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Results of the Separations Area Ground-Water Monitoring Network for 1983

Date Published: July 1984

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EXECUTIVE SUMMARY

The purpose of this report is to present a summary of the results of Rockwell Hanford Operation's (Rockwell's) ground-water monitoring program for the Separations Area of the Hanford Site, for calendar year 1983. This monitoring program is in partial fulfillment of the U.S. Department of Energy (DOE) requirement that all radioactivity in the environment shall be monitored. The 1983 report on all phases of environmental surveillance in the Separations Area is presented in Conklin, et al., 1984.

The objectives of the monitoring program are to 1) evaluate the quality of ground water for compliance with DOE orders, 2) assess the performance of disposal and storage sites in the Separations Area, 3) determine the impact of waste disposal operations on the ground water, and 4) provide data for hydrologic analyses and model application.

The 1983 Separations Area monitoring network included 112 wells. Water samples were collected monthly, quarterly or semiannually from the wells in the network. These samples were selectively analyzed for total alpha, total beta, tritium, strontium-90, cesium-137, cobalt-60, ruthenium-106, uranium and nitrate. Average radionuclide concentrations in monitoring wells for 1983 were similar to those in 1982.

Water levels were measured in 208 wells to produce the water table maps of the Separations Area (annually) and of the Hanford Site (semi-annually).

Radionuclide concentrations in the ground water were compared with Table II concentration guidelines of DOE Order 5480.1, Attachment XI-1, which are applicable at the Hanford Site boundary. Comparison of radionuclide concentrations in a well with the Table II concentration at the site boundary is conservative since concentrations would be reduced by sorption, dispersion, dilution and decay by the time flow reached the site boundary. Tritium concentrations were greater than the Table II guidelines in a well monitoring the active 216-A-36B Crib disposal site. No other radionuclide concentrations from active sites exceeded Table II guidelines. In some cases elevated concentrations of radionuclides are the result of past operations. The strontium-90 concentration was greater than Table II guidelines at two inactive disposal sites: the 216-B-5 Reverse Well and the 216-S-1 and S-2 Crib. The strontium-90 concentrations in the wells at these sites for 1983 were similar to the concentrations reported for 1982.

The contamination plumes for total beta, tritium and nitrate in 1983 were similar to those for 1982.

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ACKNOWLEDGEMENTS

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INTRODUCTION

BACKGROUND

The Hanford Site of the U.S. Department of Energy (DOE) is an area in south-central Washington used for nuclear reactor operation, radioactive waste storage and chemical separation facilities for the production and purification of plutonium and generation of electricity. The Hanford Site is located in southeast Washington State, approximately 270 km (170 mi.) southeast of Seattle and 200 km (125 mi.) southwest of Spokane (Figure 1). Rockwell Hanford Operations (Rockwell) manages the fuel reprocessing and radioactive waste management facilities in the 200 East and 200 West Areas (Figure 1).

The influence of liquid waste disposal activities extends beyond the 200 Areas, so the Separations Area (Figure 1) has been designated as the area of interest for ground-water monitoring purposes. Rockwell maintains a ground-water monitoring program for the Separations Area as part of its waste management responsibility. This monitoring program follows the requirements of DOE Order 5484.1, and samples the ground water to evaluate the impact on the aquifer of liquid waste discharged to ground, as specified in DOE Order 5480.1, Chapt. XII.

Radionuclide concentrations in the ground water are compared with Table II concentration guidelines of DOE Order 5480.1, Attachment XI-1. These guidelines give the maximum permissible concentrations (annual average) for continuous exposure of the general public. Since the Separations Area is well within the controlled area defined by the Hanford Site boundary (Figure 1), and therefore is not accessible to the general public, the DOE Table II concentration guidelines are used in this report for comparison purposes only. Rockwell has established more restrictive internal operating standards. Its goal is to meet Table II guidelines at the boundary of the Separations Area rather than at the Hanford Site boundary where they apply.

Rockwell's ground-water monitoring program for the Separations Area is coordinated with the Hanford Site ground-water monitoring program conducted by Pacific Northwest Laboratory (PNL). The PNL program is responsible for estimating and evaluating the impact of ground-water contamination at the Hanford Site on the general public.

PURPOSE AND OBJECTIVES

The purpose of this report is to present ground-water data collected during calendar year (CY) 1983 and to interpret the impacts of Rockwell's processing operations on the unconfined aquifer.

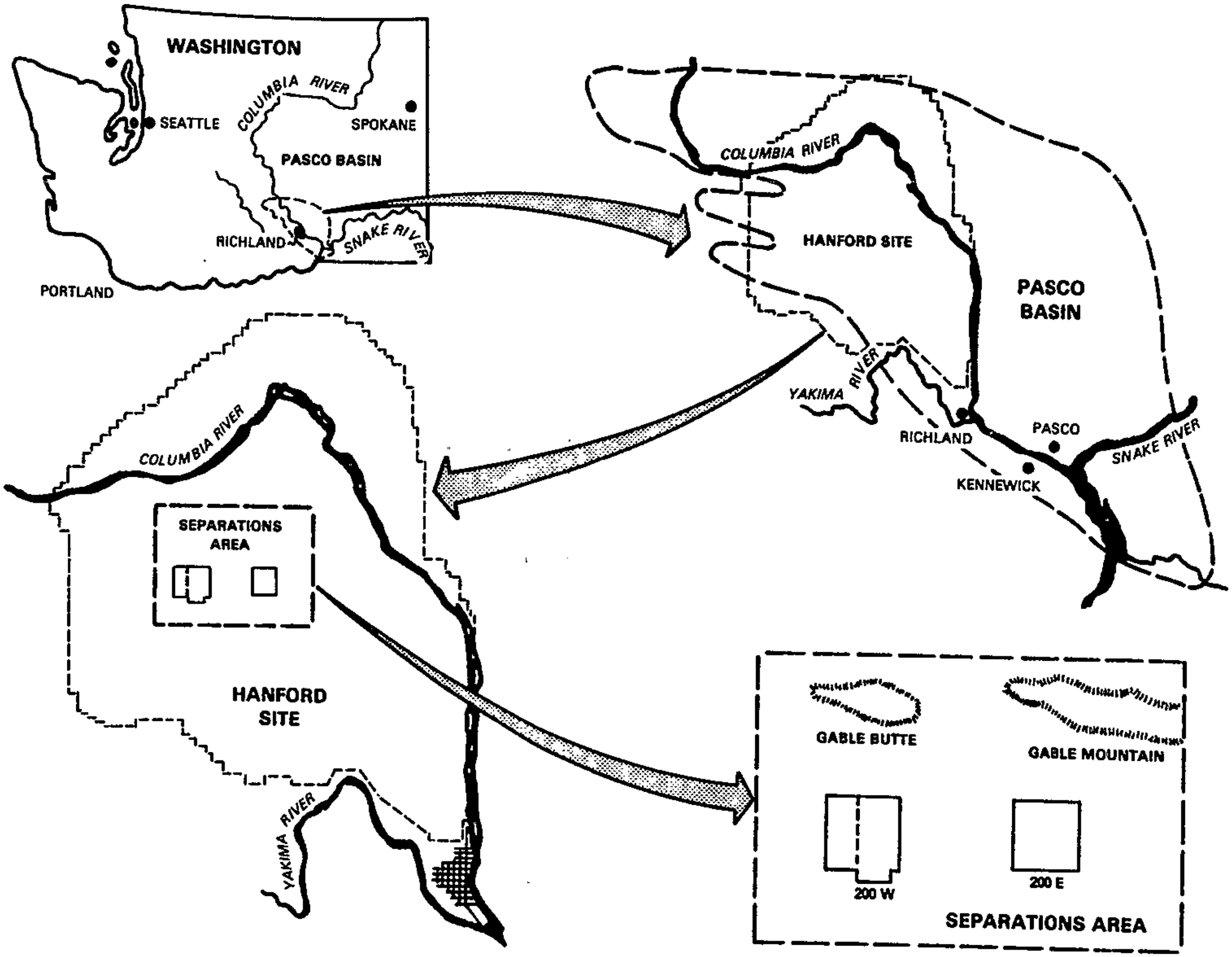

Figure 1. Separations Area Location Map.

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The objectives of the monitoring program are to: 1) evaluate the quality of ground water for compliance with DOE orders, 2) assess the performance of Rockwell's disposal and storage sites, 3) determine the impact of waste disposal operations on the ground water, and 4) provide data for hydrologic analyses and model application. To complement the water quality data obtained by sampling and analyses, water table contour maps are developed to provide basic information on the directions and rates of ground-water flow.

The Plutonium and Uranium Extraction (PUREX) plant and associated facilities were started up in late 1983 after being on standby status for 12 years. Operation of these process plants and support facilities had little impact on the ground water this year. This annual report will discuss each of the active cribs and provide average contaminant concentrations in the ground water for CY 1983.

HYDROGEOLOGY

Detailed documentation of the geology and hydrology of the Separations Area is reported in Geology of the Separation Areas (Tallman et al., 1979), Hydrology of the Separations Area (Graham et al., 1981), and in the Basalt Waste Isolation Project integration report (Gephart, et al., 1979). A brief summary of these reports follows.

The Hanford Site is located within the Pasco Basin, a structural and topographic basin in south central Washington State (see Figure 1). The boundaries of the Pasco Basin are defined by anticlinal structures of the basalt. There are three main geologic units beneath the Hanford Site. They are, in ascending order, the Columbia River Basalt Group, the Ringold Formation, and the glaciofluvial sediments. The Columbia River Basalt Group is a thick sequence of basalt flows extruded from fissures during the Miocene epoch. The Ringold Formation, a Pliocene fluvial sedimentary unit, overlies the Columbia River Basalt group except in areas where erosion has removed these sediments. The Ringold Formation is subdivided into four units on the basis of texture; in ascending order they are: the basal Ringold unit (sand and gravel), the lower Ringold unit (clay, silt, and fine sand with lenses of gravel), the middle Ringold unit (occasionally cemented sand and gravel), and the upper Ringold unit (silt and fine sand). The glaciofluvial sediments, informally named the Hanford formation, were deposited on top of the Columbia River Basalt Group and the Ringold Formation during the Pleistocene epoch.

Occurrence of Ground Water

The aquifer affected by disposal of waste from surface and subsurface disposal sites is the unconfined aquifer. The depth to ground water varies from 55m (180 ft.) to 95m (310 ft.) on the 200 Area plateau. The unconfined aquifer is contained within the Ringold Formation and the younger, overlying Hanford formation. Beneath the unconfined aquifer is a confined aquifer system consisting of sedimentary interbeds and/or interflow zones that occur between dense basalt flows or flow units. The bottom of the unconfined aquifer is the uppermost basalt surface or, in some areas, a clay zone of the Ringold Formation. The thickness of the unconfined aquifer varies from less than 15m (50 ft.) to 61m (200 ft.).

The sources of natural recharge to the unconfined aquifer are rainfall from areas of high relief to the west of the Hanford Site and the ephemeral streams, Cold Creek and Dry Creek. From the recharge areas, the ground water flows downgradient and discharges into the Columbia River. This general flow pattern is modified by basalt outcrops and subcrops in the Separations Area and by artificial recharge from the Separations Area.

The unconfined aquifer beneath the Separations Area receives artificial recharge from liquid disposal areas. Cooling water disposed to ponds forms ground-water mounds beneath three high volume disposal sites: U Pond in West Area, B Pond east of East Area, and Gable Mountain Pond north of 200 East Area (Figure 2). The water table has risen approximately 20 m (65 ft.) under U Pond and 9 m (30 ft.) under B Pond compared with the pre-Hanford conditions (Newcomb et al., 1972).

Aquifer Properties

Large differences in aquifer properties are evident between the Hanford formation and the middle member of the Ringold Formation, the major units of the unconfined aquifer. Hydraulic conductivities range from 3 to 70 m/day (10 to 230 ft/day) for the middle Ringold unit and from 600 to 3,000 m/day (2,000 to 10,000 ft/day) for the Hanford formation. Transmissivity increases from the 200 West Area to the 200 East Area. This is due both to an increase in saturated thickness of the aquifer (the result of a drop in the basalt surface) and to the fact that more of the unconfined aquifer is contained within the more permeable Hanford formation.

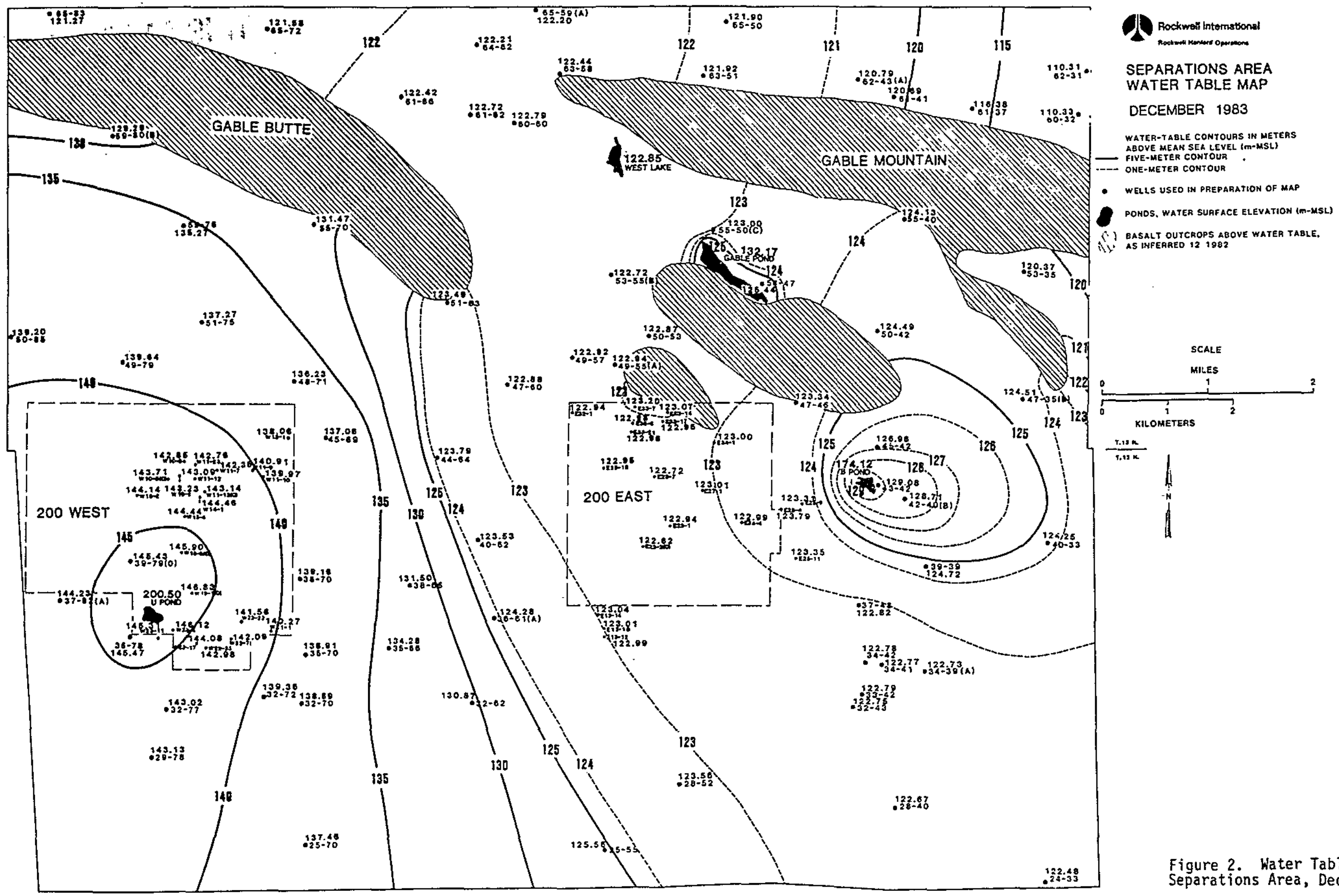

Figure 2. Water Table Map of the Separations Area, December 1983.

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Table 1. List of Changes to Well Monitoring Network in CY 1983

Wells Added:

New Wells Constructed:

Well No.	Waste Site
299-E25-21	216-A-37-2
299-E25-22	216-A-37-2
299-E25-23	216-A-37-2
299-E25-24	216-A-37-2
299-W19-11	216-U-1
299-W19-12	241-U
299-W26-6*	216-S-5

Existing Wells Added:

Well No.	Waste Site
299-E28-17	216-B-6,10A, 10B
299-W11-13	200 West
299-W11-15	216-T-34
299-W18-19	216-Z-20
299-W18-20	216-Z-20
299-W22-27	216-S-9,18
299-W23-9	216-S-25
699-42-40A	216-B-3
699-42-40B	216-B-3

Wells Deleted:

Well No.	Waste Site
299-E16-1	216-A-30
299-E33-7	216-B-48.49.50
299-E33-10	216-B-35.41
299-W15-5	216-Z-11

*Well constructed in CY 1983, but sampling not started until CY 1984

waste disposal sites. Without the protection of an adequate surface seal, voids around the well casing can provide a possible pathway for surface and/or subsurface contamination to reach the ground water. Seventeen wells were repaired in CY 1983 (Table 2).

The renovation process includes several steps (Figure 3). First, the existing casing is perforated to a depth of about 33m (100 ft). Second, a liner casing of smaller diameter is placed into the well. The bottom end of the liner contains a packer and is flared to be flush with the outer casing to reduce the probability of pumps or down hole tools catching on the lip during removal from the well. Finally, the annulus between the well and liner casings is grouted. The perforations in the old casing allow the grout to flow into any voids surrounding the well, thus reducing the possibility of contaminant migration down the outside casing of the well.

Flow Dynamics

Ground-water flow is perpendicular to the water table contours delineated in Figure 2. Flow patterns are dominated by ground-water mounds under U Pond and B Pond. Flow from 200 West Area is primarily toward the east. The flow system in 200 East Area is complex due to changes in aquifer thickness and hydraulic properties, the influence of B Pond, and the basalt subcrops and structures of the Gable Mountain/Gable Butte area. The flow from 200 East Area and environs is to the north through Gable Gap (between Gable Butte and Gable Mountain) and to the southeast toward the Columbia River (Figure 2). Radial flow from the mound under B Pond is eastward toward the Columbia River, in addition to its combining with the northern and southeastern flow from 200 East Area.

THE SEPARATIONS AREA GROUND-WATER MONITORING PROGRAM

The ground-water monitoring network was established to observe the quality of the ground water beneath waste storage and disposal facilities in the Separations Area. The network is composed of one or more wells located downgradient from active and inactive waste sites. Two primary concerns in the operation of the monitoring program are the collection of representative ground-water samples, and the identification of any condition that could enhance the migration of contaminants.

WELL NETWORK

There were 112 wells in the water quality monitoring network for CY 1983 (See Appendix B for listing), a net increase of eleven wells over the 101 wells listed in the 1982 Annual Report (Appendix A of Wilbur, et al., 1983). Table 1 gives the well number and site monitored for each of the 15 wells added and the 4 wells deleted. A brief discussion of the well numbering and facility numbering systems is presented in Appendices A.1 and A.2, respectively. Maps showing well locations are in Appendix A.3.

Well Renovation

To insure the integrity of wells, a program of well renovation was continued in 1983. This work addresses older wells that do not have an adequate surface seal and are located within 100m (300 ft.) of liquid

Wells that have undergone renovation work are fitted with a cement collar at the ground surface. A brass plate with the well number is embedded in the collar to prevent mislabeling errors.

Table 2. List of Wells Renovated in CY 1983

299-E17-8	299-W14-1	299-W18-6
299-E24-11	299-W14-2	299-W18-7
299-E25-11	299-W14-3	299-W23-9
299-E28-17	299-W14-4	299-W23-10
299-E28-18	299-W15-4	299-W23-11
299-E33-20	299-W18-1	

Well Maintenance

The maintenance program was initiated in 1981 to improve the collection of representative ground-water samples. There are several aspects of this work.

Well inspection and cleaning are routine tasks of the maintenance program. Under the inspection task a monitoring well is first video logged with a down-hole television camera. This provides recorded visual information on the condition of the inner surface of the well casing, both above and below the water table. Structural problems and/or cleaning needs are identified for maintenance. Twelve wells were logged in 1983, as listed in Table 3A. Wells requiring cleaning

Table 3. Wells Receiving Maintenance in CY 1983

A. Downhole TV Logging	B. Sonar* Jetting
299-E24-2	299-E24-2
	299-E17-2
299-E24-11	299-E24-11
299-E28-17	299-E28-17
299-E25-18	299-E25-18
299-E28-16	299-E28-16
299-E17-8	299-E17-8
299-W11-10	299-W11-10
299-W18-7	299-W18-7
299-W18-1	299-W18-1
299-W22-22	299-W22-22
299-W25-19	
299-W25-11	

* Registered Trademark

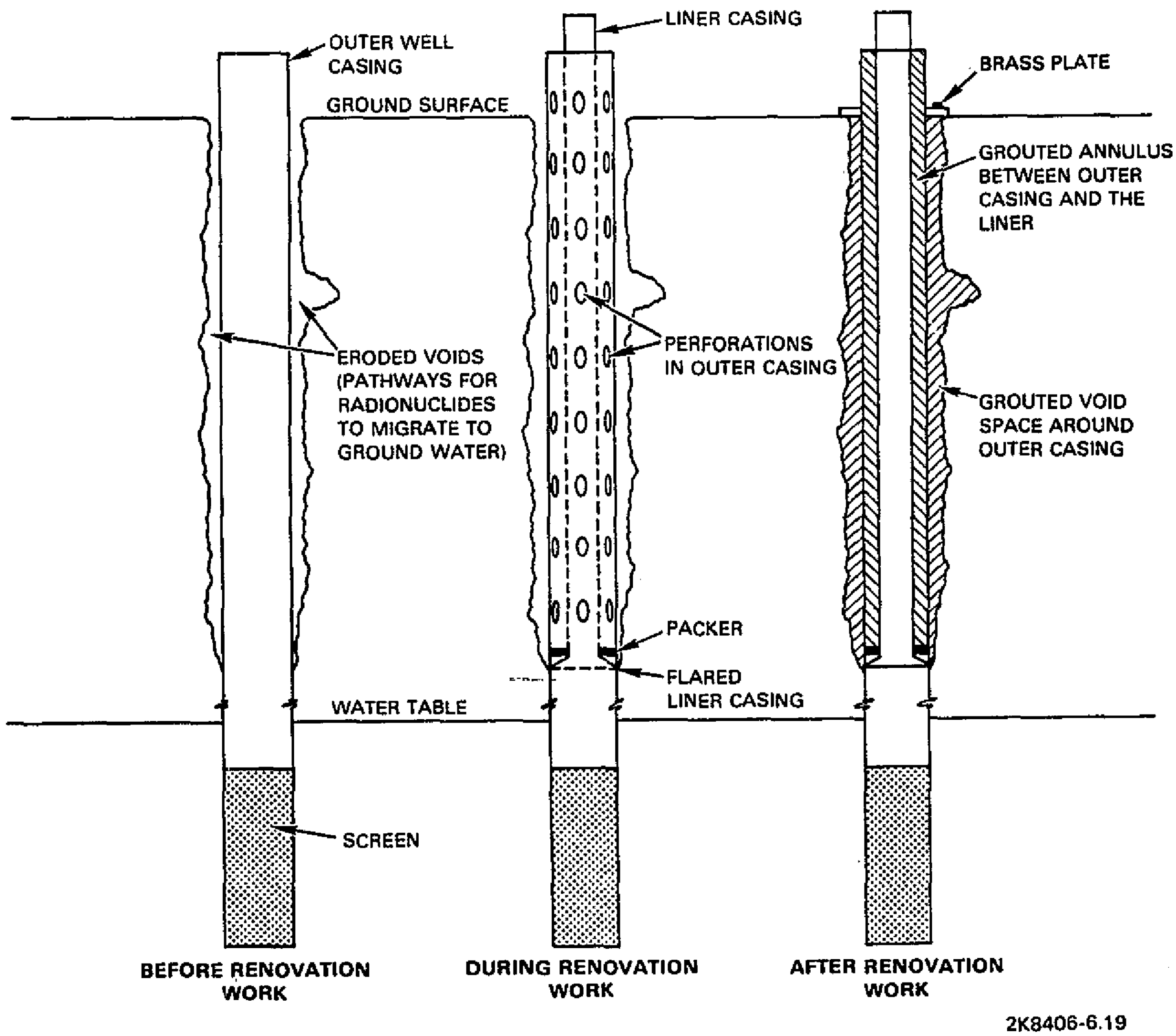

Figure 3. Idealized Cross-Sectional Views of a Well Casing Depicting the Renovation of a Well.

are treated with a Sonar Jet*, which generates high frequency sound waves in the water to remove encrustations from the well casing. The well is then video logged to determine the results of the sonar jetting. In 1983 eleven wells were cleaned by Sonar Jet* (Table 38).

Another task of this program is the maintenance and repair of submersible pumps. Presently pumps are installed by connecting a 2.5 cm (1.0 in.) diameter polyvinyl chloride (PVC) pipe to a pitless adapter (Figure 4). The well casing is capped with a bolting well cap that prevents foreign material from entering the well. An external, grounded, electrical plug is housed under the bolting cap. A portable power source outlet can be fitted easily to the external plug. In 1983 pump failures were confined to those wells with drill depths greater than 100m (300 ft.). Failure in these wells is associated with separation of the PVC pipe at plastic connecting joints. This problem is being addressed by installing cable to support the pump.

SAMPLING

The following criteria determine sampling frequencies:

- Wells monitoring active liquid waste disposal sites are sampled monthly.
- Wells monitoring inactive liquid-waste disposal sites which contain radionuclides that have a high potential for being remobilized are sampled monthly.
- Wells monitoring inactive liquid-waste disposal sites which contain radionuclides that have a low potential for being remobilized are sampled monthly or quarterly, depending upon the level and trend of concentration.
- Wells yielding samples indicating background contamination are sampled semiannually.

The 1984 sampling schedule is listed in Appendix C and includes the new wells planned for the year.

Monitoring wells with dedicated sampling pumps are pumped to remove stagnant water from the well before a sample is collected. In other wells samples are collected by bailing.

* Registered trademark

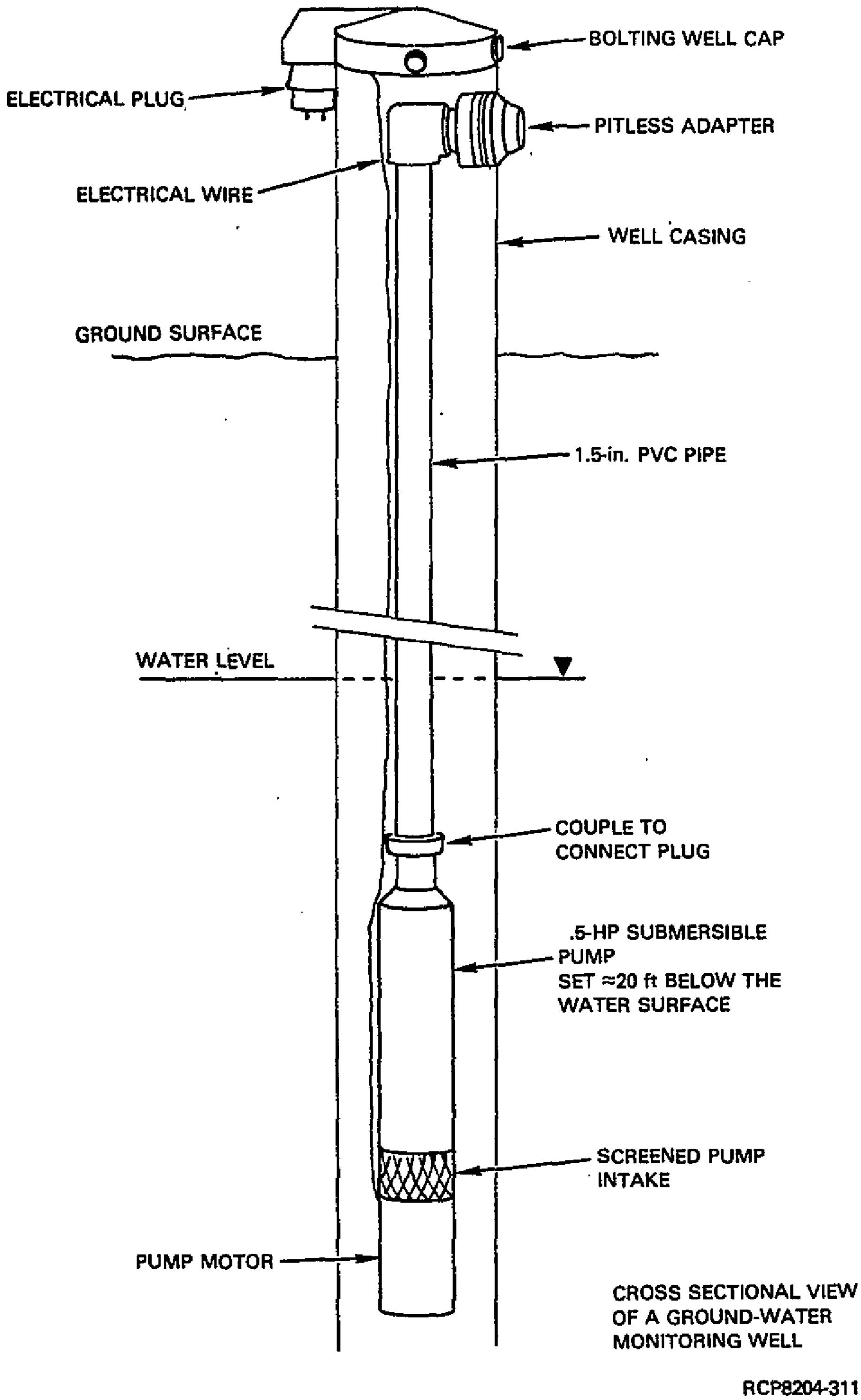

Figure 4. Cross-Sectional View of a Ground-Water Monitoring Well with Pump.

ANALYSES

The samples are analysed selectively for the following constituents: total alpha, total beta, tritium, uranium, strontium-90, cesium-137, cobalt-60, ruthenium-106 and nitrate. The constituent analyses conducted for each well are listed in Appendix C. The selection of these parameters is based on the waste disposal history of each site. The analyses are performed by U.S. Testing (UST) Co. in accordance with their procedures (UST, 1980).

WATER LEVEL MEASUREMENTS

Water level measurements are made in 208 wells to produce water table maps of the Hanford Site and the Separations Area. The water table maps of the Hanford Site are constructed semiannually; Plate 1 (in packet) is the map for December 1983. The water table map of the Separations Area is produced annually, and Figure 2 is the December 1983 map.

DATA INTERPRETATION, REPORTING, AND STORAGE

Data are received from the laboratory in the form of a computer print-out. The data are reviewed in the context of the concentration history of the well to establish their validity. They are also examined for trends that may suggest either modification of the sampling frequency or that may require other action.

