3E-2	5.7E-1 ± 2.9E-2	1.4E+0 ± 4.6E-2	2.7E+0 ± 1.2E-1	1.6E+1 ± 9.8E-1	1.5E+0 ± 9.2E-2	2.7E+0 ± 4.9E-1	3.0E+0 ± 5.6E-1	5.2E+0 ± 1.3E+0
2E18	1.6E-1 ± 1.6E-2	5.9E-1 ± 3.6E-2	3.5E-1 ± 2.9E-1	1.1E+0 ± 3.9E-2	1.3E+0 ± 8.6E-2	1.1E+0 ± 9.1E-2	9.3E-1 ± 8.7E-2	1.2E+0 ± 2.2E-1	1.3E+0 ± 2.4E-1	1.2E+0 ± 3.0E-1
2E19	1.6E-1 ± 1.5E-2	2.1E-1 ± 2.7E-2	2.2E-1 ± 2.9E-2	2.7E-1 ± 2.9E-2	1.4E-1 ± 3.0E-2	5.7E-1 ± 5.9E-2	4.1E-1 ± 1.3E-1	b	b	1.9E-1 ± 4.9E-2
2E20	6.0E-2 ± 1.4E-2	3.5E-1 ± 2.9E-2	6.4E+0 ± 1.4E+0	4.2E-1 ± 2.9E-2	1.9E-1 ± 3.9E-2	7.3E-1 ± 6.4E-2	b	4.8E-1 ± 9.3E-2	3.2E-1 ± 6.4E-2	b
2E21	1.7E-1 ± 1.7E-2	2.5E-1 ± 2.7E-2	6.1E+0 ± 1.4E+0	2.4E-1 ± 2.9E-2	2.6E-1 ± 7.0E-2	5.2E-1 ± 6.3E-2	2.8E-1 ± 5.7E-2	4.2E-1 ± 8.2E-2	b	2.0E-1 ± 5.2E-2
2E22	4.4E-1 ± 2.5E-2	3.5E-1 ± 3.7E-2	1.4E-1 ± 2.9E-2	5.3E-1 ± 2.9E-2	4.7E-1 ± 5.6E-2	6.9E-1 ± 6.9E-2	b	8.4E-1 ± 1.6E-1	5.6E-1 ± 1.1E-1	b
2E23	1.7E+0 ± 4.9E-2	1.1E+0 ± 5.0E-2	1.3E+1 ± 3.1E+0	1.5E+0 ± 4.4E-2	8.8E-1 ± 7.6E-2	6.2E-1 ± 7.2E-2	1.3E+0 ± 8.7E-2	2.3E+0 ± 4.3E-1	4.7E+0 ± 8.5E-1	1.6E+0 ± 3.9E-1
2E24	2.0E+0 ± 5.4E-2	2.8E+0 ± 7.7E-2	5.8E-1 ± 9.0E-2	1.9E+0 ± 5.2E-2	1.5E+0 ± 1.2E-1	1.9E+0 ± 1.3E-1	2.4E+0 ± 1.8E-1	1.3E+0 ± 2.4E-1	1.3E+0 ± 2.3E-1	1.2E+0 ± 3.0E-1
2E25	3.9E-1 ± 2.4E-2	3.4E-1 ± 2.9E-2	3.6E+0 ± 1.4E+0	2.0E-1 ± 2.9E-2	2.4E-1 ± 4.3E-2	2.8E-1 ± 5.0E-2	b	b	b	b
2E26	2.3E-1 ± 2.0E-2	2.7E-1 ± 2.8E-2	4.1E-2 ± 2.9E-2	3.3E-1 ± 2.9E-2	2.3E-1 ± 4.8E-2	7.9E-1 ± 9.0E-2	b	b	b	2.1E-1 ± 5.3E-2
2E27	1.3E-1 ± 1.5E-2	2.4E-1 ± 2.7E-2	5.1E-2 ± 2.9E-2	1.2E-1 ± 2.9E-2	1.0E-1 ± 3.6E-2	4.6E-1 ± 5.2E-2	1.2E-1 ± 5.5E-2	2.5E-1 ± 5.1E-2	1.2E-1 ± 3.4E-2	b
2E28	2.8E-1 ± 2.0E-2	3.2E-1 ± 2.7E-2	1.2E+1 ± 1.4E+0	2.6E-1 ± 2.9E-2	1.8E-1 ± 5.9E-2	7.3E-1 ± 7.7E-2	b	6.9E-1 ± 1.3E-1	b	2.3E-1 ± 5.8E-2
2E29	2.4E-1 ± 1.9E-2	b	7.9E+0 ± 1.4E+0	9.6E-1 ± 3.6E-2	1.7E-1 ± 6.7E-2	5.8E-1 ± 6.8E-2	5.1E-1 ± 6.1E-2	1.9E+0 ± 3.5E-1	4.2E-1 ± 8.2E-2	b
2E30	7.4E-1 ± 3.4E-2	8.2E-1 ± 4.1E-2	1.6E-1 ± 2.9E-2	3.6E-1 ± 2.9E-2	6.7E-1 ± 7.2E-2	b	1.8E-1 ± 6.8E-2	6.5E-1 ± 1.2E-1	b	2.0E-1 ± 5.0E-2
2E31	1.1E-1 ± 1.4E-2	2.8E-1 ± 2.7E-2	4.7E+0 ± 1.4E+0	2.1E-1 ± 2.9E-2	1.0E-1 ± 3.6E-2	4.4E-1 ± 4.8E-2	2.5E-1 ± 7.2E-2	5.6E-1 ± 1.1E-1	1.3E-1 ± 3.0E-2	b
2E32	1.8E-1 ± 1.6E-2	3.6E-1 ± 2.9E-2	3.7E-1 ± 3.9E-2	2.6E-1 ± 2.9E-2	1.1E-1 ± 3.8E-2	9.8E-1 ± 8.9E-2	8.2E-1 ± 5.9E-2	1.1E+0 ± 2.0E-1	7.2E-1 ± 1.4E-1	1.2E-1 ± 3.1E-2
2E33	4.8E-2 ± 1.2E-2	1.8E-1 ± 2.7E-2	2.2E-2 ± 2.9E-2	8.8E-2 ± 2.9E-2	6.1E-2 ± 2.3E-2	3.1E-1 ± 5.2E-2	7.4E-2 ± 2.2E-2	2.9E-1 ± 6.0E-2	b	b
2E34	8.4E-1 ± 3.9E-2	1.1E+0 ± 4.9E-2	3.0E+1 ± 4.3E+0	1.2E+0 ± 4.3E-2	3.6E-1 ± 5.1E-2	1.1E+0 ± 8.3E-2	1.9E+0 ± 9.3E-2	1.1E+0 ± 2.0E-1	7.2E-1 ± 1.3E-1	5.6E-1 ± 1.4E-1
2E35	3.7E-1 ± 2.3E-2	4.2E-1 ± 3.1E-2	1.8E+1 ± 2.2E+0	3.7E-1 ± 2.9E-2	5.2E-1 ± 1.4E-1	5.1E-1 ± 5.3E-2	6.3E-1 ± 6.0E-2	8.0E-1 ± 1.5E-1	b	4.8E-1 ± 1.2E-1
2E36	5.2E-1 ± 3.1E-2	3.0E-1 ± 2.7E-2	1.0E-1 ± 2.9E-2	2.3E-1 ± 2.9E-2	3.7E-1 ± 5.6E-2	4.3E-1 ± 4.5E-2	3.2E-1 ± 3.9E-2	6.0E-1 ± 1.1E-1	1.1E+0 ± 2.0E-1	b
2EA	8.9E-2 ± 1.3E-2	2.5E-1 ± 2.7E-2	1.5E-1 ± 2.9E-2	2.1E-1 ± 2.9E-2	1.8E-1 ± 3.7E-2	4.2E-1 ± 4.3E-2	2.5E-1 ± 4.9E-2	3.4E-1 ± 7.0E-2	1.8E-1 ± 4.0E-2	1.5E-1 ± 3.9E-2
2EB	5.6E-1 ± 3.2E-2	2.4E-1 ± 2.7E-2	7.8E+0 ± 1.4E+0	3.6E-1 ± 2.9E-2	3.5E-1 ± 6.4E-2	3.1E-1 ± 4.1E-2	3.7E-1 ± 4.6E-2	1.1E+0 ± 2.2E-1	2.6E-1 ± 5.4E-2	2.6E-1 ± 6.6E-2
2EC	3.9E-1 ± 2.7E-2	3.9E-1 ± 2.9E-2	1.9E-1 ± 2.9E-2	2.9E-1 ± 2.9E-2	7.2E-1 ± 2.4E-1	6.1E-1 ± 5.8E-2	4.8E-1 ± 5.5E-2	6.8E-1 ± 1.4E-1	4.0E-1 ± 7.9E-2	3.8E-1 ± 9.5E-2
2ED	1.2E+0 ± 3.8E-2	8.5E-1 ± 4.3E-2	3.4E-1 ± 8.1E-2	1.2E+0 ± 4.7E-2	1.1E+0 ± 1.1E-1	6.5E-1 ± 6.5E-2	6.6E-1 ± 5.7E-2	1.8E+0 ± 3.4E-1	7.2E-1 ± 1.4E-1	7.0E-1 ± 1.7E-1
Mean (a)	1.1E+0 ± 4.2E-1	6.4E-1 ± 1.8E-1	3.6E+0 ± 2.2E+0	7.0E-1 ± 2.1E-1	5.6E-1 ± 1.9E-1	1.1E+0 ± 8.1E-1	9.6E-1 ± 2.7E-1	1.0E+0 ± 2.3E-1	1.0E+0 ± 3.9E-1	8.4E-1 ± 4.6E-1

Table E-4. The <sup>90</sup>Sr Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 2 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2W 1	5.8E-2 ± 1.4E-2	2.0E-1 ± 2.5E-2	1.6E-1 ± 2.9E-2	2.4E-1 ± 2.9E-2	7.2E-2 ± 4.7E-2	5.4E-1 ± 5.3E-2	b	b	b	b
2W 2	2.1E-1 ± 2.0E-2	6.4E-1 ± 2.3E-2	9.0E-1 ± 2.9E-2	4.5E-1 ± 5.0E-2	9.4E-1 ± 9.8E-2	1.2E+0 ± 8.3E-2	b	b	b	b
2W 3	5.1E-2 ± 1.5E-2	4.6E-1 ± 2.3E-2	1.1E-1 ± 2.9E-2	5.4E-1 ± 3.0E-2	2.2E-1 ± 4.8E-2	3.3E-1 ± 4.1E-2	3.6E-1 ± 2.8E-2	1.1E+0 ± 1.9E-1	2.5E-1 ± 5.3E-2	b
2W 4	1.5E-1 ± 1.6E-2	4.1E-1 ± 2.3E-2	1.1E-1 ± 2.9E-2	2.5E-1 ± 2.9E-2	4.2E-1 ± 5.3E-2	5.3E-1 ± 5.1E-2	3.2E-1 ± 3.7E-2	2.4E+0 ± 4.4E-1	3.4E-1 ± 6.9E-2	4.6E-1 ± 1.1E-1
2W 5	1.4E-1 ± 1.7E-2	4.8E-1 ± 2.5E-2	1.1E-1 ± 2.9E-2	6.1E-1 ± 3.1E-2	1.7E-1 ± 4.0E-2	4.6E-1 ± 4.9E-2	b	1.5E+0 ± 2.8E-1	3.8E-1 ± 7.5E-2	b
2W 6	3.5E-2 ± 1.8E-2	1.7E-1 ± 2.5E-2	6.2E-2 ± 2.9E-2	2.1E-1 ± 2.9E-2	7.2E-2 ± 2.4E-2	3.4E-1 ± 4.2E-2	2.1E-2 ± 2.0E-2	b	1.9E-1 ± 4.1E-2	b
2W 7	9.0E-2 ± 1.9E-2	3.3E-1 ± 3.2E-2	4.0E-1 ± 2.9E-2	5.5E-1 ± 3.0E-2	3.1E-1 ± 7.1E-2	3.8E-1 ± 5.9E-2	3.4E-1 ± 3.0E-2	9.5E-1 ± 1.8E-1	4.3E-1 ± 8.5E-2	b
2W 8	7.3E-1 ± 3.2E-2	1.2E+0 ± 5.8E-2	6.5E-1 ± 3.1E-2	4.4E-1 ± 2.9E-2	9.7E-1 ± 7.6E-2	1.0E+0 ± 7.0E-2	1.2E+0 ± 6.6E-2	1.4E+0 ± 2.5E-1	1.0E+0 ± 1.9E-1	1.1E+0 ± 2.8E-1
2W 9	2.0E-1 ± 1.7E-2	b	8.4E-1 ± 3.5E-2	4.8E-1 ± 2.9E-2	5.8E-1 ± 1.2E-1	1.1E+0 ± 7.9E-2	9.3E-1 ± 4.7E-2	1.5E+0 ± 2.8E-1	1.5E+0 ± 2.7E-1	3.2E+0 ± 8.0E-1
2W10	2.9E-1 ± 2.1E-2	6.7E-1 ± 2.5E-2	3.1E-1 ± 2.9E-2	8.3E-1 ± 3.5E-2	2.6E-1 ± 4.2E-2	5.3E-1 ± 6.2E-2	4.6E-1 ± 3.8E-2	9.3E-1 ± 1.7E-1	4.5E-1 ± 8.7E-2	b
2W11	9.6E-3 ± 1.4E-2	2.2E-1 ± 2.5E-2	6.1E-2 ± 2.9E-2	2.0E-1 ± 2.9E-2	7.3E-2 ± 2.7E-2	3.6E-1 ± 5.3E-2	b	b	b	b
2W12	6.0E-2 ± 1.9E-2	3.2E-1 ± 3.7E-2	3.8E-1 ± 2.9E-2	1.7E-1 ± 2.9E-2	3.7E-1 ± 6.0E-2	5.2E-1 ± 6.8E-2	3.4E-1 ± 3.5E-2	5.5E-1 ± 1.0E-1	2.5E-1 ± 5.1E-2	b
2W13	4.3E+0 ± 5.1E-2	2.8E+0 ± 1.1E-1	9.7E-1 ± 3.6E-2	6.0E-1 ± 3.0E-2	2.7E+0 ± 1.5E-1	1.6E+0 ± 8.0E-2	2.3E+0 ± 8.3E-2	4.8E+0 ± 8.7E-1	3.3E+0 ± 6.1E-1	1.9E+0 ± 4.7E-1
2W14	7.5E-1 ± 2.2E-2	1.8E-1 ± 2.5E-2	1.5E-1 ± 2.9E-2	4.1E-1 ± 2.9E-2	3.8E-2 ± 2.3E-2	3.4E-1 ± 5.4E-2	5.6E-1 ± 5.3E-2	8.3E-1 ± 1.6E-1	2.9E-1 ± 6.1E-2	b
2W15	6.1E-1 ± 2.0E-2	9.9E-1 ± 2.6E-2	7.9E-1 ± 7.3E-2	7.0E-1 ± 6.6E-2	4.7E-1 ± 9.6E-2	6.3E-1 ± 7.3E-2	b	1.3E+0 ± 2.3E-1	3.1E-1 ± 6.3E-2	8.9E-1 ± 2.2E-1
2W16	3.0E-1 ± 1.5E-2	1.4E-1 ± 2.5E-2	1.0E-1 ± 2.9E-2	2.4E-1 ± 2.9E-2	1.3E-1 ± 4.1E-2	6.3E-1 ± 6.6E-2	3.0E-1 ± 3.4E-2	b	2.3E-1 ± 4.8E-2	1.9E-1 ± 5.2E-2
2W17	4.5E-1 ± 1.7E-2	2.7E-1 ± 3.5E-2	1.3E-1 ± 2.9E-2	7.5E-2 ± 2.9E-2	1.2E-1 ± 3.8E-2	2.1E-1 ± 5.3E-2	2.2E-1 ± 3.2E-2	4.5E-1 ± 8.5E-2	1.7E-1 ± 3.9E-2	1.6E-1 ± 4.2E-2
2W18	1.1E-1 ± 1.4E-2	3.2E-1 ± 3.2E-2	1.8E-1 ± 2.7E-2	1.6E-1 ± 2.9E-2	7.1E-2 ± 2.8E-2	7.7E-2 ± 3.1E-2	2.1E-1 ± 2.7E-2	4.3E-1 ± 8.3E-2	2.3E-1 ± 4.6E-2	b
2W19	5.2E-1 ± 1.9E-2	1.1E+0 ± 2.9E-2	3.1E-1 ± 2.9E-2	2.8E-1 ± 2.9E-2	6.2E-1 ± 7.6E-2	9.9E-1 ± 8.9E-2	b	1.3E+0 ± 2.5E-1	4.1E-1 ± 8.2E-2	6.3E-1 ± 1.6E-1
2W20	2.8E-1 ± 1.4E-2	2.5E-1 ± 2.3E-2	1.9E-1 ± 2.9E-2	3.6E-1 ± 2.9E-2	3.1E-1 ± 5.7E-2	3.6E-1 ± 5.8E-2	2.7E-1 ± 3.0E-2	9.0E-1 ± 1.7E-1	3.2E-1 ± 7.0E-2	b
2W21	1.2E-1 ± 1.4E-2	1.3E-1 ± 2.5E-2	3.6E+0 ± 1.4E+0	2.4E-1 ± 2.9E-2	1.5E-1 ± 3.8E-2	3.7E-1 ± 5.0E-2	b	7.8E-1 ± 1.4E-1	2.1E-1 ± 4.5E-2	1.5E-1 ± 4.0E-2
2W22	3.9E-1 ± 1.6E-2	6.0E-1 ± 4.1E-2	2.1E-1 ± 2.9E-2	1.0E+0 ± 4.0E-2	6.1E-1 ± 7.4E-2	9.1E-1 ± 8.0E-2	7.7E-1 ± 4.7E-2	9.4E-1 ± 1.7E-1	5.0E-1 ± 9.6E-2	b
2W23	1.1E+0 ± 2.6E-2	4.1E+0 ± 1.1E-1	1.9E+0 ± 1.8E-1	2.0E+0 ± 5.3E-2	1.6E+0 ± 1.1E-1	2.5E+0 ± 1.3E-1	2.0E+0 ± 6.7E-2	4.9E+0 ± 9.7E-2	1.6E+0 ± 2.9E-1	2.3E+0 ± 5.8E-1
2W24	4.2E-1 ± 1.7E-2	5.2E-1 ± 2.3E-2	4.5E-1 ± 2.6E-2	7.8E-1 ± 3.3E-2	4.7E-1 ± 1.4E-1	2.0E+0 ± 1.7E-1	4.8E-1 ± 3.3E-2	7.6E-1 ± 1.4E-1	5.1E-1 ± 9.7E-2	2.1E-1 ± 5.4E-2
2W25	4.2E-1 ± 2.4E-2	2.2E-1 ± 2.5E-2	2.4E-1 ± 2.9E-2	8.7E-2 ± 2.9E-2	2.8E-1 ± 4.8E-2	7.6E-1 ± 5.0E-2	b	5.2E-1 ± 9.9E-2	b	3.1E-1 ± 7.8E-2
2W26	4.0E-1 ± 2.5E-2	1.4E-1 ± 2.5E-2	1.7E-1 ± 2.9E-2	2.4E-1 ± 2.9E-2	8.9E-2 ± 7.7E-2	1.2E+0 ± 8.3E-2	1.5E-1 ± 2.2E-2	b	b	b
2W27	1.1E+0 ± 4.1E-2	7.0E-1 ± 4.0E-2	2.9E-1 ± 2.9E-2	6.5E-1 ± 3.2E-2	2.9E-1 ± 5.9E-2	1.6E+0 ± 7.0E-2	1.1E+0 ± 5.2E-2	b	5.5E-1 ± 1.1E-1	7.7E-1 ± 1.9E-1
2W28	3.4E-1 ± 2.3E-2	1.2E-1 ± 2.1E-2	2.7E-1 ± 2.9E-2	3.7E-1 ± 2.9E-2	4.0E-1 ± 5.8E-2	8.2E-1 ± 5.2E-2	2.6E+0 ± 8.4E-2	6.8E-1 ± 1.3E-1	6.9E-1 ± 1.3E-1	1.0E+0 ± 2.5E-1
2W29	8.0E-1 ± 3.9E-2	5.4E-1 ± 2.5E-2	7.9E-1 ± 9.9E-2	6.2E-1 ± 3.1E-2	4.7E-1 ± 6.5E-2	2.7E+0 ± 9.3E-2	b	1.2E+0 ± 2.2E-1	4.9E-1 ± 9.6E-2	4.6E-1 ± 1.2E-1
2W30	5.6E-1 ± 3.1E-2	2.7E-1 ± 2.3E-2	2.5E-1 ± 2.9E-2	5.6E-1 ± 2.9E-2	2.4E-1 ± 4.8E-2	6.2E-1 ± 4.7E-2	3.2E-1 ± 4.2E-2	6.8E-1 ± 1.3E-1	b	b
2W31	2.5E-1 ± 2.1E-2	2.4E-1 ± 2.5E-2	1.2E-1 ± 2.9E-2	3.3E-1 ± 2.9E-2	1.6E-1 ± 1.1E-1	3.6E-1 ± 6.5E-2	b	b	b	1.6E-1 ± 4.2E-2
2W32	6.7E-1 ± 3.3E-2	3.9E-1 ± 2.5E-2	3.3E-1 ± 2.9E-2	7.4E-1 ± 3.3E-2	3.0E-1 ± 5.2E-2	6.6E-1 ± 5.1E-2	b	b	b	b
2W33	7.3E-1 ± 3.5E-2	7.4E-1 ± 2.3E-2	7.1E-1 ± 3.2E-2	5.9E-1 ± 3.2E-2	9.6E-1 ± 1.0E-1	8.0E-1 ± 5.5E-2	9.5E-1 ± 7.7E-2	9.8E-1 ± 1.8E-1	5.2E-1 ± 1.0E-1	5.6E-1 ± 1.4E-1
2W34	7.2E-1 ± 3.1E-2	1.5E+0 ± 2.9E-2	7.2E-1 ± 3.4E-2	7.5E-1 ± 3.3E-2	6.4E-1 ± 1.1E-1	1.8E+0 ± 1.1E-1	1.0E+0 ± 8.2E-2	1.3E+0 ± 2.3E-1	1.6E+0 ± 2.8E-1	4.7E-1 ± 1.2E-1
2W35	3.5E-1 ± 2.3E-2	3.2E-1 ± 2.5E-2	2.0E-1 ± 2.9E-2	2.9E-1 ± 2.9E-2	2.1E-1 ± 4.7E-2	5.5E-1 ± 4.5E-2	b	4.0E-1 ± 7.7E-2	b	b
2WA	2.7E-1 ± 2.2E-2	2.9E-1 ± 2.5E-2	3.0E+0 ± 1.4E+0	2.0E-1 ± 2.9E-2	1.5E-1 ± 6.3E-2	1.5E-1 ± 2.0E-2	2.6E-1 ± 4.2E-2	b	2.3E-1 ± 4.8E-2	b
2WB	4.4E-1 ± 2.5E-2	2.0E-1 ± 2.5E-2	6.4E+0 ± 1.4E+0	1.6E-1 ± 2.9E-2	2.7E-1 ± 5.1E-2	1.6E-1 ± 2.5E-2	b	b	b	2.7E-1 ± 6.8E-2
2WC	1.5E-1 ± 1.6E-2	1.7E-1 ± 2.5E-2	3.0E+0 ± 1.4E+0	3.3E-1 ± 2.9E-2	1.4E-1 ± 4.1E-2	3.6E-1 ± 3.8E-2	b	b	b	b
2WD	1.8E-1 ± 1.7E-2	8.4E-2 ± 2.5E-2	1.8E+0 ± 1.4E+0	3.1E-1 ± 2.9E-2	1.8E-1 ± 6.8E-2	3.0E-1 ± 4.3E-2	b	b	b	b
2WE	2.2E-1 ± 1.9E-2	1.7E-1 ± 2.5E-2	8.9E-2 ± 2.9E-2	2.5E+0 ± 8.0E-2	1.2E-1 ± 7.8E-2	8.1E-1 ± 8.5E-2	b	b	b	b
2WF	2.8E-1 ± 2.3E-2	1.1E-1 ± 2.5E-2	0.0E+0 ± 1.4E+0	1.5E-1 ± 2.9E-2	1.9E-1 ± 4.6E-2	3.5E-1 ± 3.4E-2	b	b	b	b
Mean (a)	4.7E-1 ± 2.1E-1	5.7E-1 ± 2.4E-1	7.6E-1 ± 4.1E-1	5.0E-1 ± 1.4E-1	4.1E-1 ± 1.5E-1	7.8E-1 ± 1.9E-1	7.3E-1 ± 2.8E-1	1.1E+0 ± 3.5E-1	6.2E-1 ± 2.6E-1	8.0E-1 ± 3.9E-1

(a) Individual results ±2 sigma overall error. Means ±2 standard error of the calculated mean.  
 (b) Site not sampled.

