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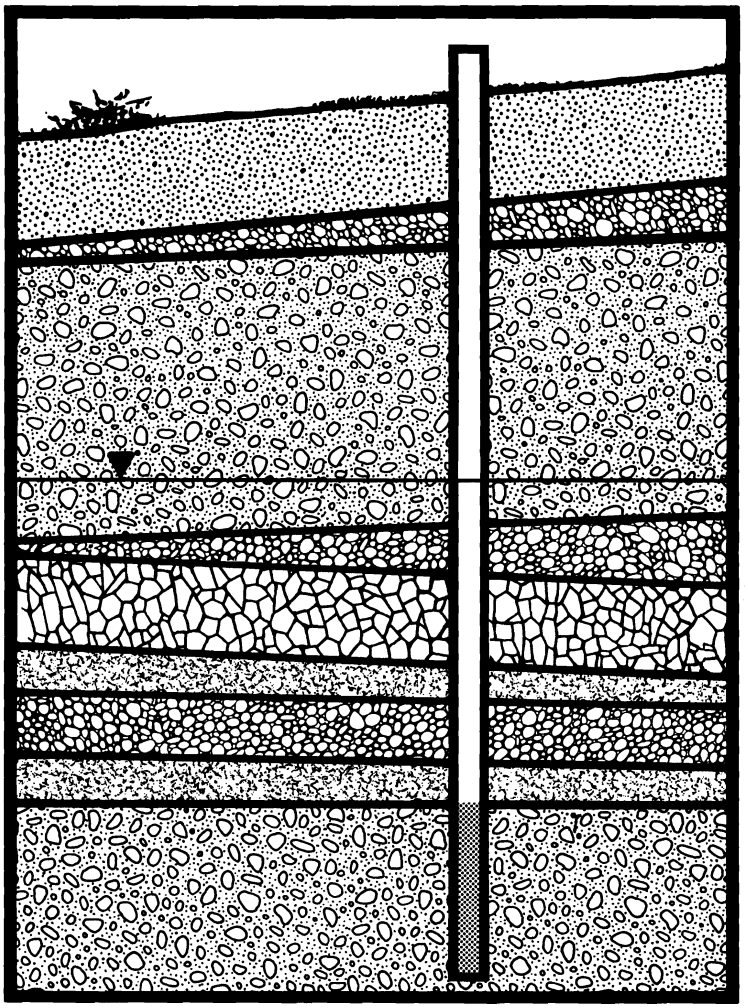
Radiological Status of The Ground Water Beneath The Hanford Site

January - December 1981



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RADIOLOGICAL STATUS OF THE GROUND WATER BENEATH THE HANFORD SITE JANUARY-DECEMBER 1981

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April 1982

Prepared for
U.S. Department of Energy
Under contract DE-AC06-76RLO 1830

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Richland, Washington 99352

SUMMARY

Operations at the Hanford Site since 1944 have resulted in discharges of large volumes of process cooling water and low-level liquid radioactive waste to the ground. These discharges, which include radioactive and chemical substances, have reached the Hanford ground water. To gather data on the distribution and movement of these discharges as they interact with the unconfined ground water beneath the Hanford Site, wells are used as ground-water sampling structures. During 1981, 299 monitoring wells were sampled at various times for radionuclide chemical contaminants. This report is one of a series prepared annually to document and evaluate the status of ground water at the Hanford Site.

Two substances, tritium and nonradioactive nitrate, are easily transported in ground water; therefore, these substances are used as primary tracers to monitor the movement of contaminated ground water. Data collected during 1981 describe the movement of tritium and the nonradioactive nitrate plumes as well as their response to the influences of ground-water flow, ionic dispersion, and radioactive decay. The gross beta (^{106}Ru) levels have become so low that it will no longer be considered a major radionuclide contaminant.

The tritium plume continues to show increasing concentrations near the Columbia River. While it is mapped as having reached the Columbia River, its contribution to the river has not been distinguished from other sources at this time. This plume shows much the same configuration as in 1977, 1978, 1979, and 1980.

The size of the nitrate plume appears stable. Concentrations of nitrate in the vicinity of the 100-H Area continue to be high as a result of past leaks from the evaporation facility.

The overall quality of the ground water at the Hanford Site is generally comparable to that of other ground waters in eastern Washington. Any exceptions to this statement will be noted in this report.