The radionuclide data are compared to Table II concentration guidelines (Table 4). These concentration guidelines are for the boundaries of the Hanford Site. Rockwell applies its own more restrictive administrative controls for management of the ground water beneath the Separations Area.

The nitrate concentrations are compared with Environmental Protection Agency (EPA) drinking water standards (EPA, 1976) for reference purpose. The drinking water standards are not applicable at the Hanford Site as there is no public drinking water supply.

The data are stored in PNL's computerized Comprehensive Information Retrieval and Modeling Input Sequence (CIRMIS) system for retrieval.

Table 4. Concentration Guidelines

Radionuclide	Concentration Guideline[1] (pCi/mL)
Total Alpha	0.03
Total Beta	0.03
Cesium-137	20
Cobalt-60	30
Ruthenium-106	10
Strontium-90	0.3
Tritium	3,000
Uranium (Natural)	0.6 (U-238)
Chemicals	**Drinking Water Standard[2] (mg/L)**
Nitrate (as Nitrate)	45

1 DOE Order 5480.1, Attachment XI-1, Table II
2 EPA, 1976

QUALITY ASSURANCE

Quality assurance is included in all aspects of the monitoring program: well maintenance, sampling, analytical procedures, and data interpretation, storage and reporting. A quality control plan is in place and is being administered. The monitoring program is subject to external audits by Rockwell's Quality Assurance Assessment and to internal audits by the Hydrogeology Unit.

ACTIVE DISPOSAL SITES

Low-level radioactive liquid wastes generated in the processing facilities in the 200 Areas are discharged to ground for disposal. Cooling water is disposed to surface ditches and ponds because of the large volumes requiring disposal. Other liquid wastes, containing radioactive constituents below guidelines (see Table 2, Conklin, et al., 1984), are disposed to subsurface facilities designated as cribs. The surface ponds are discussed first followed by subsurface facilities.

SURFACE LIQUID DISPOSAL SITES

Three major ponds are in operation within the Separations Area: 216-A-25 (Gable Mountain Pond), 216-B-3 (B Pond), and 216-U-10 (U Pond) (see Figure 2). These ponds were formed by placing dikes around depressions or drainage channels. During 1983 B Pond was expanded to meet PUREX needs by placing two additional sections into operation. These sections were constructed by excavating and placing dikes to form units of about 11 acres each. Two monitoring wells are associated with each pond:

Gable Mt. Pond	699-53-47A	699-53-55A
B Pond	699-42-40A	699-42-40B
U Pond	299-W18-15	699-35-78

In the 200 East Area, the Gable Mt. Pond and B Pond system receive large volumes of waste water for surface disposal. In CY 1983, a total of 2.10E+10 L (5.54E+9 gal.) of liquid effluent were discharged from the following effluent streams:

PUREX Cooling Water (CWL)
B Plant Cooling Water (CBC)
242-A Evaporator Cooling Water (ACW)
242-A Evaporator Steam Condensate (ASC)
244-AR Vault Cooling Water (CAR)
241-A Tank Farm Cooling Water (CA8)
PUREX Chemical Sewer (CSL)

Except for the CSL effluent stream, which goes directly to B Pond, these streams can be routed to either Gable Mt. Pond or the B Pond System. Some make-up water is added to maintain pond levels, thus preventing drying of contaminated pond bottom sediments.

In 200 West Area, U-Pond received an estimated 2.2E+9 L (5.84E+8 gal.) of water. Most of this was make-up water added to maintain pond levels to keep contaminated pond bottom sediments wetted.

Radionuclide concentrations in wells monitoring U-Pond and B-Pond were below 10% of Table II throughout the year. However, samples collected from well 699-53-47A, monitoring Gable Mountain Pond, exhibited elevated concentrations of strontium-90. The trend has been increasing since 1980 (Figure 5), and in 1983 reached Rockwell's self-imposed warning limit of 10% of Table II, or 0.03 pCi/mL for strontium-90. Investigation of strontium-90 at Gable Mountain Pond is underway at present. The geohydrologic environment in the Gable Mountain Pond region is not the same as at other disposal sites, which are on the 200 Area plateau. In the vicinity of the pond, ground water is about 7.6m (25 ft.) to 15.2m (50 ft.) below the ground surface, and the top of the basalt is approximately 7.6m (25 ft.) to 30.5m (100 ft.) below ground surface. All other disposal facilities are on the 200 Area plateau, where depth to water varies from 55m (180 ft) to 95m (310 ft.).

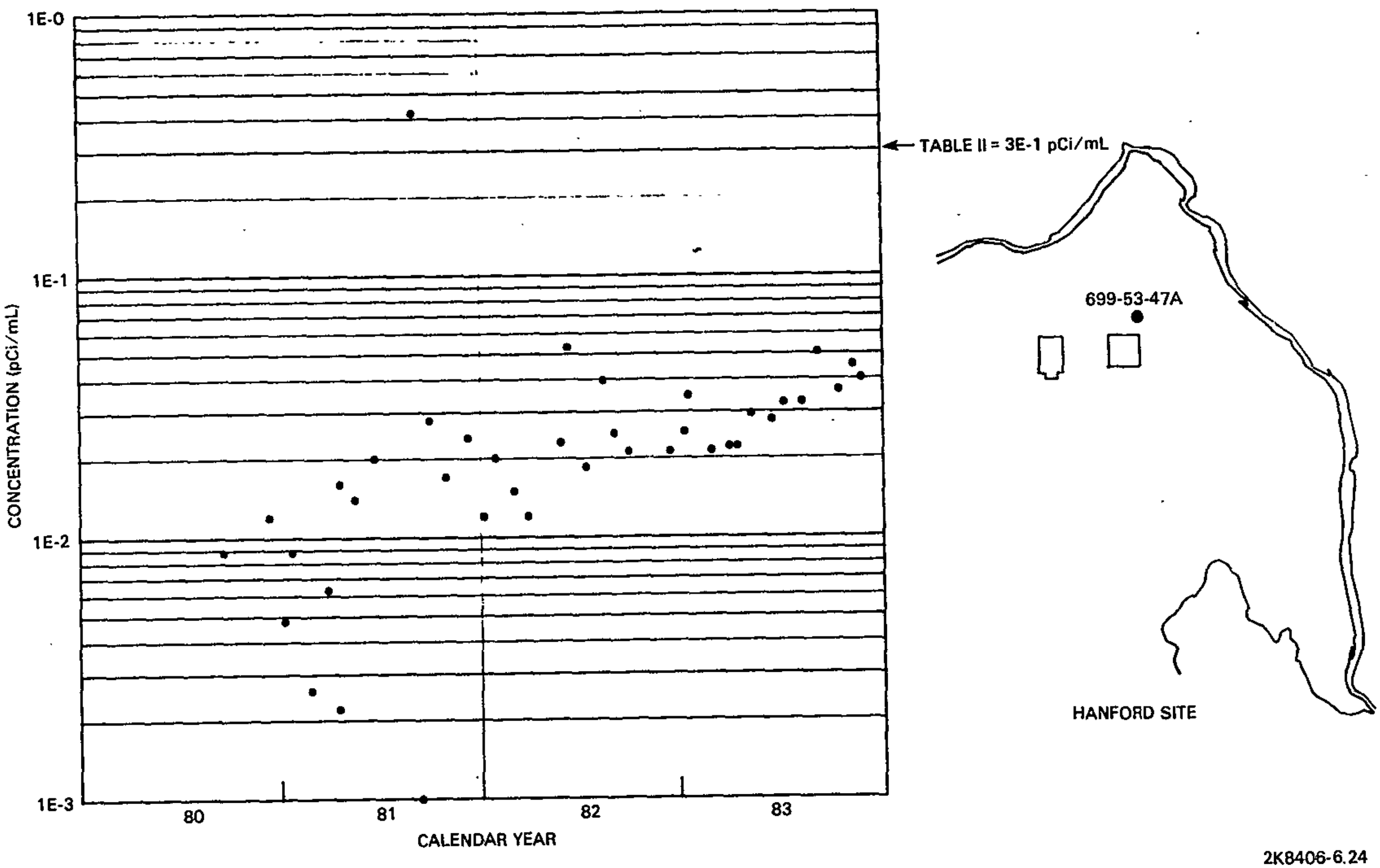

Figure 5. Strontium-90 Concentration History in Well 699-53-47A at Gable Mountain Pond.

Several minor surface liquid waste disposal facilities are not discussed because they receive low volumes of effluent. These are the 216-B-63 Trench in 200 East Area, which receives B-Plant Chemical Sewer Effluent; the 216-S-10 and 216-S-11 Ponds for the Redox Chemical Sewer; and the 216-S-19 Pond which receives waste water from the 222-S Laboratory.

SUBSURFACE LIQUID DISPOSAL SITES

Low-level radioactive liquid wastes from processing operations are disposed to subsurface cribs. A typical crib (Figure 6) consists of a long, trapezoidal rock-filled trench, covered with a sheet of plastic and several feet of backfill. A perforated distributor pipe disperses the waste throughout the length of the crib. Vents are placed to allow gases to escape, and liquid level gauges are emplaced to evaluate the functioning of the crib.

There were 11 effluent streams in 1983 discharging to 12 active cribs, as indicated in Table 5. Ground-water samples were collected from monitoring wells near 11 of the active crib sites (Figures 7 and 8). The 216-C-7 Crib received only a small amount of waste (2.27E+2 L or 6.0E+1 gal. in 1983), and therefore it is not monitored.

In the following discussions of the 11 specific sites, tables are included to list data on effluent volumes and radionuclide concentrations (Aldrich, 1984a), in addition to the average, maximum, and minimum constituent concentrations from each ground-water monitoring well. Graphs depicting long-term concentration histories of selected constituents in the effluent stream and monitoring wells are presented in Appendix E for crib receiving waste water from the 202-A Building (PUREX) and associated facilities, and the 202-B Building (B Plant). Effluent concentrations are shown on the concentration history graphs only for years during which disposal occurred. Ground-water data points are shown for all years that data are available; consecutive years are connected by a solid line, while a dashed line is drawn between data points when there is no data for the intervening years. Because of its influence on the chemistry of waste sites and ground water, information on the pH of the waste stream is noted when available (Aldrich, 1984b).

216-A-8 Crib

The 216-A-8 Crib receives condensate waste (A8) from the 241-A, AX, AY, and AZ Tank Farms. It was in operation for only 3 days in 1983 and then shut down. The crib, located east of the 241-AX Tank Farm

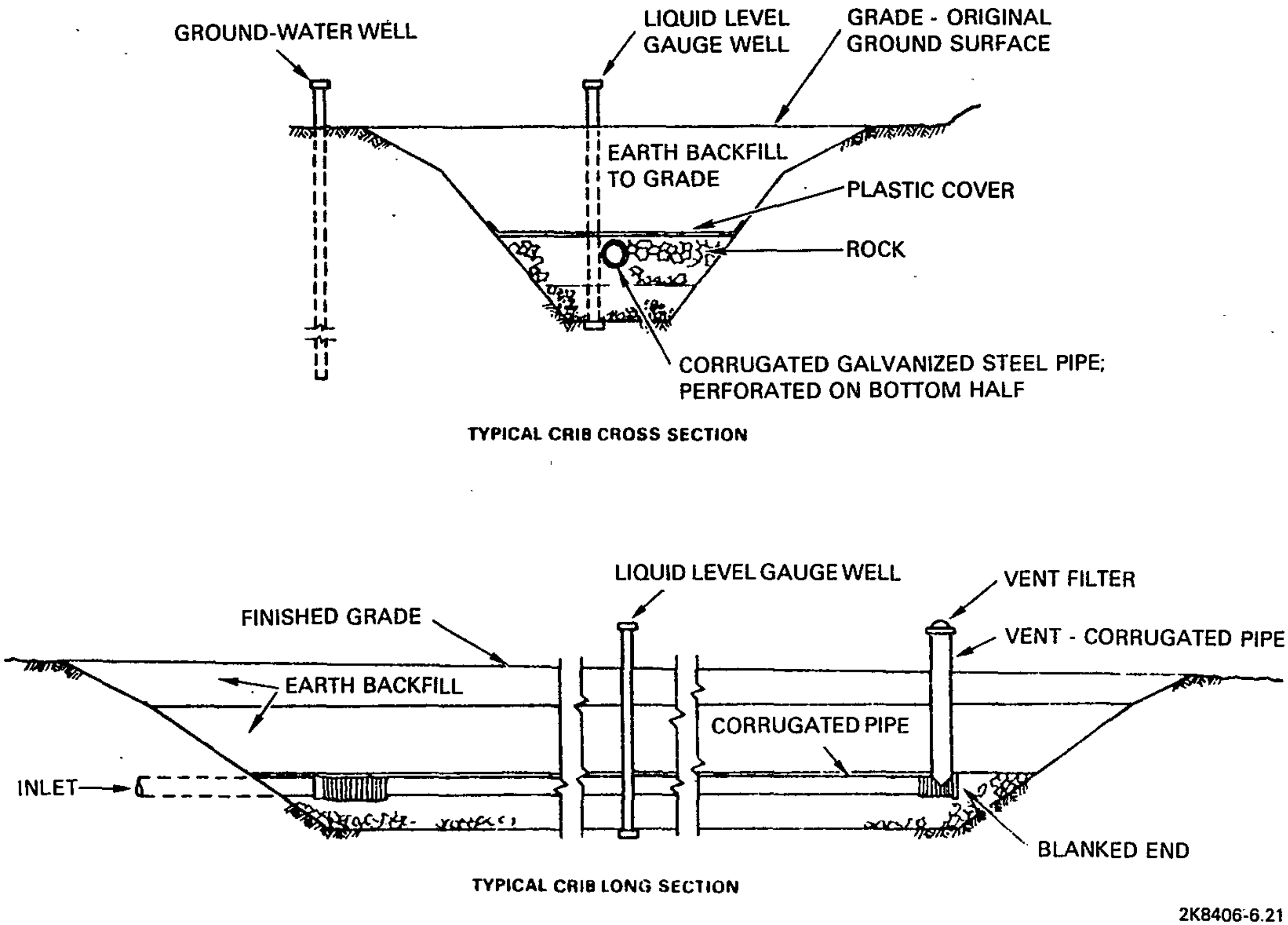

Figure 6. Typical Subsurface Liquid Waste Disposal Crib.

outside of 200 East Area (Figure 7), was in operation in 1955-1958, 1966-1976, 1978, and was reactivated in 1983. The crib received 1.33E+5 L (3.51E+4 gal.) of waste in 1983.

Table 5: Active Cribs, CY 1983

Crib	Description of Waste
216-A-8	241-A, AX, AY Tank Farms Steam Coil Condensate (A8)
216-A-10	PUREX Process Condensate (PDD)
216-A-30 216-A-37-2	PUREX Steam Condensate (SCD)
216-A-36B	PUREX Ammonia Scrubber Waste (ASD)
216-A-37-1	242-A Evaporator Process Condensate (AFPC)
216-B-55	B-Plant Steam Condensate (BCS)
216-B-62	B-Plant Process Condensate (BCP)
216-C-7	209-E Critical Mass Laboratory
216-U-12	UO_3 Plant Process Condensate (U-12)
216-W-LWC	Laundry Waste Water (LWC)
216-Z-20	Waste Water from 231-Z and 234-5Z (2904 ZA)

Monitoring wells 299-E25-6 and 299-E25-9 were sampled monthly in 1983. Average concentrations from the analyses for tritium, strontium-90, cesium-137, cobalt-60, and ruthenium-106 (Table 6) are below Table II guidelines. Long-term concentration histories for well 299-E25-6 and 299-E25-9 are presented on pages E-1 and E-2, respectively, in the appendix.

216-A-10 CRIB

The 216-A-10 Crib is south of PUREX in the 200 East Area (Figure 7). The crib receives process condensate (PDD) waste from PUREX. The crib was operated from 1961 to 1973, sporadically in 1977 and 1978, and became active again in 1981. In 1983, the crib received 3.07E+07 L (1.16E+08 gal) of effluent with pH ranging from 1 to 3.5.

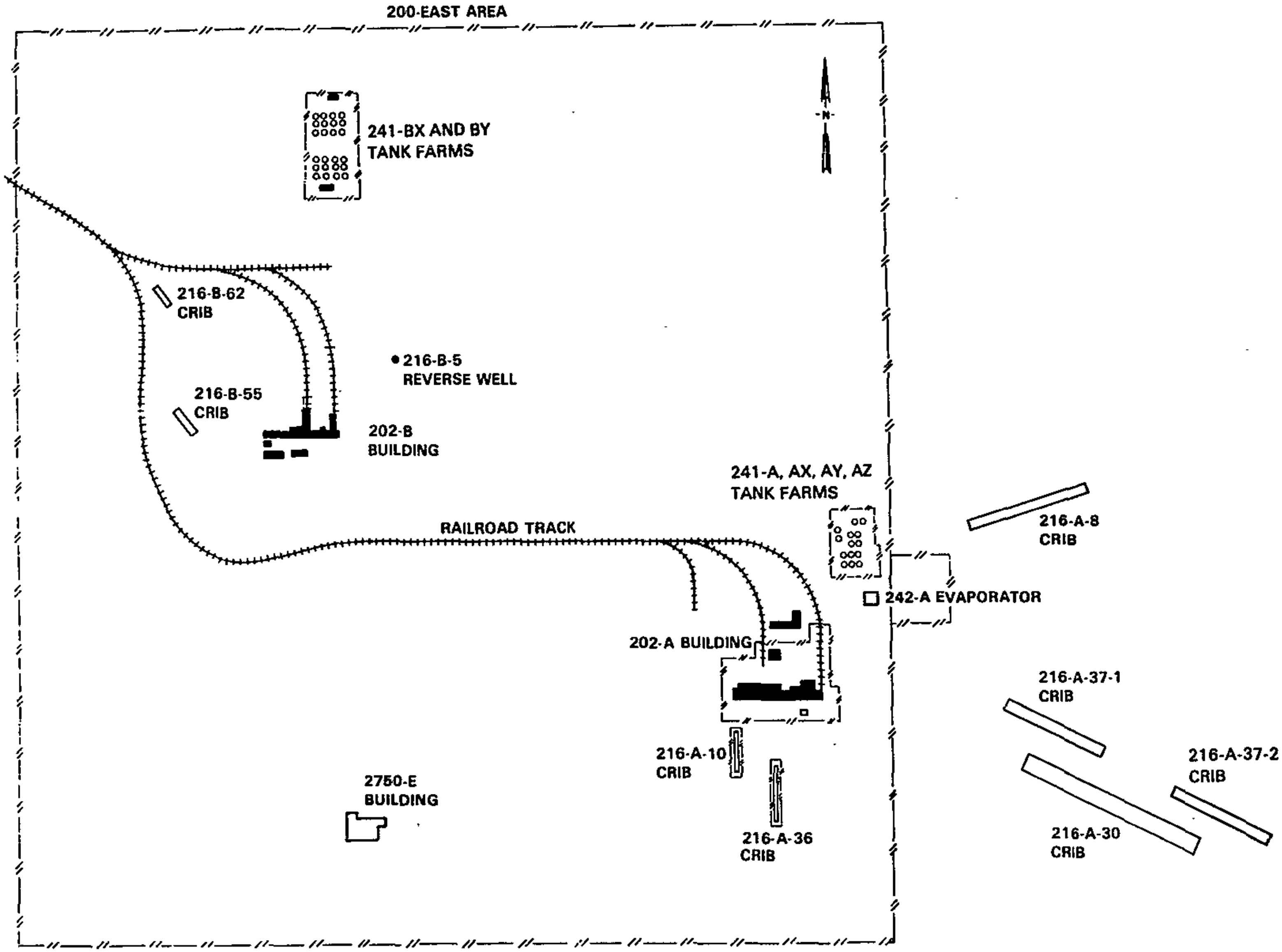

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Figure 7. Location Map for Selected Liquid Waste Disposal Sites in 200 East Area.

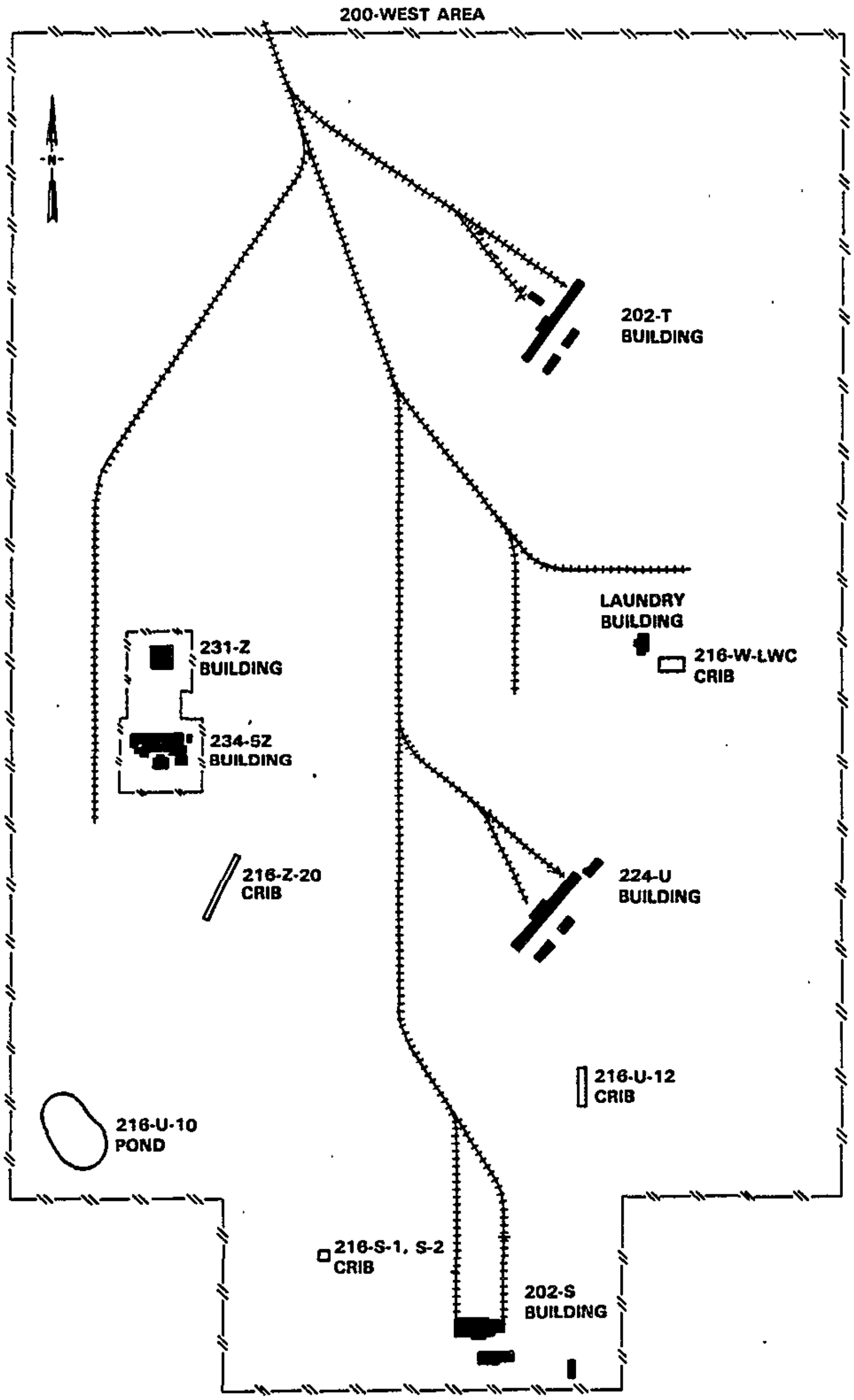


Figure 8. Location Map for Selected Waste Disposal Sites in 200 West Area.

Table 6. 1983 Average Concentrations of Radiological Parameters for 241-A, AX, AY, AZ Tank Farms Steam Coil Condensate (A8) Effluent and Ground Water Near the 216-A-8 Crib.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: 241-A,AX,AY,AZ (A8)		<6.92E-03	1.11E+02	NA	3.11E+01	1.91E+01	NA	NA	NA	NA
Wells: 299-E25-6	Max.	3.75E-03	4.06E-02	2.56E+02	3.67E-03	1.28 E-02	4.34E-02	3.68E-03		4.2
	Ave.	9.01E-04	1.82E-02	2.16E+02	1.08E-03	3.00E-03	3.95E-03	1.12E-03	NA	1.5
	Min.	0.00E+00**	0.00E+00**	1.84E+02	0.00E+00**	0.00E+00**	0.00E-00**	0.00E-00**		0.3
299-E25-9	Max.	4.62E-03	4.83E-02	5.88E+02	1.79E-03	9.01E-03	6.73E-02	4.67E-03		
	Ave.	1.32E-03	1.28E-02	9.18E+01	4.77E-04	2.33E-03	1.50E-02	1.51E-03	NA	5.2
	Min.	0.00E+00**	7.78E-04	4.13E+00	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		

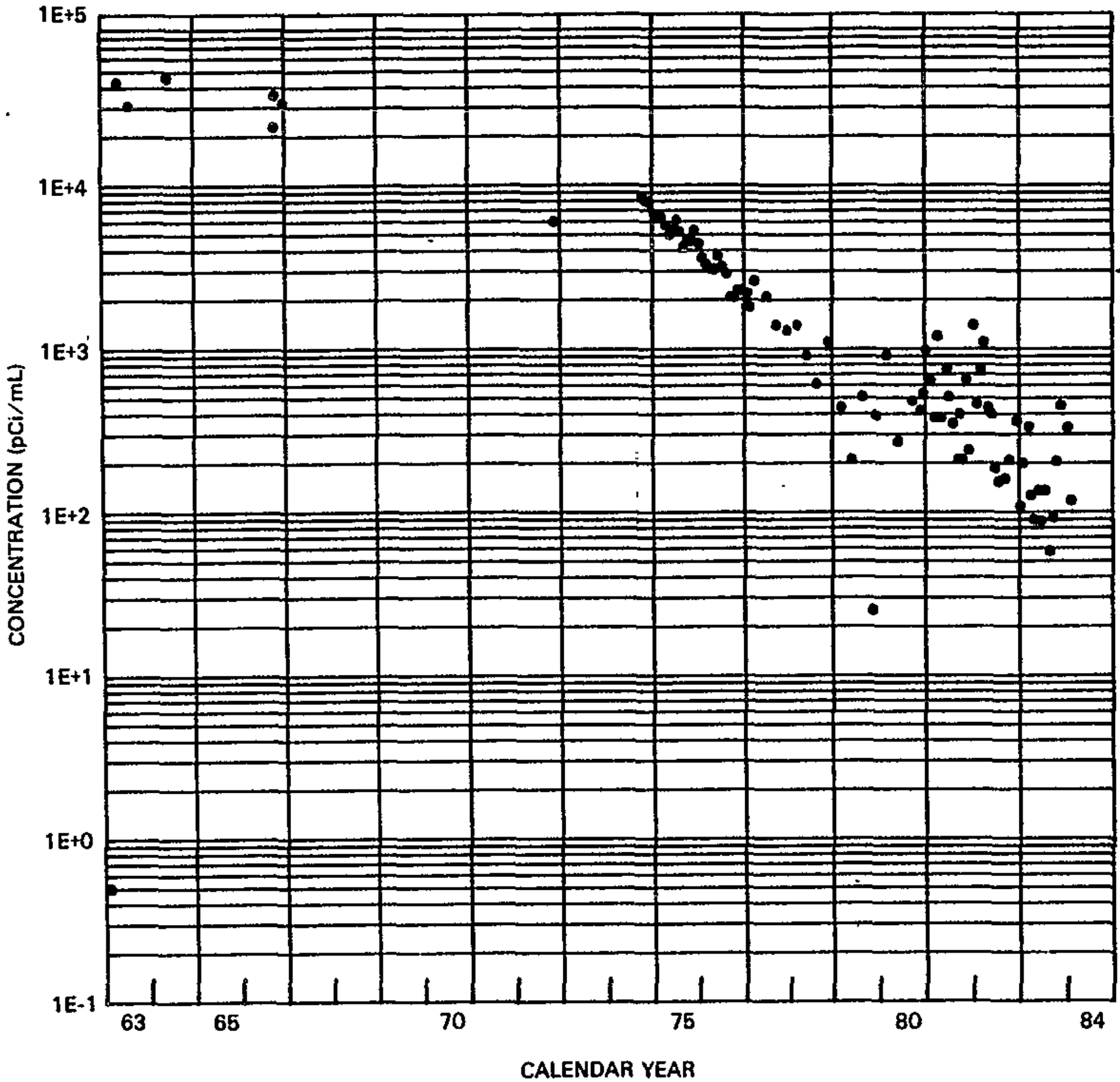
** Negative Analytical Values Appear as Zeroes
NA No Analysis for this constituent

Wells 299-E17-1 and 299-E24-2 are sampled monthly to monitor the 216-A-10 crib (Table 7). The average tritium concentrations of 237 pCi/mL and 169 pCi/mL for wells 299-E17-1 and 299-E24-2, respectively, were below the 1982 averages in these wells, reflecting a continuing downward trend. This trend is depicted in Figure 9, the concentration history of tritium in well 299-E24-2 since 1964. Although the average for 1983 was less than in 1982, the last few samples of 1983 were elevated from the previous samples. This reflects the startup of PUREX. Average concentrations for all radionuclides are below Table II guidelines. Nitrate concentrations in 299-E17-1 (Figure 10) were lower in 1983 than in 1982.

Long term concentration histories are on pages E-3 and E-4 in the appendix for wells 299-E17-1 and 299-E24-2, respectively.

216-A-30 Crib and 216-A-37-2 Crib

The 216-A-30 and 216-A-37-2 Cribs, located just east of the 200 East Area (Figure 7), receive steam condensate waste from PUREX (SCD). The 216-A-30 Crib has been in continuous operation since 1961 with the exception of 1974 and 1975, while the 216-A-37-2 Crib began operation in 1983 with the restart of PUREX. The SCD waste stream discharged



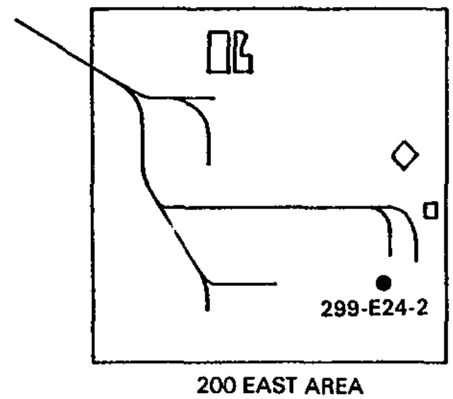


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Figure 9. Tritium Concentration History in Well 299-E24-2 at the 216-A-10 Crib.