Table E-5. The <sup>239</sup>Pu Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 1 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2E 1	2.7E-2 ± 2.3E-2	1.8E-2 ± 5.8E-3	4.9E-2 ± 9.7E-3	1.2E-2 ± 5.2E-3	1.4E-2 ± 5.5E-3	1.8E-2 ± 5.0E-3	b	b	b	2.6E-2 ± 3.2E-3
2E 2	8.2E-2 ± 1.3E-2	4.0E-2 ± 1.2E-2	2.6E-3 ± 2.9E-3	c	1.1E-2 ± 3.3E-3	3.3E-3 ± 1.9E-3	b	3.3E-2 ± 3.8E-3	3.0E-3 ± 9.0E-4	b
2E 3	1.2E-1 ± 3.8E-2	6.4E-3 ± 5.8E-3	2.0E-2 ± 6.6E-3	c	1.2E-2 ± 3.3E-3	5.1E-2 ± 1.1E-2	2.0E-2 ± 3.8E-3	3.6E-2 ± 4.3E-3	2.1E-2 ± 4.0E-3	2.3E-2 ± 3.0E-3
2E 4	2.3E-2 ± 1.8E-2	1.4E-2 ± 5.4E-3	2.3E-2 ± 6.4E-3	c	2.1E-2 ± 4.6E-3	1.3E-2 ± 2.9E-3	3.2E-2 ± 3.0E-3	2.7E-2 ± 3.3E-3	3.1E-2 ± 4.0E-3	3.6E-2 ± 4.3E-3
2E 5	1.2E-2 ± 1.0E-2	6.2E-3 ± 6.9E-3	1.8E-2 ± 6.5E-3	c	1.5E-2 ± 6.1E-3	6.0E-3 ± 3.4E-3	2.4E-2 ± 5.4E-3	3.0E-2 ± 4.4E-3	2.8E-2 ± 3.7E-3	b
2E 6	3.3E-2 ± 2.2E-2	1.1E-2 ± 6.0E-3	3.7E-2 ± 7.7E-3	c	1.5E-2 ± 6.5E-3	2.4E-2 ± 8.2E-3	3.3E-2 ± 3.9E-3	2.9E-2 ± 4.0E-3	b	b
2E 7	3.5E-2 ± 1.7E-2	1.9E-2 ± 5.3E-3	9.0E-2 ± 1.3E-3	2.7E-2 ± 4.6E-3	3.1E-3 ± 1.8E-3	7.4E-3 ± 4.1E-3	1.6E-2 ± 1.4E-2	b	b	b
2E 8	7.8E-2 ± 1.1E-2	2.0E-2 ± 6.6E-3	1.4E-2 ± 5.4E-3	c	6.6E-2 ± 1.3E-2	4.2E-3 ± 2.4E-3	2.7E-2 ± 2.4E-3	9.7E-2 ± 1.0E-2	3.3E-2 ± 4.3E-3	2.4E-2 ± 3.0E-3
2E 9	2.8E-2 ± 8.9E-3	b	3.3E-2 ± 9.3E-3	c	2.2E-2 ± 8.8E-3	1.4E-2 ± 5.0E-3	1.6E-2 ± 3.1E-3	2.0E-2 ± 3.2E-3	1.8E-2 ± 3.5E-3	b
2E10	6.6E-2 ± 1.5E-2	1.4E-2 ± 4.7E-3	4.8E-2 ± 1.1E-2	c	1.1E-3 ± 2.4E-3	6.4E-3 ± 2.9E-3	2.6E-2 ± 1.7E-3	4.4E-2 ± 5.4E-3	1.5E-2 ± 2.3E-3	4.3E-2 ± 5.8E-3
2E11	4.2E-2 ± 1.4E-2	6.9E-2 ± 1.3E-2	4.3E-2 ± 3.3E-3	c	1.9E-2 ± 7.1E-3	5.4E-2 ± 8.9E-3	4.3E-2 ± 2.5E-3	7.3E-2 ± 7.7E-3	7.3E-2 ± 8.1E-3	b
2E12	6.8E-2 ± 2.0E-2	4.5E-4 ± 2.2E-3	1.8E-1 ± 7.0E-2	2.3E-2 ± 8.7E-3	3.7E-2 ± 7.1E-3	6.4E-2 ± 5.3E-3	3.3E-2 ± 3.7E-3	2.8E-2 ± 3.9E-3	4.2E-2 ± 4.9E-3	7.4E-3 ± 1.2E-3
2E13	2.0E-2 ± 9.4E-3	6.3E-3 ± 3.8E-3	1.2E-1 ± 8.3E-3	3.7E-2 ± 7.9E-3	1.8E-2 ± 4.8E-3	2.1E-2 ± 6.4E-3	b	1.3E-2 ± 4.8E-3	1.7E-2 ± 2.5E-3	b
2E14	1.2E-2 ± 5.8E-3	6.5E-3 ± 3.3E-3	c	c	1.9E-2 ± 5.5E-3	1.6E-2 ± 2.8E-3	1.4E-2 ± 2.1E-3	1.9E-2 ± 2.6E-3	1.5E-2 ± 2.2E-3	1.3E-2 ± 1.8E-3
2E15	1.0E-1 ± 1.2E-1	5.1E-2 ± 1.1E-2	7.0E-2 ± 7.8E-3	1.7E-1 ± 1.8E-2	1.2E-1 ± 1.5E-2	8.8E-2 ± 7.1E-3	b	8.7E-2 ± 9.7E-3	5.9E-2 ± 7.1E-3	b
2E16	1.7E-1 ± 1.7E-2	4.4E-2 ± 7.2E-3	7.7E-2 ± 1.3E-2	2.3E-2 ± 7.5E-3	2.5E-2 ± 6.6E-3	5.8E-2 ± 3.9E-3	8.2E-2 ± 5.7E-3	1.1E-1 ± 1.1E-2	8.2E-2 ± 1.4E-2	1.2E-1 ± 1.2E-2
2E17	4.7E-2 ± 1.0E-2	1.5E-2 ± 5.0E-3	1.0E-2 ± 4.3E-3	c	4.8E-2 ± 1.3E-2	2.4E-4 ± 5.8E-4	8.2E-3 ± 1.6E-3	2.0E-2 ± 4.7E-3	7.5E-3 ± 2.4E-3	1.7E-2 ± 2.8E-3
2E18	1.4E-2 ± 3.9E-3	8.1E-3 ± 5.2E-3	7.2E-3 ± 6.3E-3	c	8.1E-3 ± 3.3E-3	1.3E-2 ± 3.9E-3	9.1E-5 ± 1.3E-4	1.1E-2 ± 1.9E-3	1.1E-2 ± 1.8E-3	6.8E-3 ± 1.2E-3
2E19	7.5E-2 ± 1.1E-2	1.0E-2 ± 5.7E-3	3.2E-2 ± 1.3E-2	c	1.2E-2 ± 7.1E-3	2.6E-2 ± 2.6E-3	2.2E-2 ± 2.4E-3	b	b	2.0E-2 ± 2.7E-3
2E20	5.2E-2 ± 2.8E-2	1.2E-2 ± 7.8E-3	2.5E-2 ± 8.4E-3	c	3.0E-2 ± 7.2E-3	4.1E-2 ± 3.5E-3	b	4.3E-2 ± 4.7E-3	3.9E-2 ± 5.4E-3	b
2E21	1.6E-2 ± 1.5E-2	9.9E-3 ± 4.2E-3	5.6E-1 ± 3.2E-2	2.9E-2 ± 8.6E-3	8.9E-2 ± 2.1E-2	3.0E-2 ± 3.6E-3	3.6E-2 ± 2.8E-3	6.2E-2 ± 6.6E-3	b	2.3E-2 ± 2.8E-3
2E22	1.7E-1 ± 3.9E-2	5.7E-2 ± 1.1E-2	6.9E-2 ± 1.1E-2	1.1E-1 ± 1.7E-2	2.0E-1 ± 2.6E-2	7.3E-1 ± 4.2E-2	b	1.5E-1 ± 1.6E-2	2.2E-1 ± 2.7E-2	b
2E23	1.0E-1 ± 1.4E-2	5.9E-2 ± 1.6E-2	1.9E-2 ± 7.8E-3	c	1.3E-1 ± 2.0E-2	9.4E-2 ± 1.5E-2	1.1E-1 ± 7.6E-3	1.8E-1 ± 1.8E-2	1.2E-1 ± 1.6E-2	3.9E-2 ± 4.7E-3
2E24	5.0E-2 ± 2.5E-2	4.5E-2 ± 9.6E-3	5.2E-2 ± 1.3E-2	4.4E-2 ± 1.1E-2	3.2E-2 ± 7.7E-3	2.0E-2 ± 5.2E-3	4.7E-2 ± 5.6E-3	2.6E-2 ± 3.2E-3	4.0E-2 ± 5.0E-3	2.5E-2 ± 3.2E-3
2E25	7.2E-2 ± 3.1E-2	1.5E-2 ± 6.1E-3	1.2E-2 ± 6.1E-3	c	1.1E-2 ± 5.5E-3	1.3E-2 ± 3.7E-3	b	b	b	b
2E26	2.7E-2 ± 1.5E-2	9.4E-3 ± 5.1E-3	1.5E-1 ± 2.1E-2	2.3E-2 ± 6.5E-3	2.3E-2 ± 4.9E-3	1.4E-2 ± 3.1E-3	b	b	b	1.5E-2 ± 2.0E-3
2E27	6.6E-3 ± 9.2E-3	1.2E-2 ± 5.4E-3	3.6E-2 ± 1.1E-2	c	1.1E-2 ± 3.1E-3	3.0E-3 ± 1.3E-3	2.2E-2 ± 2.9E-3	5.4E-3 ± 3.3E-3	6.5E-3 ± 2.4E-3	b
2E28	4.0E-2 ± 1.8E-2	7.1E-3 ± 3.6E-3	3.3E-2 ± 7.3E-3	c	9.7E-3 ± 3.7E-3	7.6E-3 ± 1.9E-3	b	3.1E-2 ± 4.1E-3	b	2.1E-2 ± 2.6E-3
2E29	9.5E-2 ± 2.7E-2	b	6.6E-3 ± 7.7E-3	c	1.3E-2 ± 4.2E-3	9.5E-3 ± 1.7E-3	5.2E-2 ± 5.9E-3	7.7E-2 ± 7.8E-3	4.6E-2 ± 7.1E-3	b
2E30	1.8E-1 ± 4.3E-2	1.4E-1 ± 1.8E-2	c	4.8E-2 ± 7.9E-3	8.7E-2 ± 1.2E-2	b	2.0E-2 ± 2.6E-3	1.9E-2 ± 2.6E-3	b	1.7E-2 ± 2.1E-3
2E31	8.2E-3 ± 1.1E-2	1.4E-2 ± 5.1E-3	9.5E-3 ± 4.5E-3	c	1.2E-2 ± 2.2E-3	4.7E-3 ± 1.9E-3	9.7E-3 ± 4.0E-3	7.4E-3 ± 2.2E-3	9.1E-3 ± 1.8E-3	b
2E32	1.5E-2 ± 1.5E-2	1.5E-2 ± 4.9E-3	1.4E-2 ± 4.9E-3	c	2.8E-2 ± 9.5E-3	1.2E-2 ± 2.0E-3	1.1E-2 ± 1.5E-3	2.6E-2 ± 5.0E-3	1.4E-2 ± 2.8E-3	2.7E-3 ± 6.0E-4
2E33	-7.5E-4 ± 7.5E-3	2.8E-3 ± 2.9E-3	5.2E-3 ± 3.5E-3	c	5.0E-3 ± 2.1E-3	2.0E-3 ± 1.5E-3	1.4E-3 ± 7.4E-4	5.4E-4 ± 3.6E-4	b	b
2E34	1.6E-2 ± 1.7E-2	1.2E-2 ± 4.5E-3	2.5E-2 ± 6.3E-3	c	8.0E-3 ± 4.8E-3	1.3E-2 ± 1.6E-3	2.6E-2 ± 2.8E-3	1.6E-2 ± 2.4E-3	2.8E-2 ± 4.7E-3	8.8E-3 ± 1.4E-3
2E35	1.5E-2 ± 1.5E-2	8.1E-3 ± 4.4E-3	1.1E-2 ± 3.9E-3	c	1.7E-2 ± 6.1E-3	1.0E-2 ± 2.1E-3	1.4E-2 ± 2.7E-3	1.7E-2 ± 2.7E-3	b	1.0E-2 ± 1.4E-3
2E36	7.0E-3 ± 1.5E-2	1.1E-2 ± 5.4E-3	1.9E-2 ± 1.1E-2	c	2.4E-2 ± 7.7E-3	1.4E-2 ± 3.2E-3	2.3E-2 ± 6.2E-3	1.6E-2 ± 2.6E-3	1.2E-2 ± 2.8E-3	b
2EA	6.1E-3 ± 1.4E-2	-1.8E-2 ± 5.4E-3	7.8E-3 ± 7.5E-3	c	7.4E-3 ± 4.3E-3	3.8E-3 ± 1.2E-3	1.1E-2 ± 2.2E-3	5.9E-3 ± 1.5E-3	1.1E-2 ± 3.4E-3	7.2E-3 ± 1.1E-3
2EB	4.2E-2 ± 1.7E-2	1.3E-2 ± 4.8E-3	1.8E-2 ± 5.7E-3	c	2.9E-2 ± 6.5E-3	2.9E-2 ± 3.5E-3	1.4E-2 ± 3.3E-3	2.4E-2 ± 3.2E-3	1.1E-2 ± 2.3E-3	2.0E-2 ± 2.5E-3
2EC	1.7E-2 ± 9.0E-3	1.3E-2 ± 4.2E-3	1.3E-2 ± 9.8E-3	c	1.4E-2 ± 4.7E-3	1.1E-2 ± 2.4E-3	2.2E-2 ± 5.1E-3	1.8E-2 ± 2.6E-3	2.0E-2 ± 2.9E-3	2.0E-2 ± 2.5E-3
2ED	4.9E-2 ± 1.1E-2	2.6E-2 ± 7.2E-3	2.3E-2 ± 6.9E-3	c	4.8E-2 ± 5.9E-3	3.2E-2 ± 4.7E-3	2.3E-2 ± 2.7E-3	7.1E-2 ± 7.3E-3	3.1E-2 ± 4.2E-3	4.5E-2 ± 5.1E-3
Mean (a)	5.1E-2 ± 1.6E-2	2.2E-2 ± 8.9E-3	5.2E-2 ± 3.0E-2	4.9E-2 ± 2.9E-2	3.3E-2 ± 1.3E-2	4.1E-2 ± 3.7E-2	2.7E-2 ± 8.2E-3	4.2E-2 ± 1.4E-2	3.7E-2 ± 1.7E-2	2.4E-2 ± 9.3E-3

Table E-5. The <sup>239</sup>Pu Concentrations in Soil, 1978 through 1987 (pCi/g). (sheet 2 of 2)

Location	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2W 1	5.4E-2 ± 4.6E-2	1.4E-2 ± 1.4E-2	1.6E-2 ± 4.9E-3	1.8E-2 ± 5.9E-3	1.8E-2 ± 6.3E-3	1.5E-2 ± 3.3E-3	b	b	b	b
2W 2	2.1E+0 ± 1.1E-1	9.4E-2 ± 9.4E-2	2.3E+0 ± 6.1E-2	6.2E-1 ± 3.4E-2	7.5E-1 ± 4.0E-2	9.2E-1 ± 4.5E-2	b	b	b	b
2W 3	5.7E-2 ± 5.1E-2	9.4E-2 ± 9.4E-2	1.4E-2 ± 5.8E-3	5.1E-2 ± 9.0E-3	5.7E-2 ± 1.4E-2	1.9E-2 ± 3.1E-3	8.7E-2 ± 1.1E-2	1.7E-1 ± 1.6E-2	4.5E-2 ± 5.4E-3	b
2W 4	8.4E-2 ± 2.1E-2	4.7E-2 ± 4.7E-2	6.9E-2 ± 1.0E-2	4.1E-2 ± 7.4E-3	8.1E-2 ± 1.8E-2	3.9E-2 ± 6.1E-3	1.9E+0 ± 5.0E-2	7.6E-1 ± 7.4E-2	7.1E-2 ± 8.6E-3	1.0E-1 ± 1.1E-2
2W 5	3.3E+0 ± 1.6E-1	4.7E-2 ± 4.7E-2	5.5E-1 ± 3.3E-2	1.7E-1 ± 1.5E-2	9.4E-2 ± 1.3E-2	1.6E-1 ± 1.5E-2	b	2.5E-1 ± 2.3E-2	1.5E-1 ± 1.6E-2	b
2W 6	7.3E-3 ± 2.8E-2	3.4E-2 ± 3.4E-2	1.5E-2 ± 5.2E-3	2.1E-2 ± 4.0E-3	1.7E-2 ± 5.1E-3	2.6E-2 ± 3.4E-3	3.0E-3 ± 1.3E-3	b	1.2E-2 ± 2.6E-3	b
2W 7	5.1E-2 ± 9.4E-3	2.5E-2 ± 2.5E-2	5.5E-2 ± 9.7E-3	1.3E-2 ± 5.1E-3	9.0E-2 ± 2.0E-2	2.8E-2 ± 7.3E-3	4.3E-2 ± 4.7E-3	6.6E-2 ± 6.6E-3	1.0E-1 ± 1.6E-2	b
2W 8	5.8E-2 ± 3.6E-2	3.7E-2 ± 3.7E-2	4.4E-2 ± 1.0E-2	4.7E-2 ± 9.4E-3	9.6E-2 ± 1.4E-2	5.2E-2 ± 6.0E-3	1.1E-1 ± 1.2E-2	9.1E-2 ± 9.2E-3	6.3E-2 ± 7.3E-3	1.3E-1 ± 1.5E-2
2W 9	4.7E-1 ± 3.8E-2	b	2.2E-1 ± 1.8E-2	1.7E+0 ± 5.6E-2	4.2E-1 ± 3.9E-2	1.9E+0 ± 2.0E-2	7.0E-1 ± 8.5E-3	1.3E-1 ± 1.3E-2	8.3E-1 ± 8.3E-2	1.7E+0 ± 1.7E-1
2W10	4.3E-1 ± 1.2E-1	1.4E-1 ± 1.4E-1	1.1E-1 ± 7.3E-3	2.9E-1 ± 2.5E-2	2.7E-1 ± 2.1E-2	2.5E-1 ± 8.4E-3	3.7E-1 ± 7.4E-3	3.8E-1 ± 3.5E-2	2.1E-1 ± 2.2E-2	b
2W11	1.4E-2 ± 1.0E-2	2.2E-2 ± 2.2E-2	1.7E-2 ± 5.7E-3	c	5.8E-3 ± 3.2E-3	6.5E-2 ± 6.5E-3	b	b	b	b
2W12	6.5E-2 ± 1.7E-2	5.6E-2 ± 5.6E-2	3.1E-2 ± 6.3E-3	2.5E-2 ± 7.3E-3	3.9E-2 ± 9.8E-3	5.2E-2 ± 1.3E-2	4.1E-2 ± 2.2E-3	3.3E-2 ± 3.8E-3	2.2E-1 ± 2.3E-2	b
2W13	9.5E-1 ± 1.1E-1	7.0E-2 ± 7.0E-2	6.0E-2 ± 9.3E-3	6.2E-2 ± 1.2E-2	2.6E-1 ± 3.4E-2	1.4E-1 ± 1.4E-2	1.1E-1 ± 9.4E-3	6.0E-2 ± 6.6E-3	9.8E-2 ± 1.1E-2	1.1E-1 ± 1.3E-2
2W14	2.0E-1 ± 2.6E-2	2.7E-2 ± 2.7E-2	2.6E-2 ± 7.6E-3	1.8E-1 ± 1.8E-2	3.3E-1 ± 3.6E-2	7.9E-2 ± 8.3E-3	7.3E-1 ± 9.6E-3	1.6E-1 ± 1.5E-2	1.9E-1 ± 2.3E-2	b
2W15	3.3E-1 ± 6.9E-2	2.8E+0 ± 2.8E+0	1.1E-1 ± 7.5E-3	5.3E-1 ± 3.5E-2	3.5E-1 ± 3.0E-2	1.3E-1 ± 1.2E-2	b	9.1E-1 ± 7.8E-2	1.1E-1 ± 1.1E-2	1.0E+0 ± 1.1E-1
2W16	3.0E-2 ± 1.6E-2	6.1E-2 ± 6.1E-2	3.0E-3 ± 2.9E-3	c	2.1E-2 ± 6.2E-3	1.3E-2 ± 4.5E-3	3.6E-2 ± 2.1E-3	b	2.4E-2 ± 3.3E-3	2.0E-2 ± 2.4E-3
2W17	1.4E-1 ± 2.1E-2	1.9E-1 ± 1.9E-1	2.4E-2 ± 4.4E-3	4.0E-2 ± 7.5E-3	6.3E-2 ± 1.3E-2	6.1E-2 ± 4.1E-3	6.1E-2 ± 3.4E-3	1.4E-1 ± 1.4E-2	8.8E-2 ± 1.1E-2	1.1E-1 ± 1.2E-2
2W18	6.9E-1 ± 3.7E-2	1.5E+0 ± 1.5E+0	1.8E-1 ± 2.0E-2	1.0E+0 ± 6.7E-2	1.9E-1 ± 3.0E-2	9.0E-1 ± 3.0E-2	8.4E-1 ± 9.9E-3	8.1E-1 ± 7.2E-2	4.8E-1 ± 4.8E-2	b
2W19	2.6E-1 ± 5.6E-2	3.6E-1 ± 3.6E-1	1.7E-1 ± 1.8E-2	4.8E-1 ± 3.5E-2	6.3E-1 ± 3.2E-2	4.7E-1 ± 3.7E-2	b	5.5E-1 ± 5.0E-2	2.8E-1 ± 2.9E-2	5.0E-1 ± 5.0E-2
2W20	2.8E-1 ± 4.4E-2	1.0E-1 ± 1.0E-1	1.9E-1 ± 1.9E-2	9.3E-2 ± 1.4E-2	8.5E-2 ± 1.1E-2	7.8E-2 ± 1.0E-2	1.4E-1 ± 6.3E-3	4.3E-1 ± 4.2E-2	1.3E-1 ± 1.4E-2	b
2W21	2.4E-2 ± 9.4E-3	1.2E-2 ± 1.2E-2	3.1E-2 ± 1.1E-2	2.7E-2 ± 7.0E-3	1.7E-2 ± 6.7E-3	1.9E-2 ± 5.1E-3	b	1.1E-1 ± 1.1E-2	1.8E-2 ± 2.5E-3	1.4E-2 ± 2.3E-3
2W22	8.0E-2 ± 2.4E-2	3.2E-2 ± 3.2E-2	2.0E-1 ± 1.9E-2	4.9E-2 ± 1.7E-2	7.6E-2 ± 1.2E-2	6.3E-2 ± 1.4E-2	7.2E-2 ± 4.9E-3	7.0E-2 ± 7.2E-3	3.5E-2 ± 4.3E-3	b
2W23	1.5E+0 ± 1.4E-1	1.6E+0 ± 1.6E+0	1.8E+0 ± 6.0E-2	1.1E+0 ± 4.6E-2	1.6E+0 ± 6.5E-2	1.1E+0 ± 4.4E-2	1.2E+0 ± 2.3E-2	6.3E-1 ± 5.8E-2	1.7E+0 ± 1.8E-1	1.1E+0 ± 1.1E-1
2W24	1.4E-1 ± 4.0E-2	1.7E-1 ± 1.7E-1	4.5E-2 ± 5.4E-3	9.0E-2 ± 7.9E-3	2.0E-1 ± 2.8E-2	1.1E-1 ± 1.4E-2	1.1E-1 ± 7.9E-3	5.6E-2 ± 6.0E-3	6.5E-2 ± 7.4E-3	5.0E-2 ± 5.7E-3
2W25	3.5E-2 ± 8.3E-3	1.0E-2 ± 1.0E-2	4.3E-2 ± 9.3E-3	6.9E-3 ± 3.8E-3	4.4E-2 ± 1.1E-2	2.2E-2 ± 3.5E-3	b	2.9E-2 ± 3.5E-3	b	2.9E-2 ± 3.5E-3
2W26	5.7E-2 ± 1.9E-2	9.7E-3 ± 9.7E-3	1.5E-2 ± 4.7E-3	c	1.1E-1 ± 1.2E-2	3.7E-2 ± 4.0E-3	1.3E-2 ± 3.1E-3	b	b	b
2W27	8.1E-2 ± 1.9E-2	3.4E-2 ± 3.4E-2	3.3E-2 ± 7.3E-3	1.1E-1 ± 8.5E-3	1.1E-1 ± 1.9E-2	9.7E-2 ± 8.7E-3	1.3E-1 ± 4.9E-3	b	3.8E-2 ± 4.8E-3	2.9E-2 ± 3.4E-3
2W28	8.7E-3 ± 5.5E-3	2.6E-3 ± 2.6E-3	6.1E-3 ± 3.6E-3	c	2.2E-2 ± 3.4E-3	1.6E-2 ± 2.9E-3	1.6E-2 ± 4.2E-3	1.3E-2 ± 2.0E-3	1.6E-2 ± 2.7E-3	2.0E-2 ± 2.7E-3
2W29	3.0E-2 ± 6.9E-3	2.0E-2 ± 2.0E-2	4.4E-2 ± 8.0E-3	6.5E-2 ± 1.1E-2	6.2E-2 ± 8.0E-3	5.3E-2 ± 5.2E-3	b	5.9E-2 ± 6.4E-3	5.0E-2 ± 5.8E-3	5.0E-2 ± 5.8E-3
2W30	1.2E-1 ± 1.6E-2	2.7E-2 ± 2.7E-2	3.2E-2 ± 7.1E-3	2.4E-1 ± 2.4E-2	4.6E-2 ± 8.5E-3	4.8E-2 ± 7.2E-3	4.7E-2 ± 6.5E-3	2.1E-1 ± 2.1E-2	b	b
2W31	1.6E-1 ± 3.6E-2	7.9E-2 ± 7.9E-2	5.8E-2 ± 1.1E-2	c	1.0E-1 ± 1.6E-2	1.4E-1 ± 1.0E-2	b	b	b	4.8E-2 ± 5.2E-3
2W32	8.6E-2 ± 2.7E-2	2.1E-2 ± 2.1E-2	1.7E-1 ± 1.6E-2	7.4E-2 ± 1.1E-2	3.8E-2 ± 8.4E-3	2.4E-4 ± 5.7E-4	b	b	b	b
2W33	6.0E-2 ± 1.8E-2	2.2E-2 ± 2.2E-2	4.4E-2 ± 1.1E-2	4.9E-2 ± 9.4E-3	4.7E-2 ± 9.9E-3	4.1E-2 ± 6.3E-3	5.5E-2 ± 7.8E-3	8.3E-2 ± 8.4E-3	9.1E-2 ± 1.0E-2	1.2E-1 ± 1.2E-2
2W34	6.5E-2 ± 1.1E-2	7.8E-2 ± 7.8E-2	3.4E-1 ± 2.6E-2	1.3E-1 ± 1.7E-2	6.3E-2 ± 1.3E-2	1.2E-1 ± 1.5E-2	8.0E-2 ± 1.3E-2	1.7E-1 ± 1.7E-2	2.0E-1 ± 2.0E-2	6.1E-2 ± 7.2E-3
2W35	7.5E-2 ± 1.8E-2	3.2E-2 ± 3.2E-2	3.0E-1 ± 7.7E-2	4.8E-2 ± 9.4E-3	8.7E-2 ± 1.3E-2	4.3E-2 ± 7.0E-3	b	7.1E-2 ± 7.6E-3	b	b
2WA	3.3E-2 ± 7.4E-3	1.7E-2 ± 1.7E-2	1.4E-2 ± 5.4E-3	1.5E-2 ± 5.3E-3	1.5E-2 ± 6.1E-3	2.6E-2 ± 5.9E-3	1.8E-2 ± 3.7E-3	b	1.2E-2 ± 2.2E-3	b
2WB	3.7E-1 ± 1.0E-1	1.7E-2 ± 1.7E-2	1.8E-2 ± 8.5E-3	2.2E-2 ± 7.6E-3	2.0E-2 ± 6.0E-3	9.8E-3 ± 1.9E-3	b	b	b	1.9E-2 ± 2.3E-3
2WC	2.7E-2 ± 1.6E-2	5.0E-2 ± 5.0E-2	2.9E-2 ± 6.9E-3	4.5E-2 ± 1.2E-2	1.5E-2 ± 8.3E-3	1.5E-2 ± 2.2E-3	b	b	b	b
2WD	2.7E-2 ± 1.2E-2	4.0E-3 ± 4.0E-3	4.6E-3 ± 3.2E-3	1.8E-2 ± 7.0E-3	7.8E-3 ± 3.9E-3	8.5E-3 ± 2.9E-3	b	b	b	b
2WE	-1.5E-3 ± 1.2E-2	9.7E-3 ± 9.7E-3	1.3E-2 ± 4.8E-3	9.5E-1 ± 5.1E-2	9.8E-3 ± 3.9E-3	1.0E-2 ± 3.4E-3	b	b	b	b
2WF	1.0E-2 ± 1.7E-2	5.1E-3 ± 5.1E-3	5.0E-3 ± 2.9E-3	6.4E-2 ± 1.4E-2	1.1E-2 ± 4.1E-3	9.4E-3 ± 3.5E-3	b	b	b	b
Mean (a)	3.1E-1 ± 2.0E-1	2.0E-1 ± 2.4E-1	1.8E-1 ± 1.4E-1	2.3E-1 ± 1.3E-1	1.6E-1 ± 8.9E-2	1.8E-1 ± 1.2E-1	2.9E-1 ± 1.9E-1	2.5E-1 ± 1.1E-1	2.0E-1 ± 1.3E-1	2.7E-1 ± 2.1E-1

(a) Individual results ±2 sigma overall error. Means ±2 standard error of the calculated mean.