Several studies allowing the use of models for the storage of data and prediction of the movement of contaminants in the ground water have been completed. Two studies have been started to determine the contribution of contaminants to the Columbia River from the ground water at the Hanford Site.

CONTENTS

SUMMARY iii

INTRODUCTION 1

BACKGROUND 3

DISPOSITION OF EFFLUENTS 3

MONITORING WELLS 5

SAMPLING AND ANALYSIS 5

EVALUATION OF GROUND-WATER SURVEILLANCE DATA 9

TRITIUM CONCENTRATION IN THE UNCONFINED GROUND WATER . . 11

NITRATE CONCENTRATION IN THE UNCONFINED GROUND WATER . . 17

GROSS BETA CONCENTRATION IN THE UNCONFINED GROUND WATER . . 23

RADIOLOGICAL IMPACT 29

GROUND WATER 29

COLUMBIA RIVER 29

GROUND-WATER STUDIES 33

DATA BASE MAINTENANCE 33

DATA ASSESSMENT 34

FIELD SUPPORT 41

Well Maintenance 41

Geophysical Logging 42

Aquifer Testing 43

Bank Storage 43

QUALITY CONTROL 45

REFERENCES 47

APPENDIX A: TRITIUM AND NITRATE CONCENTRATIONS IN THE GROUND WATER (UNCONFINED AQUIFER) A.1

APPENDIX B: GROSS ALPHA, STRONTIUM, CESIUM, COBALT, URANIUM, RUTHENIUM, CHROMIUM, AND FLUORIDE CONCENTRATIONS IN THE GROUND WATER (UNCONFINED AQUIFER) B.1

APPENDIX C: CHEMICAL AND SPECTROGRAPHIC ANALYSES FROM VARIOUS WELLS SAMPLED C.1

FIGURES

1 The Hanford Site 4
2 Water Table Elevations--December 1981 6
3 Locations of Selected Sampling Wells 7
4 Tritium Distribution in Unconfined Ground Water 12
5 Concentration History for Tritium in Well 699-40-1 . . . 13
6 Concentration History for Tritium in Well 699-35-9 . . . 14
7 Concentration History for Tritium in Well 699-8-17 . . . 15
8 Concentration History for Tritium in Well 699-41-23 . . . 16
9 Concentration History for Tritium in Well 699-2-3 . . . 18
10 Concentration History for Tritium in Well 699-9-E2 . . . 19
11 Concentration History for Tritium in Well 699-87-55 . . . 20
12 Nitrate Ion Distribution in Unconfined Ground Water . . . 21
13 Concentration History for Nitrate in Well 699-34-42 . . . 22
14 Concentration History for Nitrate in Well 199-H4-3 . . . 24
15 Concentration History for Nitrate in Well 699-SO-7 . . . 25
16 Concentration History for Nitrate in Well 699-40-1 . . . 26
17 Concentration History for Tritium in Well 699-SO-7 . . . 30
18 Example of Hydrograph Plot Accessed From 300 Area Terminal . 35
19 Example of Concentration History Plot Accessed From 300 Area Terminal 36
20 Schematic Diagram of Data Base System for Geophysical Well Log Data 39
21 Digitized Geophysical Logs Correlated With Lithologic Log . . 40

TABLES

1 Lower Analytical Detection Limit and Lowest Applicable Concentration Guides or Drinking Water Standards (DWS) . . 10
2 Numerical Data on the Routine Ground-Water Monitoring Program, 1981 11
3 Total Wells in the CIRMIS Data Base 34
4 Wells Which Have Received Maintenance 41

INTRODUCTION

Ground-water surveillance at the Hanford Site is a facet of the Hanford Environmental Surveillance Program sponsored by the U.S. Department of Energy (DOE). This program is designed to evaluate existing and potential pathways of exposure to radioactivity from site operations. The objectives of the ground-water monitoring program, conducted by Pacific Northwest Laboratory (PNL)[a], are as follows: 1) measure and report the concentration and distribution of radioactive and other chemical constituents in the ground water, 2) determine movement and transport of contaminants with time, and 3) determine the impact of contamination on people and their environment.

All routine ground-water samples for 1981 referred to in this report were taken by the Environmental Evaluations Section of the Occupational and Environmental Protection Department of PNL. The samples were analyzed by PNL's Technical Analysis Section. In addition, the U.S. Geological Survey collected and analyzed samples from specific wells. Program overview and coordination was provided by the members of the Environmental Evaluations Section.