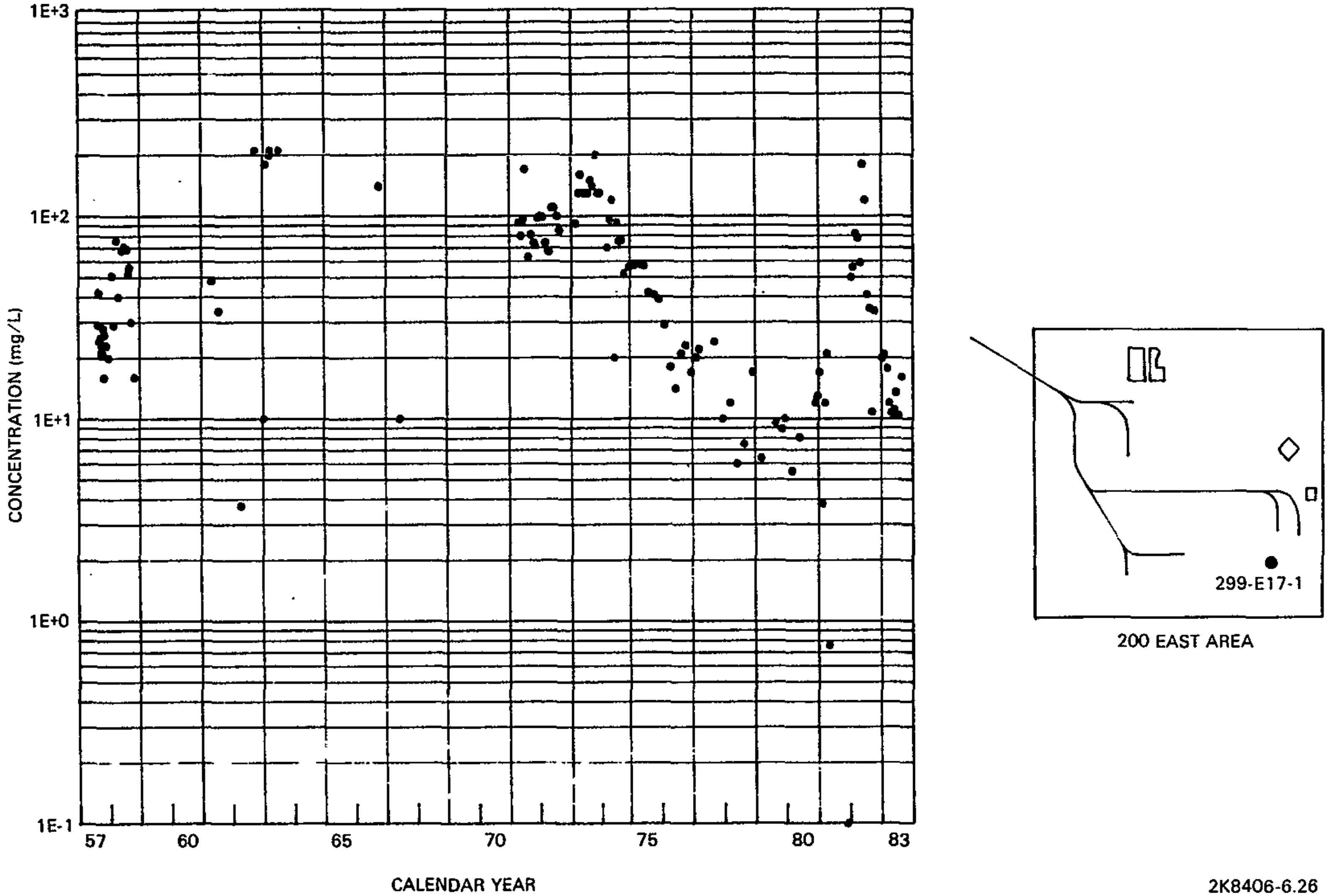

Figure 10. Nitrate Concentration History in Well 299-E17-1 at the 216-A-10 Crib.

Table 7. 1983 Average Concentrations of Radiological Parameters for PUREX Process Condensate (PDD) Effluent and Ground Water Near the 216-A-10 Crib.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: PUREX (PDD)		2.23E+01	5.24E+00	2.47E+02	6.61E-01	7.49E-01	NA	NA	8.86E-01	NA
Wells: 299-E17-1	Max.		3.96E-02	5.06E+02	2.45E-02	1.05E-02	4.58E-02	9.32E-03		21.2
	Ave.	NA	2.69E-02	2.37E+02	4.29E-03	1.80E-03	1.51E-02	3.10E-03**	NA	14.9
	Min.		1.12E-02	1.06E+02	0.00E-00**	0.00E-00**	0.00E-00**	0.00E+00**		10.4
299-E24-2	Max.	2.85E-03	5.65E-02	4.49E+02	1.04E-02	9.21E-03	7.94E-02	8.05E-03		25.7
	Ave.	1.07E-03	3.40E-02	1.69E+02	3.57E-03	2.71E-03	2.20E-02	2.48E-03	1.13E-03*	17.3
	Min.	0.00E+00**	1.70E-02	5.77E+01	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		8.8

* 3 Values or Less: No Max or Min determined
** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

Table 8. 1983 Average Concentrations of Radiological Parameters for PUREX Steam Condensate (SCD) Effluent and Ground Water Near the 216-A-30 and 216-A-37-2 Cribs.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: PUREX (SCD)		7.53E-02	< 2.20E-01	< 3.02E-01	< 4.17E-02	1.12E-01	NA	NA	< 3.78E-02	NA
Wells at 216-A-30 Crib: 299-E16-2	Max.		4.32E-02		7.06E-03	6.06E-03	6.05E-03	5.95E-03		3.0
	Ave.	NA	1.57E-02	NA	1.67E-03	1.31E-03	1.49E-03	1.29E-03	NA	1.2
	Min.		3.33E-03		0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		0.4
299-E25-11	Max.		3.48E-02	5.65E+01	7.53E-03	9.35E-03	3.50E-02	5.61E-03		7.5
	Ave.	NA	1.13E-02	2.99E+01	2.81E-03	2.33E-03	1.39E-02	2.33E-03	NA	5.0
	Min.		0.00E+00**	1.65E+01	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		3.1
Wells at 216-A-37-2 Crib: 299-E25-21	Max.		3.31E-02	2.22E+01						7.9
	Ave.	NA	1.28E-02	2.12E+01	2.82E-03*	4.73E-04*	0.00E+00**	3.39E-03*	NA	6.0
	Min.		2.99E-03	2.05E+01						3.8
299-E25-22	Max.		3.60E-02	6.49E+01						30.9
	Ave.	NA	1.85E-02	3.14E+01	3.04E-03*	5.47E-03*	1.16E-02*	1.29E-03*	NA	13.6
	Min.		7.85E-03	1.20E+01						5.7
299-E25-23	Max.		4.50E-02	2.20E+00						4.1
	Ave.	N	3.04E-02	1.45E+00	0.00E+00*	2.29E-03*	3.28E-03*	2.70E-03*	NA	2.8
	Min.		1.59E-02	9.50E-01						0.8
299-E25-24	Max.		5.14E-02	2.42E+00						5.5
	Ave.	NA	2.88E-02	1.63E+00	3.20E-03*	4.17E-03*	6.55E-03*	0.00E+00**	NA	2.5
	Min.		1.81E-02	9.59E-01						1.5

** Negative Analytical Values Appear as Zeroes
* 3 Values or less: No Max or Min determined
NA No Analysis for this Constituent

2.23E+8 L (5.89E+7 gal.) during the year. The pH of the waste stream ranged from 6.5 to 8.2. The effluent can be routed to either or both cribs. There is no provision for measuring the volume to each individual crib.

The 216-A-30 Crib is monitored by wells 299-E16-2 and 299-E25-11, and the 216-A37-2 Crib is monitored by wells 299-E25-21 through 299-E25-24. Samples were collected monthly for the wells at the 216-A-30 Crib and analyzed for total beta, tritium, strontium-90, cesium-137, ruthenium-106, cobalt-60, and nitrate. For the 216-A-37-2 monitoring wells, samples were collected monthly for total beta and tritium analyses, and quarterly for the beta-gamma emitters and nitrate. The results reported in Table 8 indicate low concentrations below Table II guidelines for all parameters.

Long term concentration histories for wells 299-E16-2 and 299-E25-11 monitoring the 216-A-30 Crib are presented on pages E-5 and E-6, respectively, in the appendix.

216-A-36B Crib

Ammonia scrubber waste (ASD) discharged from PUREX is directed to the 216-A-36B Crib, located within the 200 East Area just south of the PUREX Building (Figure 7). Effluent was discharged to this disposal facility from 1966 to 1972, and it was activated again in 1982. In 1983, 1.00E+07 L (2.69E+06 gal.) of waste was discharged to this crib with pH ranging from 8.6 to 10.

Two wells monitor the ground water at this crib: 299-E17-5 and 299-E17-9 both sampled monthly. The results of the 1983 monitoring (Table 9) are essentially the same as reported for 1982 (Wilbur, 1983). Of note are the elevated levels of tritium and nitrate in well 299-E17-9. As pointed out by Wilbur, 1983, this well is in the inactive head end of the crib (i.e, 216-A-36A), and the elevated levels are most likely due to high inventories of radionuclides in this section of the crib. Although the tritium in 299-E17-9 is still above Table II guidelines, concentrations are about 1/3 of those in 1982 (Figure 11).

The long term concentration histories for wells 299-E17-5 and 299-E17-9 are on pages E-7 and E-8, respectively, of the appendix.

216-A-37-1 Crib

Process condensate from the 242-A Evaporator (AFPC) is disposed to the 216-A-37-1 Crib after diversion and monitoring in the 207-A Retention Basin. This crib is located outside the 200 East Area just

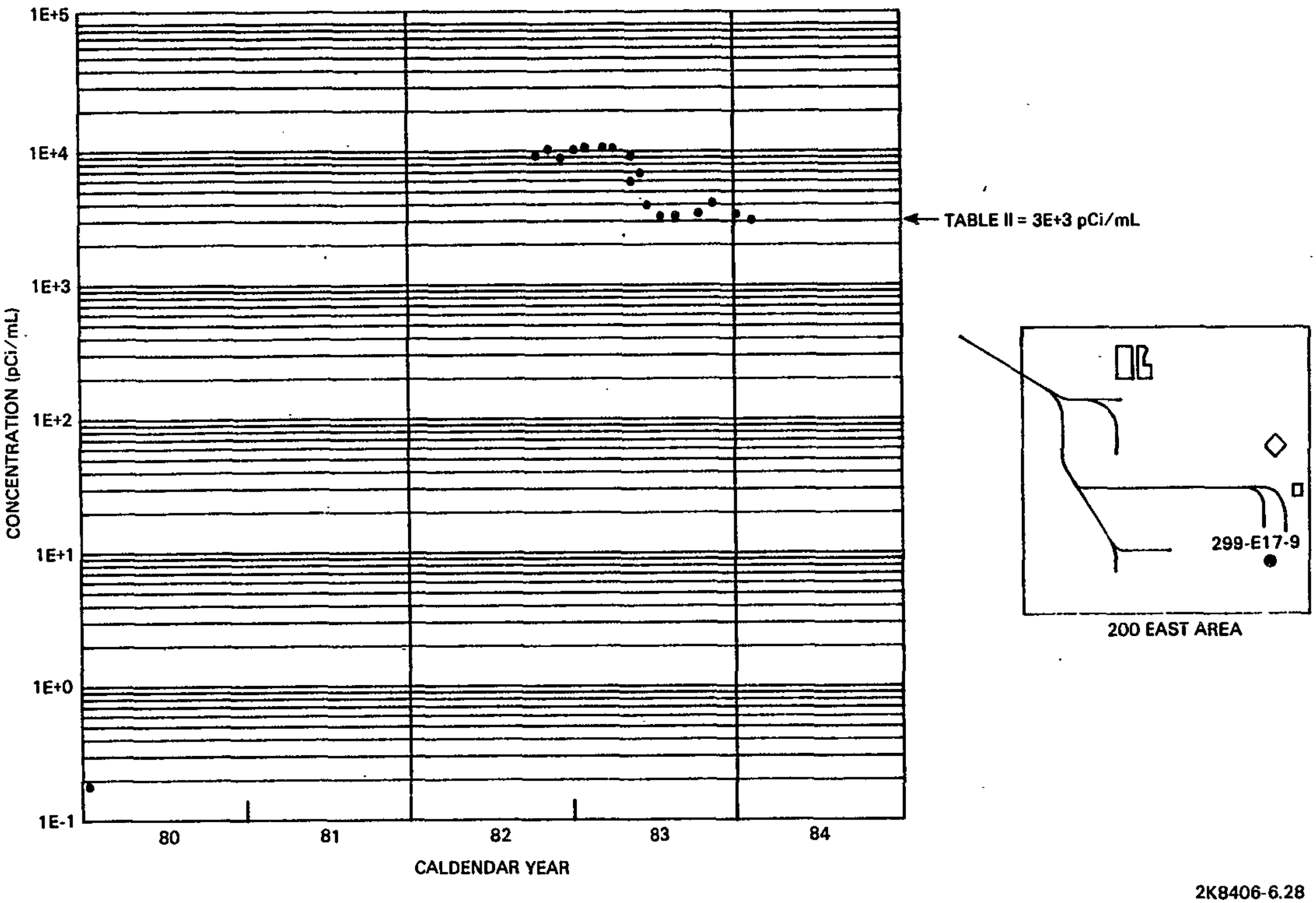

Figure 11. Tritium Concentration History in Well 299-E17-9 at the 216-A-36B Crib.

Table 9. 1983 Average Concentrations of Radiological Parameters for PUREX Ammonia Scrubber Waste (ASD) Effluent and Ground Water Near the 216-A-36B Crib.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: PUREX (ASD)		1.61E+00	1.88E+01	5.63E+02	2.28E+00	6.59E+00	NA	NA	1.38E+00	NA
Wells: 299-E17-5	Max.	1.14E-01	1.63E-01	5.70E+02	8.23E-02	1.42E-02	4.28E-02	1.08E-02		40
	Ave.	1.39E-02	4.59E-02	5.01E+02	1.04E-02	3.91E-03	1.36E-02	2.47E-03	7.69E-03*	25
	Min.	1.54E-03	9.99E-03	3.81E+02	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		19
299-E17-9	Max.		8.47E-02	1.06E+04	1.08E-02	2.08E-02	2.35E-02	1.02E-02		145
	Ave.	1.19E-03	4.09E-02	7.02E+03	4.24E-03	5.43E-03	4.97E-03	2.8E-03	NA	106
	Min.		1.57E-02	3.27E+03	4.06E-04	0.00E+00**	0.00E+00**	0.00E+00**		12

** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

east of the evaporator (Figure 7). The waste stream has been active since 1977, and in 1983 discharged 1.44E+7 L (3.80E+6 gal.) to the crib. The pH of the effluent varied between 8.3 and 9.8 during the year.

Four monitoring wells, 299-E25-17 through 299-E25-20, were sampled during 1983. Analyses for total beta, tritium and nitrate were performed monthly, while quarterly analyses were made for the beta-gamma emitting radionuclides. Results are shown in Table 10. The average tritium concentrations in ground-water samples in 1983 were similar to the 1982 values (Wilbur, et al., 1983) in wells 299-E25-17 (118 pCi/mL in 1982 vs 47.7 pCi/mL in 1983) and 299-E25-18 (142 pCi/mL vs 178 pCi/mL). The average tritium concentration in well 299-E25-19 decreased from 1,040 pCi/mL to 430 pCi/mL, but increased in well 299-E25-20 from 725 pCi/mL to 1,820 pCi/mL. The tritium levels in the latter well, illustrated in Figure 12, increase over the four years of monitoring. Tritium concentrations are below Table II guides, as are the concentrations of all other radionuclides.

Long term concentration histories for the four wells monitoring the 216-A-37-1 Crib are given on pages E-9 through E-12 of the appendix.

216-B-55 Crib

The 216-B-55 Crib is located in the 200 East Area west of the B Plant (Figure 7). This crib has received steam condensate waste (BCS)

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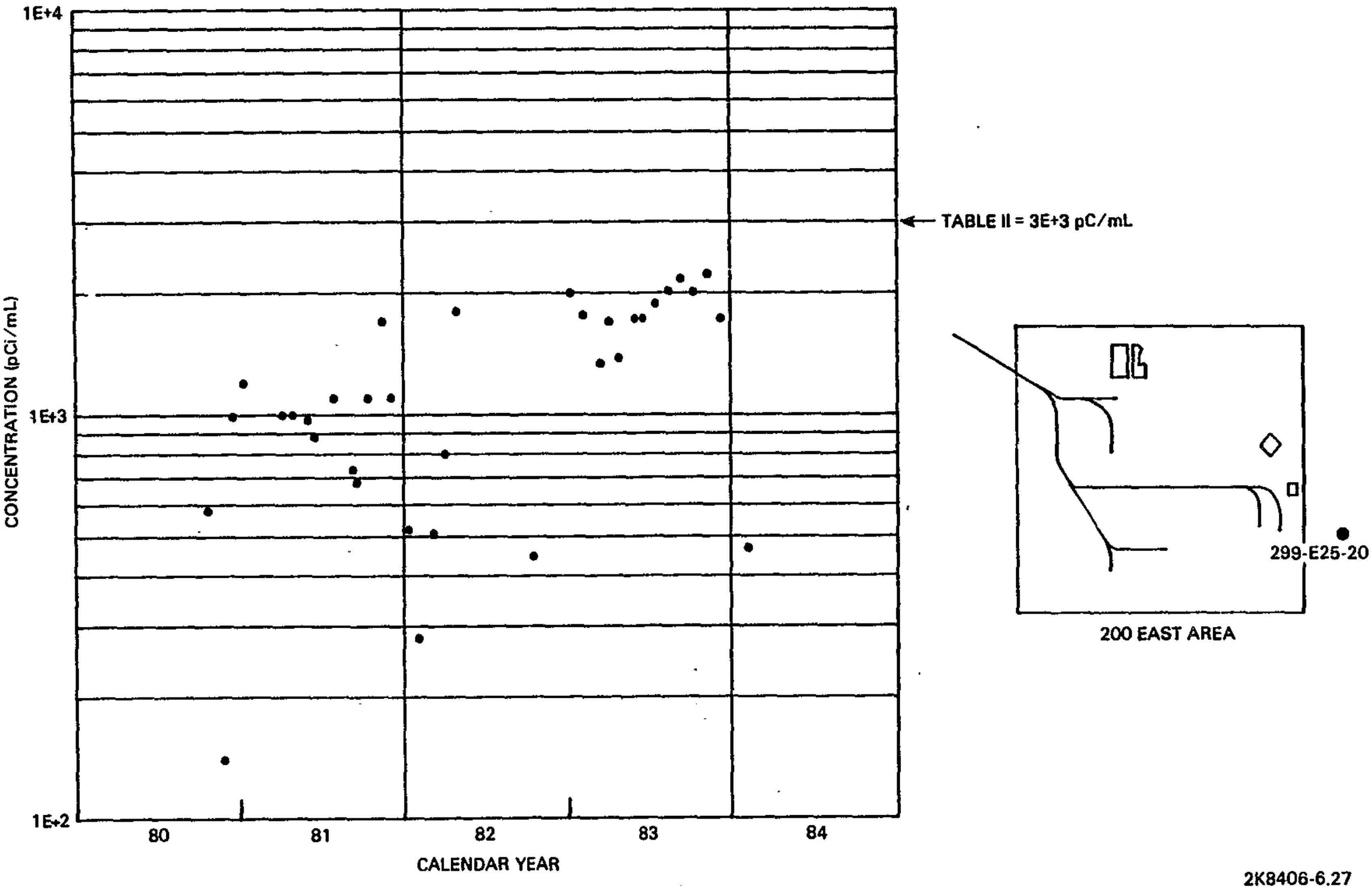

Figure 12. Tritium Concentration History in Well 299-E25-20 at the 216-A-37-1 Crib.

Table 10. 1983 Average Concentrations of Radiological Parameters for 242-A Evaporator Process Condensate (AFPC) Effluent and Ground Water Near the 216-A-37-1 Crib.

	Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: 242-A (AFPC)	<9.86E-02	2.22E-01	3.29E+02	1.35E-01	1.51E-01	NA	NA	<1.42E-02	NA
Wells: 299-E25-17 Max.		1.79E-02	5.63E+01						3.6
Ave.	NA	1.14E-02	4.77E+01	5.35E-04*	3.17E-03*	1.67E-02*	2.81E-03*	NA	1.4
Min.		5.42E-03	3.83E+01						0.4
299-E25-18 Max.		6.15E-02	2.06E+02						35.2
Ave.	NA	2.20E-02	1.78E+02	3.81E-03*	2.03E-03*	3.53E-02*	2.26E-03*	NA	26.0
Min.		0.00E+00**	1.61E+02						17.3
299-E25-19 Max.		4.62E-02	5.61E+02						137
Ave.	NA	2.75E-02	4.30E+02	2.78E-03*	4.23E-04*	4.93E-03*	5.07E-03*	NA	115
Min.		1.19E-02	3.10E+02						100
299-E25-20 Max.		6.52E-02	2.22E+03	4.48E-03	5.61E-03	2.95E-02	2.26E-03		1020
Ave.	NA	2.38E-02	1.82E+03	2.34E-03	1.97E-03	2.47E-02	1.05E-03	NA	370
Min.		2.88E-04	1.34E+03	0.00E+00**	0.00E+00**	2.03E-02	0.00E-00**		32

** Negative Analytical Values Appear as Zeroes
* 3 Values or less: No Max or Min determined
NA No Analysis for this Constituent

from B Plant since 1967. During 1983 the plant released 3.85E+7 L (1.02E+7 gal.) of effluent to this crib. The pH of the effluent range from 3.2 to 9.4.

Wells 299-E28-12 and 299-E28-13 were sampled monthly for this crib. The results presented in Table 11 indicate low levels of contamination that are below Table II.

Long term concentration histories for wells 299-E28-12 and 299-E28-13 near this crib are on pages E-13 and E-14 of the appendix, respectively.

Table 11. 1983 Average Concentrations of Radiological Parameters for B Plant Steam Condensate (BCS) Effluent and Ground Water Near the 216-B-55 Crib.

	Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate (mg/L)
Waste Stream: B-Plant (BCS)	<2.09E-02	4.23E+00	1.38E+00	1.34E+00	2.6E-01	NA	NA	< 2.34E-02	NA
Wells: 299-E28-12 Max.		8.35E-02	1.18E+02		1.56E-02	3.57E-02	4.48E-03		
Ave.	NA	2.80E-02	6.78E+01	NA	3.29E-03	7.89E-03	1.17E-03	NA	NA
Min.		0.00E+00**	7.34E+00		0.00E+00**	0.00E+00**	0.00E+00**		
299-E28-13 Max.		3.63E-02	7.33E+01		1.02E-02	8.29E-02	8.01E-03		
Ave.	NA	1.57E-02	1.29E+01	NA	2.23E-03	1.21E-02	1.95E-03	NA	
Min.		0.00E+00**	5.51E+00		0.00E+00**	0.00E+00**	0.00E+00**		

** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

216-B-62 Crib

Process condensate from B Plant (BCP) has been routed to the 216-B-62 Crib, northwest of B Plant, since 1973. In 1983, the volume of discharge was 2.38E+7 L (6.29E+6 gal.). Radionuclide concentrations in the effluent stream are given in Table 12; the pH ranged from 9.5 to 11.

Wells 299-E28-18 and 299-E28-21 monitor this crib. Nitrate concentrations in the ground water beneath this crib are high, averaging 336 and 233 mg/L, respectively. Total alpha concentrations for these two wells are large compared with those for other 200 Area wells (Appendix B). Total alpha concentration is used for screening purposes, and an investigation is now underway to identify the specific alpha emitter and to determine its source. For the record period of the last three years, there does not appear to be any trend as total alpha ranged from about 7E-2 up to 3E-1 pCi/mL (Figure 13). Concentrations of other radioisotopes are below Table II guidelines.

Table 12. 1983 Average Concentrations of Radiological Parameters for B Plant Process Condensate (BCP) Effluent and Ground Water Near the 216-B-62 Crib.

	Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: B-Plant (BCP)	<4.16E-01	2.45E+03	<7.35E-01	7.77E+02	7.39E+02	NA	NA	NA	NA
Wells:									
299-E28-18 Max.	2.51E-01	1.77E-01	1.09E+02	8.98E-03	1.21E-02	5.01E-02	8.24E-03		633
Ave.	1.68E-01	9.07E-02	7.64E+01	2.68E-03	2.45E-03	9.85E-03	2.02E-03	1.67E-02*	336
Min.	1.11E-01	5.66E-02	4.70E+01	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		138
299-E28-21 Max.	1.34E-01	1.03E-01	7.35E+01	3.51E-02	1.26E-02	3.38E-02	8.95E-03		426
Ave.	7.16E-02	6.15E-02	5.68E+01	5.44E-03	2.85E-03	6.82E-03	2.32E-03	NA	233
Min.	2.22E-04	4.23E-02	4.65E+01	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		153

** Negative Analytical Values Appear as Zeroes
* 3 Values or less: No Max or Min determined
NA No Analysis for this Constituent

Long term concentration histories for wells 299-E28-18 and 299-E28-21 are on page E-15 and E-16, respectively, in the appendix.

216-U-12 Crib

UO3 Plant in 200 West Area supports PUREX operation, and the process condensate effluent stream (U-12) from the plant is disposed to the 216-U-12 Crib (Figure 8). In 1983 1.28E+6 L (3.38E+5 gal.) of liquid waste was directed to this crib.

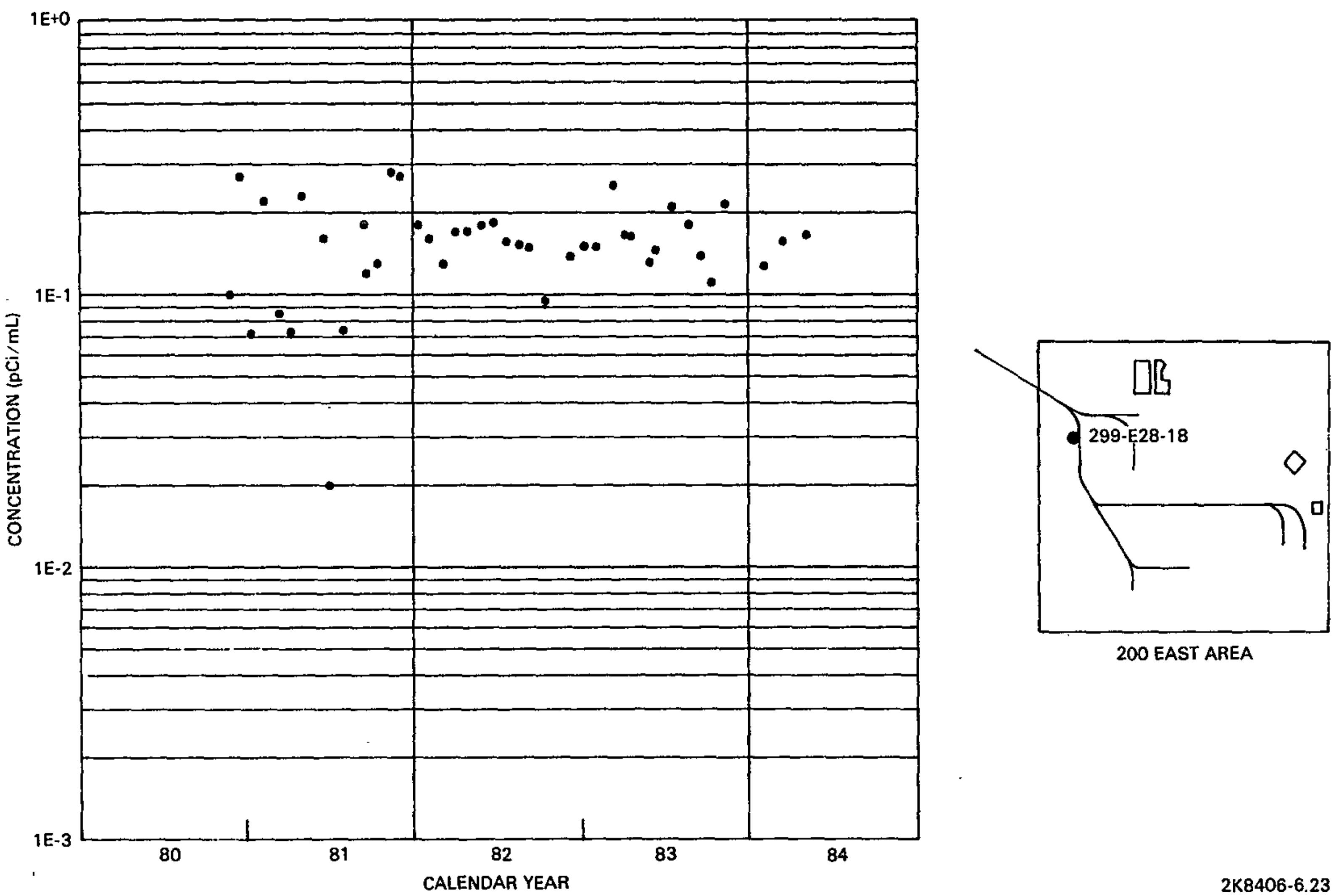

Figure 13. Total Alpha Concentration History in Well 299-E28-18 at the 216-B-62 Crib.

The concentrations of contaminants in the 299-W22-22 monitoring well are listed in Table 13. The constituent concentrations are essentially the same as reported for 1982 (Wilbur, et al., 1983) and are below Table II guidelines.

The long term concentration history for well 299-W22-22 is presented on page E-17 of the appendix.

Table 13. 1983 Average Concentrations of Radiological Parameters for UO_3 Plant Process Condensate (U-12) Effluent and Ground Water Near the 216-U-12 Crib.

	Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream: UO3 U-12	<1.01E+00	5.48E+00	6.70E+00	< 1.23E-01	<2.33E-01	NA	NA	1.43E+00	NA
Wells: 299-W22-22 Max	3.75E-03	2.18E-02	1.50E+02	5.52E-03	9.76E-03	2.29E-02	1.71E-03	5.66E-03	9.2
Ave.	9.42E-04	1.17E-02	2.02E+01	1.75E-03	1.80E-03	4.64E-03	2.52E-04	1.57E-03	2.0
Min.	0.00E+00**	0.00E+00**	2.37E+00	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**	0.2

** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

216-W-LWC Crib

Laundry wastes (LWC), are disposed to the 216-W-LWC Crib in 200 West Area (Figure 8). This crib, which was constructed and placed into operation in 1981, received 3.91E+8 L (1.03E+8 gal.) of waste in 1983.

The 299-W14-10 monitoring well was sampled monthly in 1983. Concentrations of radionuclides remained low, as indicated in Table 14. Nitrate concentrations increased from an average of 43 mg/L in 1982 (Wilbur, et al., 1983) to 308 in 1983 (Figure 14). All radionuclide concentrations were below Table II guidelines.

216-Z-20 Crib

The 216-Z-20 Crib receives waste from the 231-Z and 234-5Z (2904-ZA) Buildings. The crib is located south of the 234-5Z Building in 200 West Area (Figure 8). The crib has been active since 1981, and during 1983 it received 5.28E+8 L (1.39E+8 gal.) of effluent. Concentrations of radionuclides in the effluent are listed in Table 15.