(b) Site not sampled.

(c) Analyses not requested.

Table E-6. Soil Results for 200 Area Fencelines for 1987 (pCi/g dry weight). (sheet 1 of 3)

Location	Mn-54 ± Error	Co-58 ± Error	Co-60 ± Error	Zn-65 ± Error	Sr-90 ± Error	Zr-95 ± Error
<b>200 East Area</b>						
2E-1	< 5.8E-3 ± 1.6E-2	< 3.4E-3 ± 1.5E-2	< 1.3E-2 ± 1.6E-2	< -5.5E-2 ± 4.2E-2	3.5E-1 ± 8.7E-2	< -7.9E-3 ± 3.0E-2
2E-2	< 8.4E-3 ± 1.6E-2	< 3.1E-4 ± 1.7E-2	< -7.6E-3 ± 1.6E-2	< 1.6E-2 ± 4.0E-2	2.6E+0 ± 6.6E-1	< -2.4E-2 ± 3.2E-2
2E-3	2.3E-2 ± 1.7E-2	< 7.8E-3 ± 1.6E-2	< 6.4E-3 ± 1.6E-2	< 3.3E-2 ± 3.6E-2	5.7E-1 ± 1.4E-1	< 2.6E-2 ± 3.1E-2
2E-N	2.7E-2 ± 1.3E-2	< -3.3E-3 ± 1.3E-2	1.6E-2 ± 1.3E-2	< -3.6E-2 ± 3.4E-2	1.9E+0 ± 4.7E-1	< 4.8E-3 ± 2.4E-2
2E-NE	< -1.1E-2 ± 1.8E-2	< -1.0E-2 ± 1.8E-2	< 1.2E-2 ± 1.5E-2	< -1.5E-3 ± 3.6E-2	1.0E+0 ± 2.5E-1	< -2.5E-2 ± 2.7E-2
2E-SE	< -9.1E-4 ± 9.9E-3	< -6.9E-3 ± 9.6E-3	1.3E-2 ± 9.7E-3	< -2.5E-2 ± 2.9E-2	3.5E-1 ± 9.0E-2	< 1.0E-2 ± 2.0E-2
A-TF-E1	< 3.7E-3 ± 1.6E-2	< -2.6E-3 ± 1.7E-2	< -1.2E-2 ± 1.6E-2	< -5.7E-2 ± 4.8E-2	4.8E-1 ± 1.2E-1	< 3.0E-2 ± 3.0E-2
A-TF-E2	< -1.5E-3 ± 1.6E-2	< 2.8E-4 ± 1.5E-2	1.8E-2 ± 1.2E-2	< -3.1E-2 ± 4.0E-2	4.3E+0 ± 1.1E+0	< 1.0E-2 ± 2.8E-2
A-TF-E3	< 9.0E-3 ± 1.3E-2	< -2.9E-3 ± 1.3E-2	< 7.0E-3 ± 1.5E-2	< -3.2E-2 ± 4.0E-2	1.6E+0 ± 3.9E-1	< -2.1E-2 ± 2.7E-2
A-TF-E4	< 1.1E-2 ± 1.5E-2	< 8.9E-3 ± 1.4E-2	< -9.2E-3 ± 2.0E-2	< -1.3E-2 ± 4.6E-2	4.9E+0 ± 1.2E+0	< -1.2E-3 ± 3.4E-2
A-TF-W1	< -1.5E-2 ± 2.0E-2	2.1E-2 ± 1.5E-2	3.0E-2 ± 1.7E-2	< -2.4E-2 ± 4.1E-2	1.8E+0 ± 4.4E-1	4.4E-2 ± 3.2E-2
A-TF-W2	< 2.2E-4 ± 1.3E-2	< 1.7E-3 ± 1.3E-2	< 5.9E-3 ± 1.4E-2	< 1.8E-2 ± 3.5E-2	1.1E+0 ± 2.7E-1	3.3E-2 ± 2.3E-2
AW-TF-E	< 4.8E-3 ± 1.1E-2	< -1.3E-2 ± 1.4E-2	< -1.4E-2 ± 1.3E-2	< 1.1E-2 ± 3.1E-2	1.6E-1 ± 4.0E-2	< 5.6E-3 ± 1.9E-2
B-TF-NE	1.1E-2 ± 1.1E-2	1.2E-2 ± 1.1E-2	1.8E-2 ± 1.2E-2	< -1.5E-2 ± 3.7E-2	8.2E+0 ± 2.0E+0	< -3.1E-2 ± 2.9E-2
B-TF-SE	< 3.4E-3 ± 1.5E-2	< 7.2E-3 ± 1.4E-2	2.4E-2 ± 1.3E-2	5.6E-2 ± 3.1E-2	6.4E+0 ± 1.6E+0	3.8E-2 ± 2.8E-2
BX-TF-W	< -2.8E-3 ± 1.6E-2	< -2.1E-2 ± 1.6E-2	< -2.2E-2 ± 1.8E-2	< -4.0E-2 ± 3.9E-2	2.7E-1 ± 7.2E-2	< -3.8E-2 ± 2.8E-2
C-TF-NE	< -3.3E-3 ± 2.0E-2	< 6.3E-3 ± 1.9E-2	3.0E-2 ± 1.6E-2	< -7.7E-3 ± 3.8E-2	1.1E+1 ± 2.6E+0	< 5.8E-3 ± 3.3E-2
C-TF-SE	< 2.0E-3 ± 1.6E-2	< -1.1E-2 ± 1.7E-2	2.2E-2 ± 1.5E-2	< -1.6E-2 ± 4.0E-2	1.5E+1 ± 3.5E+0	< 0.0E+0 ± 2.8E-2
Maximum	2.7E-2	2.1E-2	3.0E-2	5.6E-2	1.5E+1	4.4E-2
Minimum	-1.5E-2	-2.1E-2	-2.2E-2	-5.7E-2	1.6E-1	-3.8E-2
<b>200 West Area</b>						
2WN	2.5E-2 ± 1.3E-2	< -1.1E-2 ± 1.4E-2	< 4.7E-3 ± 1.4E-2	< -2.0E-2 ± 3.6E-2	5.9E-2 ± 1.7E-2	< -2.9E-2 ± 3.0E-2
2WNE	< 8.5E-3 ± 1.5E-2	< -1.3E-3 ± 1.4E-2	< -2.0E-2 ± 1.7E-2	< -2.4E-2 ± 3.5E-2	2.3E-1 ± 6.0E-2	< -6.4E-3 ± 2.9E-2
2WSE	< -7.9E-3 ± 1.6E-2	< -1.5E-2 ± 1.7E-2	< -1.5E-2 ± 1.7E-2	< -3.7E-2 ± 3.9E-2	1.9E-1 ± 5.0E-2	< -3.6E-3 ± 2.8E-2
S-TF-NE	< 1.1E-2 ± 1.7E-2	< -2.7E-2 ± 2.2E-2	3.0E-2 ± 1.8E-2	< 3.1E-2 ± 4.8E-2	1.2E+0 ± 3.0E-1	< 5.5E-3 ± 3.1E-2
S-TF-SE	< 3.5E-3 ± 1.5E-2	< -9.2E-3 ± 1.5E-2	< -1.2E-2 ± 1.7E-2	< 5.8E-3 ± 3.3E-2	3.8E+0 ± 9.5E-1	< 6.7E-3 ± 2.6E-2
S-TF-W	< -2.3E-3 ± 1.5E-2	< 1.2E-2 ± 1.3E-2	< -5.2E-2 ± 2.2E-2	< -1.8E-2 ± 3.9E-2	2.4E+0 ± 5.9E-1	< 5.9E-3 ± 3.1E-2
TX-TF-NE	< -2.3E-3 ± 1.7E-2	< -8.9E-3 ± 1.8E-2	< 1.4E-2 ± 1.5E-2	< 1.7E-2 ± 3.7E-2	4.0E+0 ± 9.8E-1	< 2.6E-2 ± 2.9E-2
TX-TF-SE	1.8E-2 ± 1.5E-2	< -6.8E-3 ± 1.5E-2	< -2.3E-2 ± 1.6E-2	< 2.6E-2 ± 3.2E-2	7.4E+0 ± 1.8E+0	< 4.4E-3 ± 2.7E-2
TX-TF-W	1.3E-2 ± 1.1E-2	< -1.6E-2 ± 1.5E-2	< -5.7E-3 ± 1.4E-2	< -4.7E-2 ± 3.9E-2	1.9E+0 ± 4.8E-1	< 2.1E-2 ± 2.5E-2
U-TF-NE (a)	b	b	b	b	7.5E+1	b
U-TF-SE	1.7E-2 ± 1.6E-2	< 6.6E-3 ± 1.4E-2	< 2.5E-3 ± 1.4E-2	< -4.4E-2 ± 3.9E-2	8.4E-1 ± 2.1E-1	< 2.1E-2 ± 2.7E-2
U-TF-W	1.8E-2 ± 1.3E-2	1.6E-2 ± 1.3E-2	< -6.0E-3 ± 1.5E-2	< -1.9E-2 ± 3.9E-2	7.6E-1 ± 1.9E-1	6.5E-2 ± 2.7E-2
Maximum	2.5E-2	1.6E-2	3.0E-2	3.1E-2	7.5E+1	6.5E-2
Minimum	-7.9E-3	-2.7E-2	-5.2E-2	-4.7E-2	5.9E-2	-2.9E-2
Soil Standards (c)			300		400	

E-21

WHC-EP-0145

Table E-6. Soil Results for 200 Area Fencelines for 1987 (pCi/g dry weight). (sheet 2 of 3)

Location	Ru-106 ± Error	Cs-134 ± Error	Cs-137 ± Error	Ce-141 ± Error	Ce-144 ± Error	Eu-152 ± Error
<b>200 East Area</b>						
2E-1	< 1.2E-1 ± 1.3E-1	< 1.0E-2 ± 2.0E-2	1.1E+0 ± 1.2E-1	< 9.1E-3 ± 2.8E-2	< 2.9E-2 ± 9.3E-2	1.3E-1 ± 6.6E-2
2E-2	< 2.3E-1 ± 2.5E-1	7.5E-2 ± 2.1E-2	2.5E+1 ± 2.5E+0	< -3.1E-2 ± 5.9E-2	< 8.2E-2 ± 2.0E-1	< 5.6E-2 ± 7.4E-2
2E-3	4.4E-1 ± 1.8E-1	4.9E-2 ± 2.4E-2	4.9E-1 ± 6.4E-2	< -8.7E-3 ± 2.9E-2	< -9.3E-2 ± 9.8E-2	1.0E-1 ± 6.1E-2
2E-N	< 7.9E-2 ± 1.6E-1	6.5E-2 ± 1.7E-2	9.1E+0 ± 9.2E-1	< 1.2E-2 ± 2.9E-2	< -3.7E-3 ± 1.0E-1	9.4E-2 ± 6.8E-2
2E-NE	< 3.1E-2 ± 1.4E-1	3.2E-2 ± 2.0E-2	1.1E+0 ± 1.2E-1	< 1.8E-2 ± 2.8E-2	< -6.4E-2 ± 1.0E-1	< -2.0E-3 ± 8.1E-2
2E-SE	< -3.2E-2 ± 7.9E-2	4.7E-2 ± 1.4E-2	1.2E-1 ± 2.0E-2	< -2.2E-2 ± 1.8E-2	< 5.9E-2 ± 6.1E-2	< 4.1E-2 ± 4.7E-2
A-TF-E1	< 1.3E-1 ± 1.6E-1	3.7E-2 ± 2.5E-2	2.1E+0 ± 2.2E-1	< -1.6E-2 ± 3.2E-2	< -2.0E-2 ± 1.1E-1	8.4E-2 ± 8.2E-2
A-TF-E2	< -5.2E-2 ± 1.7E-1	8.0E-2 ± 2.2E-2	1.1E+1 ± 1.1E+0	< 7.3E-3 ± 3.7E-2	< 4.5E-3 ± 1.3E-1	1.0E-1 ± 6.3E-2
A-TF-E3	< 1.4E-1 ± 1.9E-1	8.5E-2 ± 2.9E-2	1.1E+1 ± 1.1E+0	< 2.7E-3 ± 3.8E-2	< 2.5E-2 ± 1.3E-1	< 4.6E-2 ± 6.1E-2
A-TF-E4	< -1.5E-2 ± 3.8E-1	3.6E-2 ± 2.1E-2	4.2E+1 ± 4.2E+0	< -5.3E-2 ± 7.0E-2	< -8.6E-3 ± 2.3E-1	1.2E-1 ± 6.3E-2
A-TF-W1	< -1.6E-1 ± 1.8E-1	7.5E-2 ± 2.7E-2	3.7E+0 ± 3.8E-1	< -2.0E-2 ± 3.7E-2	< -7.5E-2 ± 1.2E-1	1.1E-1 ± 7.6E-2
A-TF-W2	< -6.2E-2 ± 1.2E-1	2.6E-2 ± 1.8E-2	1.7E+0 ± 1.8E-1	< 1.9E-2 ± 2.5E-2	< 2.1E-2 ± 8.4E-2	< 3.9E-2 ± 6.1E-2
AW-TF-E	< -6.1E-2 ± 1.0E-1	4.3E-2 ± 1.4E-2	3.1E-1 ± 4.1E-2	< 2.7E-3 ± 2.0E-2	< 5.3E-4 ± 6.8E-2	< 4.7E-2 ± 5.1E-2
B-TF-NE	< -5.3E-2 ± 2.6E-1	< 1.3E-2 ± 1.8E-2	2.8E+1 ± 2.8E+0	< 1.6E-2 ± 5.4E-2	< -5.8E-2 ± 1.8E-1	< 1.2E-2 ± 7.4E-2
B-TF-SE	< -7.0E-2 ± 2.0E-1	2.2E-2 ± 2.1E-2	1.4E+1 ± 1.4E+0	5.2E-2 ± 4.7E-2	< -1.9E-2 ± 1.6E-1	< 2.2E-3 ± 7.3E-2
BX-TF-W	< -8.6E-2 ± 2.3E-1	4.5E-2 ± 2.1E-2	2.3E+1 ± 2.3E+0	< -2.6E-2 ± 5.1E-2	< 1.1E-1 ± 1.7E-1	1.9E-1 ± 5.7E-2
C-TF-NE	< -5.9E-2 ± 5.1E-1	6.5E-2 ± 2.6E-2	8.2E+1 ± 8.2E+0	< 1.0E-2 ± 9.4E-2	< 1.5E-1 ± 3.2E-1	< 6.8E-2 ± 8.4E-2
C-TF-SE	< 2.5E-1 ± 2.5E-1	6.9E-2 ± 2.4E-2	2.3E+1 ± 2.3E+0	< 4.9E-3 ± 5.4E-2	< -2.5E-2 ± 1.9E-1	9.5E-2 ± 6.8E-2
Maximum	4.4E-1	8.5E-2	8.2E+1	5.2E-2	1.5E-1	1.9E-1
Minimum	-1.6E-1	1.0E-2	1.2E-1	-5.3E-2	-9.3E-2	-2.0E-3
<b>200 West Area</b>						
2WN	< -1.4E-2 ± 1.1E-1	2.3E-2 ± 1.9E-2	1.3E-1 ± 2.7E-2	< -2.7E-2 ± 2.7E-2	< -1.2E-2 ± 8.6E-2	1.2E-1 ± 7.2E-2
2WNE	< 0.0E+0 ± 1.1E-1	4.5E-2 ± 1.7E-2	2.7E-1 ± 3.8E-2	< -3.1E-2 ± 2.7E-2	< 0.0E+0 ± 8.6E-2	< 3.9E-2 ± 7.7E-2
2WSE	1.7E-1 ± 1.2E-1	5.3E-2 ± 1.9E-2	4.3E-1 ± 5.6E-2	< -3.4E-2 ± 2.7E-2	< 3.4E-2 ± 8.5E-2	1.3E-1 ± 6.1E-2
S-TF-NE	< -5.6E-3 ± 1.7E-1	4.5E-2 ± 2.3E-2	2.6E+0 ± 2.8E-1	< -2.0E-3 ± 3.3E-2	< 3.0E-2 ± 1.1E-1	1.1E-1 ± 5.9E-2
S-TF-SE	< 6.1E-2 ± 2.0E-1	3.2E-2 ± 2.0E-2	2.0E+1 ± 2.0E+0	< 3.8E-2 ± 4.8E-2	< -2.6E-2 ± 1.6E-1	< 4.7E-2 ± 6.4E-2
S-TF-W	< 1.0E-1 ± 1.4E-1	3.7E-2 ± 1.8E-2	4.6E+0 ± 4.7E-1	< -8.4E-4 ± 3.3E-2	< -4.6E-2 ± 1.2E-1	< -3.7E-2 ± 7.2E-2
TX-TF-NE	< 1.6E-1 ± 2.8E-1	2.1E-2 ± 2.0E-2	2.5E+1 ± 2.5E+0	< 9.5E-3 ± 5.6E-2	< -4.9E-2 ± 1.9E-1	< 6.9E-2 ± 7.1E-2
TX-TF-SE	< -5.9E-2 ± 2.1E-1	2.6E-2 ± 1.8E-2	1.8E+1 ± 1.9E+0	< 7.5E-3 ± 5.0E-2	< 6.9E-2 ± 1.7E-1	1.5E-1 ± 6.7E-2
TX-TF-W	< 5.0E-2 ± 1.6E-1	3.2E-2 ± 1.4E-2	9.2E+0 ± 9.3E-1	< 1.2E-2 ± 3.6E-2	1.4E-1 ± 1.2E-1	8.3E-2 ± 5.9E-2
U-TF-NE (a)	b	b	2.5E+2	b	b	b
U-TF-SE	< -4.7E-2 ± 1.7E-1	3.1E-2 ± 2.1E-2	5.8E+0 ± 5.9E-1	< -1.4E-2 ± 3.4E-2	< -5.6E-2 ± 1.2E-1	< 1.2E-2 ± 6.7E-2
U-TF-W	< 8.7E-2 ± 1.2E-1	5.0E-2 ± 1.6E-2	1.7E+0 ± 1.8E-1	4.4E-2 ± 3.0E-2	< 8.1E-2 ± 9.1E-2	1.0E-1 ± 6.5E-2
Maximum	1.7E-1	5.3E-2	2.5E+2	4.4E-2	1.4E-1	1.5E-1
Minimum	-5.9E-2	2.1E-2	1.3E-1	-3.4E-2	-5.6E-2	-3.7E-2
Soil Standards (c)			400			800

E-22

WHC-EP-0145

Table E-6. Soil Results for 200 Area Fencelines for 1987 (pCi/g dry weight). (sheet 3 of 3)

Location	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error	Uranium ± Error
<b>200 East Area</b>					
2E-1	1.2E-1 ± 4.5E-2	< -3.7E-2 ± 5.7E-2	< 4.4E-5 ± 1.2E-4	1.1E-3 ± 4.0E-4	3.2E-1 ± 1.5E-1
2E-2	< 5.0E-2 ± 5.3E-2	< 8.7E-2 ± 1.2E-1	< 2.7E-4 ± 4.0E-4	7.3E-3 ± 1.7E-3	3.9E-1 ± 1.8E-1
2E-3	< 7.4E-3 ± 5.2E-2	< -4.0E-3 ± 5.9E-2	3.9E-4 ± 2.4E-4	1.0E-2 ± 1.6E-3	2.4E-1 ± 1.2E-1
2E-N	< 3.3E-2 ± 4.2E-2	7.1E-2 ± 5.8E-2	< 2.0E-4 ± 2.9E-4	6.0E-3 ± 1.4E-3	2.8E-1 ± 1.3E-1
2E-NE	< 3.9E-2 ± 4.4E-2	< 4.1E-2 ± 5.3E-2	< 1.6E-4 ± 1.8E-4	5.1E-3 ± 1.0E-3	1.2E-1 ± 6.2E-2
2E-SE	< 5.6E-3 ± 3.7E-2	< 2.4E-2 ± 3.3E-2	< -3.1E-6 ± 8.5E-5	1.5E-3 ± 4.2E-4	2.4E-1 ± 1.2E-1
A-TF-E1	< 4.0E-2 ± 4.8E-2	< 5.3E-2 ± 6.3E-2	< -1.0E-5 ± 7.7E-5	< 6.1E-5 ± 9.1E-5	2.8E-1 ± 1.3E-1
A-TF-E2	5.1E-2 ± 4.5E-2	7.3E-2 ± 6.4E-2	9.0E-4 ± 4.3E-4	7.6E-3 ± 1.4E-3	3.1E-1 ± 1.4E-1
A-TF-E3	7.1E-2 ± 4.8E-2	< 1.2E-2 ± 7.1E-2	< -5.9E-5 ± 1.3E-4	1.4E-3 ± 5.4E-4	3.6E-1 ± 1.7E-1
A-TF-E4	< 2.0E-2 ± 5.4E-2	< 6.1E-2 ± 1.3E-1	8.6E-4 ± 7.6E-4	8.2E-3 ± 2.1E-3	1.7E-1 ± 1.0E-1
A-TF-W1	< 9.2E-3 ± 4.7E-2	< 1.4E-2 ± 7.5E-2	< 1.8E-4 ± 2.4E-4	5.1E-3 ± 1.3E-3	2.7E-1 ± 1.3E-1
A-TF-W2	< 2.0E-2 ± 4.4E-2	< 4.7E-2 ± 5.0E-2	< 1.6E-4 ± 2.2E-4	1.3E-3 ± 5.5E-4	2.2E-1 ± 1.1E-1
AW-TF-E	< 1.2E-2 ± 4.1E-2	< 5.8E-3 ± 3.7E-2	3.3E-4 ± 2.3E-4	5.2E-3 ± 9.8E-4	5.1E-1 ± 2.8E-1
B-TF-NE	< -1.1E-2 ± 5.1E-2	< 2.5E-2 ± 1.0E-1	< 1.8E-4 ± 4.6E-4	9.9E-3 ± 2.1E-3	5.5E-2 ± 3.9E-2
B-TF-SE	< -2.5E-3 ± 4.6E-2	< 7.5E-2 ± 9.3E-2	< 6.3E-5 ± 2.7E-4	5.5E-3 ± 1.3E-3	1.3E-1 ± 6.7E-2
BX-TF-W	< 1.1E-2 ± 4.5E-2	< 7.0E-4 ± 9.3E-2	< -1.0E-4 ± 2.2E-4	2.7E-3 ± 9.6E-4	3.3E-1 ± 1.6E-1
C-TF-NE	< 1.7E-2 ± 5.2E-2	< 2.2E-2 ± 1.8E-1	< 3.9E-4 ± 6.3E-4	2.2E-2 ± 4.1E-3	2.7E-1 ± 1.3E-1
C-TF-SE	< -1.0E-2 ± 6.2E-2	< -3.2E-2 ± 1.0E-1	7.5E-4 ± 6.4E-4	1.5E-2 ± 2.9E-3	2.7E-1 ± 1.3E-1
Maximum	1.2E-1	8.7E-2	9.0E-4	2.2E-2	5.1E-1
Minimum	-1.1E-2	-3.7E-2	-1.0E-4	6.1E-5	5.5E-2
<b>200 West Area</b>					
2WN	< 1.2E-2 ± 5.3E-2	< 8.1E-3 ± 4.8E-2	< 8.9E-5 ± 1.5E-4	3.8E-3 ± 8.4E-4	< 2.3E-1 ± 1.1E+0
2WNE	< 3.4E-2 ± 5.3E-2	< 1.3E-2 ± 4.8E-2	< 9.9E-5 ± 1.7E-4	6.4E-3 ± 1.1E-3	3.0E-1 ± 1.4E-1
2WSE	< 1.1E-3 ± 5.1E-2	< 2.7E-2 ± 5.1E-2	1.1E-3 ± 5.5E-4	2.2E-2 ± 3.4E-3	2.0E-1 ± 9.7E-2
S-TF-NE	< -2.8E-2 ± 5.7E-2	< 1.7E-2 ± 6.6E-2	8.2E-4 ± 4.5E-4	1.2E-2 ± 2.1E-3	2.7E-1 ± 1.3E-1
S-TF-SE	4.7E-2 ± 4.6E-2	< 2.3E-2 ± 8.7E-2	1.1E-3 ± 8.4E-4	2.4E-2 ± 4.4E-3	2.5E-1 ± 1.2E-1
S-TF-W	< -1.5E-2 ± 4.8E-2	< -5.5E-3 ± 6.6E-2	7.6E-4 ± 3.4E-4	1.7E-2 ± 2.4E-3	3.7E-1 ± 1.7E-1
TX-TF-NE	< 2.4E-2 ± 4.8E-2	< 8.0E-3 ± 1.1E-1	< 2.0E-4 ± 3.7E-4	2.7E-2 ± 3.9E-3	2.6E-1 ± 1.2E-1
TX-TF-SE	< -9.2E-3 ± 4.4E-2	1.3E-1 ± 9.8E-2	< 3.9E-4 ± 5.0E-4	3.6E-2 ± 5.1E-3	1.7E-1 ± 8.5E-2
TX-TF-W	< 2.5E-2 ± 4.6E-2	< 1.6E-2 ± 6.5E-2	< 2.6E-4 ± 2.9E-4	1.3E-2 ± 2.1E-3	2.9E-1 ± 1.4E-1
U-TF-NE (a)	b	b	b	4.0E-1	b
U-TF-SE	< -5.3E-2 ± 5.7E-2	< 4.1E-2 ± 6.4E-2	2.1E-3 ± 7.6E-4	8.9E-2 ± 1.0E-2	3.3E-1 ± 1.6E-1
U-TF-W	6.5E-2 ± 3.9E-2	6.0E-2 ± 5.1E-2	7.4E-3 ± 1.1E-3	3.9E-1 ± 3.9E-2	2.2E-1 ± 1.1E-1
Maximum	6.5E-2	1.3E-1	7.4E-3	4.0E-1	3.7E-1
Minimum	-5.3E-2	-5.5E-3	8.9E-5	3.8E-3	1.7E-1
Soil Standards (c)	200	200	60	60	

(a) No counting error available, samples sent to 222-S laboratory.