Data from other Hanford contractors (Rockwell Hanford Operations, UNC Nuclear Industries, and the Hanford Engineering Development Laboratory) were used to construct the maps in this report. Contractors' data are site-specific and, therefore, are not included in the appendices.

All ground-water samples are collected according to a master schedule published annually (Blumer, Sula and Eddy 1980). The analytical results of these samples are summarized and evaluated annually. This report contains data collected from January 1981 through December 1981. Sampling data are contained in similar reports published annually for past years. Any contribution to the ground-water radionuclide concentrations attributable to the Hanford operations is compared with the regulations in DOE Orders 5480.1, Chapter XII; 5484.1, Chapter III; 5480.1, Chapter XI; and RL.5820.2.

(a) Pacific Northwest Laboratory is operated for DOE by Battelle Memorial Institute.

Concentrations of nonradioactive contaminants are compared with the Washington State Department of Ecology and the Environmental Protection Agency drinking water standards.

BACKGROUND

Since 1944, operations at the Hanford Site have resulted in the disposal of large volumes of low-level, liquid radioactive wastes and contaminated cooling water to the ground. Figure 1 shows the location of various operating areas at the Hanford Site. Most of the liquid wastes have been disposed of at or near the chemical separation areas (200 Areas) located on a plateau near the center of the site. Smaller amounts of wastes have been released at the reactor sites (100 Areas) and at the laboratory and fuel fabrication area (300 Area). Only one reactor and its disposal facility (the 100-N Area) are currently in operation.

There are basically three aquifers monitored at the Hanford Site. The first or deepest is an aquifer in the basalt. Ground water in this aquifer is confined and usually at pressures greater than atmospheric. When a well is drilled into this aquifer, the water level in the well rises above the bottom of the upper confining layer. The second aquifer is encountered when wells are drilled into a semiconsolidated sedimentary material overlying the basalts. This second aquifer is artesian in places and unconfined in other locations. The third aquifer is the unconfined aquifer, which overlies the artesian aquifers and is composed of the unconsolidated material nearer the land surface. This aquifer appears to contain most of the contaminants and therefore is monitored far more heavily than the deeper aquifers.

The disposal of liquid effluents to the ground has been greatly reduced at Hanford in the past several years, primarily because of the deactivation of all reactors except the N Reactor, the cessation of reactor fuel processing, and the improved treatment of several waste streams.

DISPOSITION OF EFFLUENTS

Liquid effluents disposed to the ground percolate downward and laterally through 50 to 100 m (150 to 300 feet) of unconsolidated glaciofluvial and lacustrine sands, silts, and gravels that overlie and make up the unconfined aquifer. As the wastes move through these sedimentary materials, adsorption and ion exchange take place between the minerals in