Table 14. 1983 Average Concentrations of Radiological Parameters for Laundry Waste Water (LWC) Effluent and Ground Water Near the 216-W-LWC Crib.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Stream:										
Laundry LWC		<5.93E-02	2.45E+00	NA	3.04E-01	3.68E-01	NA	1.67E+00	NA	NA
299-W14-10	Max.	3.14E-02	3.97E-02		5.29E-03	1.60E-02	3.92E-02	1.12E-02		509
	Ave.	3.69E-03	1.04E-02	NA	1.36E-03	3.90E-03	1.24E-02	2.28E-03	NA	308
	Min.	0.00E+00**	0.00E+00**		0.00E+00**	0.00E+00**	0.00E+00**	0.00E+00**		42

** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

Table 15. 1983 Average Concentrations of Radiological Parameters for 234-5Z (2904-ZA) and 231-Z Effluent and Ground Water Near the 216-Z-20 Crib.

		Total Alpha (pCi/mL)	Total Beta (pCi/mL)	^{3}H (pCi/mL)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{106}Ru (pCi/mL)	^{60}Co (pCi/mL)	U (pCi/mL)	NO_3^- (as nitrate) (mg/L)
Waste Streams: 234-5Z (2904-ZA) & 231-Z (231-Z)		<3.18E-02	<5.63E-02	NA	NA	<1.87E-03	<9.36E-03	<1.50E-03	NA	NA
Wells:										
299-W18-17	Max.	5.72E-03	4.91E-02	5.77E-01		8.83E-03	7.81E-02	2.25E-03		4.9
	Ave.	1.89E-03	1.69E-02	2.71E-01	NA	2.79E-03	3.54E-02	1.10E-03	NA	2.9
	Min.	0.00E+00**	0.00E+00**	0.00E+00**		0.00E+00**	8.38E-03	0.00E+00**		1.8
299-W18-18	Max.	4.15E-04	1.57E-01	1.67E+00		4.85E-03	1.18E-02	4.49E-03		2.7
	Ave.	1.04E-04	1.21E-01	6.88E-01	NA	2.75E-03	4.82E-03	1.55E-03	NA	1.6
	Min.	0.00E+00**	5.58E-02	2.74E-01		1.41E-03	0.00E+00**	0.00E+00**		0.9
299-W18-19	Max.	5.60E-03	3.18E-02	1.10E+01		6.46E-03	3.08E-02	1.04E-02		3.1
	Ave.	1.09E-03	1.36E-02	2.98E+00	NA	1.93E-03	4.55E-03	2.27E-03	NA	0.8
	Min.	0.00E+00**	0.00E+00**	6.30E-02		0.00E+00**	0.00E+00**	0.00E+00**		0.1
299-W18-20	Max.	6.25E-03	4.94E-02	9.50E+00		1.23E-02	8.85E-02	9.14E-03		5.3
	Ave.	2.23E-03	1.40E-02	2.67E+00	NA	2.40E-03	1.56E-02	2.20E-03	NA	1.6
	Min.	0.00E+00**	0.00E+00**	2.61E-01		0.00E+00**	0.00E+00**	0.00E+00**		0.4

** Negative Analytical Values Appear as Zeroes
NA No Analysis for this Constituent

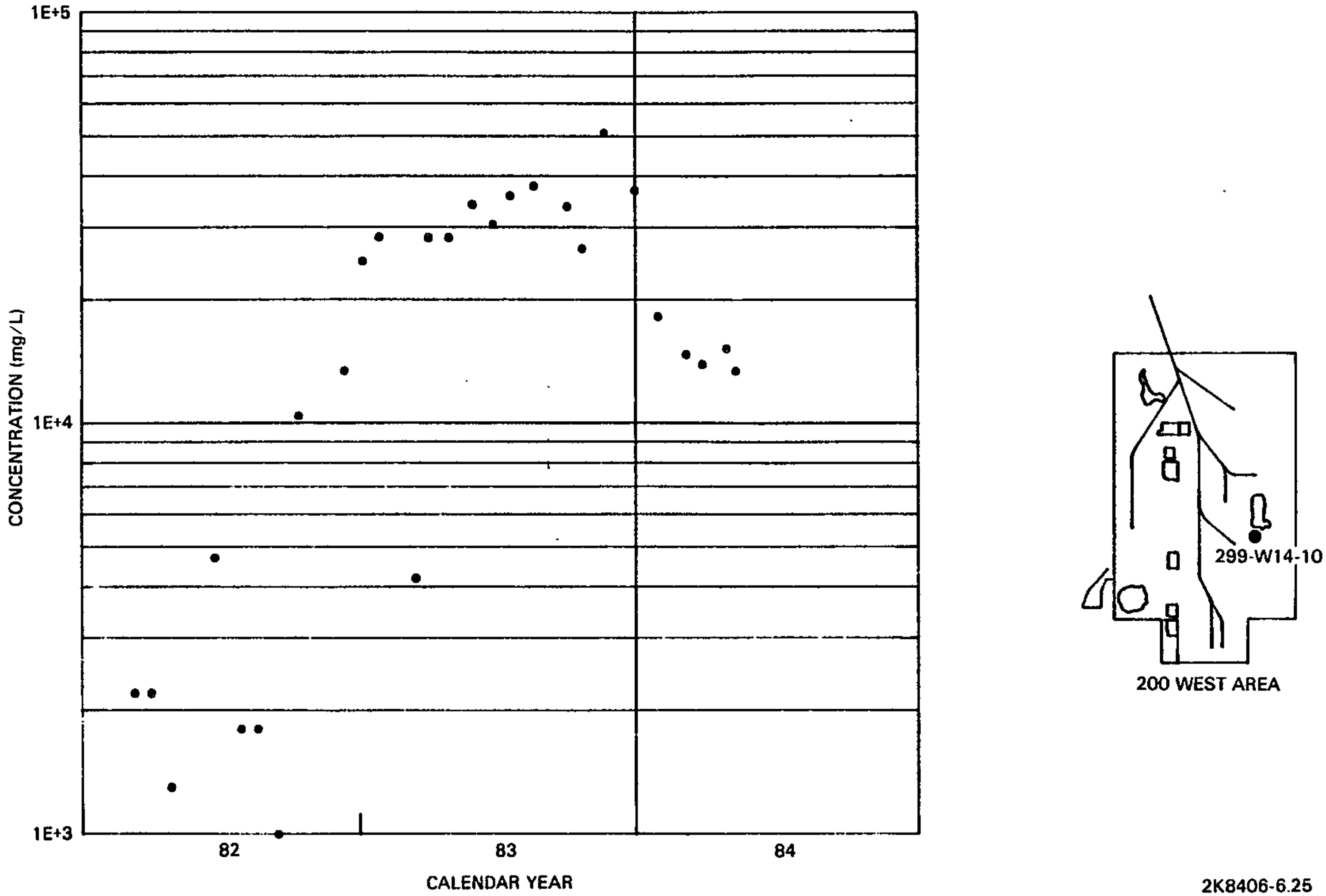

Figure 14. Nitrate Concentration History in Well 299-W14-10 at the 216-W-LWC Crib.

Four ground-water monitoring wells are located along the length of this crib. Wells 299-W18-17 and 299-W18-18, located near the head end of the crib, are sampled monthly; while wells 299-W18-19 and 299-W18-20 are at the downgradient end of the crib and sampled monthly (Table 15). Analyses of samples for radioactive parameters were all below Table II guidelines.

SEPARATIONS AREA WATER USE BALANCE

Water for use in processing, sanitary uses, and power generation is obtained from the Columbia River and pumped to treatment and storage facilities in 200 East Area and 200 West Area. Summaries of the water use vs. the volume of water pumped to each area are given in Tables 16 and 17. These tables also indicate the disposal facility for each waste stream. Sanitary water is disposed to ground via septic tank drainage systems near the plant buildings. Data relating to process use was obtained from Aldrich, 1984a; other data was obtained from power house records.

Table 16. Water Use Balance for 200 East Area During CY 1983.

Water Use	Disposal Facility No.	Volume (L)
202-A Process Condensate	216-A-10	3.07E+07
202-A Steam Condensate	216-A-30 & 216-A-37-2	2.23E+08
202-A Ammonia Scrubber Waste	216-A-36B	1.00E+07
242-A Process Condensate	216-A-37-1	1.44E+07
241-AY, AZ Tank Farm Coil Condensate	216-A-8	1.33E+05
PUREX Chemical Sewer	216-B-3	1.14E+09
PUREX Cooling Water		
242-A Cooling Water		
242-A Steam Condensate	216-B-3, 216-A-25	1.96E+10
244-AR Vault Cooling Water		
241-A Tank Farm Cooling Water		
B-Plant Cooling Water		
B-Plant Chemical Sewer	216-B-63	3.11E+08
B-Plant Steam Condensate	216-B-55	3.85E+07
B-Plant Process Condensate	216-B-62	2.38E+07
209-E Critical Mass Lab	216-C-7	2.27E+02
Powerhouse	216-A-25	2.2 E+08
Water Treatment Facility	216-B-3	
Steam	All Facilities	3.67E+08
Sanitary Water	All Facilities	9.21E+08
U.S. Ecology		1.79E+06
Total Water Use in 200 East Area in 1983		2.29E+10
Total Volume of Raw Water Pumped from the Columbia River to 200 East Area in 1983		1.87E+10

Water use data for 200 East Area are listed in Table 16. Make-up water for maintaining levels in Gable Mountain Pond and B Pond is added to the effluent streams within the plants, and therefore does not appear as a separate item. Data in Table 16 indicate that more water is disposed to ground than is pumped to 200 East Area. Inaccuracies in measurement and estimation probably cause this discrepancy. Efforts have been initiated to improve measurement of water discharged to the environment.

The water use data for 200 West Area are listed in Table 17. Estimated make-up water for maintaining water levels in U Pond is listed separately because it is added from fire hydrants. Volumes of water disposed through facilities and total water pumped for 200 West Area are in good agreement.

Table 17. Water Use Balance for 200 West Area During CY 1983.

Water Use	Disposal Facility No.	Volume (L)
Redox Chemical Sewer	216-S-11	1.99E+08
222-S Lab Pond	216-S-19	8.46E+07
242-S Steam Condensate	216-U-10	2.39E+07
UO_3 Plant Process Condensate	216-U-12	1.28E+06
231-Z Cooling Water	216-Z-20	9.88E+07
234-5Z Liquid Waste	216-Z-20	4.29E+08
Laundry	216-W-LWC	3.91E+08
Powerhouse Water Treatment Facility	216-U-10	2.2 E+08
Steam	All Facilities	1.94E+08
Sanitary Water	All Facilities	1.38E+09
Make-up Water for U Pond	216-U-10	1.97E+09
Total Water Use in 200 West Area in 1983		5.00E+09
Total Volume of Raw Water Pumped from the Columbia River to the 200 West Area in 1983		5.19E+9

INACTIVE DISPOSAL SITES

Liquid waste disposal sites that no longer receive wastes are monitored for changes that would indicate a potential problem. No changes in conditions were noted during 1983. While there are no concentration guidelines for inactive sites, concentrations of groundwater samples are compared with Table II guidelines for reference purposes. Historically, samples from two disposal sites yield concentrations greater than the Table II guidelines.

216-B-5 Reverse Well

A reverse well at Hanford is a well that received liquid waste for disposal to ground. There are no active reverse wells now. All reverse wells discharged into the vadose zone except the 216-B-5 well, which discharged waste to the water table from 1945 to 1947. This reverse well is located northeast of the 221-B Building in 200 East Area (Figure 7) from which it received waste.

A characterization study by Smith (1980) determined the concentration and distribution of radionuclides. This study, in addition to gamma logs in various wells, indicates that the contamination is localized. No significant changes were observed in the result of ground-water monitoring of well 299-E28-23 in 1983. Quarterly monitoring yielded an average strontium-90 concentration of 12.0 pCi/mL (vs. 9.45 pCi/mL in 1982-Wilbur, et al., 1983) and a cesium 137 average concentration of 3.66 pCi/mL (vs. 3.34 pCi/mL). For comparison, Table II concentration guidelines for strontium-90 and cesium-137 are 0.3 pCi/mL and 20 pCi/mL, respectively.

216-S-1 and S-2 Crib

The 216-S-1 and S-2 Crib received waste from the 202-S Building from 1952 to 1956. Elevated strontium-90 concentrations have been observed since then. A study (Van Luik and Smith, 1982) of the concentration and distribution of contaminants indicated that they were held on sediments near the bottom of the crib. That investigation also concluded that the contamination was due to a break in a well casing within the crib. Strontium-90 has been decreasing with time and the concentrations from quarterly sampling of well 299-W22-1 averaged 0.304 pCi/mL in 1983. While this value is greater than the 1982 average of 0.057 pCi/mL, it is two orders of magnitude lower than concentrations during the 1970's. For comparison, the Table II guideline for strontium-90 is 0.3 pCi/mL.

CONCENTRATION PLUME MAPS

Isopleth maps have been prepared to illustrate the average concentration of several ground-water constituents in relation to processing facilities in the Separations Area. Two sets of maps have been prepared: one set focuses on the Separations Area, and the other addresses the region that is influenced by waste disposal operations. The latter is termed the "affected area". Rockwell data has been supplemented with PNL data in the 600 Area for the construction of the maps (Prater, et al., 1984).

Plume maps have been prepared for average concentrations of tritium and nitrate, since their high mobilities will indicate the maximum extent of contaminant migration. A map of the extent of total beta contamination has been prepared for the Separations Area only. The total beta concentration has decayed downgradient from the Separations Area, so an affected area map was not appropriate.

TOTAL BETA

The total beta map for the Separations Area (Figure 15) shows the 0.1, 1.0 and 10.0 pCi/mL isopleths. Observation of Figure 15 indicates total beta is restricted to a few locations within the 200 East and 200 West Area. In 200 East, total beta is greater than 0.1 pCi/mL in the area near the 216-A-27 Crib, greater than 1.0 pCi/mL near the 241-BX Tank Farm and the 216-BY cribs, and greater than 10 pCi/mL at the 216-B-5 Reverse Well site. In the 200 West Area, total beta concentrations greater than 0.1 pCi/mL but less than 1 mCi/mL are located around the 216-S, 216-T, 216-U, and 216-Z cribs. Of the cribs mentioned above, only the 216-Z-20 Crib is active.

TRITIUM

Maps depicting tritium concentrations of the Separations Area and the affected area are shown in Figures 16 and 17, respectively. Tritium isopleths for 30, 300 and 3,000 pCi/mL are shown in the figures.

The tritium plume map for the Separations Area (Figure 16) shows tritium emanating from six sources: the inactive 216-S and 216-U cribs and the active 216-U-12 Crib in 200 West Area; the 216-A cribs, the 216-B-55, and 216-B-62 Cribs in 200 East Area, all of which are active cribs.

In 200 West Area, the plume from the 216-S Crib area is moving eastward, and the plume from the 216-T crib area is moving north, both caused by radial flow from U Pond (refer to Figure 2). Elevated tritium concentrations in the southeast corner of the 200 East Area, around the 216-A crib area south of PUREX, reflect recent operations. The tritium plume from prior operations in 200 East Area has moved eastward (Figure 17) and divided into two lobes: one moving eastward to the Columbia River and the other moving southeast toward the 400 Area.

NITRATE

Figures 18 and 19 show the plumes for nitrate for the Separations Area and affected area, respectively. Nitrate (reported as nitrate) isopleths have been constructed for 5, 10, 20, and 45 mg/L The greatest concentrations of nitrate, i.e. exceeding 45 mg/L, surround the 216-A cribs, 216-B-62 Crib, the 216-BY cribs in 200 East Area; and the 216-T and 216-Z cribs, and the 216-W-LWC Crib in 200 West Area. The general flow pattern of the nitrate plume from the 200 Areas conforms to the general tritium plume flow pattern. The distribution of nitrate for the affected area is also similar to the corresponding tritium distribution.

SPECIAL GROUND-WATER SAMPLE ANALYSES

For other hydrologic studies, water samples were collected and analyzed for selected nonradiological parameters. Analyses were performed by Hanford Environmental Health Foundation. The results of the analyses were compared with EPA drinking water standards for reference purposes.

Two groups of samples were collected; the first group had samples from 8 wells, while 7 wells were sampled in the second group. In the first group, 7 of the 8 samples were greater than one or more parameters of EPA drinking water regulations (EPA, 1976), which would apply at the tap for certain municipal water supplies.Two exceeded iron levels, four exceeded manganese, and four exceeded the proposed sodium level. None of the samples exceeded drinking water levels for nitrate (reported as nitrogen), sulfate, chloride, or fluoride. The wells and results of these special analyses are listed in Appendix D.1.

In the second group of seven samples, three were greater than the EPA drinking water standards for manganese (EPA, 1976). None of the samples exceeded drinking water limits for copper, chromium, lead, zinc, cadmium, silver, or barium. Appendix D.2 is a listing of the wells and the analytical results.

SUMMARY

The Separations Area ground-water monitoring network for CY 1983 consisted of 112 wells. New wells drilled during the year were added to the network as they were completed.

Samples from wells in the monitoring network were collected on a monthly, quarterly, or semiannual schedule, depending on the history of

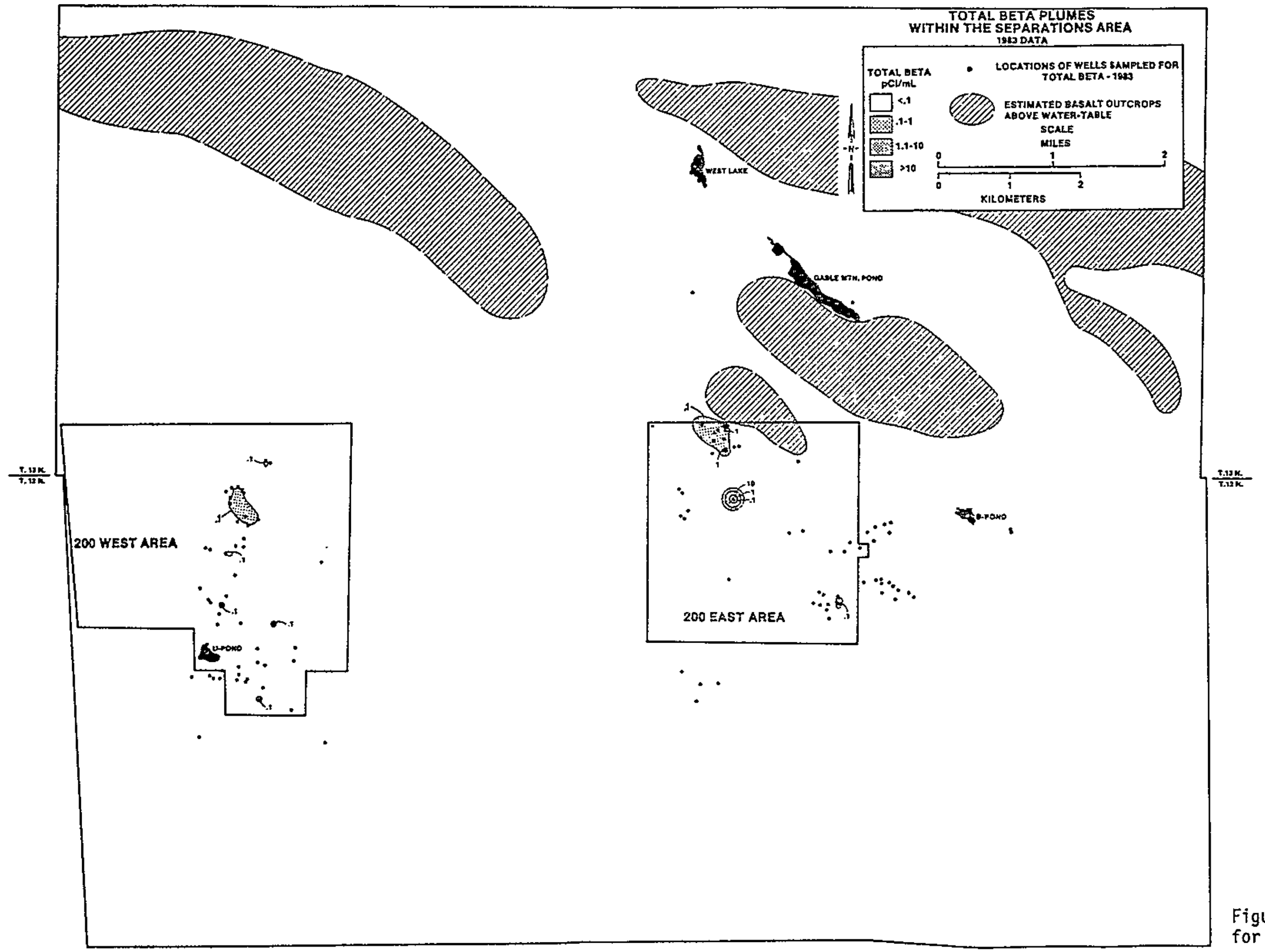

Figure 15. Total Beta Plume Map for the Separations Area, 1983.

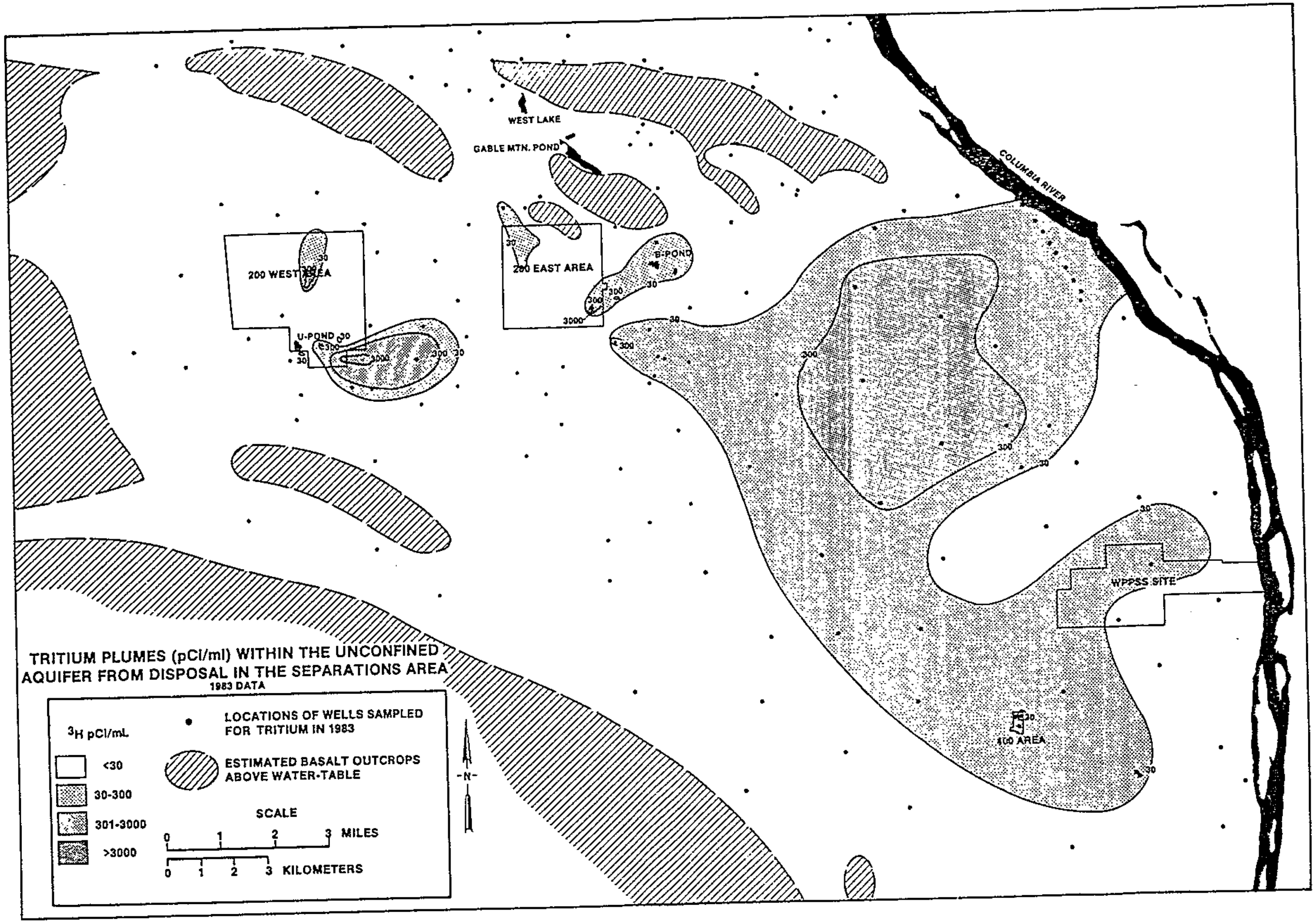

Figure 17.
Tritium Plume Map for the Affected Area, 1983.

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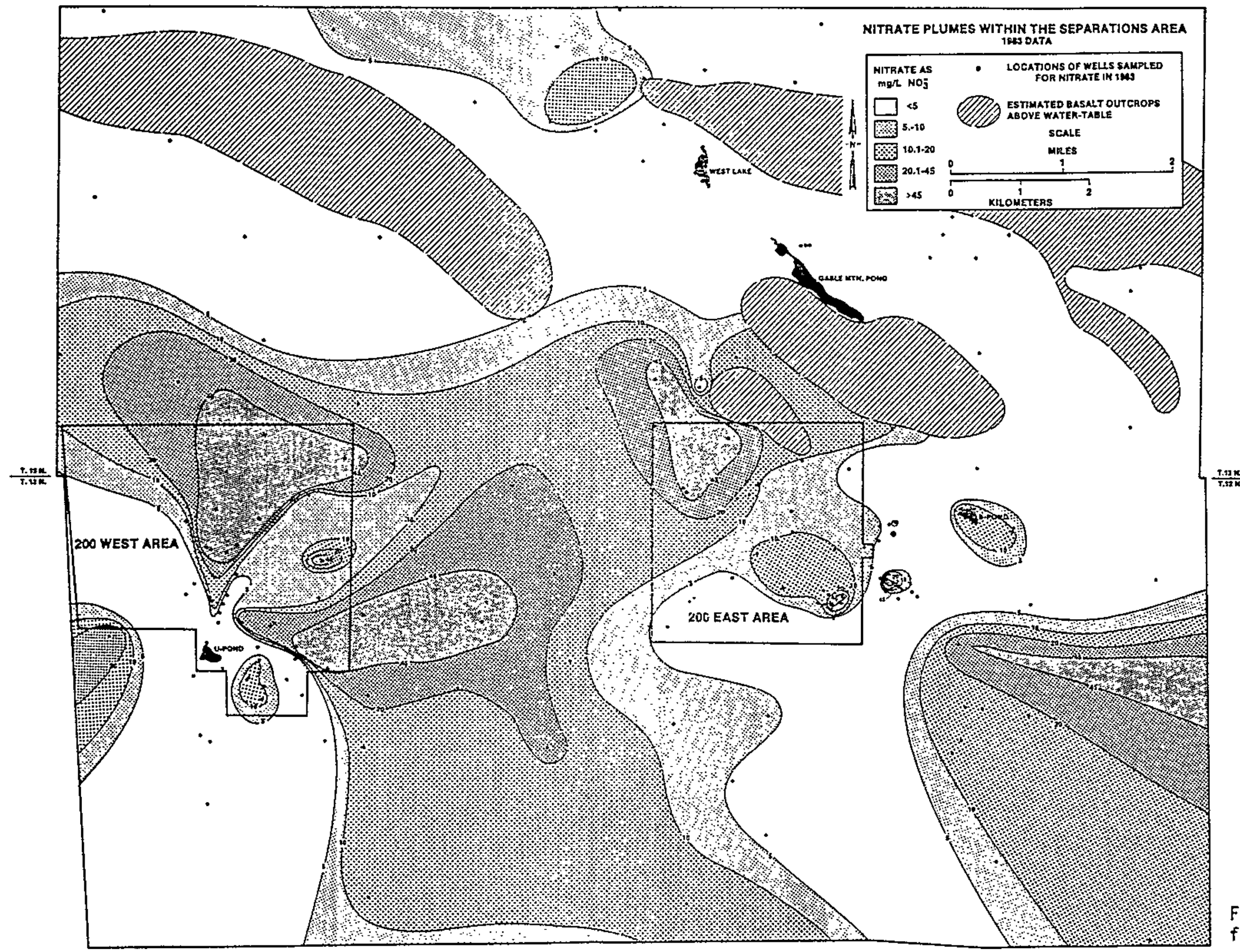

Figure 18. Nitrate Plume Map for the Separations Area, 1983.

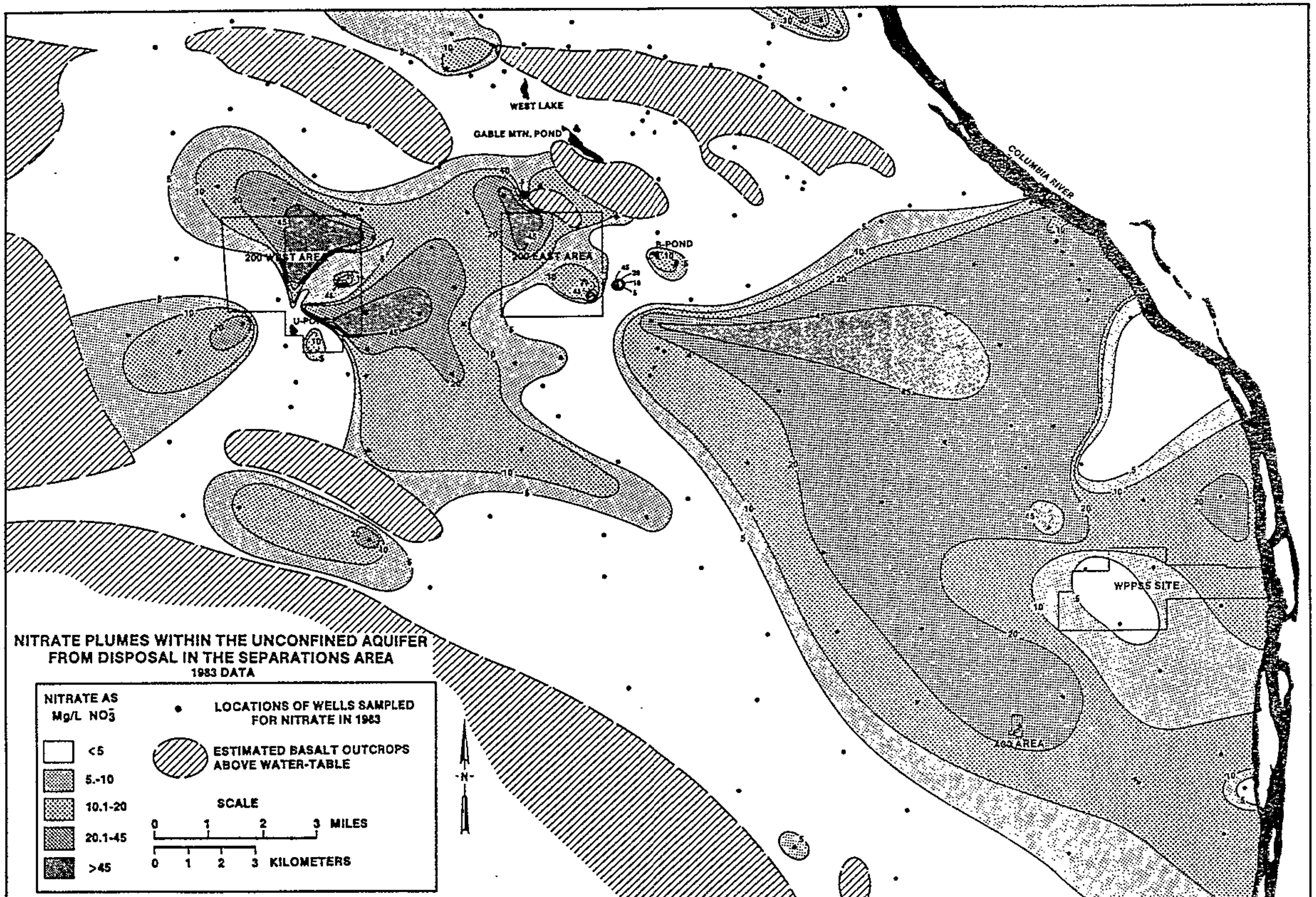

Figure 19.
Nitrate Plume Map for
the Affected Area, 1983.

the waste disposal site. Samples were analyzed selectively for total alpha, total beta, tritium, strontium-90, cesium-137, cobalt-60, ruthenium-106, uranium and nitrate. The 1983 ground-water monitoring results indicate that average concentrations of contaminants in wells were essentially the same in CY 1983 as they were in CY 1982. Plume maps for total beta, tritium and nitrate revealed only minor changes.