(b) Radionuclide not reported.

(c) Boothe 1987.

Table E-7. The  $^{137}\text{Cs}$  Concentrations in Soil at the 200 Area Fencelines, 1984 through 1987 (pCi/g dry weight).

Location	1984	1985	1986	1987
<b>200 East Area</b>				
2E-1	3.5E+0 ± 1.3E-1	3.6E+0 ± 2.9E-1	1.3E+0 ± 1.5E-1	1.1E+0 ± 1.2E-1
2E-2	2.5E+1 ± 3.3E-3	2.1E+1 ± 1.4E+0	2.1E+1 ± 2.2E+0	2.5E+1 ± 2.5E+0
2E-3	a	6.0E-1 ± 1.2E-1	2.2E-1 ± 4.6E-2	4.9E-1 ± 6.4E-2
2E-N	1.6E+1 ± 2.7E-1	1.6E+1 ± 1.1E+0	1.1E+1 ± 1.1E+0	9.1E+0 ± 9.2E-1
2E-NE	1.5E+0 ± 8.6E-2	1.5E+0 ± 1.8E-1	1.5E+0 ± 1.8E-1	1.1E+0 ± 1.2E-1
2E-SE	1.2E-1 ± 2.8E-2	6.3E-2 ± 5.2E-2	1.7E-1 ± 4.3E-2	1.2E-1 ± 2.0E-2
A-TF-E1	1.0E+0 ± 6.4E-2	9.6E-1 ± 1.4E-1	2.4E+0 ± 2.7E-1	2.1E+0 ± 2.2E-1
A-TF-E2	3.7E+0 ± 1.2E-1	5.4E+0 ± 4.0E-1	1.3E+1 ± 1.3E+0	1.1E+1 ± 1.1E+0
A-TF-E3	5.8E+0 ± 1.4E-1	4.6E+0 ± 3.5E-1	1.5E+1 ± 1.5E+0	1.1E+1 ± 1.1E+0
A-TF-E4	5.2E+2 ± 3.3E+0	8.6E+1 b	9.0E+1 ± 9.1E+0	4.2E+1 ± 4.2E+0
A-TF-W1	9.3E-2 ± 3.3E-2	6.8E-1 ± 9.3E-2	2.9E+0 ± 3.1E-1	3.7E+0 ± 3.8E-1
A-TF-W2	8.6E-1 ± 5.8E-2	1.7E+0 ± 1.7E-1	8.3E-1 ± 1.1E-1	1.7E+0 ± 1.8E-1
AW-TF-E	1.3E+0 ± 7.1E-2	9.3E-2 ± 5.0E-2	2.2E-1 ± 4.3E-2	3.1E-1 ± 4.1E-2
B-TF-NE	3.9E+1 ± 4.4E-1	8.1E+1 b	2.6E+1 ± 2.6E+0	2.8E+1 ± 2.8E+0
B-TF-SE	1.1E+1 ± 2.3E-1	1.1E+1 ± 7.4E-1	9.4E+0 ± 9.6E-1	1.4E+1 ± 1.4E+0
BX-TF-W	7.5E+0 ± 1.7E-1	2.4E+0 ± 2.2E-1	2.3E+0 b	2.3E+1 ± 2.3E+0
C-TF-NE	4.0E+0 ± 1.5E-1	3.3E+0 ± 2.7E-1	4.6E+0 ± 4.9E-1	8.2E+1 ± 8.2E+0
C-TF-SE	2.0E+1 ± 2.8E-1	a	3.9E+1 b	2.3E+1 ± 2.3E+0
Maximum	5.2E+2	8.6E+1	9.0E+1	8.2E+1
Minimum	9.3E-2	6.3E-2	1.7E-1	1.2E-1
<b>200 West Area</b>				
2WN	1.5E-1 ± 3.4E-2	1.5E-1 ± 5.2E-2	1.6E-1 ± 3.9E-2	1.3E-1 ± 2.7E-2
2WNE	2.9E-1 ± 3.8E-2	2.3E-1 ± 6.5E-2	2.1E-1 ± 4.1E-2	2.7E-1 ± 3.8E-2
2WSE	3.4E-1 ± 4.4E-2	7.4E-1 ± 1.1E-1	5.4E-1 ± 7.4E-2	4.3E-1 ± 5.6E-2
S-TF-NE	8.8E+0 ± 5.7E-1	7.8E+0 ± 4.9E-1	3.6E+0 ± 3.8E-1	2.6E+0 ± 2.8E-1
S-TF-SE	1.6E+1 ± 9.8E-1	1.2E+1 ± 7.5E-1	7.2E+0 ± 7.3E-1	2.0E+1 ± 2.0E+0
S-TF-W	2.5E+0 ± 1.8E-1	1.9E+0 ± 1.4E-1	4.4E+0 ± 4.5E-1	4.6E+0 ± 4.7E-1
TX-TF-NE	2.3E+2 ± 1.4E+1	5.7E+1 b	4.8E+1 ± 4.8E+0	2.5E+1 ± 2.5E+0
TX-TF-SE	2.7E+1 ± 1.7E+0	2.6E+1 ± 1.6E+0	2.0E+1 ± 2.0E+0	1.8E+1 ± 1.9E+0
TX-TF-W	7.7E+0 ± 5.0E-1	1.0E+1 ± 6.3E-1	2.0E+1 ± 2.0E+0	9.2E+0 ± 9.3E-1
U-TF-NE	9.0E+1 ± 5.4E+0	3.1E+2 b	2.9E+2 b	2.5E+2 b
U-TF-SE	6.8E+0 ± 1.7E-1	6.9E+0 ± 4.3E-1	1.1E+1 ± 1.1E+0	5.8E+0 ± 5.9E-1
U-TF-W	9.3E-1 ± 6.3E-2	1.1E+0 ± 8.0E-2	1.4E+0 ± 1.6E-1	1.7E+0 ± 1.8E-1
Maximum	2.3E+2	3.1E+2	2.9E+2	2.5E+2
Minimum	1.5E-1	1.5E-1	1.6E-1	1.3E-1

(a) Site not sampled.

(b) Counting error not available.

9 2 1 2 5 6 2 0 6 4 2

Table E-8. The <sup>90</sup>Sr Concentrations in Soil at the 200 Area Fencelines, 1984 through 1987 (pCi/g dry weight).

Location	1984	1985	1986	1987
<b>200 East Area</b>				
2E-1	1.3E+0 ± 6.0E-2	1.1E+0 ± 2.1E-1	4.4E-1 ± 8.6E-2	3.5E-1 ± 8.7E-2
2E-2	2.3E+0 ± 8.3E-2	2.7E+0 ± 5.0E-1	2.4E+0 ± 4.3E-1	2.6E+0 ± 6.6E-1
2E-3	a	1.0E+0 ± 1.9E-1	3.1E-1 ± 6.2E-2	5.7E-1 ± 1.4E-1
2E-N	2.0E+0 ± 8.4E-2	2.0E+0 ± 3.7E-1	1.7E+0 ± 3.1E-1	1.9E+0 ± 4.7E-1
2E-NE	1.3E+0 ± 6.3E-2	1.9E+0 ± 3.4E-1	1.5E+0 ± 2.7E-1	1.0E+0 ± 2.5E-1
2E-SE	1.0E-1 ± 1.9E-2	1.6E+0 ± 2.9E-1	4.8E-1 ± 9.5E-2	3.5E-1 ± 9.0E-2
A-TF-E1	1.6E-1 ± 2.8E-2	3.6E-1 ± 7.1E-2	4.0E-1 ± 7.9E-2	4.8E-1 ± 1.2E-1
A-TF-E2	4.6E-1 ± 4.4E-2	8.3E-1 ± 1.6E-1	2.4E+0 ± 4.4E-1	4.3E+0 ± 1.1E+0
A-TF-E3	1.3E+0 ± 6.1E-2	1.2E+0 ± 2.2E-1	5.3E+0 ± 9.6E-1	1.6E+0 ± 3.9E-1
A-TF-E4	2.1E+1 ± 5.6E-1	7.8E+0 b	7.7E+0 ± 1.4E+0	4.9E+0 ± 1.2E+0
A-TF-W1	5.5E-2 ± 1.6E-2	6.6E-1 ± 1.2E-1	1.0E+0 ± 1.9E-1	1.8E+0 ± 4.4E-1
A-TF-W2	8.8E-1 ± 6.7E-2	2.5E+0 ± 4.4E-1	7.6E-1 ± 1.5E-1	1.1E+0 ± 2.7E-1
AW-TF-E	4.7E-1 ± 4.5E-2	3.4E-2 ± 1.9E-2	3.7E-1 ± 7.3E-2	1.6E-1 ± 4.0E-2
B-TF-NE	1.1E+1 ± 1.8E-1	1.0E+1 b	5.8E+0 ± 1.0E+0	8.2E+0 ± 2.0E+0
B-TF-SE	4.3E+0 ± 1.2E-1	7.1E+0 ± 1.3E+0	3.3E+0 ± 6.0E-1	6.4E+0 ± 1.6E+0
BX-TF-W	1.4E+0 ± 7.0E-2	1.4E-1 ± 3.0E-2	5.1E+0 b	2.7E-1 ± 7.2E-2
C-TF-NE	1.6E+0 ± 7.3E-2	4.7E+0 ± 8.8E-1	3.6E+0 ± 6.7E-1	1.1E+1 ± 2.6E+0
C-TF-SE	2.2E+1 ± 2.7E-1	a	3.2E+1 b	1.5E+1 ± 3.5E+0
Maximum	2.2E+1	1.0E+1	3.2E+1	1.5E+1
Minimum	5.5E-2	3.4E-2	3.1E-1	1.6E-1
<b>200 West Area</b>				
2WN	1.7E-1 ± 3.9E-2	1.1E-1 ± 2.7E-2	5.8E-2 ± 1.7E-2	5.9E-2 ± 1.7E-2
2WNE	3.1E-1 ± 3.6E-2	4.4E-1 ± 8.9E-2	2.1E-1 ± 4.7E-2	2.3E-1 ± 6.0E-2
2WSE	1.5E-1 ± 2.9E-2	4.5E-1 ± 8.8E-2	2.1E-1 ± 4.5E-2	1.9E-1 ± 5.0E-2
S-TF-NE	1.2E+0 ± 6.8E-2	2.9E+0 ± 5.3E-1	4.2E+0 ± 7.8E-1	1.2E+0 ± 3.0E-1
S-TF-SE	4.5E+0 ± 1.4E-1	3.1E+0 ± 5.7E-1	2.3E+0 ± 4.2E-1	3.8E+0 ± 9.5E-1
S-TF-W	1.0E+0 ± 6.5E-2	5.1E-1 ± 9.9E-2	2.3E+0 ± 4.2E-1	2.4E+0 ± 5.9E-1
TX-TF-NE	1.6E+1 ± 3.8E-1	2.5E+0 b	5.0E+0 ± 9.1E-1	4.0E+0 ± 9.8E-1
TX-TF-SE	2.7E+0 ± 9.4E-2	2.9E+0 ± 5.3E-1	1.9E+0 ± 3.6E-1	7.4E+0 ± 1.8E+0
TX-TF-W	1.9E+0 ± 9.0E-2	1.7E+0 ± 3.2E-1	1.7E+0 ± 3.1E-1	1.9E+0 ± 4.8E-1
U-TF-NE	2.8E+1 ± 6.0E-1	7.1E+1 b	8.3E+1 b	7.5E+1 b
U-TF-SE	8.5E-1 ± 5.2E-2	7.3E-1 ± 1.4E-1	2.0E+0 ± 3.7E-1	8.4E-1 ± 2.1E-1
U-TF-W	3.3E-1 ± 4.1E-2	4.3E-1 ± 8.3E-2	1.6E+0 ± 3.0E-1	7.6E-1 ± 1.9E-1
Maximum	2.8E+1	7.1E+1	8.3E+1	7.5E+1
Minimum	1.5E-1	1.1E-1	5.8E-2	5.9E-2

(a) Site not sampled.

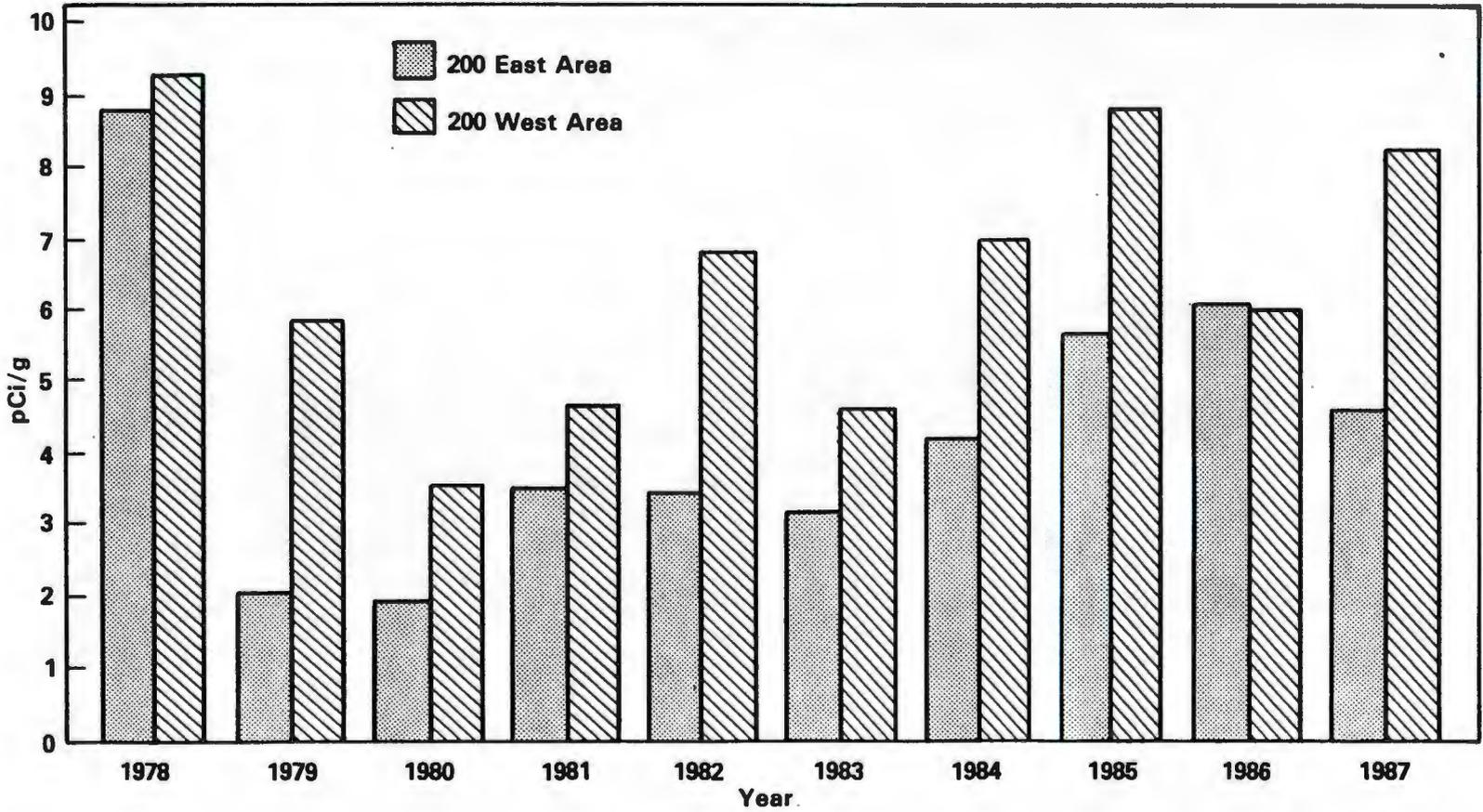
(b) Counting error not available.

Table E-9. The  $^{239}\text{Pu}$  Concentrations in Soil at the 200 Area Fencelines, 1984 through 1987 (pCi/g dry weight).

Location	1984	1985	1986	1987
<b>200 East Area</b>				
2E-1	5.2E-3 ± 1.3E-3	2.8E-2 ± 3.4E-3	1.9E-3 ± 8.4E-4	1.1E-3 ± 4.0E-4
2E-2	3.0E-3 ± 2.7E-3	8.5E-3 ± 1.5E-3	7.0E-3 ± 1.5E-3	7.3E-3 ± 1.7E-3
2E-3	a	4.2E-2 ± 4.7E-3	1.0E-2 ± 1.8E-3	1.0E-2 ± 1.6E-3
2E-N	1.2E-2 ± 2.5E-3	7.5E-3 ± 1.4E-3	6.7E-3 ± 1.4E-3	6.0E-3 ± 1.4E-3
2E-NE	4.3E-3 ± 1.0E-3	5.1E-3 ± 1.2E-3	4.7E-3 ± 1.1E-3	5.1E-3 ± 1.0E-3
2E-SE	2.4E-3 ± 8.7E-4	1.9E-3 ± 7.4E-4	1.4E-3 ± 6.3E-4	1.5E-3 ± 4.2E-4
A-TF-E1	1.0E-3 ± 7.5E-4	2.3E-3 ± 6.9E-4	3.4E-3 ± 1.1E-3	6.1E-5 ± 9.1E-5
A-TF-E2	3.2E-3 ± 1.7E-3	2.6E-3 ± 8.3E-4	4.4E-3 ± 1.2E-3	7.6E-3 ± 1.4E-3
A-TF-E3	3.3E-4 ± 7.3E-4	7.8E-4 ± 4.0E-4	2.8E-3 ± 7.9E-4	1.4E-3 ± 5.4E-4
A-TF-E4	3.1E-2 ± 5.1E-3	2.3E+2 b	1.4E-2 ± 2.3E-3	8.2E-3 ± 2.1E-3
A-TF-W1	8.1E-4 ± 3.7E-4	1.3E-3 ± 5.0E-4	3.3E-3 ± 8.1E-4	5.1E-3 ± 1.3E-3
A-TF-W2	2.4E-3 ± 5.3E-4	1.8E-3 ± 9.7E-4	1.4E-3 ± 5.8E-4	1.3E-3 ± 5.5E-4
AW-TF-E	9.0E-4 ± 3.9E-4	7.1E-2 ± 7.3E-3	1.5E-3 ± 6.5E-4	5.2E-3 ± 9.8E-4
B-TF-NE	2.1E-3 ± 5.0E-4	a	8.1E-3 ± 1.5E-3	9.9E-3 ± 2.1E-3
B-TF-SE	2.2E-3 ± 5.4E-4	5.7E-3 ± 1.1E-3	5.0E-3 ± 1.1E-3	5.5E-3 ± 1.3E-3
BX-TF-W	1.5E-2 ± 1.6E-3	3.8E-3 ± 9.4E-4	<1	2.7E-3 ± 9.6E-4
C-TF-NE	2.5E-2 ± 2.2E-3	7.4E-4 ± 4.3E-4	3.4E-2 ± 4.5E-3	2.2E-2 ± 4.1E-3
C-TF-SE	5.7E-2 ± 7.9E-3	a	<1	1.5E-2 ± 2.9E-3
Maximum	5.7E-2	2.3E+2	3.4E-2	2.2E-2
Minimum	3.3E-4	7.4E-4	1.4E-3	6.1E-5
<b>200 West Area</b>				
2WN	9.7E-3 ± 6.7E-3	6.2E-3 ± 1.7E-3	4.7E-3 ± 1.1E-3	3.8E-3 ± 8.4E-4
2WNE	1.9E-2 ± 8.5E-3	1.7E-2 ± 2.6E-3	1.1E-2 ± 2.2E-3	6.4E-3 ± 1.1E-3
2WSE	2.3E-2 ± 1.1E-2	2.5E-2 ± 3.3E-3	2.0E-2 ± 3.1E-3	2.2E-2 ± 3.4E-3
S-TF-NE	4.6E-2 ± 4.0E-3	4.0E-2 ± 4.7E-3	1.2E-2 ± 2.1E-3	1.2E-2 ± 2.1E-3
S-TF-SE	1.5E-2 ± 1.7E-3	4.0E-2 ± 9.8E-3	9.2E-3 ± 1.7E-3	2.4E-2 ± 4.4E-3
S-TF-W	2.7E-2 ± 2.9E-3	1.4E-2 ± 3.3E-3	2.0E-2 ± 3.0E-3	1.7E-2 ± 2.4E-3
TX-TF-NE	1.7E-2 ± 9.3E-3	1.3E+0 b	3.2E-2 ± 4.1E-3	2.7E-2 ± 3.9E-3
TX-TF-SE	1.1E-1 ± 1.3E-2	5.2E-2 ± 5.9E-3	3.5E-2 ± 4.3E-3	3.6E-2 ± 5.1E-3
TX-TF-W	1.3E-2 ± 1.7E-3	1.4E-2 ± 2.1E-3	1.6E-2 ± 2.4E-3	1.3E-2 ± 2.1E-3
U-TF-NE	2.8E-1 ± 9.6E-3	8.1E+0 b	5.0E-1 b	4.0E-1 b
U-TF-SE	2.2E-2 ± 2.8E-3	3.8E-2 ± 4.7E-3	8.2E-2 ± 9.4E-3	8.9E-2 ± 1.0E-2
U-TF-W	6.9E-1 ± 1.7E-2	6.3E-1 ± 6.0E-2	5.7E-1 ± 5.9E-2	3.9E-1 ± 3.9E-2
Maximum	6.9E-1	8.1E+0	5.7E-1	4.0E-1
Minimum	9.7E-3	6.2E-3	4.7E-3	3.8E-3

(a) Site not sampled.

(b) Counting error not available.



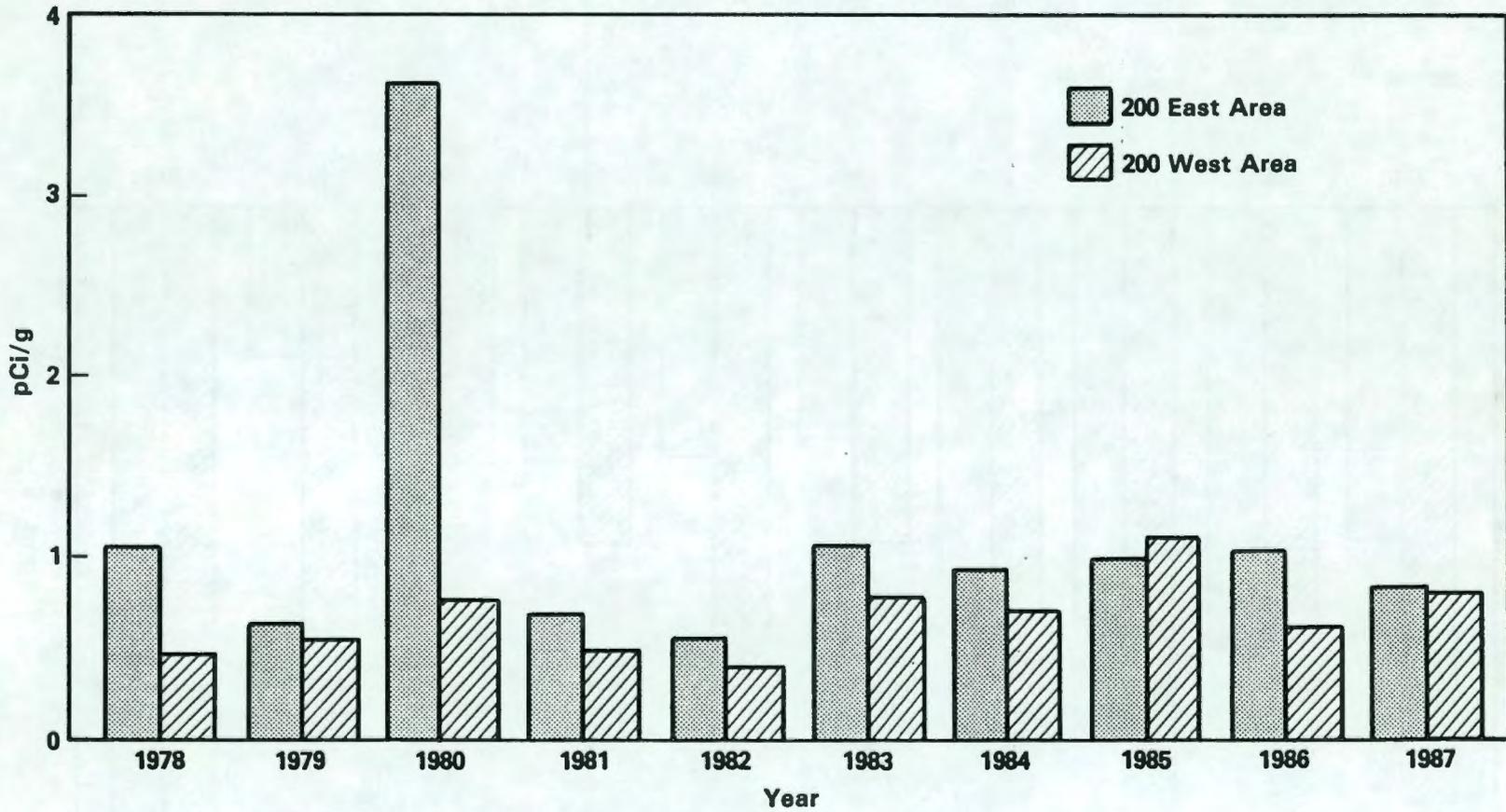
E-27

WHC-EP-0145

28803-050.2

Figure E-7. Yearly Averages for <sup>137</sup>Cs in Soil.