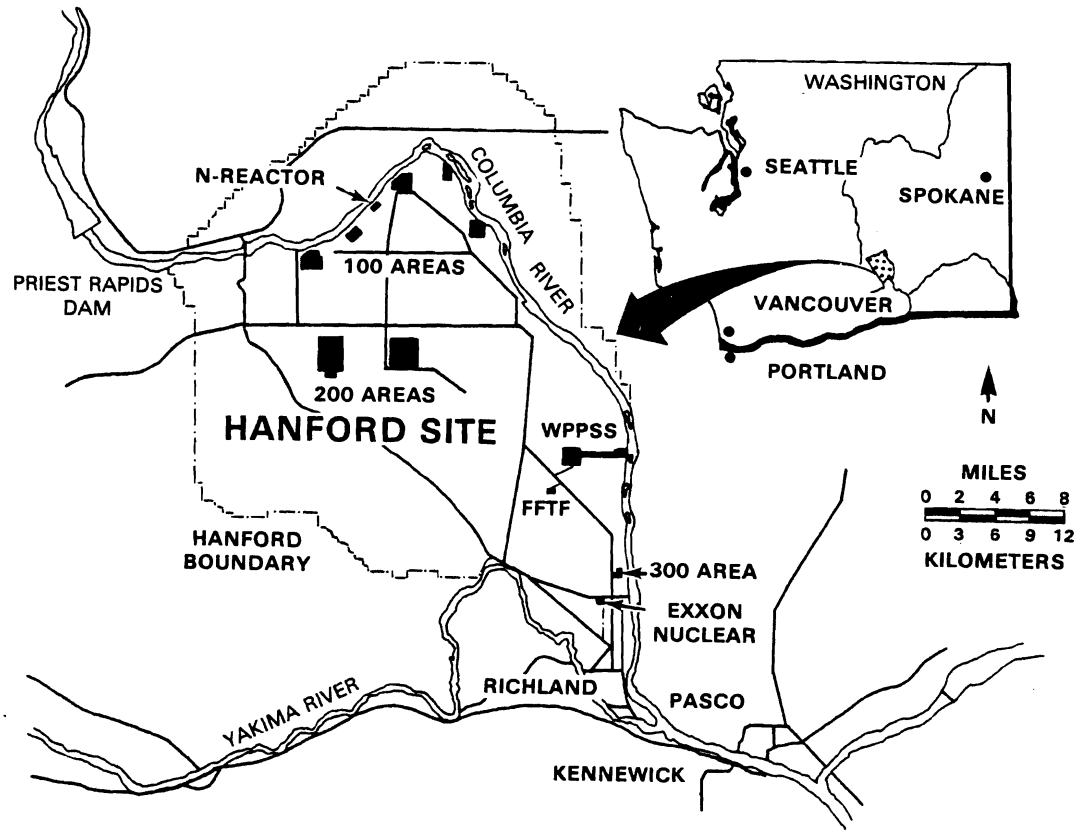


FIGURE 1. The Hanford Site

the sediments and the substances in the liquid waste. Some of the longer-lived radionuclides, such as strontium-90 (^{90}Sr), cesium-137 (^{137}Cs), and plutonium-239 (^{239}Pu), have good ion-exchange characteristics and are effectively removed from the waste streams as the liquid percolates downward through the soil column. Other contaminants, such as ruthenium-106 (^{106}Ru), cobalt-60 (^{60}Co), iodine-129 (^{129}I), technetium-99 (^{99}Tc), tritium (^{3}H), and nonradioactive nitrate (NO_3^-), have poor ion-exchange characteristics and move through the soil column at varying rates until they eventually enter the ground water. Once they enter the unconfined aquifer, the contaminants move in a general down-gradient direction at a rate nearly equal to the velocity of the ground water. As the contaminants move with the ground water, their concentrations are further reduced by radioactive decay, ion exchange, diffusion, and hydrodynamic dispersion.

During the past thirty-eight years, the disposal of more than 6×10^{11} liters (169 billion gallons) of process cooling water and over 3×10^{10} liters (8 billion gallons) of other liquid has changed the water table configuration. Ground-water mounds, created by the discharge of water, now exist near each of the chemical processing areas (Figure 2). Ground-water levels have changed continuously over the years because of variations in the volume and location of waste water discharged to the ground. The levels shown in this report are representative of 1981 data (Wilbur 1982). The movement of the ground water and its associated contaminants has also changed with time and reflects the amounts of effluent discharged.

MONITORING WELLS

Nearly 850 cased ground-water monitoring wells (McGhan and Damschen 1979) have been drilled since the beginning of the disposal operations at the Hanford Site (Figure 3). These wells provide a means for obtaining water samples and for conducting onsite investigations.

Most of the wells drilled at Hanford are multipurpose structures. That is, they are used to obtain geologic and hydrologic information before they become sampling structures. For a well to be useful in monitoring, its casing should be perforated along the entire saturated thickness of the aquifer to allow water in the aquifer to flow in a direction normal to the well at all depths. Lenses on layers of clay might, in some wells, prevent this total flow-through of ground water. Therefore, each well structure on the site must be evaluated individually as a potential monitoring facility.

SAMPLING AND ANALYSIS

Ground-water samples are obtained routinely from wells throughout the Hanford Site. For the 1981 routine ground-water monitoring program, 299 wells were sampled. From these, 1,400 well-water samples were taken to provide 4,461 analytical results for evaluating the effects of site operations on the ground water. (These figures do not include the monitoring efforts of other DOE contractors on the Hanford Site.) The frequency of sampling is monthly, quarterly, semiannually, or annually depending on well locations and constituents to be analyzed.