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APPENDIX A.1

WELL NUMBER SYSTEM

A detailed description of the well numbering system is given in McGhan and Damschen, 1979. Briefly, well identification in the 200 Areas contains three parts separated by dashes. The first part, 299, identifies it as a well (99) in one of the 200 Areas. The second part contains the prefix E or W, for 200 East or 200 West, respectively, along with a two-digit block number. These block numbers are denoted on pages 11 and 13 of McGhan and Damschen (1979) for the 200 East and 200 West Areas, respectively. The third part of the well number represents the consecutive numbering of a well constructed in a given block. For example, well 299-E25-21 identifies the 21st well drilled in block 25 of 200 East Area. Computer-drawn graphs and tables from the CIRMIS system presented in this report use a modification of the preceding whereby well 299-E25-21 is identified as 2E-25-21.

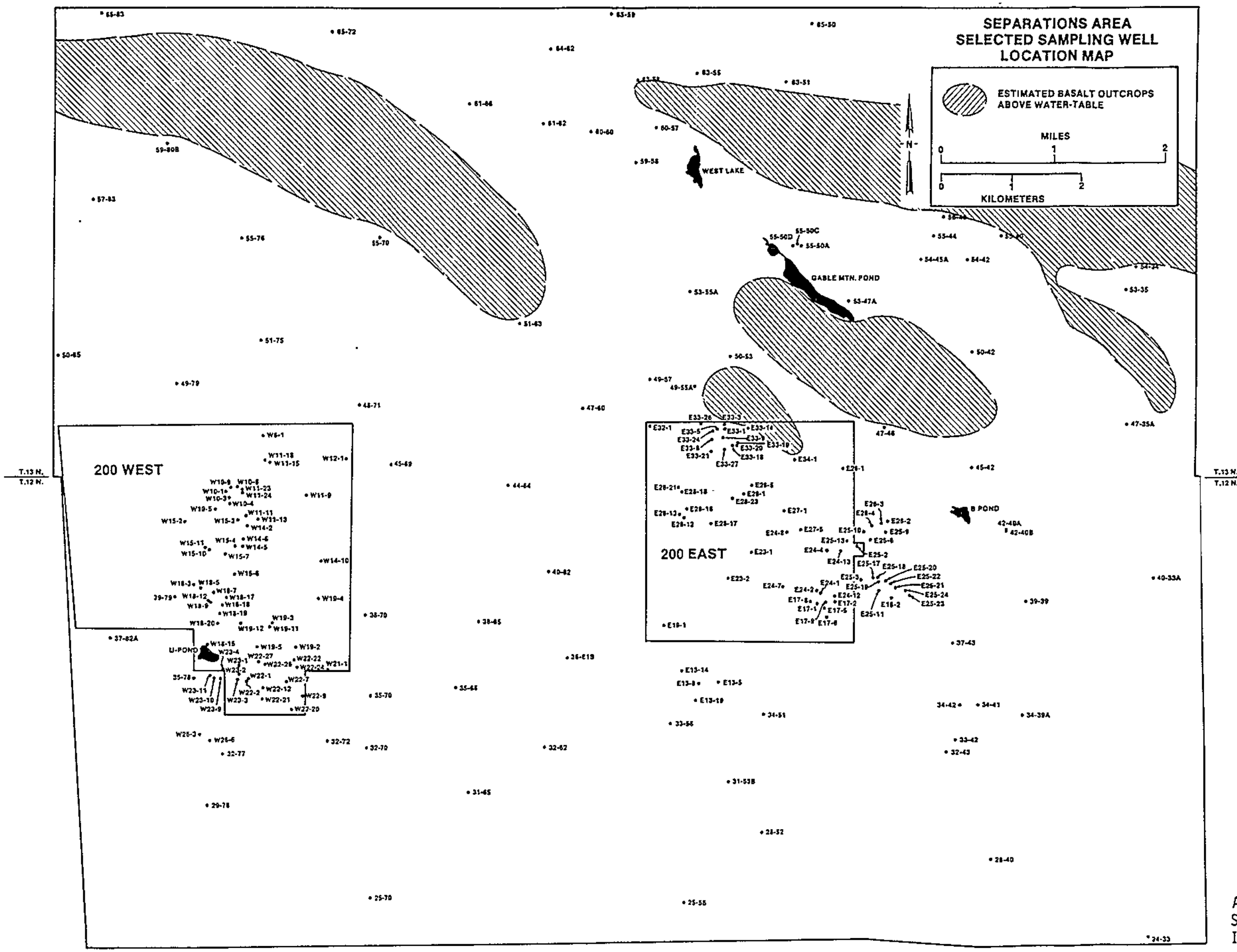
Wells in the 600 Area (all parts of the Hanford Site not identified as a "hundred" area - 100, 200, 300, 400, 700, 1100, 3000) have a different coding system. The well identification number contains three parts with the first part being 699 to identify it as a well in the 600 Area. The second and third parts represent the north and west Hanford coordinates respectively, of a well, in thousands. For example, well 699-35-78 has the coordinates of N035478 and W078190 (McGhan, 1979). Letters are added when there is more than one well in a zone described by coordinates, such as 699-42-40A and 699-42-40B. The CIRMIS system uses the form 6 35 78 to represent well 699-35-78.

APPENDIX A.2

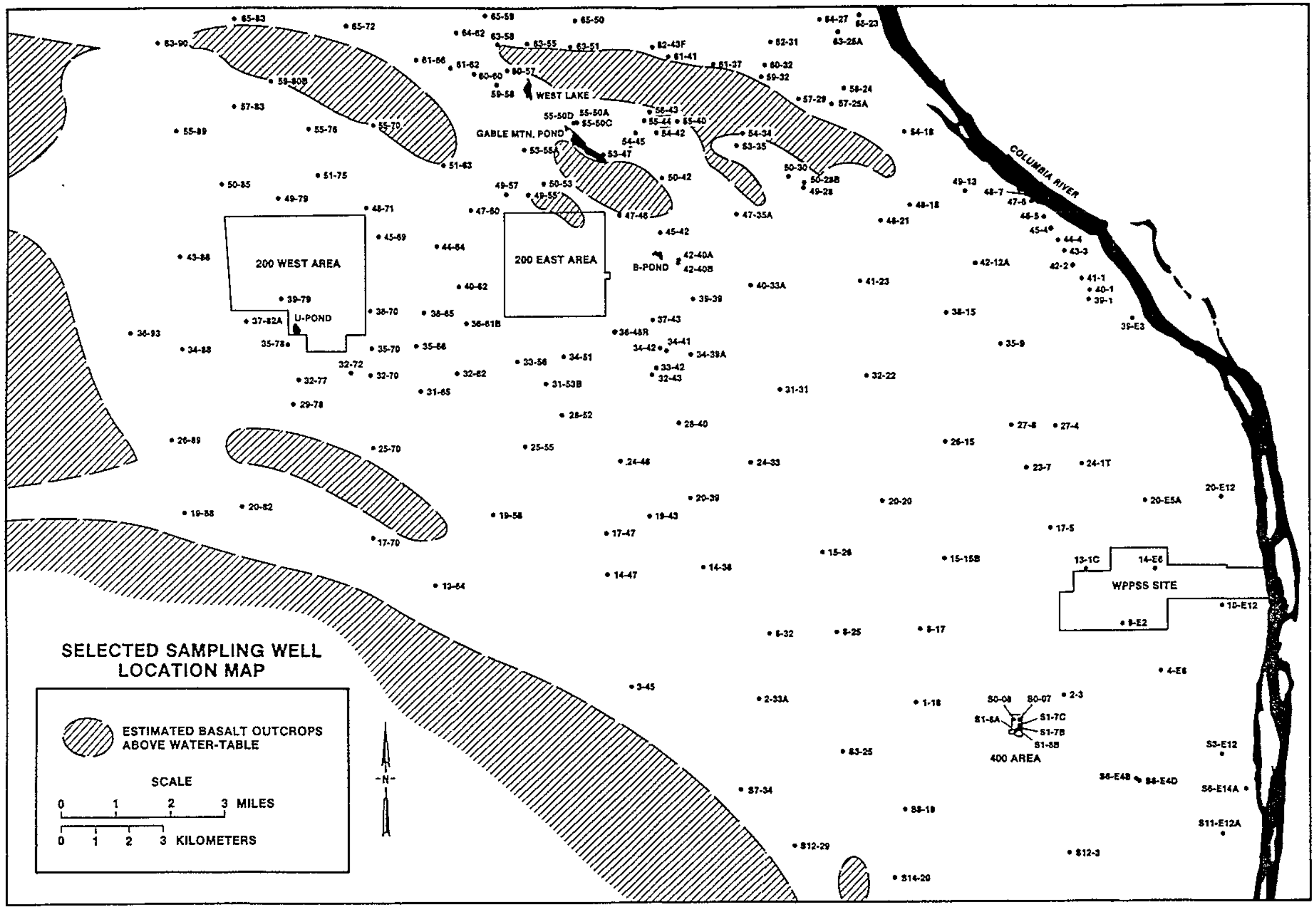
FACILITY NUMBERING SYSTEM

Liquid waste disposal facilities (crib facilities, ponds, and ditches) are identified as "216-" sites, while tank farms are designated as "241-" sites. The second part of the site number represents a zone; A, B, C, E represent zones in 200 East Area, and S, T, U, W, Z represent zones in 200 West Area. For cribs the third part of the site designation is the consecutive numbering within a zone. In some cases a further identification tag has been added: site 216-A-37-2 is the 37th liquid waste disposal site in zone A of the 200 East Area. The "-2" differentiates this facility from 216-A-37-1. In other cases a letter is added, such as 216-A-36B, which represents the 36th facility in block A of 200 East Area. There is also a 216-A-36A facility.

For tank farms the second part of the site number may be modified. For example, there is the 241-A Tank Farm, the 241-AX Tank Farm, the 241-AY Tank Farm, and the 241-AZ Tank Farm. The third part of the tank farm number is the number assigned to the tank within the farm, such as 241-A-103 Tank.



APPENDIX A.3.
SELECTED SAMPLING WELLS
IN THE SEPARATIONS AREA.



APPENDIX A.3.
SELECTED SAMPLING WELLS
IN THE AFFECTED AREA.

APPENDIX B

RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983

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APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX		4.05E-01	1.59E+00						
2E 13 5	AVE		9.46E-02	4.81E-01						
(216-B-18)	MIN		3.80E-03	0.00E-01**						
	MAX		3.84E-02				7.67E-03	8.19E-03	1.78E-02	
2E 13 8	AVE		2.22E-02				2.86E-03	2.32E-03	6.70E-03	
(216-B-21)	MIN		1.10E-02				0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		3.73E-02							
2E 13 14	AVE		1.42E-02							
(216-B-29)	MIN		0.00E-01**							
	MAX		2.95E-02							
2E 13 19	AVE		2.05E-02							
(216-B-28)	MIN		5.11E-03							
	MAX		4.32E-02		2.98E+00	7.06E-03	6.06E-03	5.95E-03	6.05E-03	
2E 16 2	AVE		1.57E-02		1.24E+00	1.67E-03	1.31E-03	1.29E-03	1.49E-03	
(216-A-30)	MIN		3.33E-03		4.40E-01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		3.96E-02	5.06E+02	2.12E+01	2.45E-02	1.05E-02	9.32E-03	4.58E-02	
2E 17 1	AVE		2.69E-02	2.37E+02	1.49E+01	4.29E-03	1.80E-03	3.10E-03	1.51E-02	
(216-A-10)	MIN		1.12E-02	1.06E+02	1.04E+01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	4.54E-02	3.56E-01	6.09E+02	6.86E+01					
2E 17 2	AVE	3.14E-02	1.17E-01	4.76E+02	3.99E+01					
(216-A-27)	MIN	1.62E-02	5.31E-02	2.68E+02	2.20E+01					
	MAX	1.14E-01	1.63E-01	5.70E+02	3.99E+01	8.23E-02	1.42E-02	1.08E-02	4.28E-02	
2E 17 5	AVE	1.39E-02	4.59E-02	5.01E+02	2.48E+01	1.04E-02	3.91E-03	2.47E-03	1.36E-02	7.69E-03*
(216-A-36B)	MIN	1.54E-03	9.99E-03	3.81E+02	1.90E+01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		7.21E-01	1.05E+00	9.30E-01					
2E 17 6	AVE		7.26E-02	4.98E-01	6.13E-01					
(216-A-36B)	MIN		4.48E-03	0.00E-01**	2.20E-01					
	MAX		2.43E-01	2.17E+02	2.28E+01	1.41E-03	1.63E-02	1.19E-02	4.88E-02	
2E 17 8	AVE		4.16E-02	2.83E+01	9.89E+00	2.82E-04	5.35E-03	3.57E-03	9.76E-03	
(216-A-38)	MIN		9.59E-03	6.95E+00	2.20E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		8.47E-02	1.06E+04	1.45E+02	1.08E-02	2.08E-02	1.02E-02	2.35E-02	
2E 17 9	AVE	1.19E-03*	4.09E-02	7.02E+03	1.06E+02	4.24E-03	5.43E-03	2.18E-03	4.97E-03	
(216-A-36A,B)	MIN		1.57E-02	3.27E+03	1.20E+01	4.06E-04	0.00E-01**	0.00E-01**	0.00E-01**	

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APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX									
2E 23 2	AVE		1.22E-02*	2.25E+00*	1.36E+00*					
(200 EAST)	MIN									
	MAX		6.47E-02	1.82E+02	3.04E+01	6.57E-03	1.23E-02	1.12E-02	4.11E-02	
2E 24 1	AVE		3.65E-02	1.33E+02	1.68E+01	1.99E-03	4.38E-03	4.79E-03	1.97E-02	
(216-A-5)	MIN		1.22E-02	7.37E+01	1.02E+01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	2.85E-03	5.65E-02	4.49E+02	2.57E+01	1.04E-02	9.21E-03	8.05E-03	7.94E-02	
2E 24 2	AVE	1.07E-03	3.40E-02	1.69E+02	1.73E+01	3.57E-03	2.71E-03	2.48E-03	2.20E-02	1.13E-03*
(216-A-10)	MIN	0.00E-01**	1.70E-02	5.77E+01	8.80E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		2.25E-01	2.74E+01	1.99E+01	3.04E-03	3.24E-03	2.13E-04	3.94E-02	
2E 24 4	AVE		3.87E-02	2.03E+01	1.04E+01	1.52E-03	1.48E-03	5.33E-05	1.38E-02	
(216-A-9)	MIN		0.00E-01**	1.58E+01	7.75E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		5.19E-02	1.47E+01	2.12E+01		9.31E-03	7.82E-03	6.76E-02	
2E 24 8	AVE		2.50E-02	9.71E+00	9.53E+00		2.17E-03	1.81E-03	6.30E-03	
(216-C-3,4,5)	MIN		0.00E-01**	6.20E+00	6.20E+00		0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		1.18E-01	1.11E+03	7.50E+01					
2E 24 12	AVE	4.38E-02*	8.57E-02	1.01E+03	5.67E+01					1.95E-02*
(216-A-21,31)	MIN		6.18E-02	8.52E+02	3.78E+01					
	MAX		2.50E-02							
2E 24 13	AVE		1.50E-02							
(241-A)	MIN		1.04E-02							
	MAX			7.70E+01	6.64E+00					
2E 25 2	AVE		1.14E-02*	4.07E+01	5.67E+00			6.60E-03*		
(216-A-1,7)	MIN			2.75E+01	4.70E+00					
	MAX		3.99E-02							
2E 25 3	AVE		2.34E-02							
(216-A-6)	MIN		2.35E-03							
	MAX	3.75E-03	4.06E-02	2.56E+02	4.21E+00	3.67E-03	1.28E-02	3.68E-03	4.34E-02	
2E 25 6	AVE	9.01E-04	1.82E-02	2.16E+02	1.53E+00	1.08E-03	3.00E-03	1.12E-03	3.95E-03	
(216-A-8)	MIN	0.00E-01**	0.00E-01**	1.84E+02	3.10E-01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	4.62E-03	4.83E-02	5.88E+02		1.79E-03	9.01E-03	4.67E-03	6.73E-02	
2E 25 9	AVE	1.32E-03	1.28E-02	9.18E+01	5.16E+00*	4.77E-04	2.33E-03	1.51E-03	1.50E-02	
(216-A-8)	MIN	0.00E-01**	7.78E-04	4.13E+00		0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	

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APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX	9.23E-03	1.99E-02				7.82E-03	6.19E-03	3.57E-02	1.23E-02
2E 25 10	AVE	2.70E-03	1.22E-02				1.65E-03	2.84E-03	2.01E-02	3.03E-03
(216-A-8,19,20)	MIN	1.19E-04	0.00E-01**				0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**
	MAX		3.48E-02	5.65E+01	7.50E+00	7.53E-03	9.35E-03	5.61E-03	3.50E-02	
2E 25 11	AVE		1.13E-02	2.99E+01	4.99E+00	2.81E-03	2.33E-03	2.33E-03	1.39E-02	
(216-A-30)	MIN		0.00E-01**	1.65E+01	3.07E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		1.78E-01							
2E 25 13	AVE		5.04E-02							
(241-AX)	MIN		5.95E-03							
	MAX		1.79E-02	5.63E+01	3.58E+00					
2E 25 17	AVE		1.14E-02	4.77E+01	1.42E+00	5.35E-04*	3.17E-03*	2.81E-03*	1.67E-02*	
(216-A-37-1)	MIN		5.42E-03	3.83E+01	4.40E-01					
	MAX		6.15E-02	2.06E+02	3.52E+01					
2E 25 18	AVE		2.20E-02	1.78E+02	2.60E+01	3.81E-03*	2.03E-03*	2.26E-03*	3.53E-02*	
(216-A-37-1)	MIN		0.00E-01**	1.61E+02	1.73E+01					
	MAX		4.62E-02	5.61E+02	1.37E+02					
2E 25 19	AVE		2.75E-02	4.30E+02	1.15E+02	2.78E-03*	4.23E-04*	5.07E-03*	4.93E-03*	
(216-A-37-1)	MIN		1.19E-02	3.10E+02	1.00E+02					
	MAX		6.52E-02	2.22E+03	1.02E+03	4.48E-03	5.61E-03	2.26E-03	2.95E-02	
2E 25 20	AVE		2.38E-02	1.82E+03	3.70E+02	2.34E-03	1.97E-03	1.05E-03	2.47E-02	
(216-A-37-1)	MIN		2.88E-04	1.34E+03	3.21E+01	0.00E-01**	0.00E-01**	0.00E-01**	2.03E-02	
	MAX		3.31E-02	2.22E+01	7.88E+00					
2E 25 21	AVE		1.28E-02	2.12E+01	5.97E+00	2.82E-03*	4.73E-04*	3.39E-03*	0.00E-01**	
(216-A-37-2)	MIN		2.99E-03	2.05E+01	3.84E+00					
	MAX		3.60E-02	6.49E+01	3.09E+01					
2E 25 22	AVE		1.85E-02	3.14E+01	1.36E+01	3.04E-03*	5.47E-03*	1.29E-03*	1.16E-02*	
(216-A-37-2)	MIN		7.85E-03	1.20E+01	5.70E+00					
	MAX		4.50E-02	2.20E+00	4.14E+00					
2E 25 23	AVE		3.04E-02	1.45E+00	2.78E+00	0.00E-01**	2.29E-03*	2.70E-03*	3.28E-03*	
(216-A-37-2)	MIN		1.59E-02	9.50E-01	7.50E-01					
	MAX		5.14E-02	2.42E+00	5.50E+00					
2E 25 24	AVE		2.88E-02	1.63E+00	2.53E+00	3.20E-03*	4.17E-03*	0.00E-01**	6.55E-03*	
(216-A-37-2)	MIN		1.81E-02	9.59E-01	1.49E+00					

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2E 26 2 (216-A-24)	MAX		1.92E-02	8.24E+00	8.85E+00					
	AVE		1.18E-02	5.32E+00	6.45E+00					
	MIN		2.53E-04	3.82E+00	4.40E+00					
2E 26 4 (216-A-24)	MAX		1.34E-02	3.61E+01	7.00E+00					
	AVE		9.30E-03	2.56E+01	5.68E+00					
	MIN		4.87E-03	1.87E+01	4.20E+00					
2E 27 5 216-C-10)	MAX		1.61E-01				1.46E-02	9.69E-03	3.90E-02	
	AVE		5.21E-02				4.41E-03	4.15E-03	9.75E-03	
	MIN		0.00E-01**				0.00E-01**	0.00E-01**	0.00E-01**	
2E 28 12 (216-B-55)	MAX		8.35E-02	1.18E+02			1.56E-02	4.48E-03	3.57E-02	
	AVE		2.80E-02	6.78E+01			3.29E-03	1.17E-03	7.89E-03	
	MIN		0.00E-01**	7.34E+00			0.00E-01**	0.00E-01**	0.00E-01**	
2E 28 13 (216-B-55)	MAX		3.63E-02	7.33E+01			1.02E-02	8.01E-03	8.29E-02	
	AVE		1.57E-02	1.29E+01			2.23E-03	1.95E-03	1.21E-02	
	MIN		0.00E-01**	5.51E+00			0.00E-01**	0.00E-01**	0.00E-01**	
2E 28 16 (216-B-12)	MAX		2.54E-01							
	AVE		8.25E-02							
	MIN		1.17E-02							
2E 28 17 (216-B-6)	MAX									
	AVE	1.19E-02*								
	MIN									
2E 28 18 (216-B-62)	MAX	2.51E-01	1.77E-01	1.09E+02	6.33E+02	8.98E-03	1.21E-02	8.24E-03	5.01E-02	
	AVE	1.68E-01	9.07E-02	7.64E+01	3.36E+02	2.68E-03	2.45E-03	2.02E-03	9.85E-03	1.67E-02*
	MIN	1.11E-01	5.66E-02	4.70E+01	1.38E+02	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
2E 28 21 (216-B-62)	MAX	1.34E-01	1.03E-01	7.35E+01	4.26E+02	3.51E-02	1.26E-02	8.95E-03	3.38E-02	
	AVE	7.16E-02	6.15E-02	5.68E+01	2.33E+02	5.44E-03	2.85E-03	2.32E-03	6.82E-03	
	MIN	2.22E-04	4.23E-02	4.65E+01	1.53E+02	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
2E 28 23 (216-B-5)	MAX									
	AVE	4.32E-02*	2.28E+01*	2.82E+00*	1.97E+01*	1.20E+01*	3.66E+00*	1.20E-03*	2.69E-02*	
	MIN									
2E 32 1 (200 EAST)	MAX									
	AVE		3.91E-02*	4.31E+00*	3.10E+01*					
	MIN									

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	MAX									
2E 33 1	AVE		3.57E-01*				2.52E-03*	5.28E-02*	1.15E-03*	
(216-B-43)	MIN									
	MAX									
2E 33 3	AVE		3.11E+00*	8.89E+00*		1.30E-03*	1.26E-02*	8.49E-01*	7.33E-02*	
(216-B-44,45,46)	MIN									
	MAX									
2E 33 5	AVE		8.46E-01*				4.54E-03*	1.00E-01*	1.79E-02*	
(216-B-47)	MIN									
	MAX									
2E 33 8	AVE		1.62E-01*				2.78E-03*	4.72E-03*	2.76E-02*	
(216-B-41)	MIN									
	MAX									
2E 33 9	AVE		2.32E-01*	2.12E+00*	2.56E+02*	4.05E-03*	7.78E-03*	2.93E-02*	6.69E-03*	
(241-BY)	MIN									
	MAX									
2E 33 18	AVE		4.14E-02*			3.31E-03*	2.00E-03*	2.83E-03*	0.00E-01**	
(216-B-7A,7B)	MIN									
	MAX									
2E 33 20	AVE		5.22E-02*			6.50E-03*				
(216-B-7A,7B, 11A,11B)	MIN									
	MAX									
2E 33 21	AVE		4.17E-03*				2.18E-03*	2.35E-03*	2.67E-02*	
(216-B-36)	MIN									
	MAX									
2E 33 24	AVE		2.86E-01*				4.67E-03*	1.85E-02*	3.70E-02*	
(216-B-57)	MIN									
	MAX									
2E 33 26	AVE		8.18E-01*				7.16E-03*	8.31E-02*	7.80E-03*	
(216-B-61)	MIN									
	MAX									
2E 33 27	AVE		1.28E+00*	4.77E+01*			1.39E+00*	1.31E-02*	8.03E-02*	
(241-BX)	MIN									

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WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX		1.27E-01	4.57E+01	2.70E+01		7.43E-03	7.09E-03	3.59E-02	
2E 34 1	AVE		2.61E-02	4.34E+00	9.42E+00		2.05E-03	2.37E-03	1.32E-02	
(216-B-63)	MIN		0.00E-01**	5.60E-02	2.80E+00		0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		4.14E-02							
2W 10 1	AVE		2.98E-02							
(216-T-5)	MIN		1.96E-02							
	MAX	2.56E-02	6.51E-02							
2W 10 3	AVE	1.86E-02	5.88E-02							
(216-T-32)	MIN	1.19E-02	4.84E-02							
	MAX		1.50E-01				1.86E-02	2.49E-02	1.01E-02	
2W 10 4	AVE		1.05E-01	3.30E+01*			8.26E-03	1.58E-02	2.02E-03	
(216-T-36)	MIN		7.24E-02				3.00E-03	5.19E-03	0.00E-01**	
	MAX	3.18E-03	1.15E-01				1.02E-02	1.98E-02	6.53E-02	
2W 10 8	AVE	2.15E-03	9.04E-02				3.42E-03	1.41E-02	3.00E-02	
(241-T)	MIN	1.54E-03	7.85E-02				0.00E-01**	4.46E-03	0.00E-01**	
	MAX	8.00E-03	1.58E-01				1.70E-02	2.75E-02	6.45E-02	
2W 10 9	AVE	3.91E-03	9.27E-02				3.97E-03	1.46E-02	1.82E-02	
(241-T)	MIN	1.78E-03	6.34E-02				0.00E-01**	5.96E-03	0.00E-01**	
	MAX	9.34E-03	1.65E-01				1.46E-02	9.85E-03	4.52E-02	
2W 11 11	AVE	3.77E-03	1.12E-01	3.40E+01*			3.98E-03	7.85E-03	2.27E-02	
(216-T-8)	MIN	1.19E-03	8.29E-02				0.00E-01**	6.15E-03	0.00E-01**	
	MAX									
2W 11 13	AVE		1.03E-01*	1.02E+02*	1.87E+02*					
(200W)	MIN									
	MAX		7.15E-02							
2W 11 15	AVE		4.98E-02							
(216-T-34)	MIN		2.98E-02							
	MAX		1.53E-01							
2W 11 18	AVE		1.23E-01							
(216-T-35)	MIN		1.06E-01							
	MAX	7.00E-03	1.69E-01				8.83E-03	1.94E-02	1.96E-02	
2W 11 23	AVE	3.30E-03	1.01E-01				3.02E-03	1.55E-02	3.92E-03	
(241-T)	MIN	0.00E-01**	7.04E-02				0.00E-01**	1.12E-02	0.00E-01**	

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	MAX	2.73E-03	1.17E-01				3.52E-03	2.27E-02	2.74E-02	
2W 11 24	AVE	1.50E-03	9.88E-02				1.39E-03	1.50E-02	1.08E-02	
(241-T)	MIN	6.22E-04	8.38E-02				0.00E-01**	1.05E-02	0.00E-01**	
	MAX									
2W 14 2	AVE	3.92E-03*	7.89E-02*	2.86E+02*						
(216-T-26,27,28)	MIN									
	MAX		2.08E-02	5.71E+01						
2W 14 5	AVE		1.31E-02	2.87E+01						
(241-TX)	MIN		8.07E-04	1.27E+01						
	MAX		2.77E-02							
2W 14 6	AVE		1.61E-02							
(241-TX)	MIN		1.09E-03							
	MAX	3.14E-02	3.97E-02		5.09E+02	5.29E-03	1.60E-02	1.12E-02	3.92E-02	
2W 14 10	AVE	3.69E-03	1.04E-02		3.08E+02	1.36E-03	3.90E-03	2.28E-03	1.24E-02	
216-W-LWC)	MIN	0.00E-01**	0.00E-01**		4.20E+01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		5.75E-02				1.16E-02	1.41E-02	2.47E-02	
2W 15 3	AVE		5.30E-02				4.76E-03	1.12E-02	1.07E-02	
(241-TY)	MIN		4.91E-02				0.00E-01**	6.36E-03	0.00E-01**	
	MAX		4.38E-02	9.71E+02	9.43E+02					
2W 15 4	AVE		2.28E-02	9.06E+02	8.78E+02					
(216-T-19)	MIN		8.35E-03	8.04E+02	8.23E+02					
	MAX	2.73E-03	1.90E-02		1.38E+01					
2W 15 6	AVE	1.56E-03	1.14E-02		8.89E+00					
(216-Z-9)	MIN	9.49E-04	6.28E-03		5.30E+00					
	MAX	7.11E-04	2.22E-01		1.79E+02		1.39E-03	5.03E-02	3.91E-02	
2W 15 7	AVE	3.85E-04	1.00E-01		1.22E+02		5.24E-04	2.63E-02	1.52E-02	
(216-Z-7)	MIN	0.00E-01**	2.67E-02		8.40E+01		0.00E-01**	6.71E-03	0.00E-01**	
	MAX	2.73E-03	1.92E-01							
2W 15 10	AVE	1.33E-03	6.05E-02		1.68E+02*					
216-Z-16)	MIN	0.00E-01**	1.50E-02							
	MAX	3.20E-03	5.51E-02		3.54E+02					
2W 15 11	AVE	2.29E-03	3.43E-02		3.01E+02					
(216-Z-16)	MIN	1.54E-03	2.07E-02		2.57E+02					