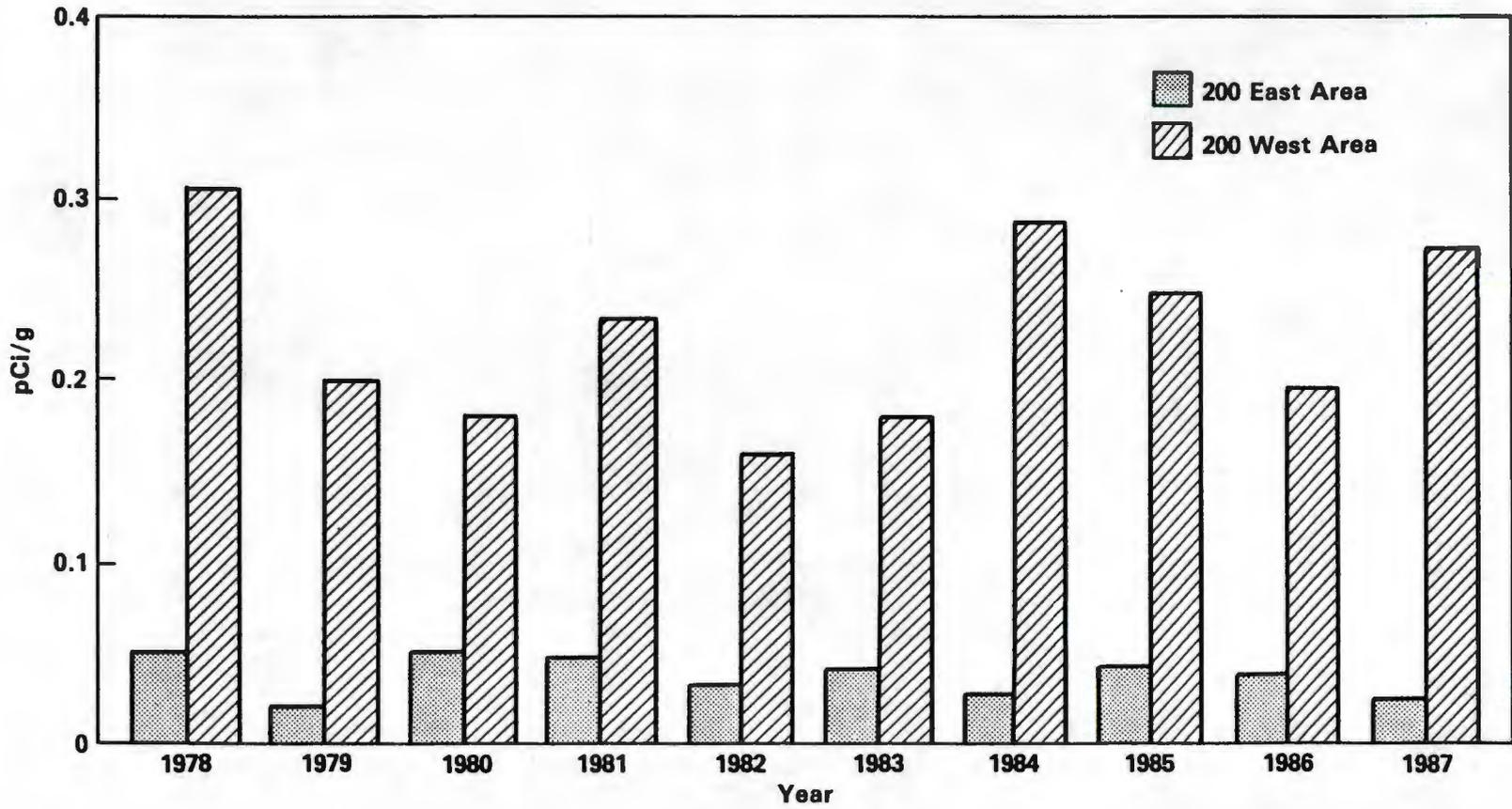
E-28



WHC-EP-0145

28803-050.11

Figure E-8. Yearly Averages for <sup>90</sup>Sr in Soil.



E-29

WHC-EP-0145

28803-050.10

Figure E-9. Yearly Averages for <sup>239</sup>Pu in Soil.

Table E-10. Grid Site Vegetation Results for 200 East Area for 1987 (pCi/g dry weight). (sheet 1 of 2)

Location	Co-60 ± Error	Sr-90 ± Error	Nb-95 ± Error	Zr-95 ± Error	Tc-99 ± Error	Ru-106 ± Error	I-129 ± Error
2E 1	< -7.3E-3 ± 1.6E-2	a	3.0E-2 ± 1.9E-2	< -1.3E-2 ± 3.0E-2	a	b	a
2E 3	< 1.3E-2 ± 1.4E-2	a	< -2.7E-2 ± 1.9E-2	< -4.0E-3 ± 2.5E-2	a	b	a
2E 4	< 6.0E-3 ± 1.3E-2	1.2E-1 ± 3.1E-2	< 7.8E-3 ± 2.0E-2	3.5E-2 ± 2.3E-2	a	b	a
2E 4B	< 9.5E-3 ± 1.5E-2	1.2E-1 ± 3.2E-2	< 3.1E-3 ± 1.9E-2	< -4.7E-2 ± 3.3E-2	a	b	a
2E 6	< -7.7E-3 ± 1.5E-2	a	< 3.3E-3 ± 1.9E-2	4.0E-2 ± 2.6E-2	a	b	a
2E10	2.8E-2 ± 1.4E-2	9.5E-1 ± 2.4E-1	< -1.9E-2 ± 2.3E-2	< 1.1E-2 ± 2.9E-2	1.1E+0 ± 8.8E-1	b	< -8.5E-1 ± 4.5E-1
2E12	1.8E-2 ± 1.5E-2	a	< 1.4E-2 ± 2.1E-2	< 1.7E-2 ± 2.9E-2	a	b	a
2E14	< -4.2E-3 ± 1.4E-2	a	< -1.9E-2 ± 2.4E-2	3.7E-2 ± 2.5E-2	< 3.1E-1 ± 8.5E-1	b	< -5.8E-2 ± 3.2E-1
2E14B	< -4.4E-3 ± 1.8E-2	a	< -2.2E-2 ± 2.7E-2	< 1.9E-2 ± 3.0E-2	< 1.5E-1 ± 8.4E-1	b	3.6E-1 ± 2.3E-1
2E16	2.5E-2 ± 2.2E-2	a	< -2.0E-2 ± 3.0E-2	< -4.4E-2 ± 4.5E-2	a	b	a
2E17	1.7E-2 ± 1.3E-2	1.0E+1 ± 2.4E+0	< -1.2E-2 ± 2.3E-2	< 1.7E-2 ± 2.8E-2	a	b	a
2E18	< 4.3E-3 ± 2.1E-2	2.1E-1 ± 5.4E-2	< 1.0E-2 ± 2.9E-2	5.6E-2 ± 4.3E-2	a	b	a
2E19	< 7.3E-3 ± 1.7E-2	a	< -1.3E-2 ± 2.7E-2	< 2.7E-2 ± 3.3E-2	a	b	a
2E23	< -1.7E-2 ± 2.3E-2	3.5E-2 ± 1.2E-2	< -3.4E-3 ± 3.6E-2	< -5.2E-3 ± 4.9E-2	a	b	a
2E24	< 3.9E-3 ± 1.4E-2	3.8E-1 ± 9.7E-2	< -6.6E-3 ± 2.0E-2	< -1.8E-2 ± 2.7E-2	< 2.0E-1 ± 8.4E-1	b	< -3.9E-1 ± 4.1E-1
2E28	< -1.2E-3 ± 1.7E-2	a	< -4.3E-3 ± 2.9E-2	< -7.1E-2 ± 4.1E-2	a	b	a
2E28B	< -1.0E-2 ± 1.8E-2	a	< 2.2E-2 ± 3.3E-2	< -2.0E-2 ± 4.4E-2	a	b	a
2E34	1.9E-2 ± 1.8E-2	a	< -2.4E-2 ± 2.6E-2	< -3.5E-3 ± 3.4E-2	a	b	a
2E35	< 1.6E-3 ± 1.4E-2	1.4E+0 ± 3.6E-1	< -2.2E-2 ± 2.5E-2	< -6.1E-3 ± 3.2E-2	a	b	a
2EA	< 1.3E-2 ± 1.4E-2	a	< 9.3E-3 ± 2.4E-2	< -4.6E-3 ± 2.9E-2	a	b	a
2EB	< 1.1E-2 ± 1.5E-2	a	< 6.5E-3 ± 2.3E-2	< -1.5E-2 ± 3.4E-2	a	4.3E-1 ± 1.7E-1	a
2EC	< 0.0E+0 ± 1.8E-2	a	< -2.2E-3 ± 2.6E-2	< -2.3E-2 ± 3.5E-2	a	b	a
2ED	1.9E-2 ± 1.8E-2	3.7E-1 ± 9.4E-2	< -2.3E-2 ± 3.3E-2	< 4.9E-3 ± 3.9E-2	< 3.8E-1 ± 8.5E-1	b	< -2.8E-1 ± 3.1E-1
2EDB	< 1.4E-2 ± 1.6E-2	3.3E-1 ± 8.4E-2	< 1.8E-2 ± 2.9E-2	< 8.9E-3 ± 3.9E-2	9.6E-1 ± 8.8E-1	b	< -1.4E-1 ± 3.7E-1
GRT1	< 5.5E-3 ± 1.7E-2	2.2E-1 ± 5.7E-2	< -1.1E-2 ± 2.8E-2	< 1.4E-2 ± 4.2E-2	a	b	< -3.5E-1 ± 3.0E-1
GRT2	3.4E-2 ± 2.5E-2	3.6E-1 ± 9.0E-2	< 7.0E-3 ± 2.5E-2	< -1.3E-3 ± 3.7E-2	4.7E+0 ± 1.1E+0	b	< -1.1E-1 ± 2.2E-1
GRT4	< 1.5E-2 ± 1.8E-2	3.4E-1 ± 8.5E-2	< 2.6E-3 ± 3.2E-2	< -3.6E-2 ± 4.1E-2	< 2.3E-1 ± 8.4E-1	b	< 4.6E-2 ± 2.8E-1
GRT5	< 9.7E-3 ± 1.5E-2	1.4E-1 ± 3.7E-2	< 1.1E-2 ± 2.1E-2	< -3.9E-3 ± 2.9E-2	< 2.1E-2 ± 8.3E-1	b	< -1.0E-1 ± 2.8E-1
GRT6	< 1.1E-2 ± 1.5E-2	2.4E-1 ± 6.0E-2	< 1.9E-2 ± 2.8E-2	< 3.7E-2 ± 3.3E-2	< 6.4E-1 ± 8.6E-1	b	< 1.7E-1 ± 3.7E-1
Maximum	3.4E-2	1.0E+1	3.0E-2	5.6E-2	4.7E+0	4.3E-1	3.6E-1
Minimum	-1.7E-2	3.5E-2	-2.7E-2	-7.1E-2	2.1E-2	4.3E-1	-8.5E-1
Mean	8.0E-3	1.0E+0	-2.2E-3	2.8E-4	8.6E-1	4.3E-1	-1.6E-1
Background (c)		4.8E-2					

E-30

WHC-EP-0145

Table E-10. Grid Site Vegetation Results for 200 East Area for 1987 (pCi/g dry weight). (sheet 2 of 2)

Location	Cs-134 ± Error	Cs-137 ± Error	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error
2E 1	4.3E-2 ± 1.6E-2	1.6E-1 ± 2.6E-2	< 4.2E-2 ± 6.5E-2	< 8.2E-3 ± 4.8E-2	< 9.6E-3 ± 3.5E-2	a	a
2E 3	b	4.2E-1 ± 5.1E-2	< -3.3E-2 ± 6.1E-2	< -3.8E-2 ± 4.7E-2	< 1.8E-2 ± 3.1E-2	a	a
2E 4	b	3.4E-1 ± 4.4E-2	< -3.2E-2 ± 6.9E-2	< 3.1E-2 ± 4.4E-2	< 2.0E-2 ± 3.0E-2	2.9E-4 ± 2.4E-4	1.4E-3 ± 5.4E-4
2E 4B	6.9E-2 ± 1.9E-2	3.3E-1 ± 4.4E-2	< -6.6E-2 ± 7.0E-2	< -2.8E-2 ± 5.1E-2	< 2.5E-2 ± 3.7E-2	3.3E-4 ± 2.0E-4	2.7E-3 ± 6.4E-4
2E 6	3.3E-2 ± 1.7E-2	2.6E-1 ± 3.6E-2	1.0E-1 ± 5.8E-2	< -3.6E-2 ± 5.6E-2	< -4.1E-2 ± 3.7E-2	a	a
2E10	5.4E-2 ± 1.7E-2	3.7E+0 ± 3.7E-1	< -2.7E-2 ± 6.7E-2	< -1.9E-2 ± 4.8E-2	< -1.4E-3 ± 4.2E-2	< 2.3E-4 ± 2.8E-4	4.9E-3 ± 1.2E-3
2E12	3.2E-2 ± 1.8E-2	2.7E-1 ± 3.7E-2	< 5.3E-2 ± 5.8E-2	< 2.0E-3 ± 4.9E-2	< -3.2E-2 ± 4.3E-2	a	a
2E14	b	8.2E-1 ± 9.3E-2	< 2.4E-2 ± 7.3E-2	< 1.2E-2 ± 4.3E-2	< 1.9E-3 ± 4.0E-2	a	a
2E14B	b	1.0E+1 ± 1.0E+0	< -4.3E-3 ± 7.5E-2	< -2.6E-2 ± 5.7E-2	8.1E-2 ± 6.7E-2	a	a
2E16	1.0E-1 ± 2.7E-2	2.8E-1 ± 4.2E-2	< 2.5E-2 ± 7.8E-2	< 1.6E-2 ± 5.9E-2	< -6.9E-3 ± 5.0E-2	a	a
2E17	4.2E-2 ± 1.8E-2	5.4E-1 ± 6.4E-2	< 2.8E-2 ± 6.3E-2	< -2.4E-2 ± 5.1E-2	< 4.0E-2 ± 5.0E-2	3.3E-4 ± 2.1E-4	2.1E-3 ± 5.7E-4
2E18	7.6E-2 ± 2.8E-2	9.1E-1 ± 1.1E-1	< 2.6E-2 ± 9.1E-2	< -3.5E-2 ± 6.9E-2	< 3.7E-2 ± 6.1E-2	4.5E-4 ± 2.7E-4	1.9E-3 ± 5.7E-4
2E19	b	1.1E-1 ± 2.5E-2	< -2.2E-2 ± 7.3E-2	5.8E-2 ± 5.1E-2	< 9.7E-3 ± 4.0E-2	a	a
2E23	b	1.1E-1 ± 3.3E-2	< -8.7E-2 ± 9.7E-2	< -3.8E-3 ± 7.0E-2	< -1.7E-2 ± 6.3E-2	< 8.6E-5 ± 1.7E-4	2.9E-3 ± 1.1E-3
2E24	5.5E-2 ± 1.8E-2	1.5E+0 ± 1.6E-1	< 1.3E-2 ± 6.7E-2	5.1E-2 ± 4.7E-2	< -3.3E-2 ± 4.0E-2	< 7.8E-5 ± 1.6E-4	5.9E-3 ± 1.2E-3
2E28	b	1.8E-1 ± 3.2E-2	< 5.9E-3 ± 7.6E-2	< 1.9E-2 ± 5.8E-2	< 1.8E-3 ± 4.9E-2	a	a
2E28B	7.2E-2 ± 2.3E-2	2.2E-1 ± 3.4E-2	< -2.4E-2 ± 8.0E-2	< 1.1E-2 ± 5.8E-2	< -2.9E-4 ± 3.7E-2	a	a
2E34	5.3E-2 ± 2.6E-2	2.6E-1 ± 4.0E-2	< -2.9E-2 ± 7.4E-2	< 6.4E-3 ± 5.0E-2	< -1.4E-2 ± 5.1E-2	a	a
2E35	7.7E-2 ± 2.0E-2	3.9E-1 ± 4.9E-2	7.4E-2 ± 5.4E-2	< -1.1E-2 ± 5.0E-2	< 2.7E-2 ± 3.8E-2	4.5E-4 ± 3.1E-4	6.8E-3 ± 1.4E-3
2EA	5.6E-2 ± 1.9E-2	2.4E-1 ± 3.4E-2	< -1.8E-3 ± 7.6E-2	< -7.8E-3 ± 4.8E-2	< -2.8E-2 ± 4.6E-2	a	a
2EB	4.0E-2 ± 2.0E-2	1.4E-1 ± 2.8E-2	< -7.2E-2 ± 8.2E-2	< -3.1E-3 ± 5.5E-2	< -2.2E-2 ± 4.3E-2	a	a
2EC	8.4E-2 ± 2.2E-2	6.5E-1 ± 7.5E-2	< -5.7E-2 ± 7.5E-2	< -4.5E-2 ± 5.7E-2	< -1.4E-2 ± 3.9E-2	a	a
2ED	6.8E-2 ± 2.4E-2	3.0E-1 ± 4.4E-2	< 0.0E+0 ± 8.4E-2	< -1.9E-2 ± 6.0E-2	< 1.4E-3 ± 4.5E-2	< 3.1E-5 ± 6.5E-5	8.0E-3 ± 1.3E-3
2EDB	5.2E-2 ± 2.1E-2	2.8E-1 ± 3.9E-2	< 4.8E-2 ± 6.4E-2	< -2.9E-2 ± 4.9E-2	< 1.4E-2 ± 3.8E-2	< 8.9E-5 ± 1.3E-4	8.0E-3 ± 1.5E-3
GRT1	6.1E-2 ± 2.2E-2	3.6E-1 ± 4.9E-2	6.9E-2 ± 6.7E-2	< -5.8E-2 ± 5.9E-2	< -2.5E-2 ± 4.3E-2	3.2E-4 ± 2.6E-4	6.0E-3 ± 1.3E-3
GRT2	8.3E-2 ± 3.0E-2	3.6E-1 ± 5.0E-2	< 7.5E-2 ± 9.2E-2	< 2.7E-2 ± 7.7E-2	< 2.0E-2 ± 6.1E-2	< 1.9E-4 ± 2.7E-4	2.9E-3 ± 1.1E-3
GRT4	5.0E-2 ± 2.2E-2	4.8E-1 ± 6.1E-2	< 2.9E-2 ± 7.7E-2	< 4.3E-2 ± 5.3E-2	< -2.4E-2 ± 5.0E-2	< 9.9E-5 ± 1.4E-4	7.3E-3 ± 1.5E-3
GRT5	8.5E-2 ± 1.9E-2	4.6E-1 ± 5.6E-2	< -8.2E-3 ± 7.0E-2	< -3.3E-2 ± 5.0E-2	< -3.2E-2 ± 4.3E-2	< 8.3E-5 ± 9.8E-5	4.0E-3 ± 7.9E-4
GRT6	8.0E-2 ± 2.1E-2	4.9E-1 ± 5.9E-2	< 1.0E-2 ± 7.1E-2	< -3.7E-2 ± 5.4E-2	< 0.0E+0 ± 3.8E-2	< -1.5E-6 ± 8.1E-4	9.4E-3 ± 3.5E-3
Maximum	1.0E-1	1.0E+1	1.0E-1	5.8E-2	8.1E-2	4.5E-4	9.4E-3
Minimum	3.2E-2	1.1E-1	-8.7E-2	-5.8E-2	-4.1E-2	-1.5E-6	1.4E-3
Mean	6.2E-2	8.5E-1	5.4E-3	-5.8E-3	5.1E-4	2.0E-4	4.9E-3
Background (c)		5.1E-2					2.1E-4

(a) Not analyzed for this radionuclide.

(b) Not routinely reported.

(c) Derived from PNL 1987 data (PNL 1988). Background numbers represent mean + 2 SE.

Table E-11. Grid Site Vegetation Results for 200 West Area for 1987 (pCi/g dry weight). (sheet 1 of 2)

Location	Co-60 ± Error	Sr-90 ± Error	Nb-95 ± Error	Zr-95 ± Error	Tc-99 ± Error	I-129 ± Error	Cs-134 ± Error
2W 4	< 1.4E-2 ± 1.7E-2	a	< -2.4E-3 ± 4.8E-2	< 1.1E-2 ± 5.1E-2	a	a	b
2W 8	< 3.6E-3 ± 1.8E-2	6.2E-1 ± 1.6E-1	< 1.5E-2 ± 3.2E-2	< -4.5E-3 ± 3.7E-2	< 3.4E-1 ± 8.5E-1	< -1.6E-1 ± 2.7E-1	4.4E-2 ± 2.3E-2
2W 9	< -8.0E-3 ± 2.5E-2	a	< 1.5E-3 ± 3.6E-2	< -1.6E-2 ± 5.0E-2	< 4.8E-1 ± 8.5E-1	4.2E-1 ± 1.8E-1	b
2W13	< 5.5E-3 ± 1.7E-2	2.1E-1 ± 5.3E-2	< 3.1E-2 ± 3.7E-2	< -2.1E-3 ± 4.3E-2	< 8.6E-1 ± 8.7E-1	< -1.3E-1 ± 2.2E-1	b
2W13B	< -1.1E-3 ± 1.8E-2	1.5E-1 ± 3.9E-2	< -4.7E-2 ± 3.5E-2	< 3.2E-2 ± 4.3E-2	< 8.2E-1 ± 8.7E-1	< -6.5E-1 ± 3.6E-1	b
2W15	< -5.4E-3 ± 1.7E-2	a	< 5.6E-3 ± 3.2E-2	3.8E-2 ± 3.4E-2	a	a	2.8E-2 ± 1.7E-2
2W16	< 2.0E-2 ± 2.2E-2	a	< -2.5E-2 ± 4.8E-2	< -5.8E-2 ± 6.1E-2	< 8.2E-1 ± 8.7E-1	4.2E-1 ± 3.1E-1	6.7E-2 ± 2.6E-2
2W17	1.7E-2 ± 1.6E-2	a	< -3.4E-2 ± 4.1E-2	< -3.7E-2 ± 4.3E-2	a	a	b
2W19	< -6.6E-3 ± 1.8E-2	a	< -1.2E-2 ± 3.5E-2	< 9.4E-3 ± 3.6E-2	a	a	4.2E-2 ± 1.7E-2
2W19B	< -6.2E-3 ± 1.6E-2	a	< -2.4E-2 ± 3.6E-2	< 4.3E-3 ± 3.6E-2	a	a	b
2W21	< 1.1E-2 ± 1.5E-2	a	< -1.5E-2 ± 2.6E-2	< 2.4E-2 ± 3.2E-2	a	a	3.9E-2 ± 1.6E-2
2W23	2.3E-2 ± 1.7E-2	a	< -1.0E-2 ± 4.6E-2	< -1.1E-2 ± 4.8E-2	a	a	b
2W24	< -1.7E-3 ± 1.7E-2	2.5E-1 ± 6.4E-2	< 2.0E-2 ± 3.2E-2	< -8.6E-3 ± 3.9E-2	8.8E+0 ± 1.4E+0	3.2E-1 ± 2.3E-1	b
2W31	< 7.5E-3 ± 1.4E-2	a	< 6.4E-3 ± 2.4E-2	4.6E-2 ± 2.9E-2	< 4.1E-1 ± 8.5E-1	< -1.4E-1 ± 2.8E-1	2.9E-2 ± 1.8E-2
2W31B	< -1.9E-2 ± 2.4E-2	a	6.8E-2 ± 5.4E-2	5.2E-2 ± 5.4E-2	< 4.4E-1 ± 8.5E-1	< -1.8E-1 ± 3.7E-1	b
2W33	< 1.3E-2 ± 1.7E-2	4.9E-1 ± 1.2E-1	< -3.8E-2 ± 4.0E-2	< 3.2E-3 ± 4.4E-2	< 4.7E-1 ± 8.5E-1	< -8.3E-2 ± 4.0E-1	b
2WB	< -3.8E-2 ± 2.3E-2	2.1E-1 ± 5.4E-2	< -5.7E-2 ± 4.3E-2	< 2.1E-2 ± 4.3E-2	< 1.5E-1 ± 8.4E-1	< 3.3E-2 ± 3.6E-1	3.3E-2 ± 1.9E-2
2WBB	< -1.9E-2 ± 2.4E-2	2.0E-1 ± 5.1E-2	< 1.5E-2 ± 5.0E-2	7.3E-2 ± 4.7E-2	< 3.6E-1 ± 8.5E-1	< -1.8E-2 ± 2.2E-1	4.6E-2 ± 2.4E-2
Maximum	2.3E-2	6.2E-1	6.8E-2	7.3E-2	8.8E+0	4.2E-1	6.7E-2
Minimum	-3.8E-2	1.5E-1	-5.7E-2	-5.8E-2	1.5E-1	-6.5E-1	2.8E-2
Mean	5.3E-4	3.0E-1	-5.7E-3	9.8E-3	1.3E+0	-1.3E-2	4.1E-2
Background (c)		4.8E-2					

Table E-11. Grid Site Vegetation Results for 200 West Area for 1987 (pCi/g dry weight). (sheet 2 of 2)

Location	Cs-137 ± Error	Eu-152 ± Error	Eu-154 ± Error	Pu-238 ± Error	Pu-239 ± Error
2W 4	1.1E-1 ± 2.5E-2	< 2.7E-2 ± 8.1E-2	< 5.4E-2 ± 6.2E-2	a	a
2W 8	3.8E+0 ± 3.9E-1	< -7.7E-2 ± 8.0E-2	< 2.1E-2 ± 5.0E-2	4.1E-4 ± 2.4E-4	1.1E-2 ± 1.6E-3
2W 9	4.2E-1 ± 5.5E-2	< 3.2E-2 ± 7.4E-2	< -4.9E-2 ± 8.4E-2	a	a
2W13	1.1E+0 ± 1.2E-1	< -6.5E-2 ± 7.8E-2	< -5.1E-2 ± 6.9E-2	< 6.1E-5 ± 1.3E-4	1.5E-2 ± 2.6E-3
2W13B	1.0E+0 ± 1.1E-1	< 6.6E-2 ± 7.3E-2	< -6.3E-2 ± 7.0E-2	4.1E-4 ± 2.0E-4	7.1E-3 ± 1.1E-3
2W15	1.6E-1 ± 2.7E-2	< -2.5E-2 ± 6.9E-2	< -3.3E-2 ± 5.4E-2	a	a
2W16	1.6E-1 ± 3.5E-2	< -4.1E-2 ± 1.0E-1	< -4.3E-2 ± 7.2E-2	a	a
2W17	1.1E-1 ± 2.3E-2	< -5.4E-2 ± 7.5E-2	< -3.5E-2 ± 6.1E-2	a	a
2W19	2.5E-1 ± 3.7E-2	< -7.9E-2 ± 7.5E-2	< -3.8E-2 ± 5.1E-2	a	a
2W19B	2.5E-1 ± 3.7E-2	< 2.9E-2 ± 6.5E-2	< 2.0E-2 ± 5.6E-2	a	a
2W21	1.3E-1 ± 2.4E-2	< -4.3E-2 ± 6.8E-2	6.6E-2 ± 4.2E-2	a	a
2W23	5.2E+0 ± 5.3E-1	< 4.9E-2 ± 8.3E-2	< 2.7E-2 ± 6.0E-2	a	a
2W24	8.7E-1 ± 9.8E-2	< 1.3E-2 ± 6.9E-2	< -5.9E-2 ± 6.0E-2	6.7E-4 ± 3.4E-4	2.5E-2 ± 3.4E-3
2W31	1.3E-1 ± 2.7E-2	< 1.6E-2 ± 5.6E-2	< -1.7E-2 ± 4.8E-2	a	a
2W31B	1.5E-1 ± 3.2E-2	< 2.5E-2 ± 1.0E-1	< -1.6E-2 ± 7.9E-2	a	a
2W33	8.2E-1 ± 9.3E-2	7.7E-2 ± 6.8E-2	7.3E-2 ± 4.6E-2	1.6E-3 ± 5.4E-4	8.9E-2 ± 1.0E-2
2WB	2.6E-1 ± 3.9E-2	< 7.5E-2 ± 8.3E-2	< 2.5E-2 ± 5.0E-2	6.4E-4 ± 3.6E-4	6.2E-3 ± 1.3E-3
2WBB	2.4E-1 ± 4.1E-2	< 2.2E-3 ± 9.6E-2	9.1E-2 ± 6.9E-2	8.2E-4 ± 3.6E-4	5.8E-3 ± 1.1E-3
Maximum	5.2E+0	7.7E-2	9.1E-2	1.6E-3	8.9E-2
Minimum	1.1E-1	-7.9E-2	-6.3E-2	6.1E-5	5.8E-3
Mean	8.4E-1	1.5E-3	-1.5E-3	6.6E-4	2.3E-2
Background (c)	5.1E-2				2.1E-4

(a) Not analyzed for this radionuclide.