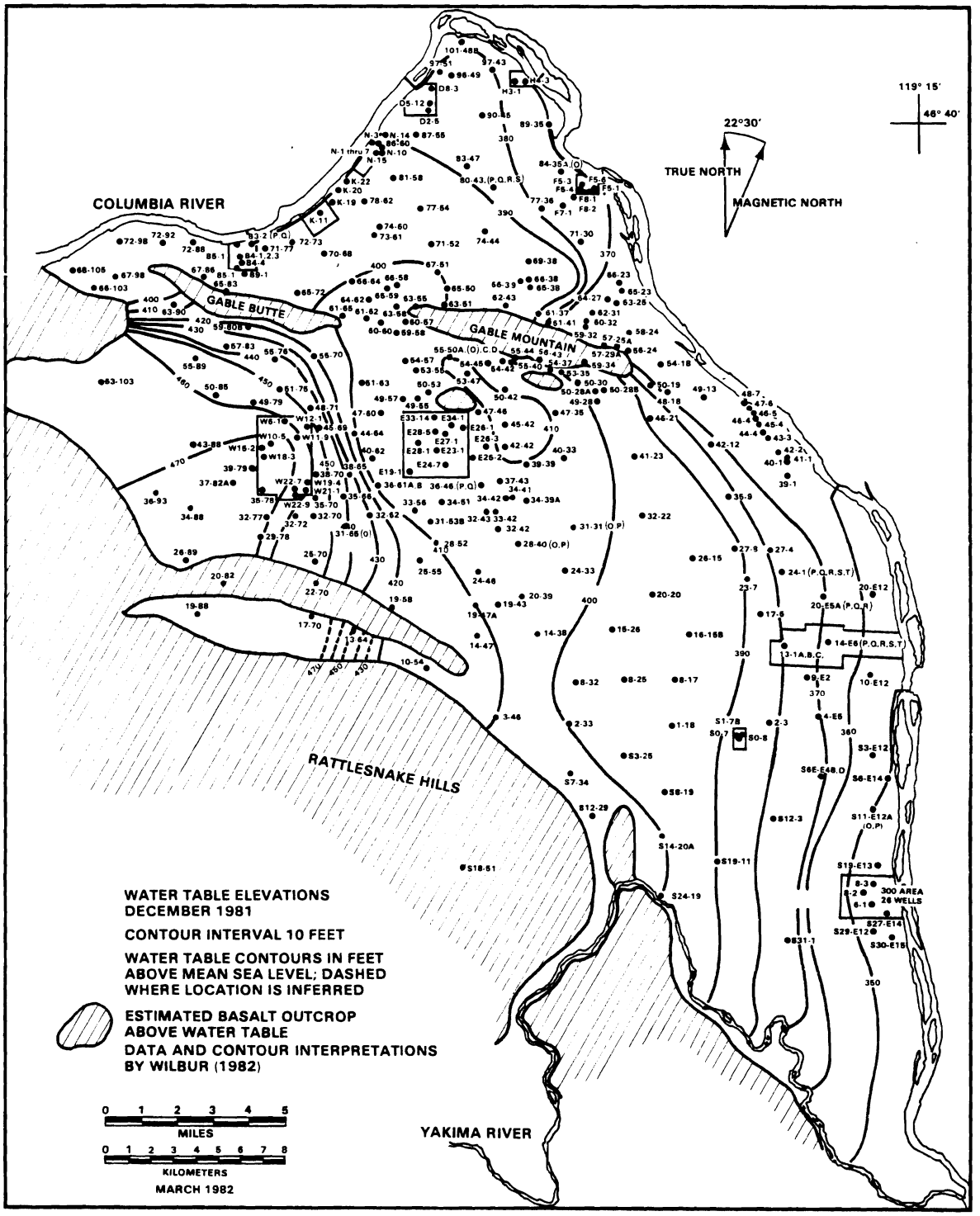


FIGURE 2. Water Table Elevations--December 1981

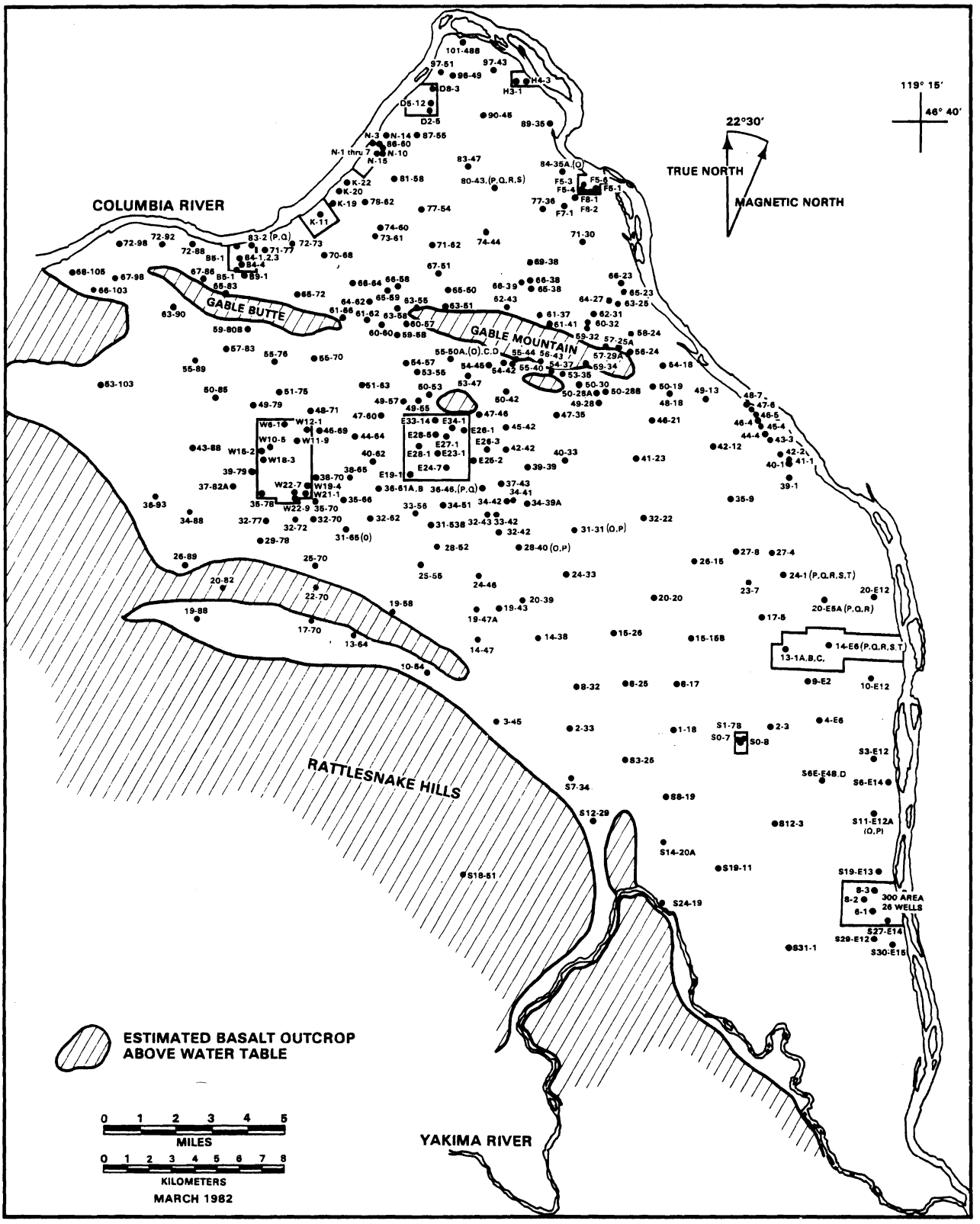


FIGURE 3. Locations of Selected Sampling Wells

Some ground-water samples are collected just below the water surface of the unconfined aquifer by lowering a plastic bottle enclosed in a steel bailer. The greatest concentration of contaminants is usually observed at the surface of the water table (Eddy, Myers, and Raymond 1978).

Submersible sampling pumps have been installed in most wells to obtain a more representative sample of the water in the aquifer adjacent to the well than is provided by a small-volume bailer sample. Since the submersible pumps are left in the wells, this method prevents the possibility of cross contamination that may result from using a single bailer or pump to sample several wells. At a few locations where appropriate wells are available, samples are obtained from the confined aquifers. Some small-diameter wells and piezometer tubes are sampled by the airlift method (Trescott and Pinder 1970).

Two substances, tritium (^{3}H) and nonradioactive nitrate (NO_3^-), are readily transported in ground water with little decrease in concentration from adsorption or ion exchange. Therefore, these substances are used as primary tracers to monitor the movement of contaminated ground water. In addition, samples from selected wells are routinely analyzed at less frequent intervals for the radionuclides ^{90}Sr, ^{137}Cs, and ^{60}Co. Gross alpha (as ^{239}Pu) emission is also determined. Selected samples are analyzed by gamma spectrometry to identify the mixture of radionuclides present. Standard radiometric and chemical methods are used to analyze the routine ground-water samples (ASTM 1979).