*-- 3 VALUES OR LESS, NO MAX OR MIN CALCULATED

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX	2.73E-03	4.46E-02							
2W 18 5	AVE	9.49E-04	1.77E-02							
(216-Z-12)	MIN	0.00E-01**	6.97E-03							
	MAX	2.49E-03	3.01E-02		3.14E+01					
2W 18 9	AVE	1.28E-03	1.16E-02		1.26E+01					
(216-Z-18)	MIN	6.24E-04	4.50E-03		2.88E+00					
	MAX	3.36E-03	3.76E-02	1.72E+00	1.64E+01					1.35E-03
2W 18 12	AVE	2.08E-03	1.22E-02	8.30E-01	5.02E+00					9.46E-04
(216-Z-18)	MIN	0.00E-01**	0.00E-01**	1.10E-01	5.30E-01					6.19E-04
	MAX	3.34E-01	6.93E-02	3.20E+00	5.30E+00		3.47E-02	9.02E-03	7.43E-02	
2W 18 15	AVE	6.88E-02	3.70E-02	6.69E-01	1.12E+00		5.23E-03	3.56E-03	1.40E-02	1.80E-02*
(216-U-10)	MIN	9.49E-04	1.06E-02	0.00E-01**	3.50E-01		0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	5.72E-03	4.91E-02	5.77E-01	4.90E+00		8.83E-03	2.25E-03	7.81E-02	
2W 18 17	AVE	1.89E-03	1.69E-02	2.71E-01	2.85E+00		2.79E-03	1.10E-03	3.54E-02	
(216-Z-20)	MIN	0.00E-01**	0.00E-01**	0.00E-01**	1.80E+00		0.00E-01**	0.00E-01**	8.38E-03	
	MAX	4.15E-04	1.57E-01	1.67E+00	2.70E+00		4.85E-03	4.49E-03	1.18E-02	
2W 18 18	AVE	1.04E-04	1.21E-01	6.88E-01	1.64E+00		2.75E-03	1.55E-03	4.82E-03	
(216-Z-20)	MIN	0.00E-01**	5.58E-02	2.74E-01	9.07E-01		1.41E-03	0.00E-01**	0.00E-01**	
	MAX	5.60E-03	3.18E-02	1.10E+01	3.10E+00		6.46E-03	1.04E-02	3.08E-02	
2W 18 19	AVE	1.09E-03	1.36E-02	2.98E+00	7.94E-01		1.93E-03	2.27E-03	4.55E-03	
(216-Z-20)	MIN	0.00E-01**	0.00E-01**	6.30E-02	6.20E-02		0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	6.25E-03	4.94E-02	9.50E+00	5.30E+00		1.23E-02	9.14E-03	8.85E-02	
2W 18 20	AVE	2.23E-03	1.40E-02	2.67E+00	1.57E+00		2.40E-03	2.02E-03	1.56E-02	
(216-Z-20)	MIN	0.00E-01**	0.00E-01**	2.61E-01	4.40E-01		0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		7.92E-02	9.31E+01	4.39E+02					2.05E-03
2W 19 2	AVE		4.72E-02	7.38E+01	2.55E+02					1.20E-03
(216-U-8)	MIN		2.39E-02	6.18E+01	1.82E+02					5.47E-04
	MAX	9.65E-02	1.76E-01	3.16E-01	3.23E+01		0.00E-01**	3.88E-03	1.92E-02	3.55E-02
2W 19 3	AVE	4.26E-02	1.14E-01	1.92E-01	2.36E+01		0.00E-01**	1.90E-03	7.70E-03	2.83E-02
(216-U-1,2)	MIN	3.20E-03	3.12E-02	8.10E-02	1.50E+01		0.00E-01**	0.00E-01**	0.00E-01**	2.38E-02
	MAX		1.45E-02	9.79E-01	5.89E+00					
2W 19 5	AVE		9.82E-03	7.44E-01	3.29E+00					
(216-S-23)	MIN		3.34E-03	3.96E-01	1.77E+00					

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**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX	1.18E-02		2.21E+00	3.65E+01		3.09E-03	7.46E-03	1.93E-02	
2W 19 11	AVE	5.34E-03		1.08E+00	2.75E+01		7.73E-04	2.24E-03	1.49E-02	
(216-U-1)	MIN	5.69E-04		4.19E-01	1.79E+01		0.00E-01**	0.00E-01**	7.61E-03	
	MAX									
2W 19 12	AVE	6.13E-03*	2.03E-02*	1.13E-01*	3.22E+01*		2.88E-03*	2.63E-03*	1.05E-03*	2.82E-03*
(241-U)	MIN									
	MAX									
2W 22 1	AVE	7.39E-03*	5.56E-01*	3.54E+01*	1.41E+01*	3.04E-01*	3.40E-04*	1.77E-03*	2.48E-03*	
(216-S-1)	MIN									
	MAX									
2W 22 2	AVE	5.49E-03*	9.67E-02*	9.92E-01*	1.60E+01*	2.21E-03*	2.15E-03*	1.38E-03*	2.37E-02*	
(216-S-1,2)	MIN									
	MAX									
2W 22 12	AVE		3.45E-02*	4.40E+02*	5.37E+00*	1.39E-03*				
(216-S-7)	MIN									
	MAX		1.31E-01			5.10E-03				
2W 22 20	AVE		7.52E-02	3.62E+02*		1.28E-03				
(216-S-20)	MIN		5.43E-02			0.00E-01**				
	MAX	4.57E-02	1.65E-01		1.91E+01	4.50E-03	3.10E-03	3.74E-03	2.81E-02	
2W 22 21	AVE	3.32E-02	1.35E-01		1.33E+01	2.29E-03	9.33E-04	9.35E-04	1.76E-02	
(216-S-13)	MIN	1.19E-02	1.20E-01		7.51E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	3.75E-03	2.18E-02	1.50E+02	9.20E+00	5.52E-03	9.76E-03	1.71E-03	2.29E-02	5.66E-03
2W 22 22	AVE	9.42E-04	1.17E-02	2.02E+01	1.97E+00	1.75E-03	1.80E-03	2.52E-04	4.64E-03	1.57E-03
(216-U-12)	MIN	0.00E-01**	0.00E-01**	2.37E+00	1.80E-01	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**
	MAX									
2W 22 26	AVE		2.08E-02*	2.81E+02*		9.30E-04*	5.17E-04*	2.72E-03*	1.10E-02*	
(216-S-9)	MIN									
	MAX									
2W 22 27	AVE		2.00E-02*	7.01E+02*	9.48E+00*					
(216-S-9)	MIN									
	MAX									
2W 23 1	AVE		1.27E-02*							
(216-S-3; 241-S)	MIN									

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**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX									
2W 23 2	AVE		6.54E-03*							
(241-SX)	MIN									
	MAX									
2W 23 3	AVE		1.75E-02*							
(241-SX)	MIN									
	MAX	3.51E-02	3.86E-02	3.39E+00	2.70E+00					2.09E-02
2W 23 4	AVE	2.91E-02	2.73E-02	2.08E+00	1.11E+00					1.59E-02
(216-S-21)	MIN	2.54E-02	1.36E-02	6.03E-01	4.40E-01					1.37E-02
	MAX	2.26E-02	3.34E-02	4.25E+01		8.26E-03	1.93E-03	4.49E-03	3.40E-02	
2W 23 9	AVE	9.62E-03	1.38E-02	2.58E+01		2.52E-03	5.12E-04	1.05E-03	8.24E-03	
(216-S-25)	MIN	5.93E-04	1.86E-03	4.59E-01		0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX		3.39E-02	3.15E+02		8.47E-03	9.51E-03	4.49E-03	6.81E-02	
2W 23 10	AVE		1.56E-02	8.18E+01		1.47E-03	2.40E-03	1.55E-03	2.72E-02	
(216-S-25)	MIN		0.00E-01**	6.67E-01		0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	4.20E-01	6.31E-02	1.83E+02			7.49E-03	8.32E-03	3.43E-02	
2W 23 11	AVE	4.92E-02	2.43E-02	2.44E+01			1.68E-03	2.13E-03	4.10E-03	6.72E-03*
(216-U-10)	MIN	3.11E-03	0.00E-01**	7.87E-01			0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	1.91E-03	2.02E-02	8.64E-01						
2W 26 3	AVE	9.87E-04	7.53E-03	6.25E-01	9.72E-01*					
(216-S-6)	MIN	5.93E-04	0.00E-01**	7.00E-02						
	MAX	5.82E-03	3.95E-02	1.20E+02	5.00E-01					
6 32 72	AVE	8.33E-04	8.52E-03	1.14E+02	2.55E-01			5.13E-03*		
(216-S-19)	MIN	0.00E-01**	0.00E-01**	1.10E+02	1.40E-01					
	MAX	3.90E-02	5.59E-02	2.91E+00			6.63E-03	5.96E-03	4.18E-02	1.85E-02
6 35 78A	AVE	2.50E-02	1.73E-02	6.30E-01	6.67E-01*		1.62E-03	2.34E-03	1.32E-02	1.15E-02
(216-U-10)	MIN	8.06E-03	8.56E-03	3.44E-03			0.00E-01**	0.00E-01**	0.00E-01**	3.58E-03
	MAX		1.59E-01	2.24E+02	1.06E+01	5.13E-03	5.67E-03	3.84E-03	4.55E-02	6.24E-03
6 42 40A	AVE		2.61E-02	1.81E+02	6.88E+00	1.06E-03	8.14E-04	7.56E-04	1.21E-02	2.12E-03
(216-B-3)	MIN		0.00E-01**	9.49E+00	3.07E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	4.22E-04
	MAX		3.44E-01	2.48E+02	1.59E+01	2.77E-02	9.17E-03	8.16E-03	4.23E-02	
6 42 40B	AVE		3.76E-02	1.91E+02	1.18E+01	3.16E-03	2.17E-03	1.91E-03	6.54E-03	
(216-B-3)	MIN		0.00E-01**	9.22E+00	5.13E+00	0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	

*-- 3 VALUES OR LESS, NO MAX OR MIN CALCULATED

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

RHO-RE-SR-84-24 P

APPENDIX B. RESULTS OF THE GROUND-WATER MONITORING NETWORK IN CY 1983.

WELL NO. (WASTE SITE)		TOTAL ALPHA (PCI/ML)	TOTAL BETA (PCI/ML)	TRITIUM (PCI/ML)	NITRATE (MG/L)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	RUTHENIUM (PCI/ML)	URANIUM (PCI/ML)
	MAX	9.23E-03	9.90E-02			5.07E-02	6.12E-03	1.04E-02	4.93E-02	
6 53 47A	AVE	1.57E-03	5.59E-02			3.23E-02	2.00E-03	2.47E-03	6.67E-03	
(216-A-25)	MIN	0.00E-01**	3.63E-02			2.13E-02	0.00E-01**	0.00E-01**	0.00E-01**	
	MAX	3.49E-03	7.10E-02			5.01E-03	1.25E-02	6.57E-03	8.88E-02	
6 53 55A	AVE	1.27E-03	1.73E-02			8.16E-04	4.04E-03	2.47E-03	2.35E-02	
(216-A-25)	MIN	3.56E-04	2.32E-03			0.00E-01**	0.00E-01**	0.00E-01**	0.00E-01**	

*-- 3 VALUES OR LESS, NO MAX OR MIN CALCULATED

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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APPENDIX C

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APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E25-10	2363	216-A-18,19 20	P	Q	Q		Q	Q	Q			Q
299-E25-11	2370	216-A-30	B		M	M	M	M	M	M	M	
299-E25-13	2523	241-AX	B		Q							
299-E25-17	2386	216-A-37-1	B	M	M	Q	Q	Q	Q	M	M	
299-E25-18	2387	216-A-37-1	P	M	M	Q	Q	Q	Q	M	M	
299-E25-19	2388	216-A-37-1	B	M	M	Q	Q	Q	Q	M	M	
299-E25-20	2389	216-A-37-1	P	M	M	Q	Q	Q	Q	M	M	
299-E25-21	2391	216-A-37-2	P		M	M	M	M	M	M	M	
299-E25-22	2392	216-A-37-2	P		M	M	M	M	M	M	M	
299-E25-23	2393	216-A-37-2	P		M	M	M	M	M	M	M	
299-E25-24	2394	216-A-37-2	P		M	M	M	M	M	M	M	
299-E26-2	2364	216-A-24	B		Q					Q	Q	
299-E26-4	2362	216-A-24	B		Q					Q	Q	
299-E27-5	2551	216-C-10	P		Q		Q	Q	Q			
299-E27-7	2557	241-C	P	Q	Q							
299-E28-12	2380	216-B-55	B		M		M	M	M	M		
299-E28-13	2324	216-B-55	P		M		M	M	M	M		
299-E28-16	2325	216-B-12	P		Q							
299-E28-17	2519	216-B-6 -10B	B	Q								
299-E28-18	2524	216-B-62	P	M	M	M	M	M	M	M	M	
299-E28-21	2556	216-B-62	P	M	M	M	M	M	M	M	M	
299-E28-23	2390	216-B-5	B	Q	Q	Q	Q	Q	Q	Q	Q	
299-E32-1	2358	200 East	P		S					S	S	
299-E33-1	2301	216-B-43	P		Q		Q	Q	Q			
299-E33-3	2303	216-B-44,45, 46	P		Q	Q	Q	Q	Q	Q		
299-E33-5	2308	216-B-47	P		Q		Q	Q	Q			
299-E33-7	2305	216-B-48,49, 50	P		Q		Q	Q	Q			
299-E33-8	2300	216-B-41	P		Q		Q	Q	Q			
299-E33-9	2299	241-BY	B		Q	Q	Q	Q	Q	Q	Q	

APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E13-5	2314	216-B-18	P		Q					Q		
299-E13-8	2334	216-B-21	P		Q		Q	Q	Q			
299-E13-14	2340	216-B-29	P		Q							
299-E13-19	2352	216-B-28	P		Q							
299-E16-2	2372	216-A-30	B		M	M	M	M	M	M	M	
299-E17-1	2328	216-A-10	P	M	M	M	M	M	M	M	M	
299-E17-2	2367	216-A-27	B	M	M					M	M	
299-E17-5	2511	216-A-36B	P	M	M	M	M	M	M	M	M	M
299-E17-6	2512	216-A-36B	P		M					Q	Q	
299-E17-8	2513	216-A-38	P		M	Q	Q	Q	Q	M	M	
299-E17-9	2514	216-A-36A	P	M	M	M	M	M	M	M	M	
299-E23-2	2376	200 East	B		Q					Q	Q	
299-E24-1	2317	216-A-5	B		M	Q	Q	Q	Q	M	M	
299-E24-2	2326	216-A-10	P	M	M	M	M	M	M	M	M	
299-E24-4	2329	216-A-9	B		M	Q	Q	Q	Q	M	M	
299-E24-8	2355	216-C-3,4,5	P		M		M	M	M	M	M	
299-E24-12	2521	216-A-21,31	P		M					M	M	
299-E24-13	2383	241-A	B		Q							
299-E25-2	2316	216-A-1,7	B		S					S	S	
299-E25-3	2318	216-A-6	B		Q							
299-E25-6	2343	216-A-8	B	M	M	M	M	M	M	M	Q	
299-E25-9	2344	216-A-8	B	M	M	M	M	M	M	M	Q	

APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E33-10	2306	216-B-35,41	P		Q		Q	Q	Q	Q	Q	
299-E33-18	2309	216-B-7A,7B,	P		Q	Q	Q	Q	Q			
299-E33-20	2332	216-B-7A,7B 11A,11B	B		Q	Q						
299-E33-21	2353	216-B-36	P		Q		Q	Q	Q			
299-E33-24	2520	216-B-57	P		Q		Q	Q	Q			
299-E33-26	2382	216-B-61	P		Q		Q	Q	Q			
299-E33-27	2527	241-BX	B		Q		Q	Q	Q	Q		
299-E34-1	2549	216-B-63	P		M		M	M	M	M		
299-W10-1	2892	216-T-5	B		Q							
299-W10-3	2885	216-T-32	B	Q	Q							
299-W10-4	2886	216-T-36	P		Q		Q	Q	Q			
299-W10-8	2996	241-T	P	Q	Q		Q	Q	Q			
299-W10-9	3009	241-T	P	Q	Q		Q	Q	Q			
299-W11-11	2887	216-T-18	P	Q	Q		Q	Q	Q			
299-W11-13	2942	200 West	B		S					S	S	
299-W11-15	2961	216-T-34	P		Q							
299-W11-18	2963	216-T-35	P		Q							
299-W11-23	2616	241-T	P	Q	Q		Q	Q	Q			
299-W11-24	3010	241-T	P	Q	Q		Q	Q	Q			
299-W14-2	2895	216-T-26,27, 28	P	Q	Q					Q		
299-W14-5	3007	241-TX	P		Q					Q		
299-W14-6	3008	241-TX	P		Q					Q		
299-W14-10	3018	216-W-LWC	P	M	M	M	M	M	M	M	M	

APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-W15-3	2894	241-TY	B		Q		Q	Q	Q			
299-W15-4	2896	216-T-19	P		Q					Q	Q	
299-W15-6	2934	216-Z-9	B	Q	Q						Q	
299-W15-7	2960	216-Z-7	P	Q	Q		Q	Q	Q		Q	
299-W15-10	2609	216-Z-16	P	Q	Q						Q	
299-W15-11	2610	216-Z-16	P	Q	Q						Q	
299-W18-5	2933	216-Z-12	P	Q	Q							
299-W18-9	2965	216-Z-18	B	Q	Q						Q	
299-W18-12	2967	216-Z-18	P	M	M					Q	Q	Q
299-W18-15	3015	216-U-10	P	M	M		M	M	M	M	M	
299-W18-17	3016	216-Z-20	B	Q	Q		Q	Q	Q	Q	Q	
299-W18-18	3017	216-Z-20	P	Q	Q		Q	Q	Q	Q	Q	
299-W18-19	3019	216-Z-20	P	M	M		M	M	M	M	M	
299-W18-20	3020	216-Z-20	B	M	M		M	M	M	M	M	
299-W19-2	2928	216-U-8	P		Q					Q	Q	Q
299-W19-3	2929	216-U-1,2	P	Q	Q		Q	Q	Q	Q	Q	Q
299-W19-5	2968	216-S-23	P		Q					Q	Q	
299-W19-11	2619	216-U-1	P	Q			Q	Q	Q	Q	Q	
299-W19-12	2618	241-U	P	Q	Q		Q	Q	Q	Q	Q	Q
299-W19-13	----▲	216-U-16	P	Q	Q	Q	Q	Q	Q	Q	Q	Q
299-W19-14	----▲	216-U-16	P	Q	Q	Q	Q	Q	Q	Q	Q	Q
299-W22-1	2919	216-S-1	P	Q	Q	Q	Q	Q	Q	Q	Q	

APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-W22-2	2920	216-S-1,2	P	Q	Q	Q	Q	Q	Q	Q	Q	
299-W22-12	2912	216-S-7	P		Q	Q				Q	Q	
299-W22-20	2926	216-S-20	P		Q	Q				Q		
299-W22-21	2931	216-S-13	P	Q	Q	Q	Q	Q	Q		Q	
299-W22-22	2939	216-U-12	P	M	M	M	M	M	M	M	M	M
299-W22-26	2954	216-S-9	P		Q	Q	Q	Q	Q	Q		
299-W22-27	2955	216-S-9,18	B		S					S	S	
299-W23-1	2898	216-S-3; 241-S	B		Q							
299-W23-2	2910	241-SX	B		Q							
299-W23-3	2911	241-SX	B		Q							
299-W23-4	2925	216-S-21	P	Q	Q					Q	Q	Q
299-W23-9	2993	216-S-25	B	M	M	M	M	M	M	M		
299-W23-10	2994	216-S-25	P		M	M	M	M	M	M		
299-W23-11	2995	216-U-10	P	M	M		M	M	M	M		
299-W26-3	2917	216-S-6	P	Q	Q					Q	Q	
299-W26-6	----▲	216-S-5	P	Q	Q					Q	Q	
299-W27-1	----▲	216-S-26	P	Q	Q	Q	Q	Q	Q	Q	Q	Q
699-32-72	4868	216-S-19	P	M	M							
699-35-78A	4869	216-U-10	P	M	M		M	M	M	M	Q	Q
699-42-40A	4874	216-B-3	P		M	M	M	M	M	M	Q	Q
699-42-40B	4875	216-B-3	P		M	M	M	M	M	M	Q	
699-50-42	4460	216-A-25	P	Q	Q	Q						
699-53-47A	4866	216-A-25	P	M	M	M	M	M	M			
699-53-47B	4600	216-A-25	P	M	M	M	M	M	M			

APPENDIX C.1. SEPARATIONS AREA UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULE FOR CY 1984.

Well	EMA No.	Site Monitored	Sample Type[a]	Total Alpha	Total Beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
699-53-48A	----▲	216-A-25	P	M	M	M	M	M	M			
699-53-48B	----▲	216-A-25	P	M	M	M	M	M	M			
699-54-48	----▲	216-A-25	P	M	M	M	M	M	M			
699-53-55A	4867	216-A-25	P	M	M	M	M	M	M			
699-55-50C	4483	216-A-25	P	Q	Q	Q						
699-55-50D	----	216-A-25	B	Q	Q	Q						
699-59-58	4827	216-A-25	P	S	S	S						
699-63-58	4822	216-A-25	P	S	S	S						

[a]P = Pump; B = Bailer.

▲ = Well to be constructed in FY 1984.

APPENDIX C.2. SEPARATIONS AREA CONFINED AQUIFER MONITORING SCHEDULE FOR CY 1984.

Well	EMA NO.	Site Monitored	Sample Type [a]	^3H	NO_3
299-E26-8	---	Rattlesnake Ridge	B	S	S
299-E33-12	2294	"	B	S	S
699-42-40C	---	"	B	S	S
699-47-50	4882	"	B	S	S
699-49-55B	---	"	B	S	S
699-50-45	---	"	B	S	S
699-50-48	4883	"	B	S	S
699-51-46	4884	"	B	S	S
699-52-46A	---	"	B	S	S
699-52-48	4886	"	B	S	S
699-53-50	---	"	B	S	S
699-54-57	4469	"	B	S	S
699-56-53	---	"	B	S	S

[a]P = Pump; B = Bailer

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APPENDIX D

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APPENDIX D.1. ANALYSES OF SPECIAL SAMPLES.

WELL NO. & CONCENTRATION

	299-W22-22 EMA 2939	299-W22-22 EMA 2939	299-W22-24T	699-31-65R EMA 4495	EPA Drinking Water Limits[1]
PH	7.52	7.85	8.15	8.48	
Total dissolved solids mg/L	225	224	279	193	
Nitrate-N mg/L	1.4	1.4	0.21	0.05	10
Sulfate mg/L	15.5	15.0	1.7	26	250
Chloride mg/L	29	30	39	7.5	250
Fluoride mg/L	0.48	0.44	0.42	0.42	2.2
Total alkalinity mg/L	112	119	110	137	
HCO_3 alkalinity mg/L	110	115	100	125	
Silica mg/L	45	29	77	16	
Iron mg/L	0.21	0.48*	0.067	<0.03	0.3
Manganese mg/L	0.35*	0.95*	0.097*	0.053*	.05
Calcium mg/L	32	37	31	26	
Magnesium mg/L	14.3	14.6	11.2	9.5	
Sodium mg/L	12.5	12.7	15.7	29	20 (proposed)
Potassium mg/L	4.4	4.4	5.5	6.3	

* Exceeds EPA Drinking Water Limit
[1] EPA 1976

APPENDIX D.1. ANALYSES OF SPECIAL SAMPLES.

	WELL NO. & CONCENTRATION				
	699-31-65R EMA 4495	699-36-46P EMA 4756	699-36-46R EMA 4753	699-36-46Q EMA 4752	EPA Drinking Water Limits[1]
PH	8.53	8.65	9.3	8.64	
Total dissolved solids mg/L	214	219	182	208	
Nitrate-N mg/L	3.1	0.02	0.27	0.02	10
Sulfate mg/L	21	22	56	20	250
Chloride mg/L	7.0	< 1	13.0	< 1	250
Fluoride mg/L	0.37	0.42	0.46	0.38	2.2
Total alkalinity mg/L	155	149	72	142	
HCO_3 alkalinity mg/L	140	135	53	140	
Silica mg/L	34	37	1.6	24	
Iron mg/L	< 0.03	0.047	0.43 *	< 0.03	.3
Manganese mg/L	0.023	0.022	0.015	0.021	.05
Calcium mg/L	32	48	20	28	
Magnesium mg/L	18.5	11.5	7.7	13.5	
Sodium mg/L	16.5	25 *	22 *	21 *	20 (proposed)
Potassium mg/L	5.5	11.2	7.3	9.3	

* Exceeds EPA Drinking Water Limit
[1] EPA 1976.

APPENDIX D.2. TRACE METAL ANALYSES OF SPECIAL SAMPLES.

CONCENTRATION OF TRACE METALS

Well & Date		Cu mg/L	Co mg/L	Cr mg/L	Ni mg/L	Pb mg/L	Mn mg/L	Zn mg/L	Cd mg/L	Ag mg/L	Ba mg/L
299E-25-18	8/12	<0.01	<0.05	<0.01	<0.05	<0.005	0.05	<0.05	<0.001	<0.01	0.12
299E-25-20	8/12	<0.01	<0.05	<0.01	<0.05	<0.005	0.03	<0.05	<0.001	<0.01	0.48
299E-25-21	8/11	<0.01	<0.05	<0.01	<0.05	<0.005	0.04	<0.05	<0.001	<0.01	0.10
299E-25-22	8/11	<0.01	<0.05	<0.01	<0.05	<0.005	<0.01	<0.05	<0.001	<0.01	0.10
299E-25-23	8/11	<0.01	<0.05	<0.01	<0.05	<0.005	0.01	<0.05	<0.001	<0.01	0.10
299E-25-24	8/11	<0.01	<0.05	<0.01	<0.05	<0.005	0.13	0.06	<0.001	<0.01	0.19
299W-22-22	8/16	<0.01	<0.05	<0.01	<0.05	<0.005	0.56	<0.05	<0.001	<0.01	0.17