(b) Not routinely reported.

(c) Derived from PNL 1987 data (PNL 1988). Background numbers represent mean + 2 SE.

Table E-12. The <sup>137</sup>Cs Concentrations in Vegetation, 1978 through 1987 (pCi/g dry weight). (sheet 1 of 2)

Site	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2E 1	2.5E-1 ± 1.1E-1	1.0E-1 ± 6.2E-2	-4.9E-4 ± 1.2E-1	7.2E-3 ± 4.4E-1	-9.3E-2 ± 2.6E-1	b	b	1.6E-2 ± 1.1E-2	b	1.6E-1 ± 2.6E-2
2E 2	2.8E+0 ± 2.8E-1	1.1E+0 ± 1.5E-1	2.6E-1 ± 1.6E-1	7.8E-2 ± 3.6E-1	-6.3E-1 ± 6.3E-1	b	b	1.6E-1 ± 2.5E-2	1.8E-1 ± 5.1E-2	b
2E 3	6.3E+0 ± 4.4E-1	2.1E+0 ± 1.8E-1	1.2E-1 ± 1.1E-1	8.0E-1 ± 6.1E-1	-2.8E-1 ± 4.0E-1	b	8.6E-1 ± 1.1E-1	5.1E-1 ± 5.5E-2	b	4.2E-1 ± 5.1E-2
2E 4	5.2E+0 ± 3.8E-1	2.0E+0 ± 2.1E-1	b	1.4E+0 ± 7.6E-1	5.2E-1 ± 7.1E-1	b	3.6E-1 ± 8.5E-2	4.5E-1 ± 4.1E-2	2.9E+0 ± 3.1E-1	3.4E-1 ± 4.4E-2
2E 5	b	1.1E+0 ± 1.4E-1	1.1E-1 ± 1.2E-1	4.8E-1 ± 3.3E-1	-5.9E-1 ± 7.2E-1	1.8E-1 ± 1.6E-1	2.3E-1 ± 7.1E-2	2.3E-1 ± 2.8E-2	5.3E-1 ± 8.5E-2	b
2E 6	b	2.1E-1 ± 7.5E-2	b	1.0E-1 ± 4.8E-1	4.8E-2 ± 2.2E-1	b	4.8E-1 ± 9.3E-2	1.4E-1 ± 2.8E-2	b	2.6E-1 ± 3.6E-2
2E 7	b	1.4E-1 ± 7.9E-2	1.0E-1 ± 1.4E-1	-1.2E-2 ± 4.6E-1	-6.4E-2 ± 2.7E-1	b	1.7E-1 ± 6.7E-2	2.4E-2 ± 2.4E-2	b	b
2E 8	8.3E-1 ± 1.6E-1	9.8E-1 ± 1.4E-1	b	4.4E-1 ± 3.6E-1	1.1E+0 ± 9.2E-1	b	1.4E-1 ± 6.9E-2	2.9E-2 ± 2.1E-2	3.7E-1 ± 5.8E-2	b
2E 9	3.2E+0 ± 2.8E-1	1.4E+0 ± 1.6E-1	b	3.0E-1 ± 4.3E-1	6.9E-1 ± 9.3E-1	b	9.0E-1 ± 1.1E-1	2.2E-1 ± 4.3E-2	2.2E-1 ± 4.7E-2	b
2E10	1.2E+1 ± 5.7E-1	8.4E-1 ± 1.1E-1	1.6E+0 ± 2.7E-1	1.1E+0 ± 2.4E-1	7.9E-2 ± 1.3E-1	2.2E-1 ± 8.0E-2	3.6E-1 ± 6.8E-2	1.9E-1 ± 2.9E-2	7.6E-1 ± 1.2E-1	3.7E+0 ± 3.7E-1
2E11	2.5E+0 ± 2.7E-1	1.9E-1 ± 6.8E-2	b	1.9E-1 ± 3.4E-1	5.2E-1 ± 7.8E-1	1.1E-1 ± 8.4E-2	1.8E-1 ± 6.2E-2	3.2E-1 ± 3.1E-2	3.9E-1 ± 6.7E-2	b
2E12	9.2E-1 ± 1.6E-1	4.9E-1 ± 1.1E-1	b	1.5E-1 ± 4.6E-1	2.0E-1 ± 9.4E-2	b	1.7E-1 ± 7.5E-2	3.3E-1 ± 3.5E-2	4.3E-1 ± 6.5E-2	2.7E-1 ± 3.7E-2
2E13	b	2.7E-1 ± 8.5E-2	5.9E-2 ± 1.2E-1	2.0E-1 ± 4.6E-1	6.7E-2 ± 2.3E-1	1.3E-1 ± 8.9E-2	b	3.4E-2 ± 1.2E-2	2.6E-1 ± 4.4E-2	b
2E14	b	1.8E+0 ± 1.6E-1	b	3.0E-1 ± 7.9E-1	0.0E+0 ± 3.4E-1	1.4E-1 ± 1.3E-1	6.5E-1 ± 1.4E-1	6.0E-1 ± 6.0E-2	9.5E-2 ± 3.0E-2	8.2E-1 ± 9.3E-2
2E15	b	2.5E-1 ± 7.1E-2	b	-7.7E-2 ± 4.5E-1	-1.8E+0 ± 1.2E+0	b	b	2.0E-1 ± 3.3E-2	1.1E-1 ± 4.9E-2	b
2E16	6.2E-1 ± 1.9E-1	5.4E-1 ± 9.6E-2	5.1E-1 ± 1.9E-1	1.2E-2 ± 4.6E-1	1.3E+0 ± 6.4E-1	b	4.7E-1 ± 8.2E-2	1.1E-1 ± 1.6E-2	8.1E-1 ± 1.1E-1	2.8E-1 ± 4.2E-2
2E17	b	3.6E-1 ± 9.7E-2	5.4E-1 ± 2.0E-1	4.7E-1 ± 4.3E-1	3.0E-1 ± 4.1E-1	2.4E-1 ± 1.7E-1	4.7E-1 ± 7.9E-2	1.2E+0 ± 7.9E-2	1.0E+0 ± 1.3E-1	5.4E-1 ± 6.4E-2
2E18	4.6E+0 ± 4.4E-1	2.6E+0 ± 2.1E-1	6.3E-1 ± 2.0E-1	8.1E-1 ± 3.9E-1	1.8E-1 ± 1.5E-1	1.1E-1 ± 9.4E-2	6.6E-1 ± 1.1E-1	5.3E-1 ± 4.2E-2	1.9E+0 ± 2.1E-1	9.1E-1 ± 1.1E-1
2E19	b	1.0E-1 ± 6.4E-2	1.1E-1 ± 1.5E-1	3.8E-1 ± 1.9E-1	-7.6E-1 ± 6.8E-1	b	b	7.8E-2 ± 2.7E-2	b	1.1E-1 ± 2.5E-2
2E20	b	2.4E+0 ± 2.2E-1	1.1E-1 ± 1.2E-1	1.4E-1 ± 3.3E-1	2.6E-1 ± 8.6E-1	b	b	6.6E-2 ± 1.9E-2	8.2E-1 ± 1.4E-1	b
2E21	b	5.0E-1 ± 9.8E-2	5.7E-2 ± 1.3E-1	1.8E-2 ± 5.3E-1	2.5E-1 ± 1.6E-1	b	1.1E-1 ± 5.3E-2	9.1E-2 ± 1.3E-2	b	b
2E22	b	1.2E-1 ± 6.4E-2	2.3E-1 ± 1.3E-1	2.7E-2 ± 4.7E-1	-3.9E-1 ± 4.5E+0	2.0E-1 ± 1.5E-1	b	1.1E-1 ± 1.1E-2	7.7E-1 ± 1.1E-1	b
2E23	3.9E-1 ± 1.1E-1	9.7E-2 ± 6.5E-2	b	1.7E-1 ± 4.1E-1	7.4E-1 ± 4.0E-1	b	5.1E-1 ± 6.8E-2	1.5E-1 ± 3.0E-2	2.0E-1 ± 4.2E-2	1.1E-1 ± 3.3E-2
2E24	2.2E+0 ± 2.1E-1	1.9E+0 ± 2.1E-1	1.4E+0 ± 3.8E-1	1.3E+0 ± 3.9E-1	3.5E-1 ± 1.3E-1	4.6E-1 ± 1.5E-1	6.9E-1 ± 1.1E-1	3.5E-1 ± 7.7E-2	1.2E+0 ± 1.4E-1	1.5E+0 ± 1.6E-1
2E25	b	3.9E-1 ± 9.7E-2	-1.6E-2 ± 1.3E-1	2.4E-1 ± 6.4E-1	1.1E+0 ± 7.8E-1	b	b	9.3E-2 ± 4.0E-2	b	b
2E26	b	2.2E-1 ± 7.5E-2	-3.1E-2 ± 1.1E-1	5.9E-3 ± 4.1E-1	4.1E-2 ± 7.8E-1	b	b	b	b	b
2E27	b	5.0E-3 ± 4.7E-2	b	6.0E-1 ± 5.6E-1	9.2E-1 ± 4.8E-1	b	1.7E-1 ± 6.6E-2	2.7E-1 ± 7.9E-2	6.9E-2 ± 3.0E-2	b
2E28	b	4.8E-1 ± 1.1E-1	1.1E-1 ± 1.3E-1	1.4E-1 ± 4.2E-1	1.2E-1 ± 5.6E-1	1.6E-1 ± 1.4E-1	b	1.3E-1 ± 4.5E-2	b	1.8E-1 ± 3.2E-2
2E29	b	1.3E-1 ± 7.0E-2	b	5.8E-1 ± 5.5E-1	6.5E-1 ± 4.9E-1	b	3.2E-1 ± 7.7E-2	2.8E-2 ± 6.2E-2	2.5E-1 ± 4.8E-2	b
2E30	b	6.4E-1 ± 1.2E-1	2.1E-1 ± 1.3E-1	3.2E-1 ± 3.6E-1	3.9E-1 ± 3.8E-1	b	1.1E-1 ± 5.5E-2	b	b	b
2E31	b	2.0E-1 ± 8.6E-2	2.8E-1 ± 2.0E-1	4.1E-1 ± 6.0E-1	4.7E-1 ± 3.1E-1	b	b	7.6E-2 ± 3.9E-2	4.7E-1 ± 7.2E-2	b
2E32	b	7.4E-2 ± 5.3E-2	-2.3E-2 ± 1.8E-1	3.8E-2 ± 2.3E-1	-5.1E-2 ± 1.3E-1	b	1.4E-1 ± 4.9E-2	6.9E-2 ± 3.8E-2	5.6E-1 ± 9.4E-2	b
2E33	b	1.1E-1 ± 6.6E-2	b	1.8E-1 ± 4.4E-1	3.4E-1 ± 6.1E-1	b	b	6.9E-2 ± 3.0E-2	b	b
2E34	b	-3.5E-2 ± 5.3E-2	9.6E-2 ± 1.1E-1	-1.1E-3 ± 4.7E-1	-3.2E-2 ± 2.7E-1	b	8.2E-2 ± 5.9E-2	1.2E-1 ± 4.4E-2	6.6E-1 ± 1.2E-1	2.6E-1 ± 4.0E-2
2E35	b	2.3E-1 ± 7.6E-2	-2.9E-2 ± 1.1E-1	1.4E-2 ± 4.0E-1	1.5E-2 ± 1.5E-1	b	1.5E-1 ± 4.6E-2	3.9E-2 ± 7.1E-2	b	3.9E-1 ± 4.9E-2
2E36	b	1.9E-1 ± 7.5E-2	8.7E-2 ± 1.3E-1	9.0E-3 ± 3.5E-1	1.4E-1 ± 3.4E-1	b	2.0E-1 ± 8.5E-2	3.8E-1 ± 1.1E-1	6.0E-1 ± 9.1E-2	b
2EA	2.8E-1 ± 1.5E-1	1.1E-1 ± 6.2E-2	8.0E-2 ± 1.4E-1	-1.1E-1 ± 4.9E-1	1.2E-1 ± 4.0E-1	2.3E-1 ± 2.1E-1	1.2E-1 ± 6.9E-2	7.2E-2 ± 5.6E-2	6.4E-1 ± 1.0E-1	2.4E-1 ± 3.4E-2
2EB	b	1.5E-1 ± 6.2E-2	1.8E-2 ± 1.3E-1	1.2E-1 ± 3.1E-1	-2.6E-2 ± 4.7E-1	1.4E-1 ± 1.1E-1	1.5E-1 ± 5.0E-2	6.5E-2 ± 4.4E-2	2.5E-1 ± 4.3E-2	1.4E-1 ± 2.8E-2
2EC	b	3.6E-1 ± 9.6E-2	2.8E-1 ± 1.5E-1	9.6E-2 ± 3.5E-1	1.8E-1 ± 2.9E-1	b	1.8E-1 ± 6.5E-2	2.8E-1 ± 5.9E-2	4.5E-1 ± 8.6E-2	6.5E-1 ± 7.5E-2
2ED	b	1.1E+0 ± 1.6E-1	8.4E-1 ± 2.6E-1	2.3E+0 ± 6.4E-1	1.3E-1 ± 3.2E-1	1.6E-1 ± 8.4E-2	4.0E-1 ± 9.0E-2	2.4E-1 ± 7.1E-2	2.0E+0 ± 2.3E-1	3.0E-1 ± 4.4E-2
Mean (a)	3.0E+0 ± 1.7E+0	6.4E-1 ± 2.3E-1	2.7E-1 ± 1.5E-1	3.4E-1 ± 1.6E-1	1.6E-1 ± 2.8E-1	1.9E-1 ± 5.6E-2	3.4E-1 ± 9.1E-2	2.1E-1 ± 7.2E-2	6.7E-1 ± 2.4E-1	5.8E-1 ± 3.6E-1

E-34

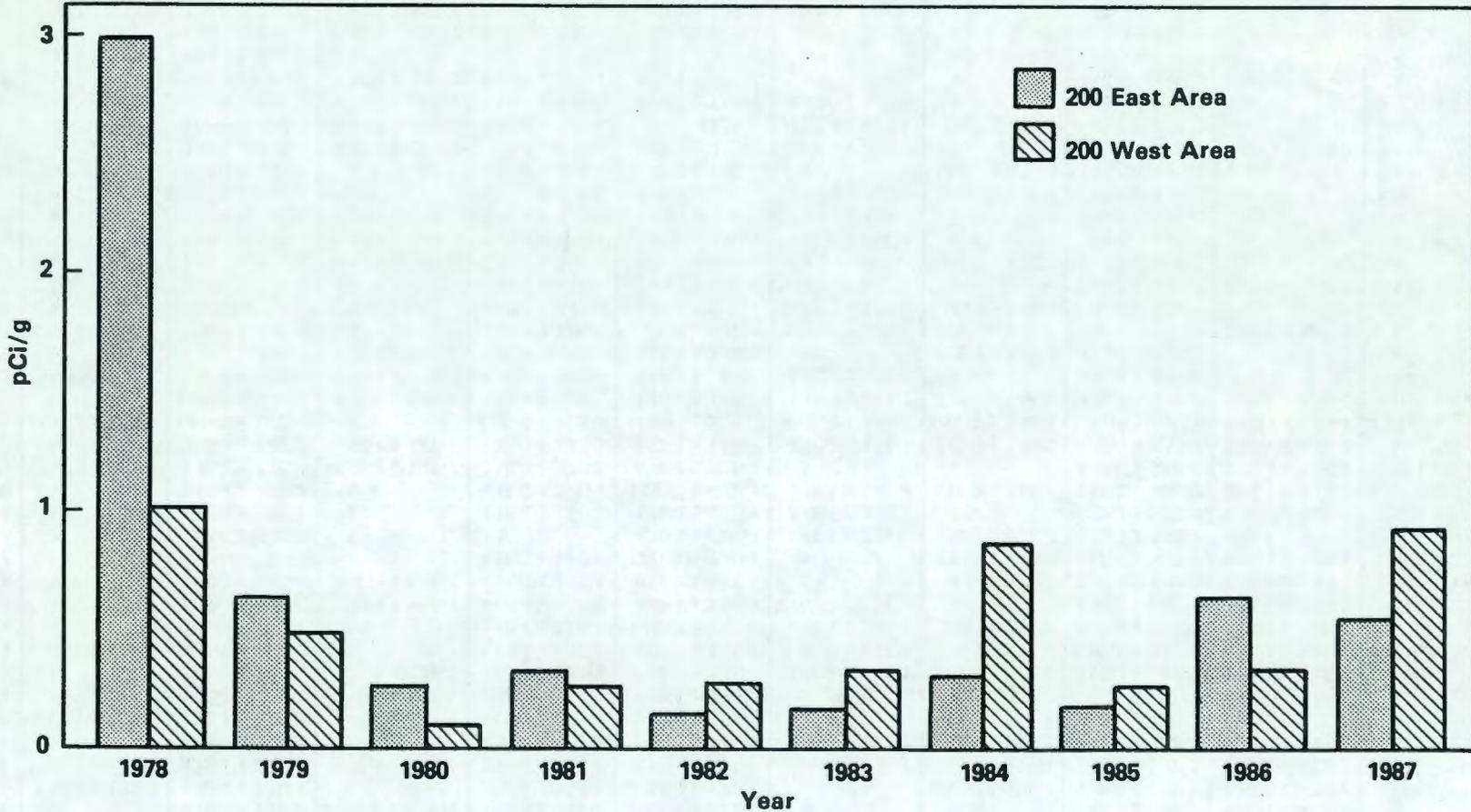
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Table E-12. The <sup>137</sup>Cs Concentrations in Vegetation, 1978 through 1987 (pCi/g dry weight). (sheet 2 of 2)

Site	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
2W 1	5.4E-1 ± 1.4E-1	6.4E-2 ± 6.5E-2	-3.5E-2 ± 1.4E-1	-1.4E-2 ± 2.5E-1	2.1E+0 ± 8.7E-1	1.7E-1 ± 1.3E-1	b	b	b	b
2W 2	4.6E-1 ± 1.2E-1	2.1E+0 ± 1.8E-1	4.4E-3 ± 1.1E-1	1.8E-1 ± 3.3E-1	7.9E-1 ± 4.9E-1	2.9E-1 ± 1.1E-1	b	b	b	b
2W 3	b	3.2E-1 ± 8.4E-2	2.4E-2 ± 1.8E-1	4.0E-1 ± 3.2E-1	7.5E-1 ± 1.1E+0	b	b	1.5E-1 ± 6.7E-2	2.1E-1 ± 3.1E-2	b
2W 4	b	5.1E-1 ± 1.1E-1	b	1.4E-1 ± 2.4E-1	2.2E-2 ± 2.6E-1	b	1.4E-1 ± 6.8E-2	6.0E-2 ± 6.1E-2	2.4E-1 ± 3.4E-2	1.1E-1 ± 2.5E-2
2W 5	4.8E-1 ± 1.4E-1	4.5E-2 ± 6.0E-2	-3.3E-3 ± 1.2E-1	2.8E-1 ± 2.8E-1	1.2E-1 ± 1.8E-1	2.3E-1 ± 1.0E-1	b	-3.8E-2 ± 7.3E-2	3.4E-1 ± 4.7E-2	b
2W 6	b	9.1E-2 ± 7.1E-2	6.6E-3 ± 1.3E-1	3.7E-1 ± 2.5E-1	5.0E-1 ± 8.8E-1	b	9.8E-2 ± 5.7E-2	7.8E-2 ± 4.9E-2	4.4E-1 ± 5.4E-2	b
2W 7	3.0E-1 ± 1.5E-1	5.9E-1 ± 1.1E-1	b	2.1E-2 ± 3.6E-1	1.6E-1 ± 2.7E-1	b	8.1E-2 ± 5.0E-2	3.0E-1 ± 1.1E-1	3.0E-1 ± 4.5E-2	b
2W 8	1.1E+0 ± 1.8E-1	6.1E-1 ± 1.2E-1	2.2E-1 ± 1.7E-1	7.8E-1 ± 3.6E-1	4.3E-1 ± 1.9E-1	3.4E-1 ± 1.7E-1	8.3E-1 ± 1.1E-1	2.9E-1 ± 7.1E-2	5.5E-1 ± 6.2E-2	3.8E+0 ± 3.9E-1
2W 9	b	4.0E-1 ± 1.0E-1	b	-1.1E-1 ± 1.3E+0	8.0E-1 ± 1.9E+0	2.8E-1 ± 2.2E-1	1.3E-1 ± 6.2E-2	8.5E-1 ± 1.5E-1	7.2E-1 ± 8.3E-2	4.2E-1 ± 5.5E-2
2W10	4.1E-1 ± 1.7E-1	1.6E-1 ± 6.8E-2	-3.0E-2 ± 1.3E-1	3.0E-1 ± 3.0E-1	1.5E-2 ± 1.9E-1	b	1.5E-1 ± 6.5E-2	6.1E-2 ± 4.5E-2	3.4E-1 ± 5.4E-2	b
2W11	b	1.1E-1 ± 7.0E-2	1.4E-1 ± 1.2E-1	3.2E-1 ± 2.5E-1	8.9E-1 ± 8.7E-1	b	b	b	b	b
2W12	b	9.0E-1 ± 1.4E-1	2.7E-2 ± 1.2E-1	2.9E-1 ± 5.5E-1	6.4E-2 ± 2.3E+0	2.0E-1 ± 1.3E-1	1.6E-1 ± 6.2E-2	5.9E-2 ± 4.0E-2	1.9E-1 ± 4.1E-2	b
2W13	2.2E+0 ± 2.8E-1	2.1E+0 ± 2.0E-1	b	9.0E-1 ± 5.3E-1	1.0E-1 ± 1.6E+0	1.1E+0 ± 3.7E-1	1.1E-1 ± 5.1E-2	2.3E+0 ± 2.5E-1	8.5E-1 ± 9.9E-2	1.1E+0 ± 1.2E-1
2W14	b	9.4E-1 ± 1.1E-1	b	1.5E-4 ± 2.6E-1	1.1E+0 ± 1.6E+0	1.8E-1 ± 1.4E-1	1.7E-1 ± 7.5E-2	2.0E-1 ± 5.3E-2	4.8E-1 ± 7.0E-2	b
2W15	b	2.7E-1 ± 8.7E-2	-2.9E-2 ± 1.1E-1	4.9E-1 ± 4.1E-1	2.4E-1 ± 7.9E-1	b	b	1.8E-2 ± 6.4E-2	2.6E-1 ± 4.1E-2	1.6E-1 ± 2.7E-2
2W16	b	6.0E-2 ± 5.9E-2	2.3E-1 ± 1.6E-1	4.5E-1 ± 3.2E-1	9.5E-1 ± 4.6E-1	b	b	7.3E-2 ± 4.0E-2	3.0E-2 ± 1.4E-2	1.6E-1 ± 3.5E-2
2W17	b	b	b	2.7E-2 ± 4.8E-1	-3.1E-1 ± 9.4E-1	b	2.3E-1 ± 6.8E-2	9.0E-3 ± 4.6E-2	2.0E-1 ± 5.9E-2	1.1E-1 ± 2.3E-2
2W18	b	3.2E-1 ± 9.2E-2	b	b	4.3E-1 ± 7.0E-1	3.9E-1 ± 2.0E-1	2.5E-1 ± 5.7E-2	1.7E-1 ± 4.9E-2	3.5E-1 ± 5.0E-2	b
2W19	b	6.0E-1 ± 1.2E-1	b	1.1E-1 ± 3.0E-1	4.0E-2 ± 2.7E-1	2.4E-1 ± 2.0E-1	b	1.2E-1 ± 5.5E-2	3.7E-1 ± 6.2E-2	2.5E-1 ± 3.7E-2
2W20	b	2.5E-1 ± 7.7E-2	b	8.4E-2 ± 2.4E-1	1.2E+0 ± 6.5E-1	1.7E-1 ± 1.4E-1	8.1E-2 ± 5.6E-2	8.1E-2 ± 3.9E-2	2.6E-1 ± 4.1E-2	b
2W21	b	3.4E-2 ± 5.7E-2	-3.4E-2 ± 1.1E-1	2.3E-1 ± 2.8E-1	6.7E-2 ± 9.2E-1	b	b	6.4E-2 ± 5.6E-2	2.3E-1 ± 3.7E-2	1.3E-1 ± 2.4E-2
2W22	b	2.2E-1 ± 7.6E-2	1.5E-1 ± 1.5E-1	1.8E-1 ± 2.6E-1	3.5E-1 ± 1.9E-1	1.3E-1 ± 1.3E-1	2.4E-1 ± 7.5E-2	6.9E-2 ± 7.5E-2	2.6E-1 ± 4.7E-2	b
2W23	1.7E+0 ± 2.0E-1	1.6E+0 ± 1.7E-1	b	2.2E+0 ± 5.2E-1	4.0E-1 ± 2.2E+0	1.1E+0 ± 3.4E-1	6.5E+0 ± 2.6E-1	1.9E+0 ± 2.2E-1	8.4E-1 ± 1.1E-1	5.2E+0 ± 5.3E-1
2W24	b	1.6E+0 ± 1.7E-1	1.2E-1 ± 1.4E-1	2.3E-1 ± 2.8E-1	-1.1E-1 ± 1.5E+0	1.3E-1 ± 1.1E-1	3.7E-1 ± 7.6E-2	2.3E-1 ± 6.1E-2	4.2E-1 ± 6.4E-2	8.7E-1 ± 9.8E-2
2W25	b	3.0E-1 ± 1.0E-1	2.1E-1 ± 1.7E-1	4.4E-1 ± 3.1E-1	8.8E-2 ± 1.9E-1	2.4E-1 ± 1.7E-1	b	1.8E-1 ± 5.4E-2	b	b
2W26	b	1.9E-1 ± 9.1E-2	1.3E-1 ± 1.8E-1	1.1E-1 ± 4.0E-1	2.5E-1 ± 2.4E-1	b	5.2E-2 ± 4.1E-2	4.1E-2 ± 4.2E-2	b	b
2W27	2.7E+0 ± 2.5E-1	3.0E-1 ± 9.1E-2	b	2.5E-1 ± 2.9E-1	1.2E+0 ± 8.7E-1	1.0E+0 ± 1.8E-1	4.9E-1 ± 7.8E-2	b	2.9E-1 ± 4.9E-2	b
2W28	b	b	b	7.4E-2 ± 2.2E-1	6.9E-1 ± 3.3E-1	9.4E-1 ± 5.7E-1	6.2E+0 ± 3.2E-1	2.1E+0 ± 2.3E-1	b	b
2W29	b	9.7E-1 ± 1.5E-1	b	7.9E-1 ± 3.7E-1	2.4E-1 ± 2.2E-1	b	b	5.4E-2 ± 8.1E-2	2.1E-1 ± 4.0E-2	b
2W30	b	2.8E-1 ± 8.4E-2	2.5E-1 ± 1.6E-1	2.8E-2 ± 5.8E-1	9.5E-2 ± 2.4E-1	b	7.5E-2 ± 4.8E-2	3.5E-1 ± 7.0E-2	b	b
2W31	b	1.6E-1 ± 1.0E-1	1.8E-1 ± 1.4E-1	1.1E-1 ± 3.4E-1	-3.0E-1 ± 2.9E-1	2.6E-1 ± 2.0E-1	b	1.5E-2 ± 5.3E-2	b	1.3E-1 ± 2.7E-2
2W32	b	4.6E-1 ± 1.4E-1	1.3E-1 ± 1.4E-1	2.1E-4 ± 3.7E-1	-9.4E-3 ± 1.1E-1	1.2E-1 ± 1.1E-1	b	8.9E-2 ± 6.3E-2	b	b
2W33	b	2.9E-1 ± 9.6E-2	b	5.6E-1 ± 4.2E-1	8.4E-3 ± 1.8E-1	1.3E-1 ± 1.2E-1	1.6E-1 ± 5.4E-2	3.1E-1 ± 9.5E-2	b	8.2E-1 ± 9.3E-2
2W34	b	8.0E-1 ± 1.2E-1	b	6.4E-1 ± 9.1E-1	-1.7E+0 ± 1.4E+0	2.9E-1 ± 1.4E-1	1.9E-1 ± 5.7E-2	1.4E-1 ± 4.8E-2	b	b
2W35	b	5.0E-1 ± 1.5E-1	2.5E-1 ± 1.6E-1	-5.9E-2 ± 7.5E-1	-9.1E-2 ± 2.0E-1	2.9E-1 ± 1.4E-1	b	7.9E-2 ± 3.8E-2	b	b
2WA	b	2.0E-1 ± 8.4E-2	6.6E-2 ± 1.4E-1	2.1E-1 ± 3.1E-1	-1.2E+0 ± 8.3E-1	1.2E-1 ± 9.6E-2	2.9E+0 ± 1.3E-1	9.0E-2 ± 5.5E-2	b	b
2WB	b	2.3E-1 ± 8.6E-2	6.2E-1 ± 2.2E-1	2.2E-1 ± 3.2E-1	1.9E-1 ± 1.9E-1	2.1E-1 ± 1.4E-1	b	1.4E-1 ± 5.9E-2	b	2.6E-1 ± 3.9E-2
2WC	b	2.7E-1 ± 1.0E-1	1.7E-2 ± 1.4E-1	4.4E-1 ± 4.3E-1	2.0E-1 ± 1.3E-1	b	b	6.6E-2 ± 4.4E-2	b	b
2WD	b	9.6E-2 ± 6.5E-2	5.7E-2 ± 1.5E-1	-5.4E-1 ± 4.9E-1	4.2E-1 ± 3.4E-1	b	b	1.2E-1 ± 5.0E-2	b	b
2WE	b	1.6E-1 ± 8.4E-2	1.4E-1 ± 1.8E-1	-4.1E-2 ± 3.7E-1	7.5E-1 ± 6.2E-1	b	b	4.6E-2 ± 4.9E-2	b	b
2WF	3.8E-1 ± 1.3E-1	2.0E-1 ± 9.0E-2	2.2E-1 ± 1.7E-1	3.3E-2 ± 4.8E-1	4.1E-1 ± 3.3E-1	b	b	1.5E-2 ± 3.7E-2	b	b
Mean (a)	1.0E+0 ± 5.5E-1	4.9E-1 ± 1.7E-1	1.2E-1 ± 5.6E-2	2.8E-1 ± 1.5E-1	3.0E-1 ± 2.7E-1	3.6E-1 ± 1.4E-1	8.9E-1 ± 8.0E-1	2.9E-1 ± 1.9E-1	3.6E-1 ± 8.7E-2	9.6E-1 ± 8.3E-1

(a) Individual results ±2 sigma overall error. Means ±2 standard error of the calculated mean.

(b) Site not sampled.



E-36

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Figure E-10. Yearly Averages for <sup>137</sup>Cs in Vegetation.

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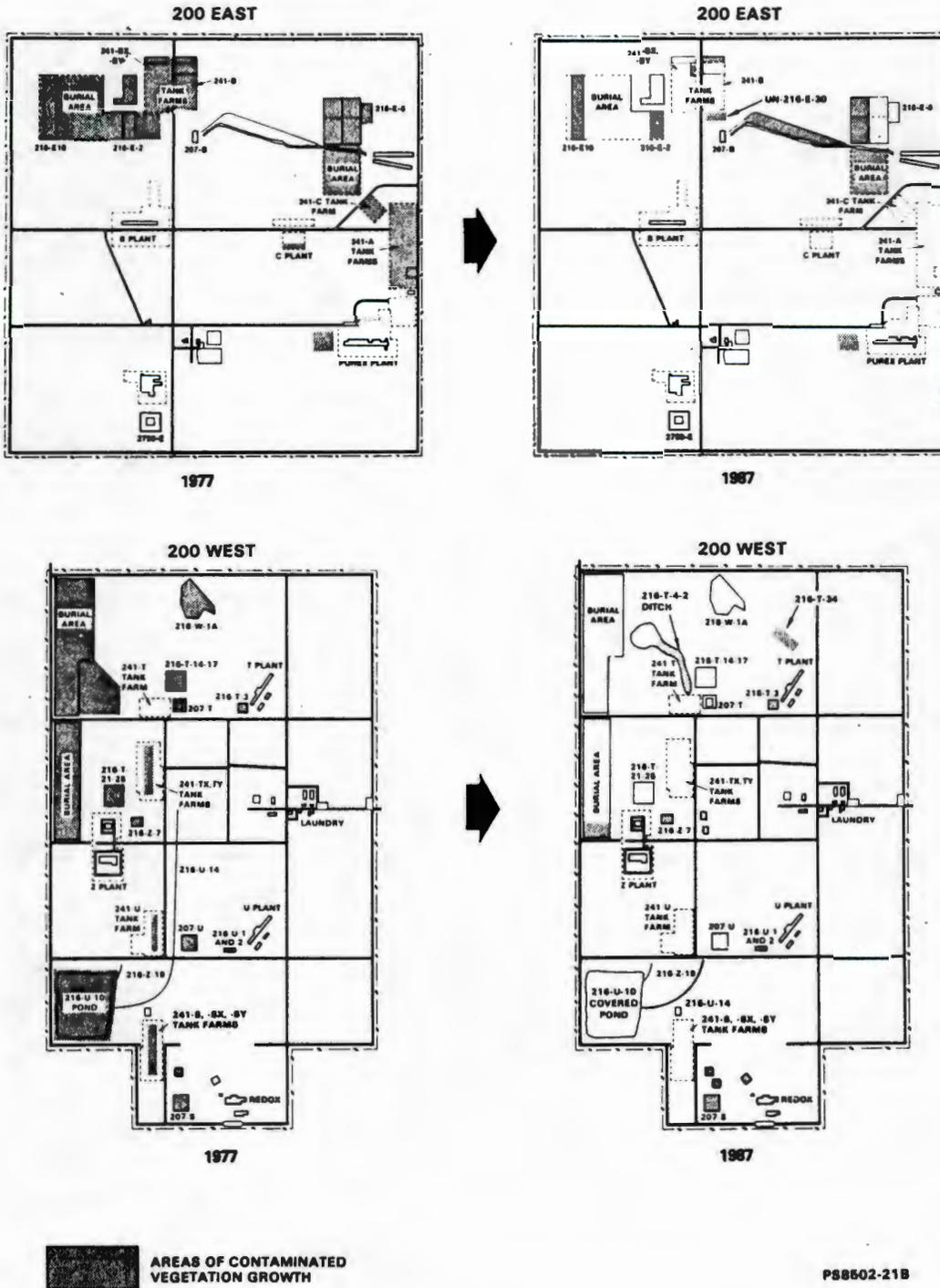


Figure E-11. Progress in Control of Contaminated Vegetation inside of the 200 Areas.

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**APPENDIX F**

**EXTERNAL RADIATION MONITORING  
FIGURES AND TABLES**

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Table F-1. The 1987 Thermoluminescent Dosimeter Results from 200 East Area.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total (b)
2E 1	200 East Area NW	88	49	74
2E 2	241-BY Tank Farm NW	115	86	99
2E 3	241-B,-BY Tank Farm N	158	118	141
2E 4	241-B,-BY Tank Farm NE	127	98	112
2E 5	E-12B N	125	85	100
2E 6	200 East Area NE	132	83	101
2E 7	E-10 W	99	77	92
2E 8	E-10 E	96	84	90
2E 9	241-BX Tank Farm S	137	119	127
2E10	B-63 N	137	113	126
2E11	E-12B N	112	83	97
2E12	E-12B E	103	69	88
2E13	200 East Area W	95	75	83
2E14	B-Plant W	100	83	90
2E15	B-Plant NE	107	93	100
2E16	221-C Excavation NW	103	87	93
2E17	241-C Tank Farm W	122	92	104
2E18	241-C Tank Farm E	137	104	115
2E19	200 East Area W	93	82	88
2E20	B-Plant SSW	93	72	83
2E21	B-Plant SSE	94	75	87
2E22	Semiworks SSE	102	83	94
2E23	PUREX N	132	90	106
2E24	PUREX NE	131	100	117
2E25	200 East Area W	91	69	78
2E26	2101-M W	98	79	88
2E27	2101-M E	89	72	80
2E28	284-E Powerhouse SE	98	79	88
2E29	PUREX S	92	75	84
2E30	PUREX SE	94	71	81
2E31	U.S. Ecology N	92	70	82
2E32	B-C Cribs NW	95	70	84
2E33	200 East Area S	90	74	81
2E34	200 East Area S	98	82	90
2E35	200 East Area S	96	74	84
2E36	200 East Area SW	90	75	81
2EA	200 East Area SW	90	68	77
2EB	200 East Area SW	93	73	83
2EC	200 East Area SW	95	50	79
2ED	216-A-29 Ditch E	108	87	96
Grout NE	NE of TGF (N991)	140	74	97
Grout SE	SE of TGF (N992)	98	83	92
Grout SW	SW of TGF (N993)	92	78	84

NOTE: The 1987 background ranged from 76 to 89 mrem/yr (PNL 1988).

(a) Quarterly dose rates normalized to annual dose rate equivalent.

(b) The mean value for the measured totals is  $93 \pm 15$ .

Table F-2. The 1987 Thermoluminescent Dosimeter Results from 200 West Area.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total (b)
2W 2	216-T-4 Pond N	131	106	118
2W 3	W-1A N	105	79	89
2W 4	T-Plant N	100	80	88
2W 5	200 West Area NE	107	77	90
2W 6	200 West Area W	96	73	84
2W 7	W-2A E	115	91	102
2W 8	241-T Tank Farm E	208	164	185
2W 9	Near 291-T-1 Stack	107	80	92
2W10	200 West Area NE	109	83	91
2W12	W-1 E	99	69	82
2W13	241-TX Tank Farm E	145	117	135
2W14	284-W Powerhouse N	98	72	83
2W15	200 West Area E	122	80	96
2W16	200 West Area W	109	74	89
2W17	Z-Plant W	117	79	95
2W18	216-U-14 Ditch W	108	74	90
2W19	284-W Powerhouse S	116	79	96
2W20	200 West Area E	117	80	93
2W21	200 West Area W	100	75	85
2W22	Z-Plant S	110	68	83
2W23	241-U Tank Farm E	247	175	204
2W24	U-Plant SE	107	77	88
2W25	200 West Area E	106	72	88
2W26	200 West Area W	119	77	93
2W27	SE U-10 Covered Pond	128	79	100
2W28	241-SX Tank Farm E	130	84	101
2W29	U-Plant S	120	79	100
2W30	200 West Area SE	112	78	95
2W31	200 West Area SW	99	70	83
2W32	200 West Area S	97	71	83
2W33	207-S Retention Basin SE	101	81	88
2W34	Redox ESE	100	73	84
2W35	200 West Area SE	108	80	90

NOTE: The 1987 background ranged from 76 to 89 mrem/yr (PNL 1988).

(a) Quarterly dose rates normalized to annual dose rate equivalent.

(b) The mean value for the measured totals is  $99 \pm 27$ .

**Table F-3. The 1987 Thermoluminescent Dosimeter Results from the Ponds and Ditches.**

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total (b)
A-25P N	Gable Mt. Pond N (b)	68	64	66
A-25P S	Gable Mt. Pond S (b)	80	78	79
A-29D	216-A-29 Ditch	91	71	81
B-3D	216-B-3 Ditch	143	101	120
B-63D	216-B-63 Ditch	108	99	103
S-19P	216-S-19 Covered Pond	86	68	78
U-10P	216-U-10 Covered Pond N	95	72	83
U-14D	216-U-14 Covered Ditch	78	61	69
W Lake	West Lake	83	66	75
Z-19D	216-Z-19 Covered Ditch	91	68	81

NOTE: The 1987 background ranged from 76 to 89 mrem/yr (PNL 1988).

(a) Quarterly dose rates normalized to annual dose rate equivalent.

(b) Only active for the first two quarters of 1987.

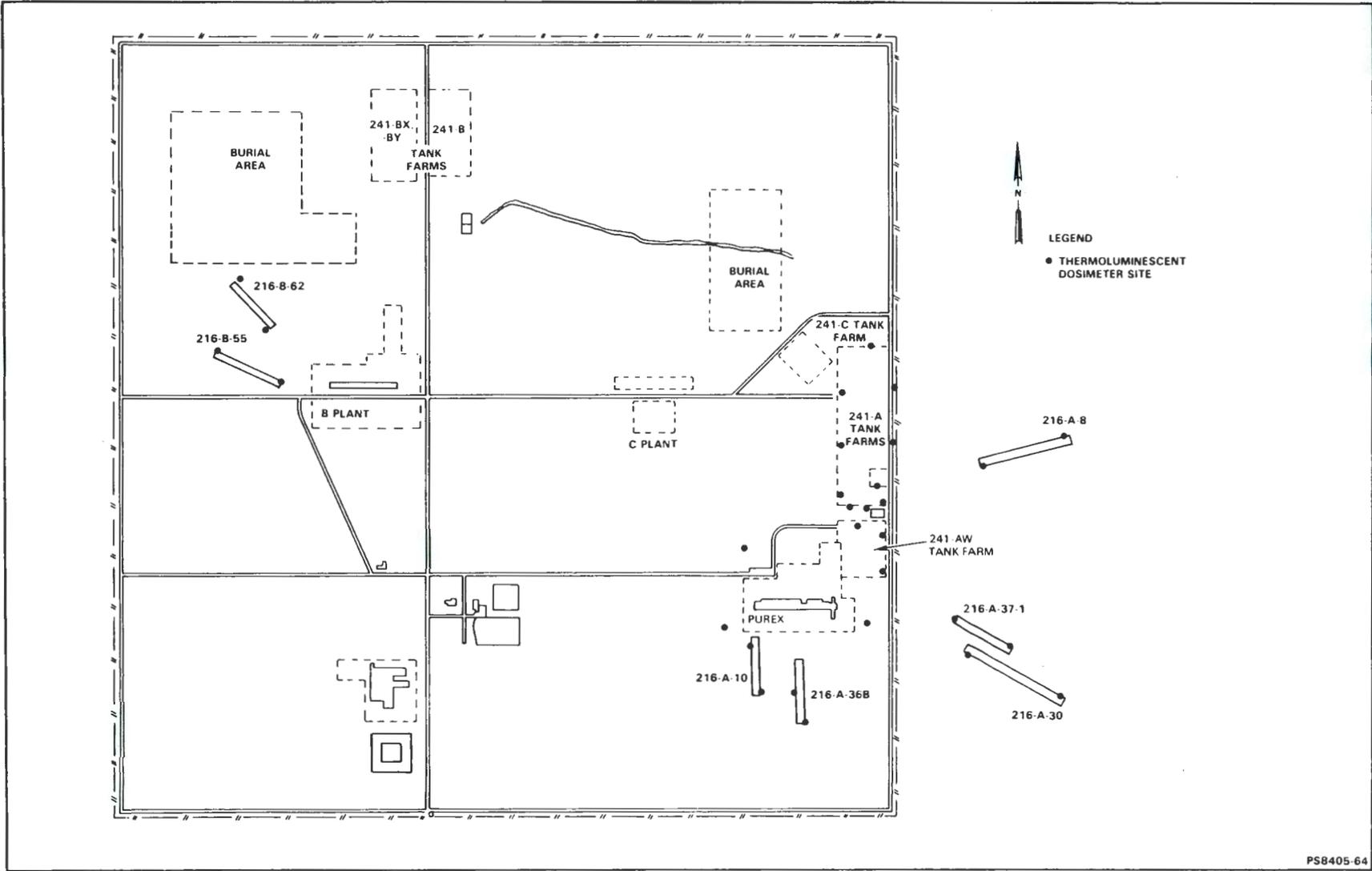
**Table F-4. The 1987 Thermoluminescent Dosimeter Results from PUREX Plant-Related Facilities.**

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total
202A# 1	PUREX #1	91	74	83
202A# 2	PUREX #2	101	78	88
202A# 3	PUREX #3	98	81	90
A10 # 1	216-A-10 Crib #1	92	71	83
A10 # 2	216-A-10 Crib #2	89	72	82
A30 # 1	216-A-30 Crib #1	99	77	88
A30 # 2	216-A-30 Crib #2	90	74	81
A36B# 1	216-A-36B Crib #1	87	56	77
A36B# 2	216-A-36B Crib #2	89	55	79
A37-1# 1	216-A-37-1 Crib #1	105	76	89
A37-1# 2	216-A-37-1 Crib #2	83	77	80
A8 # 1	216-A-8 Crib #1	113	88	99
A8 # 2	216-A-8 Crib #2	140	101	118
ATF # 1	241-A Tank Farm # 1	264	210	237
ATF # 2	241-A Tank Farm # 2	156	127	138
ATF # 3	241-A Tank Farm # 3	126	107	118
ATF # 4	241-A Tank Farm # 4	113	93	102
ATF # 5	241-A Tank Farm # 5	104	77	89
ATF # 6	241-A Tank Farm # 6	108	84	97
ATF # 7	241-A Tank Farm # 7	149	110	120
ATF # 8	241-A Tank Farm # 8	2,036	1,535	1,781
ATF # 9	241-A Tank Farm # 9	809	438	666
ATF #10	241-A Tank Farm #10	832	649	729
ATF #11	241-A Tank Farm #11	125	103	115
ATF #12	241-A Tank Farm #12	156	92	122
ATF #13	241-A Tank Farm #13	146	92	121
B55 # 1	216-B-55 Crib #1	108	81	94
B55 # 2	216-B-55 Crib #2	91	75	82
B62 # 1	216-B-62 Crib #1	85	70	76
B62 # 2	216-B-62 Crib #2	94	73	82
U12 # 1	216-U-12 Crib #1	91	75	84
U12 # 2	216-U-12 Crib #2	99	81	89

NOTE: The 1987 background ranged from 76 to 89 mrem/yr (PNL 1988).

(a) Quarterly dose rates normalized to annual dose rate equivalent.

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Figure F-1. The PUREX Plant-Related Thermoluminescent Dosimeter Locations.

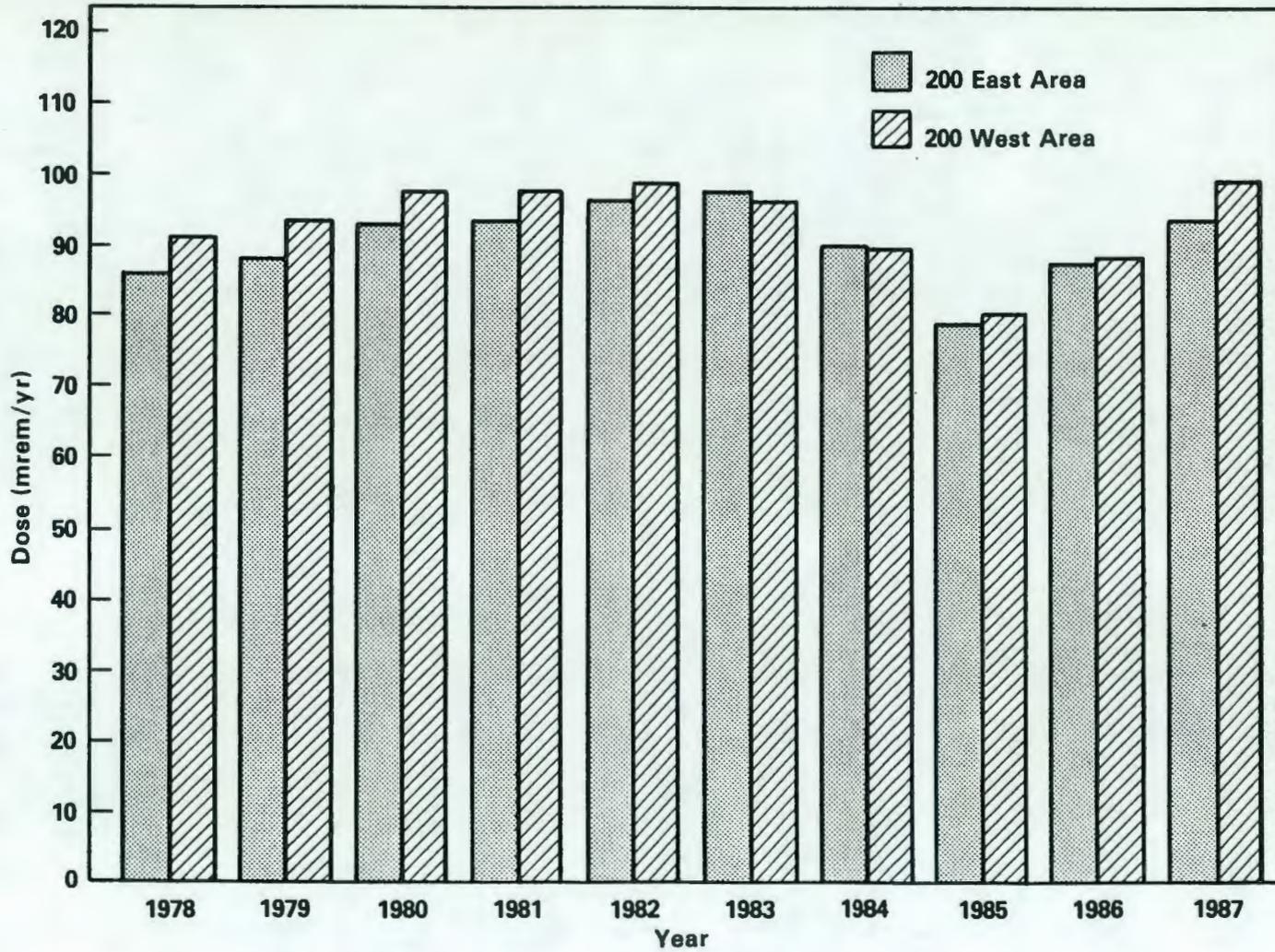


Figure F-2. Yearly Averages for Thermoluminescent Dosimeters.

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**APPENDIX G**

**POND AND DITCH MONITORING  
FIGURES AND TABLES**

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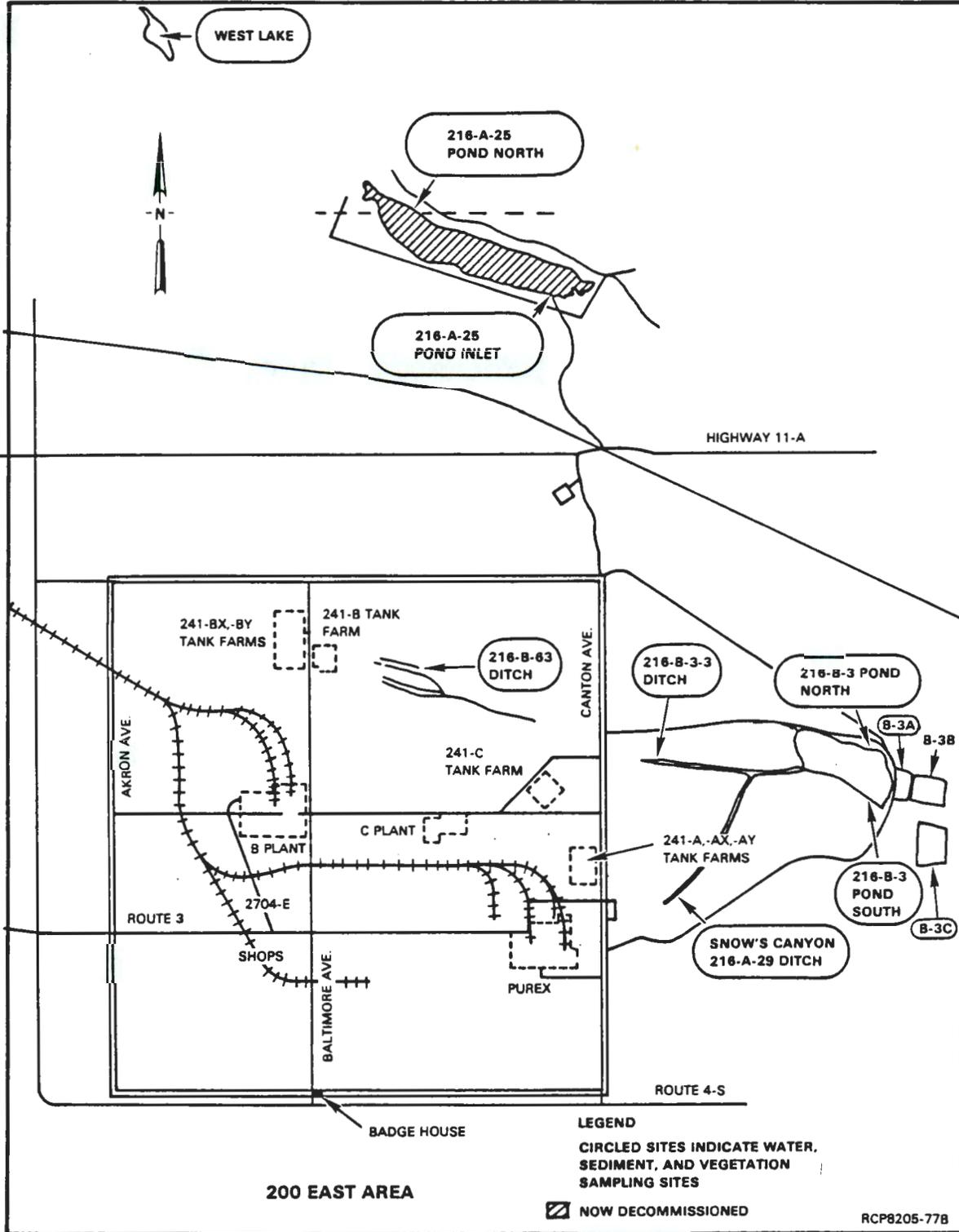


Figure G-1. The 200 East Area Pond and Ditch Sample Sites.