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APPENDIX A

LONG TERM CONCENTRATION HISTORIES

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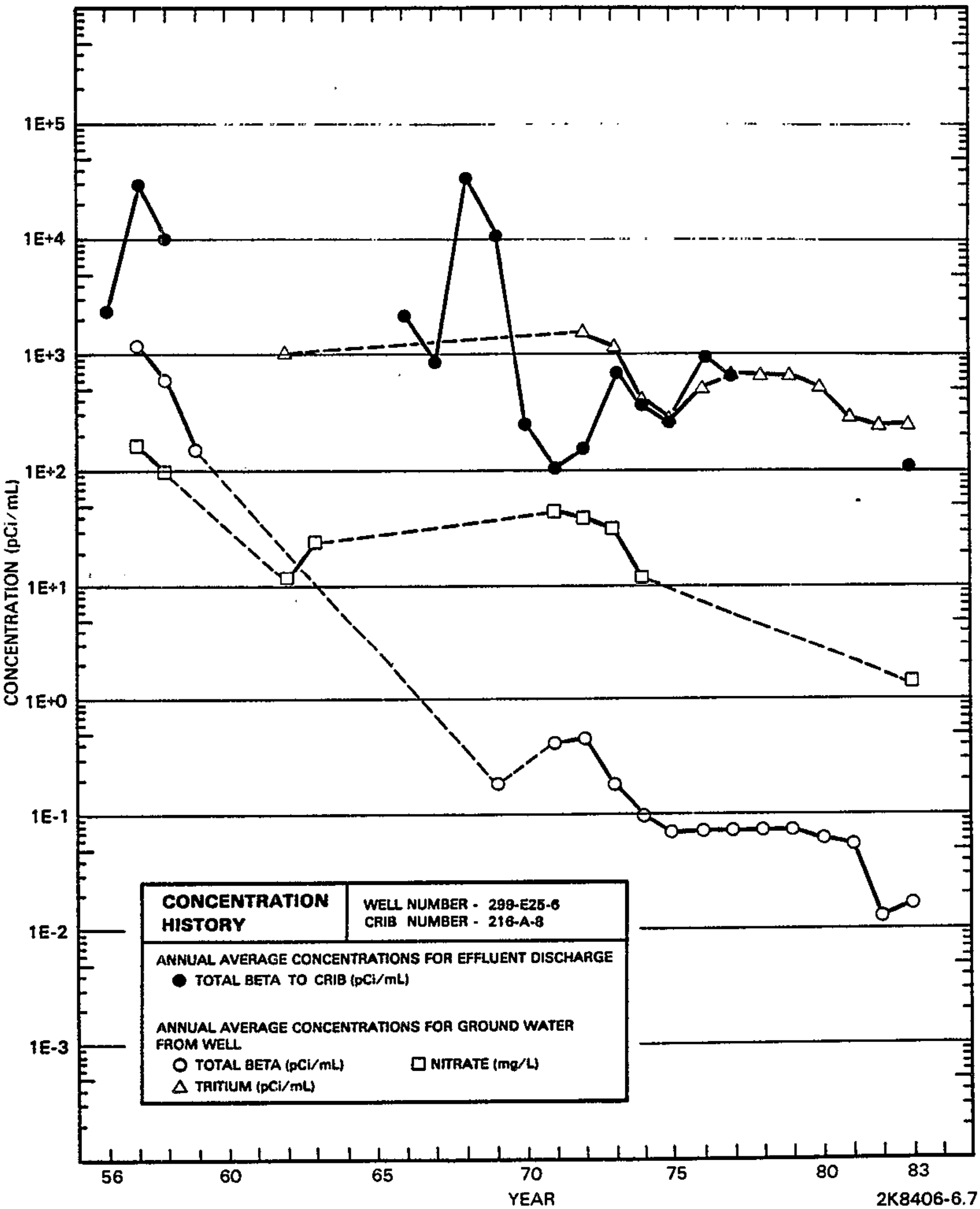
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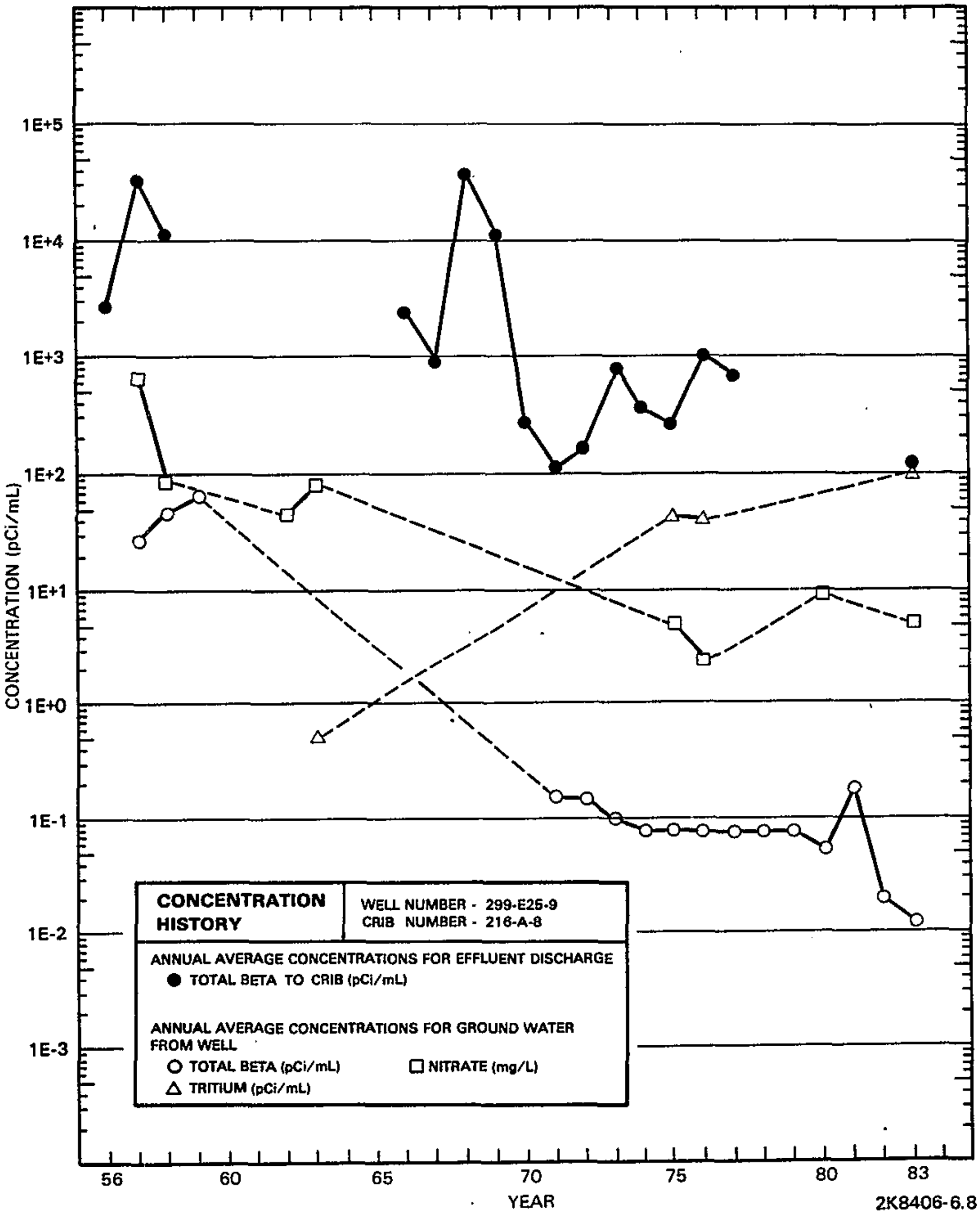
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.7
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-6
CRIB NUMBER - 216-A-8
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
□ NITRATE (mg/L)
△ TRITIUM (pCi/mL)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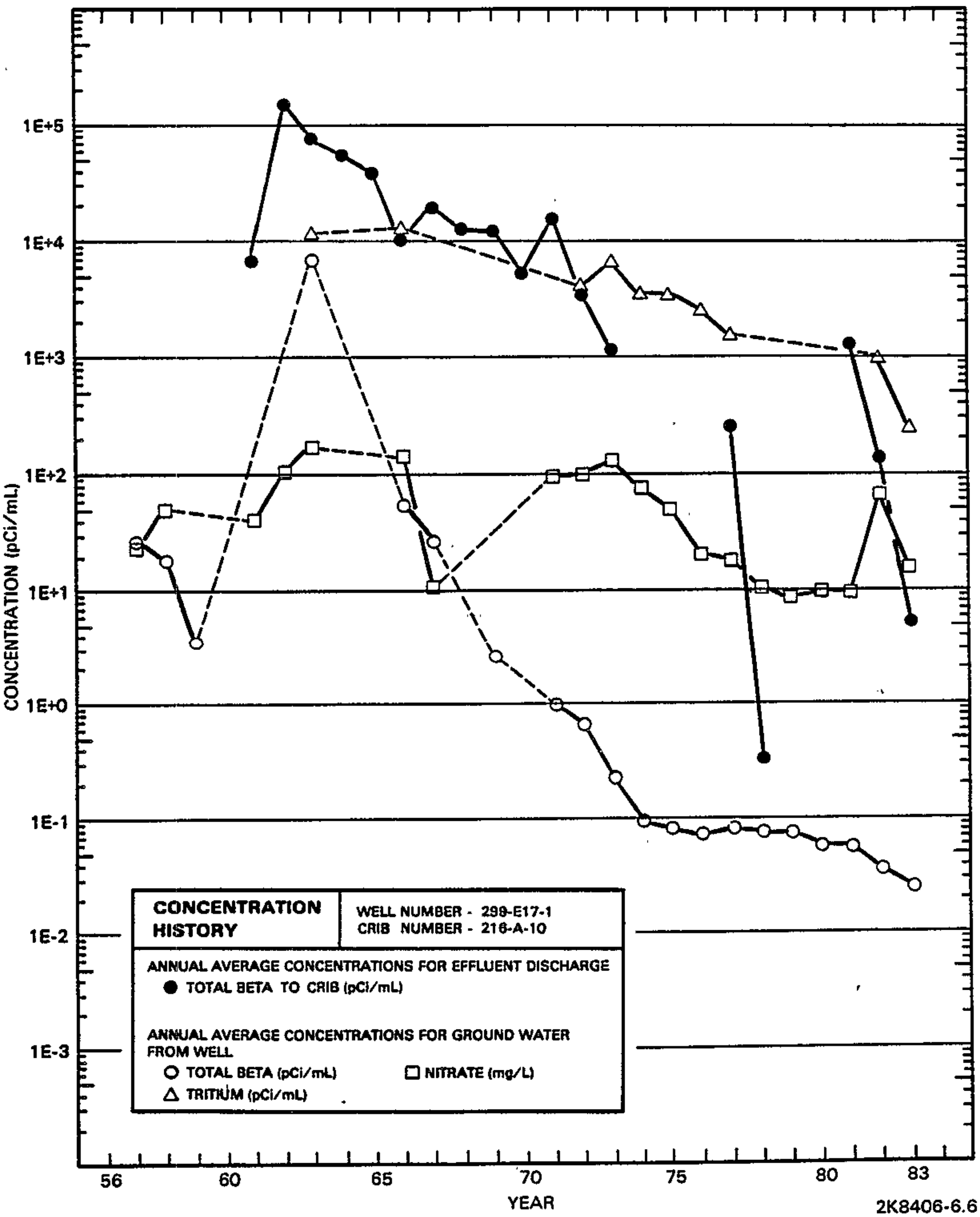
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-9
CRIB NUMBER - 216-A-8
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)
2K8406-6.8



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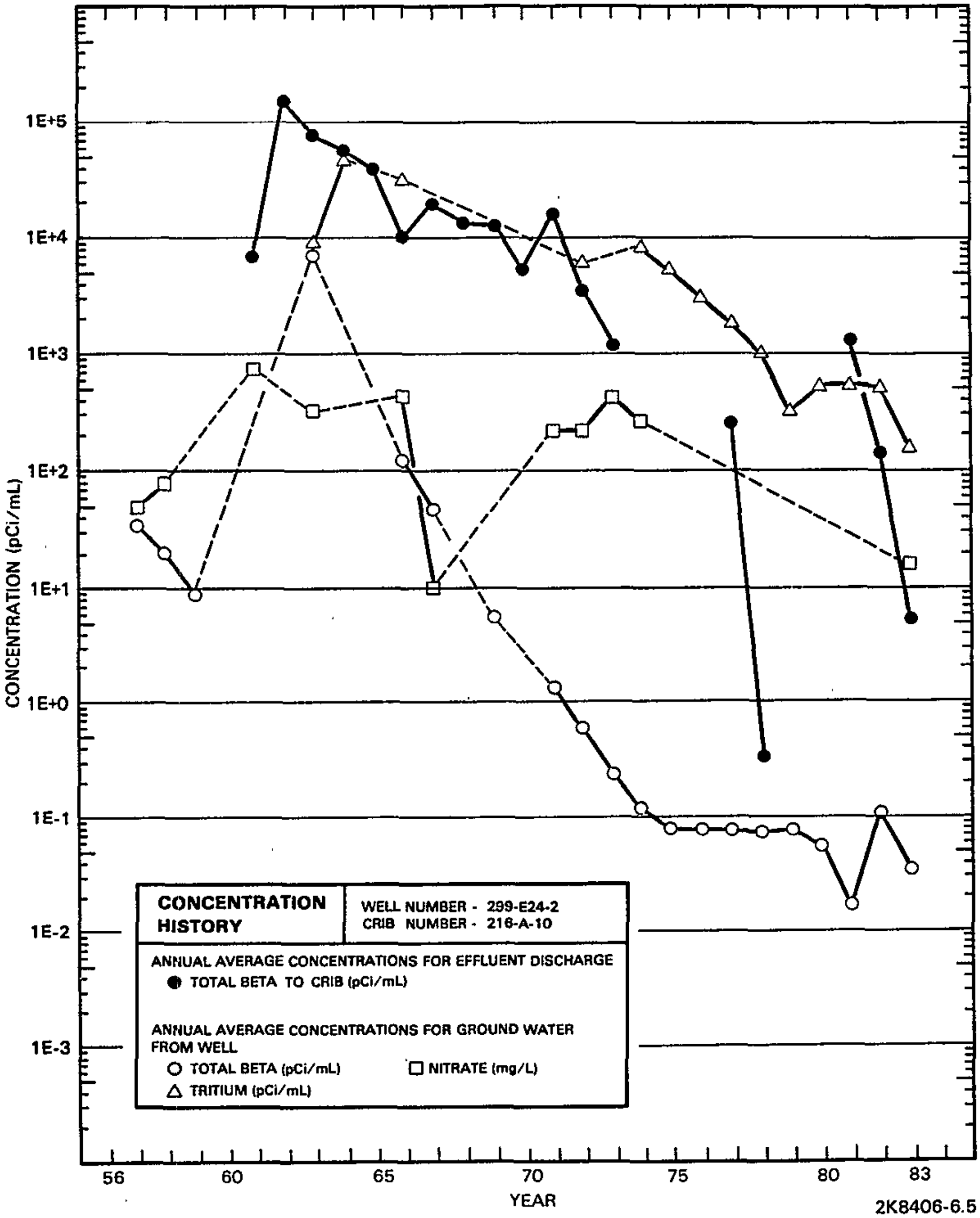
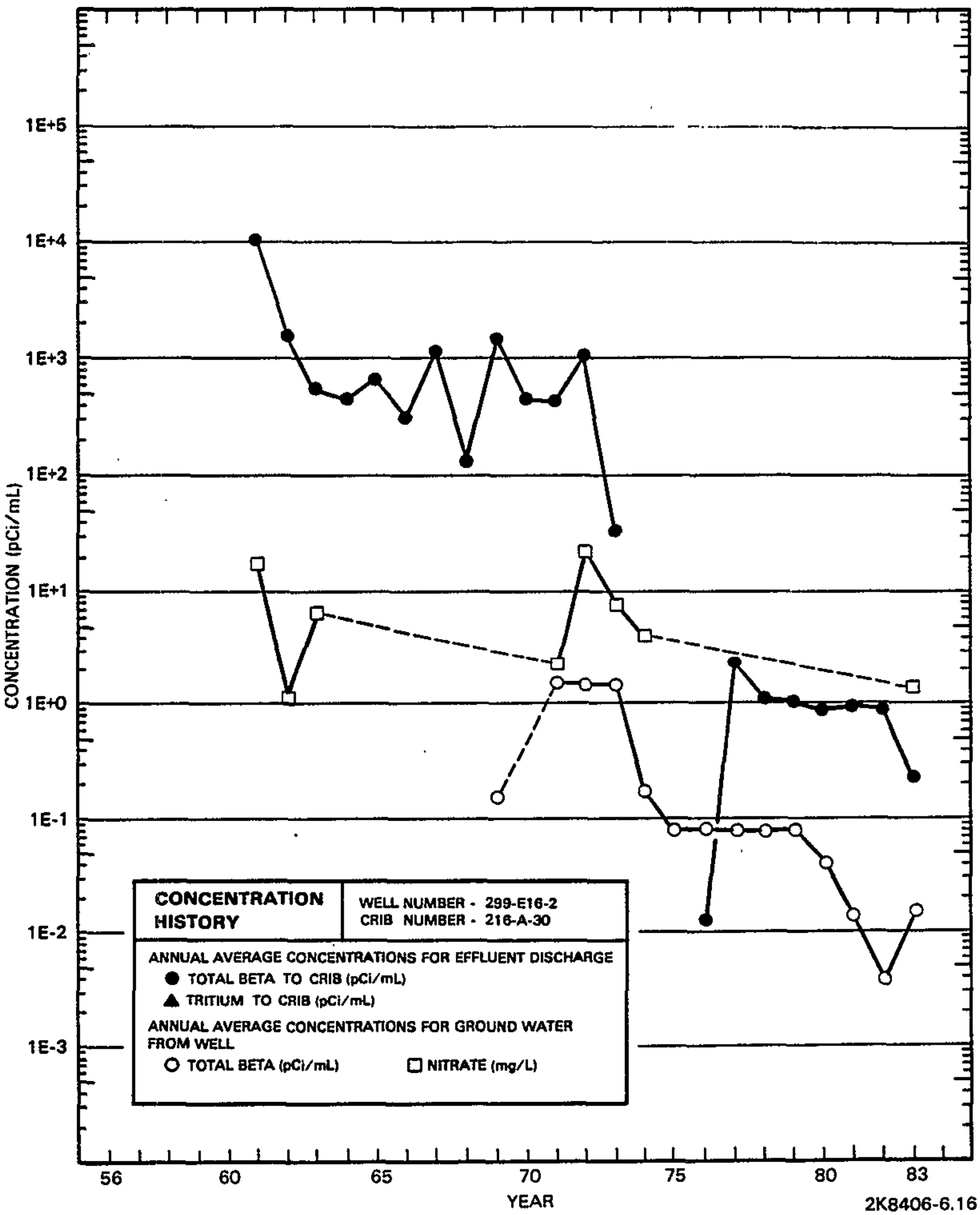

CONCENTRATION (pCi/mL)
1E+5
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
56
60
65
70
75
80
83
YEAR
CONCENTRATION HISTORY
WELL NUMBER - 299-E24-2
CRIB NUMBER - 216-A-10
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)
2K8406-6.5



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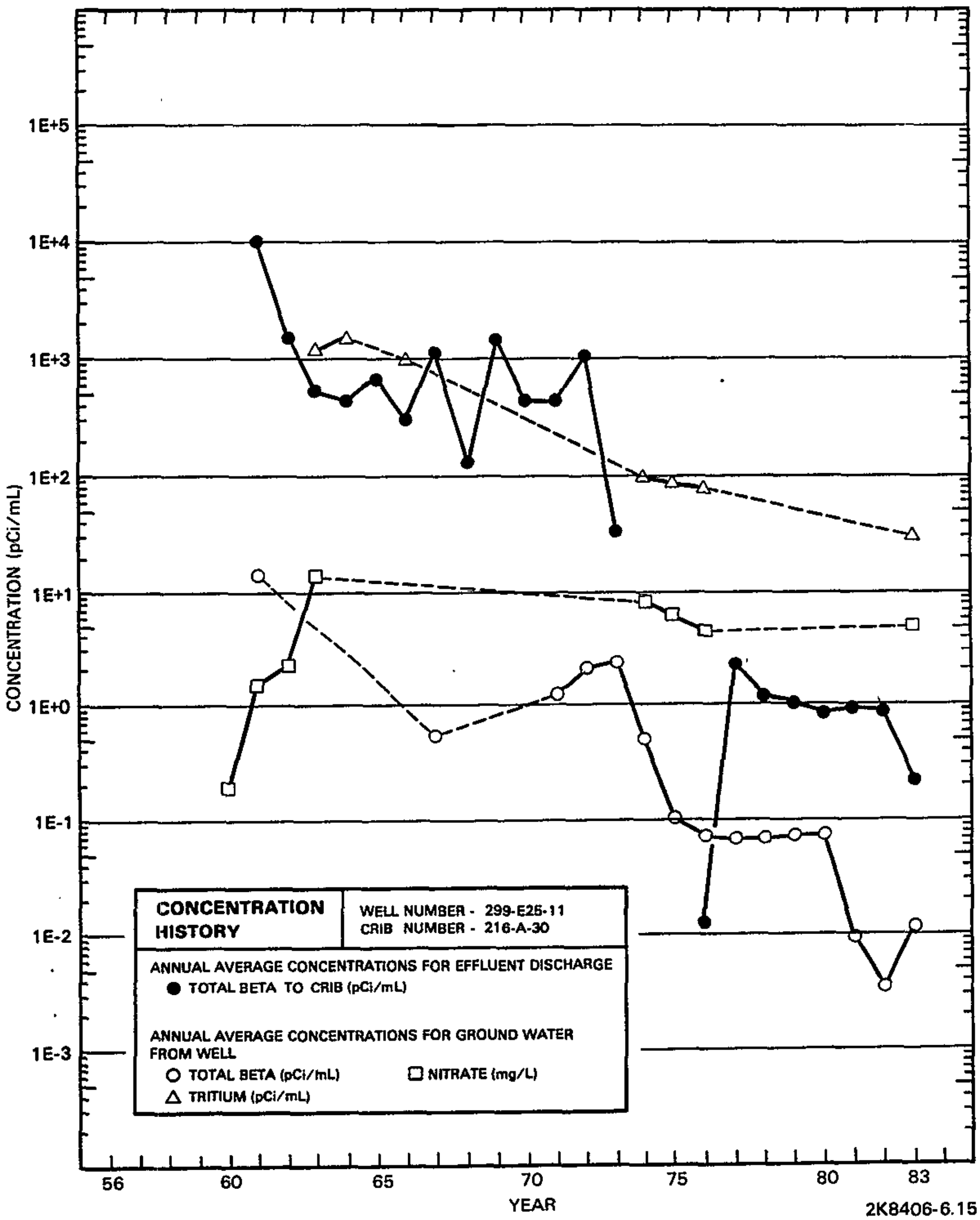
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1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.15
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-11
CRIB NUMBER - 216-A-30
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)

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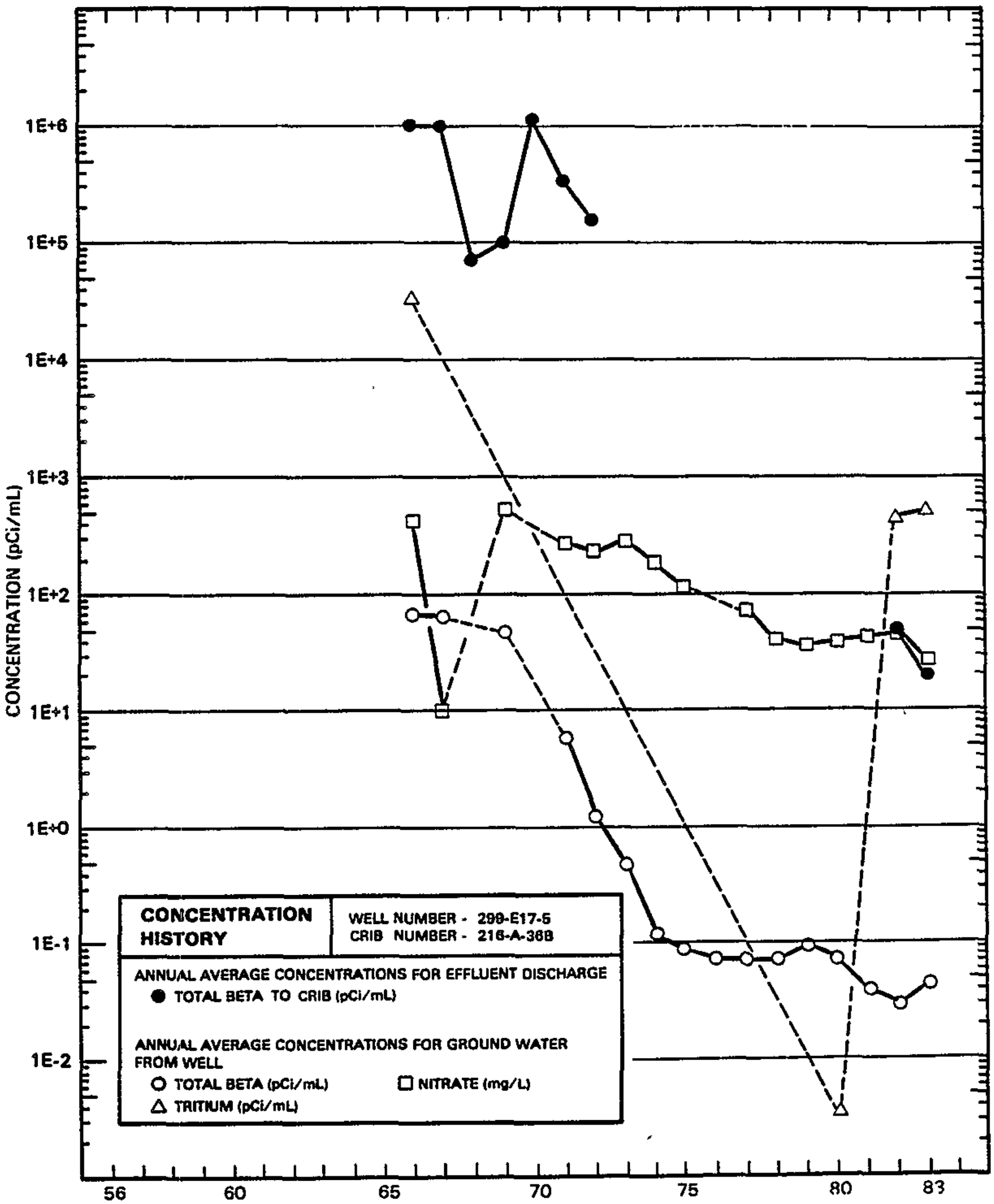
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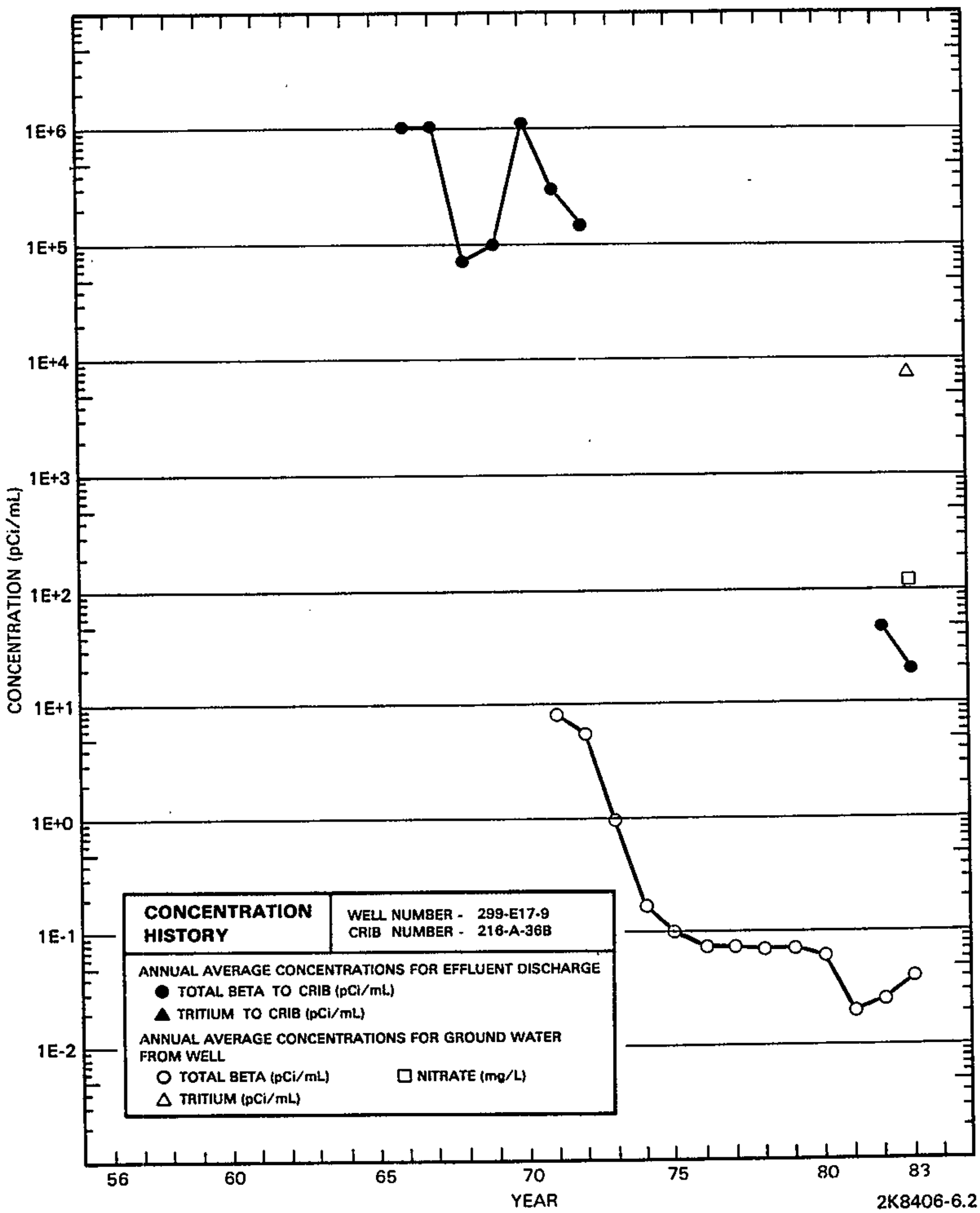
1E+5
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
CONCENTRATION HISTORY
WELL NUMBER - 299-E17-5
CRIB NUMBER - 216-A-36B
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)