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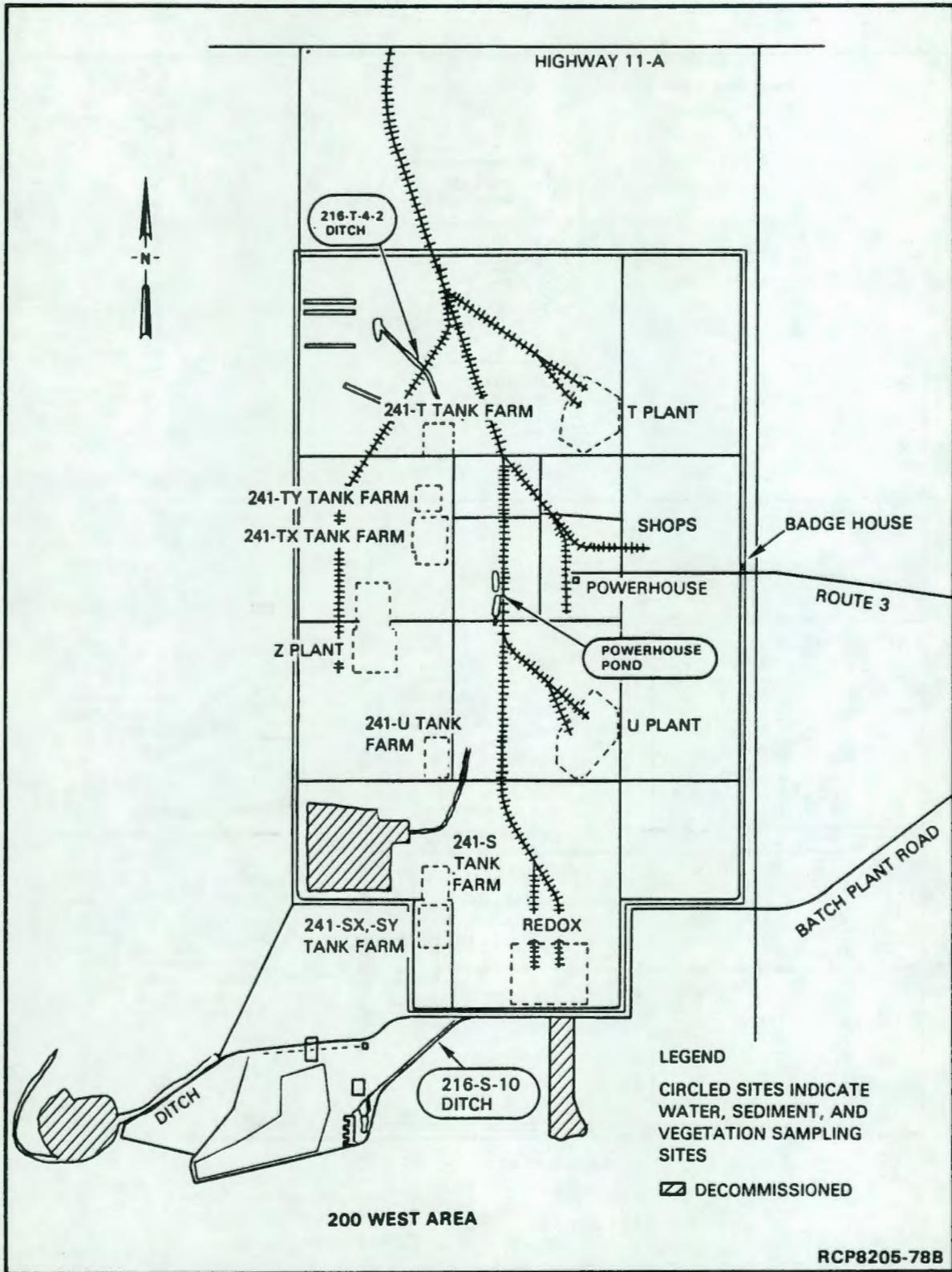


Figure G-2. The 200 West Area Pond and Ditch Sample Sites.

Table G-1. The 200 Areas Ponds and Ditches and Their Water Sources.

Pond or ditch	Location	Source
216-B-3 (B Pond)	Figure G-1	B Plant cooling water (216-B-2 Ditch) PUREX Plant chemical sewer (216-A-29 Ditch) 200-E powerhouse (pipe)
216-B-3-3 Ditch to B Pond	Figure G-1	Cooling water from PUREX and B Plants, 242-A Evaporator, and 241-A-701
216-B-63 Ditch	Figure G-1	B Plant chemical sewer (pipe)
216-A-25 Pond (Gable Mountain Pond)	Figure G-1	PUREX and B Plants, cooling water (pipe) 244-AR Vault cooling water (pipe) 242-A steam condensate (pipe) 242-A cooling water (pipe)
216-T-4-2 Ditch	Figure G-2	221-T and 224-T waste water (ditch)
216-N-8 Pond (West Lake)	Figure G-1	Groundwater seepage basin (does not receive liquid discharges)
216-A-29 Ditch	Figure G-1	PUREX Plant chemical sewer
Powerhouse Pond	Figure G-2	200-W powerhouse (nonradioactive but treated as potentially radioactive)
216-S-10 Ditch	Figure G-2	202-S bearing cooling water

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Table G-2. Surface Water Results for 1987 (pCi/mL).

Site number	Sampling site	Total beta		Total alpha		Cs-137		Sr-90	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
RM 3	216-T-4-2 Ditch	0.336	<DL	0.007	<DL	0.189	0.027	<0.030	<DL
RM18	216-B-63 Ditch	<0.098	<DL	<0.004	<DL	0.170	<DL	<0.028	<DL
RM20	216-A-29 Ditch	0.027	<DL	0.011	<DL	<0.127	<DL	<0.030	<DL
RM21	216-B-3-3 Ditch	0.155	<DL	0.052	<DL	<0.055	<DL	<0.040	<DL
RM22	216-B-3 Pond N	<0.044	<DL	0.010	<DL	<0.060	<DL	<0.042	<DL
RM23	216-B-3 Pond S	<0.108	<DL	<0.030	<DL	0.143	<DL	<0.043	<DL
RM24	216-A-25 Pond inlet (Gable Mountain Pond)	0.059	<DL	<0.013	<DL	<0.080	0.038	<0.110	<DL
RM25	216-A-25 Pond outfall (Gable Mountain Pond)	0.260	0.045	<0.011	<DL	0.140	<DL	0.045	<DL
RM26	216-B-3 Pond overflow	0.030	<DL	0.010	<DL	<0.087	<DL	<0.030	<DL
RM27	Powerhouse Pond	0.064	<DL	0.031	<DL	<0.057	<DL	0.119	<DL
RM28	216-S-10 Ditch	<0.037	<DL	<0.007	<DL	<0.088	<DL	<0.115	<DL
RM29	216-B-3 Pond 3rd overflow	<0.059	<DL	<0.014	<DL	<0.057	<DL	<0.040	<DL
RM53	Westlake	0.578	0.320	0.132	0.039	<0.044	<DL	<0.020	<DL
	Detection limit	0.1		0.04		0.2		0.1	
	Derived concentration guideline (a)	1.0 (b)		3.0 (c)		3.0		1.0	

NOTE: &lt;DL = less than detection limit.

(a) DOE 1986b.

(b) Using Sr-90 DCG for comparison.

(c) Using Pu-239 DCG for comparison.

Table G-3. Nonradiological Parameters in Water at the Ponds and Ditches for 1987.

Site number	Sampling site	pH			Nitrate (NO <sub>3</sub> ) (ppm).		
		Maximum	Minimum	Average	Maximum	Minimum	Average
RM 3	216-T-4-2 Ditch	8.3	5.7	7.1	2.7	<DL	<DL
RM18	216-B-63 Ditch	9.3	6.6	7.6	1.6	<DL	<DL
RM20	216-A-29 Ditch	10.8	6.5	7.8	0.6	<DL	<DL
RM21	216-B-3-3 Ditch	8.9	6.9	7.8	<DL	<DL	<DL
RM22	216-B-3 Pond N	9.7	6.8	8.1	<DL	<DL	<DL
RM23	216-B-3 Pond S	9.9	6.8	8.2	<DL	<DL	<DL
RM24	216-A-25 Pond inlet (Gable Mountain Pond)	9.7	7.2	7.9	<DL	<DL	<DL
RM25	216-A-25 Pond outfall (Gable Mountain Pond)	9.9	6.8	8.0	<DL	<DL	<DL
RM26	216-B-3 Pond overflow	9.4	6.8	8.2	<DL	<DL	<DL
RM27	Powerhouse Pond	10.0	7.2	9.0	<DL	<DL	<DL
RM28	216-S-10 Ditch	8.4	6.8	7.6	<DL	<DL	<DL
RM29	216-B-3 Pond 3rd overflow	9.7	6.9	8.3	<DL	<DL	<DL
RM53	Westlake	9.9	7.6	9.5	<DL	<DL	<DL

NOTE: pH maximum and minimum are from weekly samples.

<DL = less than detection limit (~1.2 ppm).

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**Table G-4. Radionuclides in Aquatic Vegetation Samples Taken from the Separations Area Ponds and Ditches for 1987.**

Sample site	Cs-137 (pCi/g)	Sr-90 (pCi/g)	Pu-239 (pCi/g)	U (g/g)
216-A-25 Pond Inlet	3.4	0.78	0.40	2.18E-07
216-A-25 Pond N	15.0	0.61	< 1	4.39E-07
216-A-29 Ditch	4.5	2.29	2.06	1.68E-06
216-B-2-3 Ditch	21.0	0.65	0.29	1.08E-06
216-B-3 Pond 1st Overflow	9.0	1.12	< 1	5.20E-07
216-B-3 Pond N	4.3	0.65	1.52	3.78E-07
216-B-3 Pond S	4.6	< 0.39	2.95	1.12E-07
216-B-3-3 Ditch	17.0	17.58	a	9.61E-07
216-B-63 Ditch	20.0	1.04	1.00	2.58E-07
216-T-4 Ditch	8.0	6.18	< 1	1.37E-07
West Lake	3.9	< 0.60	0.46	1.13E-07

Note: No standard deviation is available.

(a) Sample lost.

**Table G-5. Radionuclide Concentrations in Sediment Samples from Separations Area Ponds and Ditches for 1987.**

Sample site	Co-60 (pCi/g)	Sr-90 (pCi/g)	Nb-95 (pCi/g)	Zr-95 (pCi/g)	RuRh-106 (pCi/g)	Cd-109 (pCi/g)	Cs-134 (pCi/g)	Cs-137 (pCi/g)	CePr-144 (pCi/g)	Eu-154 (pCi/g)	Eu-155 (pCi/g)	Bi-214 (pCi/g)	Pu-239 (pCi/g)	U (g/g)
216-A-25 Pond Inlet	<DL	3.0	0.8	0.7	27	76	0.6	30	147	4.0	9.0	<DL	1.6	1.39E-06
216-A-25 Pond N	<DL	0.5	<DL	<DL	<DL	<DL	<DL	23	<DL	<DL	<DL	1.0	0.2	7.49E-07
216-A-29 Ditch	<DL	0.6	<DL	<DL	<DL	<DL	<DL	2.0	<DL	<DL	<DL	<DL	1.8	2.20E-06
216-B-2-3 Ditch	<DL	2.2	0.2	<DL	11	<DL	<DL	11	<DL	<DL	<DL	<DL	8.2	1.83E-06
216-B-3 Pond 1st Overflow	<DL	< 1.0	<DL	<DL	7.0	<DL	<DL	9.0	<DL	<DL	<DL	<DL	0.5	1.16E-06
216-B-3 Pond N	<DL	0.5	<DL	<DL	<DL	<DL	<DL	2.2	<DL	<DL	<DL	0.8	3.2	5.36E-07
216-B-3 Pond S	<DL	1.0	<DL	<DL	<DL	<DL	<DL	95	<DL	<DL	<DL	<DL	1.8	1.34E-06
216-B-3-3 Ditch	<DL	2.1	1.0	0.6	25	<DL	0.8	134	167	1.0	2.5	2.0	1.6	1.05E-06
216-B-63 Ditch	<DL	1.7	<DL	<DL	<DL	<DL	<DL	9.3	<DL	<DL	<DL	<DL	0.2	5.80E-07
216-T-4 Ditch	2.1	2.6	<DL	<DL	<DL	<DL	<DL	172	<DL	<DL	<DL	<DL	0.9	1.10E-06
West Lake	<DL	0.3	<DL	<DL	<DL	<DL	<DL	0.3	<DL	<DL	<DL	<DL	0.5	2.43E-06
200 Area soil standards (a)	300	400						400		200	200		60	

Note: No standard deviation is available.

<DL = less than detection limit.

(a) Boothe 1987.

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**APPENDIX H**

**RADIOLOGICAL SURVEYS FIGURES AND TABLES**

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**Table H-1. The 1987 Radiological Survey Schedule.**

Interval	Areas scheduled for surveys
Bimonthly	Surveys of all paved and improved road surfaces inside 200 Areas
Quarterly	200 Areas outside perimeter roads Route 3 and 4-S from 200 West to 200 East hill 216-B-55 and -62 Cribs 216-T-30 Catch Tank between the 222-T and 221-T Buildings 216-A-8, -10, -30, -36B, -45, -37-1, and -37-2 Cribs 216-U-12 and -17 Cribs 216-B-2-1 and -2-2 Ditches (backfilled) 216-U-16, -S-25, -S-26, and -Z-20 Cribs 216-W-LWC
Semiannually	All stabilized sites in the 200 and 600 Areas BC cribs and ground plots BC cribs controlled area roads and fire breaks Gable Mountain Pond and B Pond perimeter roads Vent station on east/west cross-country transfer line 216-N Wastes Sites UN-216-W-5, -23, and -33 216-S-10 Ditch
Annually	Roofs of 202-S, 222-S, 276-S, 221-U, 231-Z, 221-T, and 200 East powerhouse Burial grounds in the 600 Area not surveyed semiannually Nonstabilized burial grounds in the 200 Area Underground pipeline to B-3-3 Ditch from the B-2-3 Ditch Outdoor areas at PUREX Plant, 244-AR Vault, B Plant, and Hot Semiworks All tank farm perimeters West Lake, 216-B-3 and -4 Pond All ditch banks, backfilled ditches, cribs, trenches, drains, and inactive burial grounds not covered quarterly or semiannually Outdoor areas of Laundry, REDOX, and 222-S, -U, -T, and -Z Plants All unplanned release sites not surveyed semiannually Retention basins inside the 200 Areas

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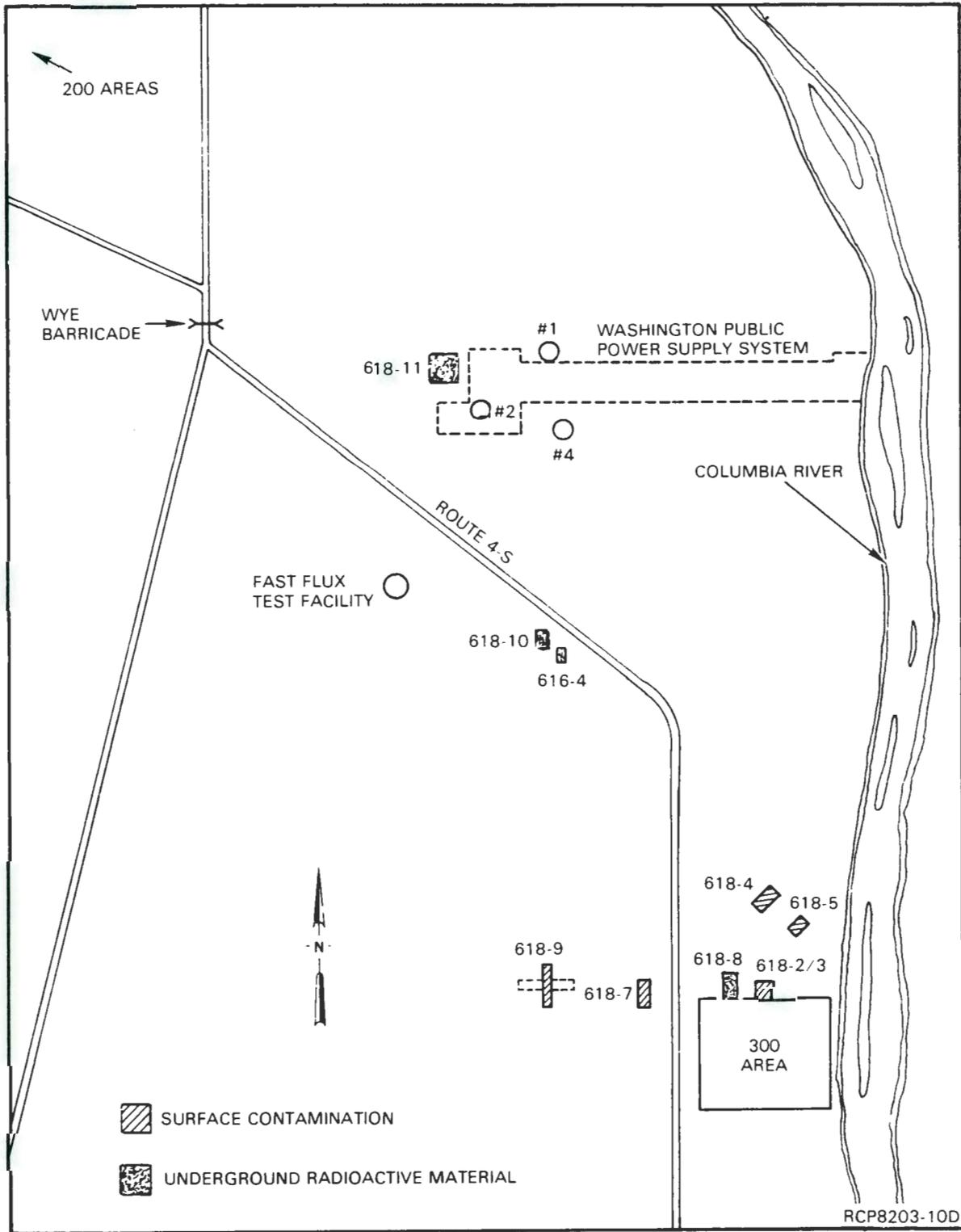
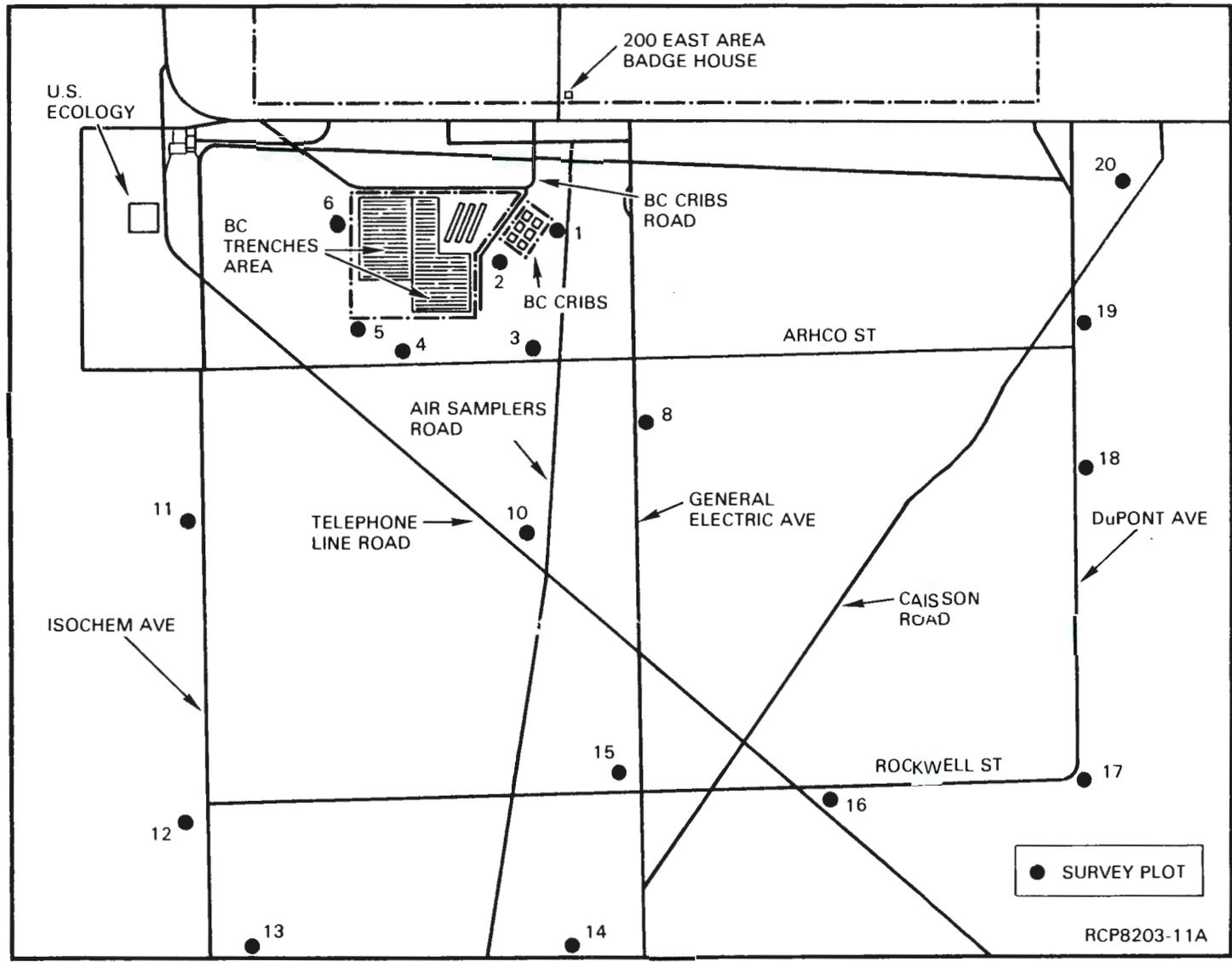


Figure H-1. The 600 Area Burial Grounds.



H-5

WHC-EP-0145

Figure H-2. The BC Cribs Controlled Area.

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**APPENDIX I**  
**INVESTIGATIVE SAMPLING TABLES**

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**Table I-1. Categories of Special Samples Taken in Calendar Year 1987.**

Sample type	Total collected	Number radioactive
Air	5	4
Liquid effluent	3	0
Sediment	1	1
Soil	29	2
Vegetation	17	5
Animal and feces	26	6
<b>Total</b>	<b>81</b>	<b>18</b>

PST8-3220-I-1

**Table I-2. Analytical Results of 1987 Special Biotic Samples.**

Sample type (with counts per minute)	Location	Analytical results (pCi/g dry weight)					
		<sup>60</sup> Co	<sup>90</sup> Sr	<sup>137</sup> Cs	<sup>154</sup> Eu	<sup>155</sup> Eu	<sup>239</sup> Pu
Bird nest #1 (6,000 cpm)	202-A rail road cut	9.7	2,000	295	10	22	a
Bird nest #2 (1,000 cpm)	202-A rail road cut	85	180	3,600	b	b	1.0
Mouse #1 body (10,000 cpm)	272-AW	b	300	17,000	b	b	0.6
Mouse #1 gastro-intestinal tract (10,000 cpm)	272-AW	b	12	14,000	b	b	0.6
Mouse #2 body (500 cpm)	A-40 Basin	b	208	283	b	b	0.5
Rabbit feces (30,000 cpm)	231-Z fenceline	b	55,800	<18	b	b	<5
Mouse feces (100,000 cpm/10mR)	Open field near Semi-works	b	d	760,000 <sup>c</sup>	3,120 <sup>c</sup>	3,880 <sup>c</sup>	d
Tumbleweed #1 (900 cpm)	U-12 pipeline	b	1,010	11.2	b	b	a
Tumbleweed #2 (300 cpm)	U-12 pipeline	b	236	0.5	b	b	a
Tumbleweed #3 (3,000 cpm)	U-12 pipeline	b	1,420	0.3	b	b	a
Tumbleweed #4 (1,000 cpm)	U-12 pipeline	b	746	0.6	b	b	a
Sagebrush (35,000 cpm)	A-8 Crib	d					

<sup>a</sup>Analysis not requested.  
<sup>b</sup>Radionuclide not detected.  
<sup>c</sup>Results in pCi/sample.  
<sup>d</sup>Laboratory unable to complete analysis.

PST88-3220-I-2

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**APPENDIX J**  
**CONCENTRATION GUIDELINES**

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**Table J-1. Airborne Derived Concentration Guidelines (DCGs).**

Radionuclide	DCG (pCi/m <sup>3</sup> )
<sup>90</sup> Sr	9
<sup>137</sup> Cs	400
<sup>239</sup> Pu	0.02

Source: RHO-MA-139.

PST88-3220-J-1

**Table J-2. Comparison of Groundwater Administrative Control Limits and Derived Concentration Guidelines.**

Radionuclide	200 East Area ACL (pCi/L)	200 West Area ACL (pCi/L)	DCG (pCi/L)
<sup>3</sup> H	See note	See note	2,000,000
<sup>60</sup> Co	5,000	5,000	5,000
<sup>90</sup> Sr	74	480	1,000
<sup>99</sup> Tc	4,000	4,000	100,000
<sup>106</sup> Ru	6,000	6,000	6,000
<sup>129</sup> I	20	20	500
<sup>137</sup> Cs	210	1,200	3,000
<sup>234</sup> U	20	20	500
<sup>235</sup> U	24	24	600
<sup>238</sup> U	24	24	600
<sup>238</sup> Pu	200	360	4,000
<sup>239</sup> Pu	120	120	3,000
<sup>240</sup> Pu	120	120	3,000

Source: RHO-MA-139.

NOTE: There currently is no ACL for <sup>3</sup>H in groundwater.

ACL = Administrative Control Limit.

DCG = Derived Concentration Guidelines.

PST88-3220-J-2

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**Table J-3. Drinking Water Standards.**

Contaminant	Guide (p/m)
NO <sub>3</sub>	45

Source: EPA 1976.

PST88-3220-J-3

**Table J-4. Surface Soil Concentration Guides.**

Radionuclide	Guide (pCi/g)
<sup>60</sup> Co	300
<sup>90</sup> Sr	400
<sup>137</sup> Cs	400
<sup>152</sup> Eu	800
<sup>154</sup> Eu	200
<sup>155</sup> Eu	200
<sup>238</sup> Pu	60
<sup>239</sup> Pu	60

Source: RHO-MA-139.

PST88-3220-J-4

**Table J-5. Derived Concentration Guidelines for Surface Water.**

Radionuclide	Guide (pCi/mL)
<sup>90</sup> Sr	1.0
<sup>137</sup> Cs	3.0
<sup>239</sup> Pu	3.0

Source: RHO-MA-139.

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