2K8406-6.3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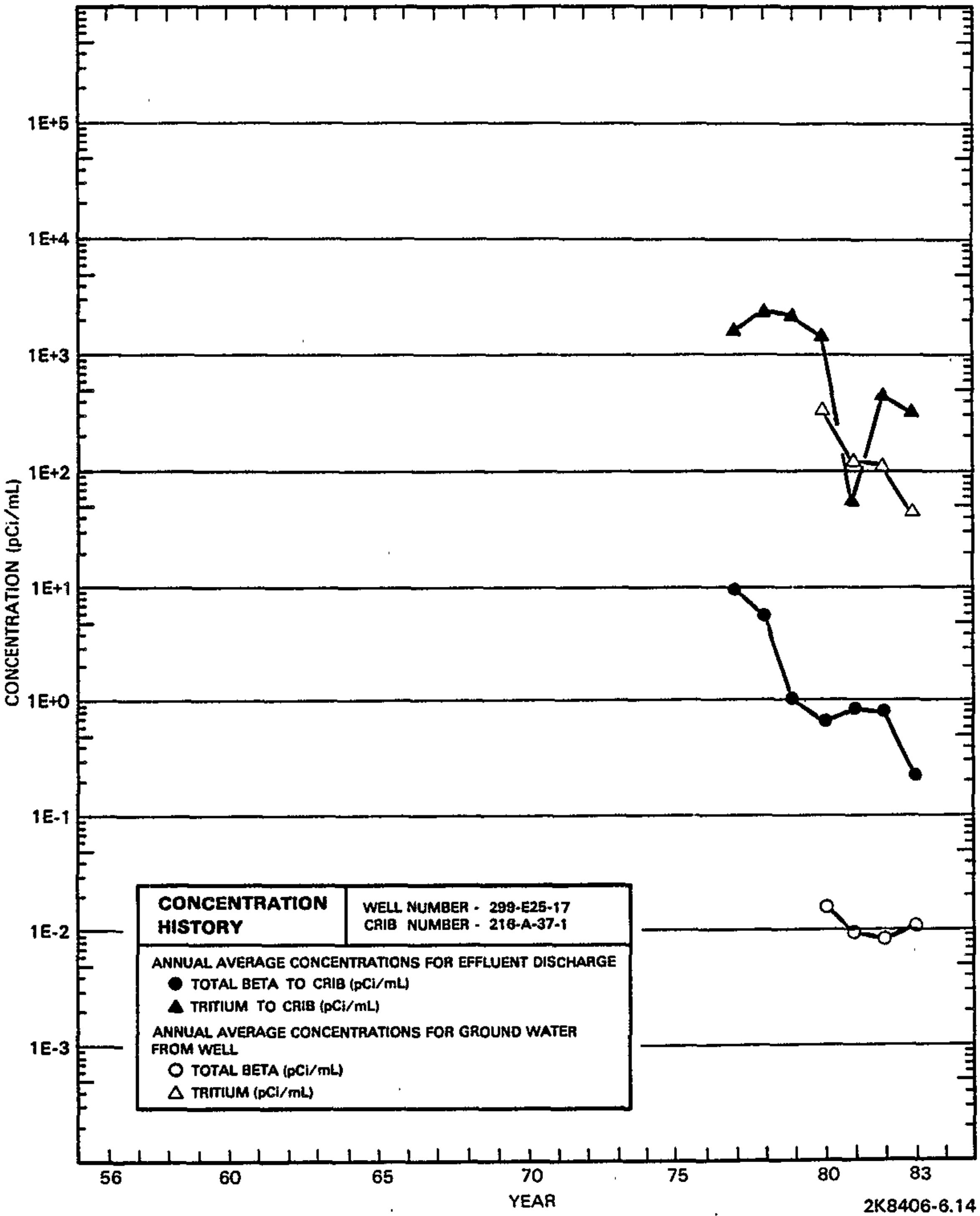
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-E17-9
CRIB NUMBER - 216-A-36B
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.2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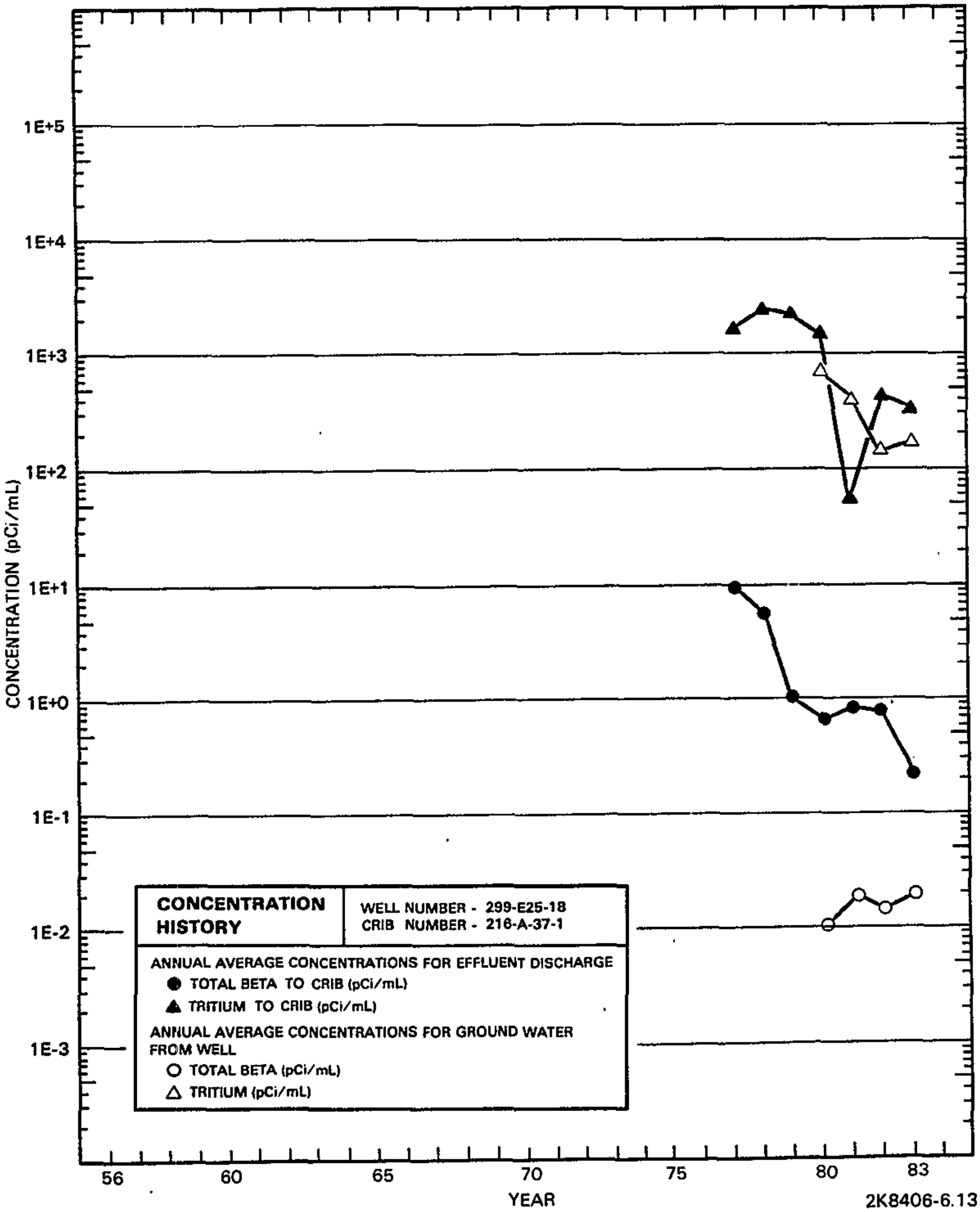
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-17
CRIB NUMBER - 216-A-37-1
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
▲ TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
△ TRITIUM (pCi/mL)
2K8406-6.14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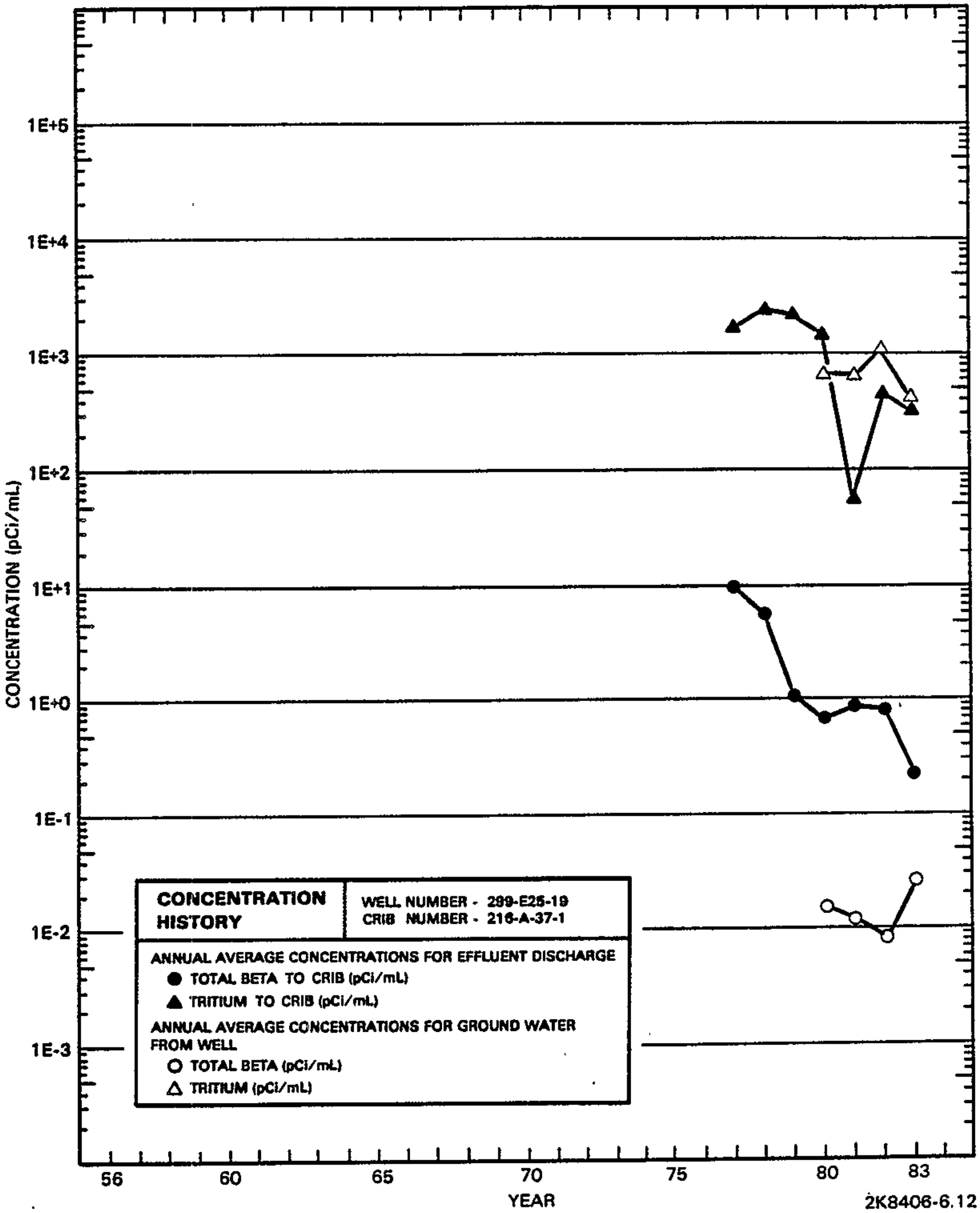
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-18
CRIB NUMBER - 216-A-37-1
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
▲ TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
△ TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.13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1E+4
1E+3
1E+2
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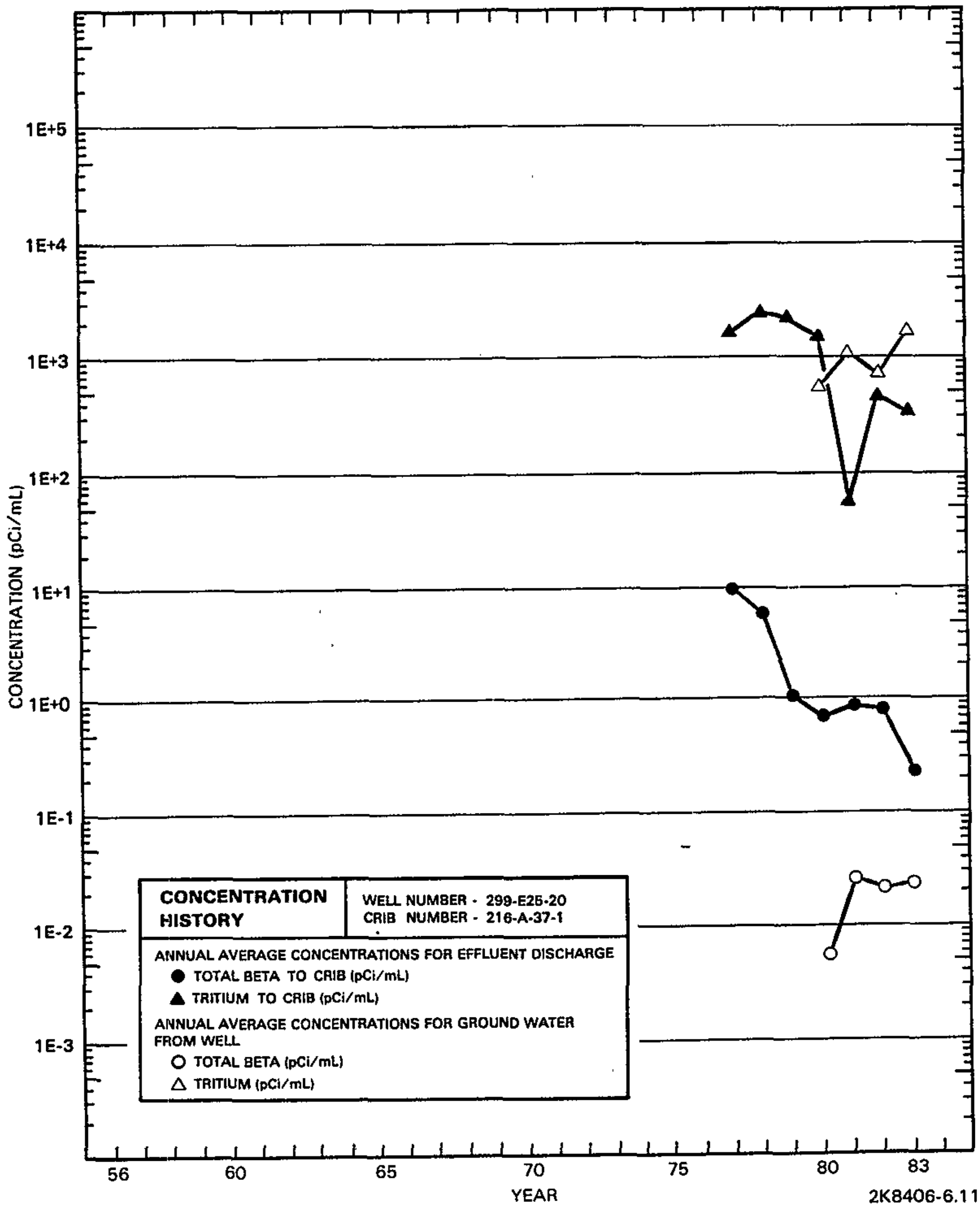
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-E25-19
CRIB NUMBER - 216-A-37-1
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
▲ TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
△ TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.12



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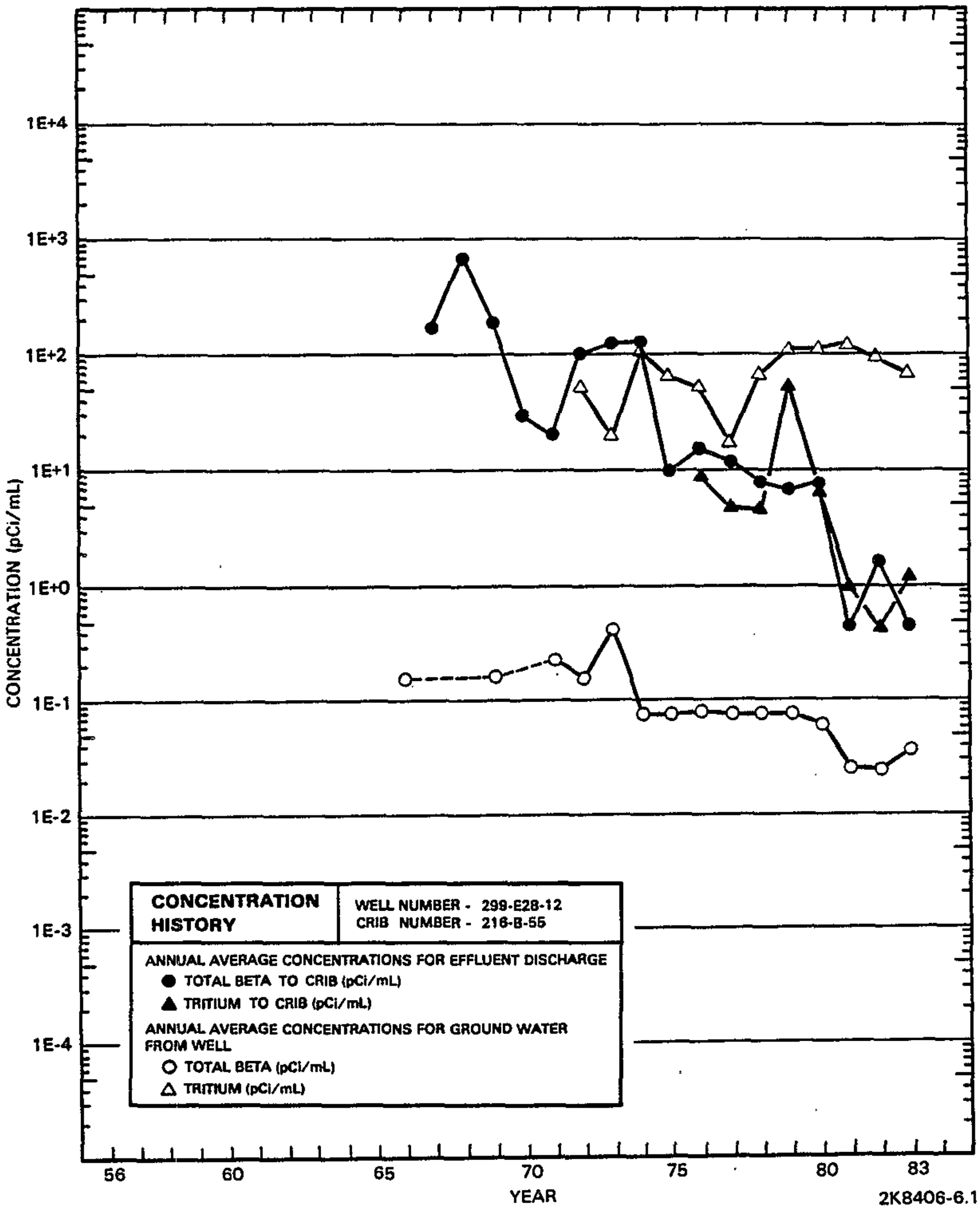
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1E+3
1E+2
1E+1
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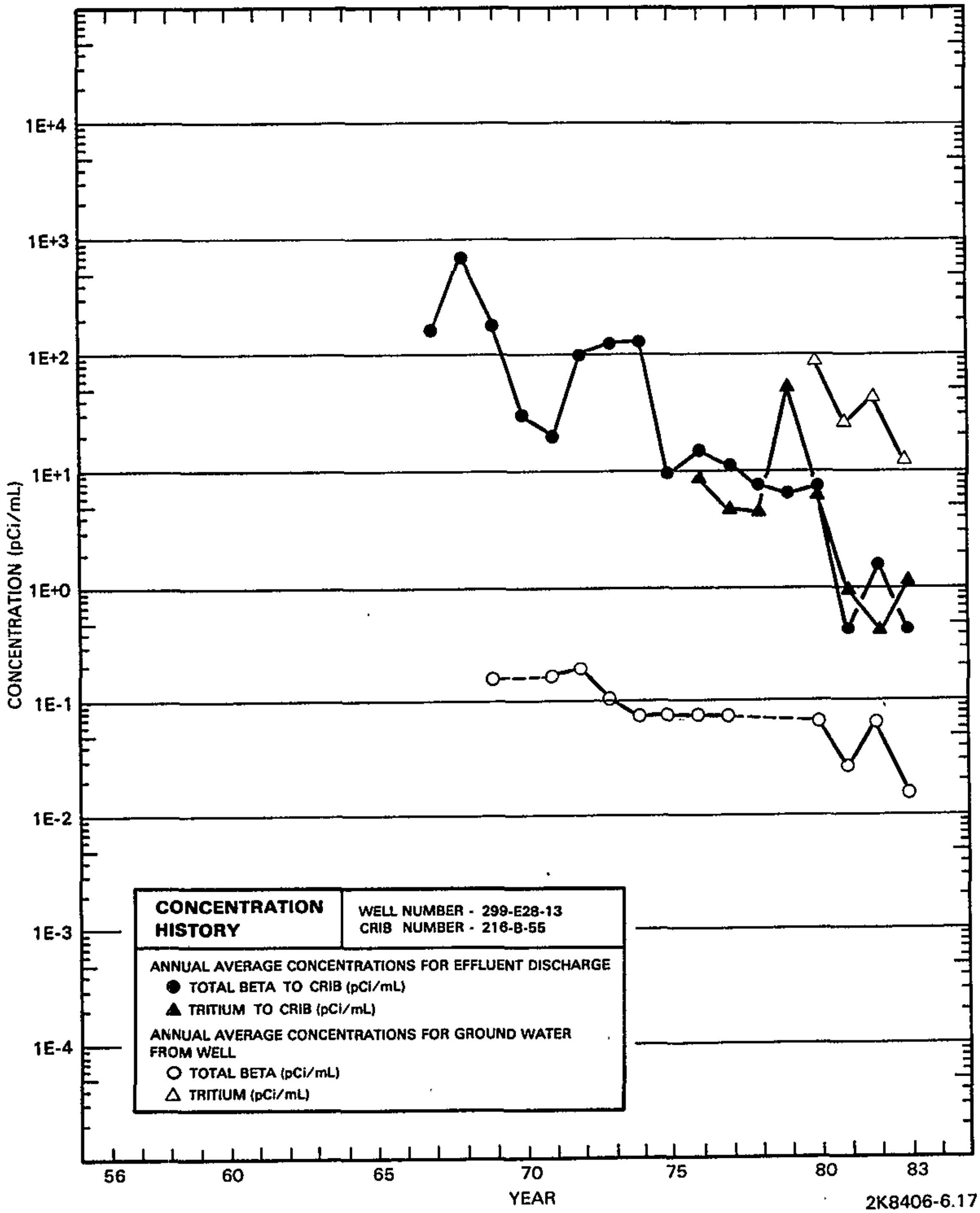
1E-2
1E-3
1E-4
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-E28-12
CRIB NUMBER - 216-B-55
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
▲ TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
△ TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.1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1E+2
1E+1
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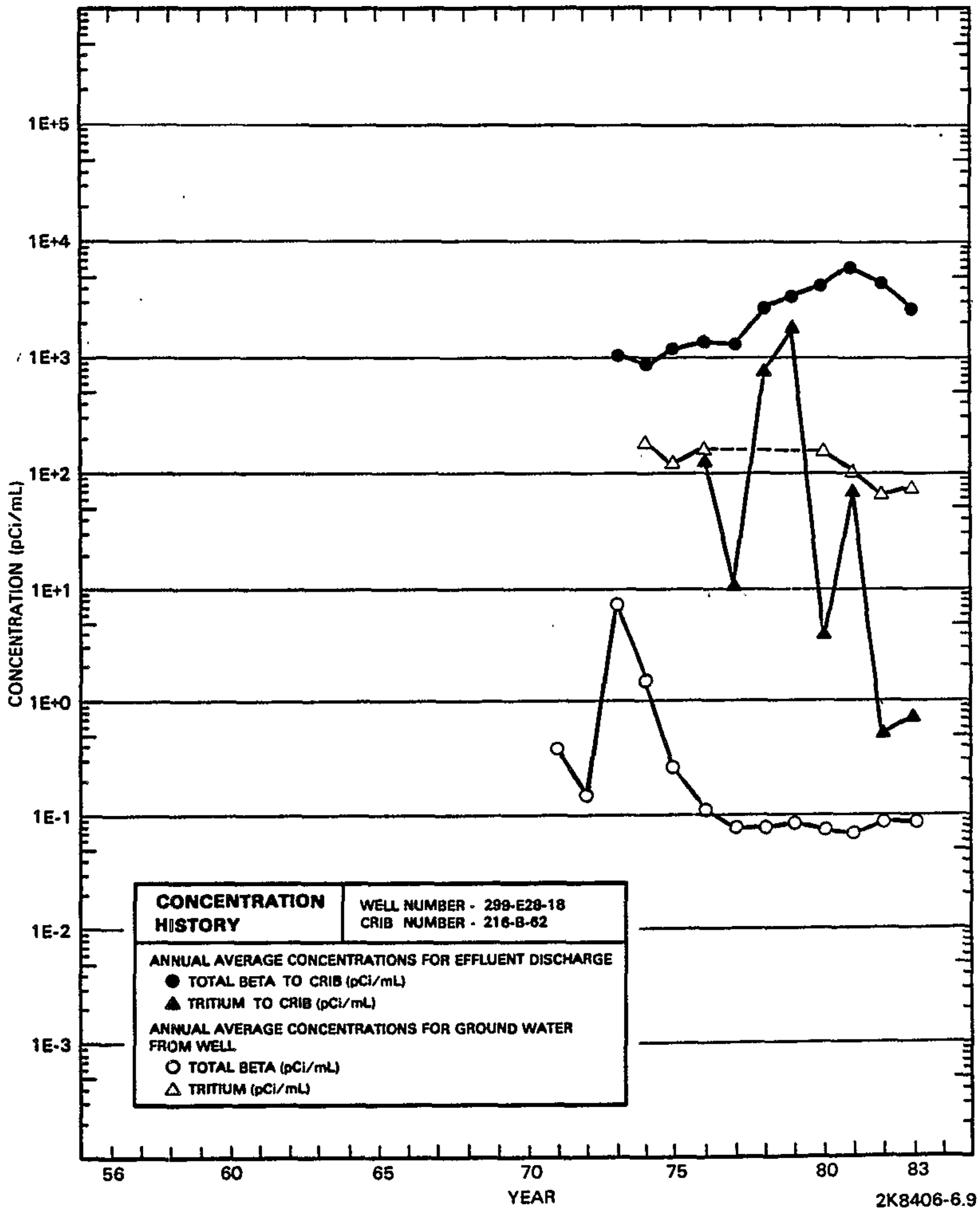
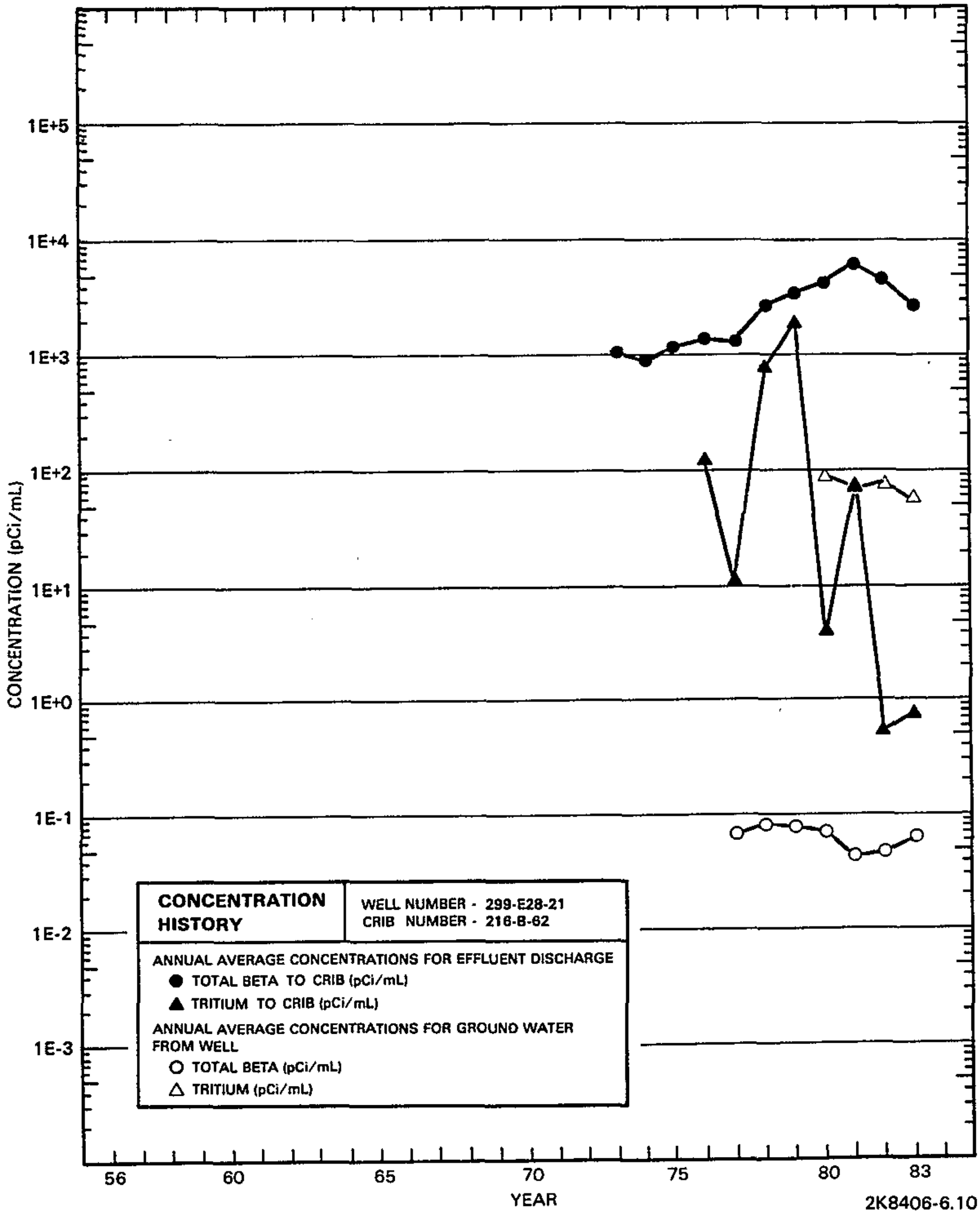
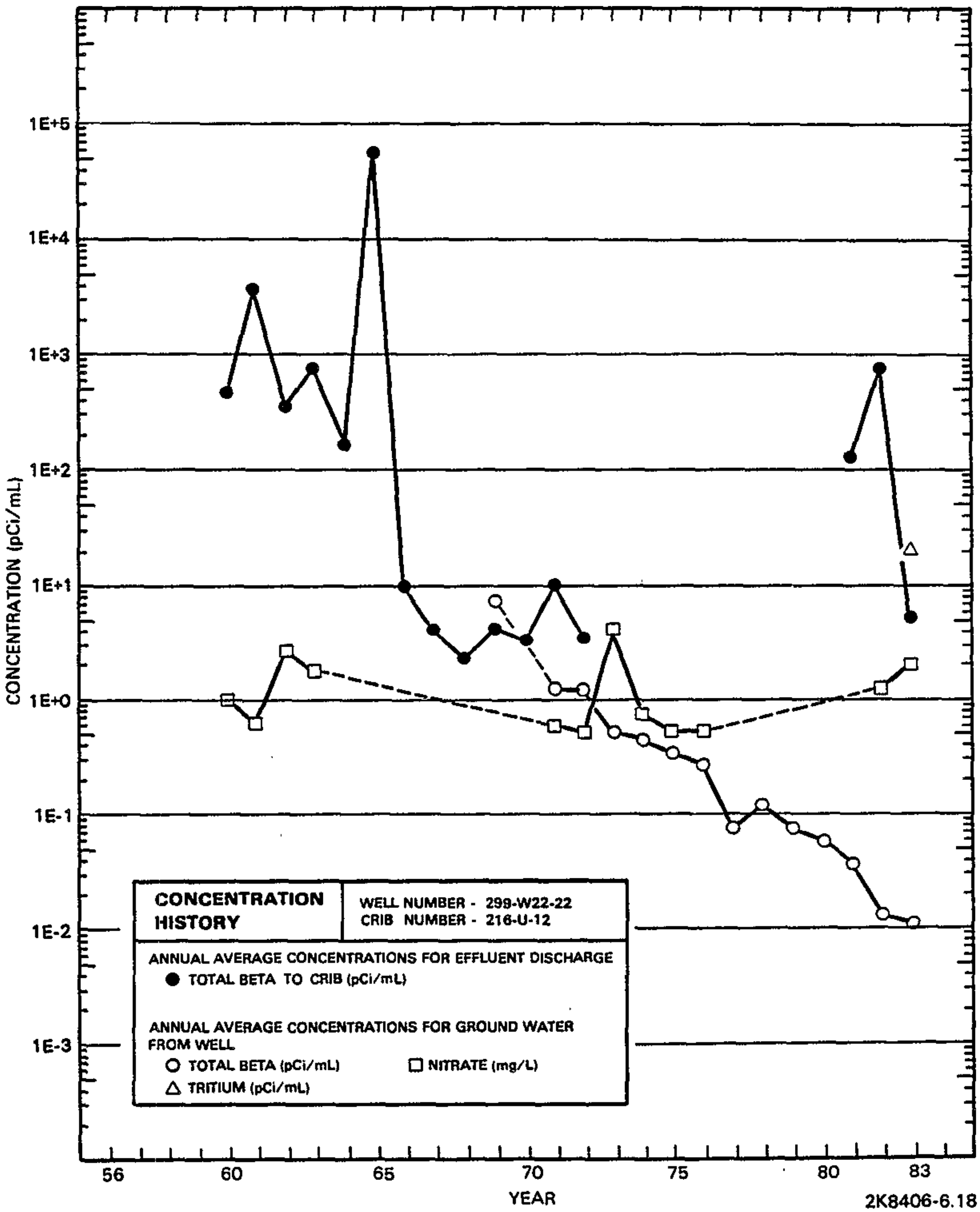
1E-1
1E-2
1E-3
1E-4
CONCENTRATION (pCi/mL)
56
60
65
70
75
80
83
YEAR
CONCENTRATION HISTORY
WELL NUMBER - 299-E28-13
CRIB NUMBER - 216-B-55
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
TRITIUM (pCi/mL)
2K8406-6.17



2K8406-6.9

9 2 1 2 4 5 6 0 9 3 2


1E+5
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-E28-21
CRIB NUMBER - 216-B-62
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
● TOTAL BETA TO CRIB (pCi/mL)
▲ TRITIUM TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
○ TOTAL BETA (pCi/mL)
△ TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.10


1E+5
1E+4
1E+3
1E+2
1E+1
1E+0
1E-1
1E-2
1E-3
CONCENTRATION (pCi/mL)
CONCENTRATION HISTORY
WELL NUMBER - 299-W22-22
CRIB NUMBER - 216-U-12
ANNUAL AVERAGE CONCENTRATIONS FOR EFFLUENT DISCHARGE
TOTAL BETA TO CRIB (pCi/mL)
ANNUAL AVERAGE CONCENTRATIONS FOR GROUND WATER FROM WELL
TOTAL BETA (pCi/mL)
NITRATE (mg/L)
TRITIUM (pCi/mL)
56
60
65
70
75
80
83
YEAR
2K8406-6.18

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