Other radionuclides, such as ^{129}I and ^{99}Tc, have been detected in the ground water beneath the Hanford Site. Although these radionuclides generally occur in very low concentrations, they make excellent tracers of ground-water contamination. Analyses for uranium (^{238}U), fluoride (F^-) and total chromium (Cr^{+6}) are also made on selected ground-water samples in and adjacent to the areas where these substances are present.

EVALUATION OF GROUND-WATER SURVEILLANCE DATA

Radionuclide concentrations in the ground water beneath the Hanford Site are evaluated in terms of their respective Concentration Guides (CGs) (U.S. Department of Energy 1981). Radioactive materials are also compared with drinking water standards promulgated by the Environmental Protection Agency (EPA 40 CFR 141) and adopted by the state of Washington. The comparison between the actual concentration and the CGs provides a conservative method for evaluating the potential significance of most water-borne materials. The CGs used in this report are those that apply to uncontrolled areas. Table 1 shows the minimum detectable concentration (MDC) and applicable CGs or drinking water standards for various chemicals analyzed under the routine ground-water monitoring program.

This report includes sections for each of the contaminants used as tracers. Each section contains a map showing the distribution of the contaminant described in that section. The isopleths on the maps show concentration zones rather than discrete contours, because the data do not justify the additional detail. Some published data from the 200 Areas are used to provide continuity in the maps (Graham and Brown 1981). However, no data from waste disposal operations and resultant ground-water contamination in the 200 Areas are included in this report.

Appendix A contains tabular analytical data for 1981 on the average, maximum, and minimum concentrations of the primary tracers (tritium and nitrate ion). The data on the average concentrations of the primary tracers were used to generate the isopleth maps.

Table 2 shows the number of wells sampled, the number of samples taken, and the number of analyses made as part of the 1981 ground-water monitoring program for each area of the Hanford Site. The data shown in Appendices A (the primary tracers) and B (selected contaminants in ground water) were derived from analysis of these samples. The numbers in the table do not include any special samples.

TABLE 1. Lower Analytical Detection Limit and Lowest Applicable Concentration Guides or Drinking Water Standards (DWS)

Analysis	MDC	CGs
	(pCi/ℓ)	
Gross Beta (as ^{106}Ru)	0.08	NA[a]
Total Alpha (as ^{239}Pu)	0.017	NA[a]
^{3}H	0.5	3,000.0
^{60}Co	0.02	30.0
^{90}Sr	0.03	0.3
^{106}Ru	0.06	10.0
^{125}Sb	0.06	100.0
^{129}I	1×10^{-8}	0.06
^{131}I	0.01	0.3
^{137}Cs	0.02	20.0
U (Natural)	3.4	20
	MDC	DWS
	(mg/ℓ)	
NO_3^-	0.5	45[b]
F^-	0.08	1.8
Cr^{+6}	0.01	0.05

(a) NA--Not Applicable. Significance of contaminations determined by specific radionuclide analysis.

(b) Calculated as (NO_3^-)

TABLE 2. Numerical Data on the Routine Ground-Water Monitoring Program, 1981

Area	Number of Wells Sampled	Number of Samples Taken	Number of Analyses Made
100	39	181	458
200	22	96	348
300	28	200	1252
600 [a]	210	923	2403
	299	1400	4461

(a) The 600 Area includes all of the Hanford Site not included in the other operating areas (100, 200, 300 Areas).

TRITIUM CONCENTRATION IN THE UNCONFINED GROUND WATER

Because tritium (^3H) entered the ground-water system as part of the water molecule, it is carried along with the ground-water flow and remains almost unaffected by the geologic conditions that affect other radionuclides. Tritium, therefore, provides the most accurate and extensive overview of ground-water movement at the Hanford Site. Figure 4 shows the distribution of ^3H in the unconfined aquifer. Appendix A contains data concerning maximum, average, and minimum concentrations for samples collected in 1981.

The configuration of the ^3H plume has changed somewhat in the past year. Concentrations of ^3H in Well 699-40-1, shown in Figure 5, have continued to increase, which indicates that the plume has reached the Columbia River. Figures 6 and 7, which are graphic illustrations of the concentration histories of ^3H for Wells 699-35-9 and 699-8-17, show essentially the same results.

Tritium concentrations in wells within the plume show different responses depending upon the geohydrology of the locale being monitored. Figure 8 is a concentration history for Well 699-41-23. While this well is in one of the areas of highest ^3H concentration, the level of concentration

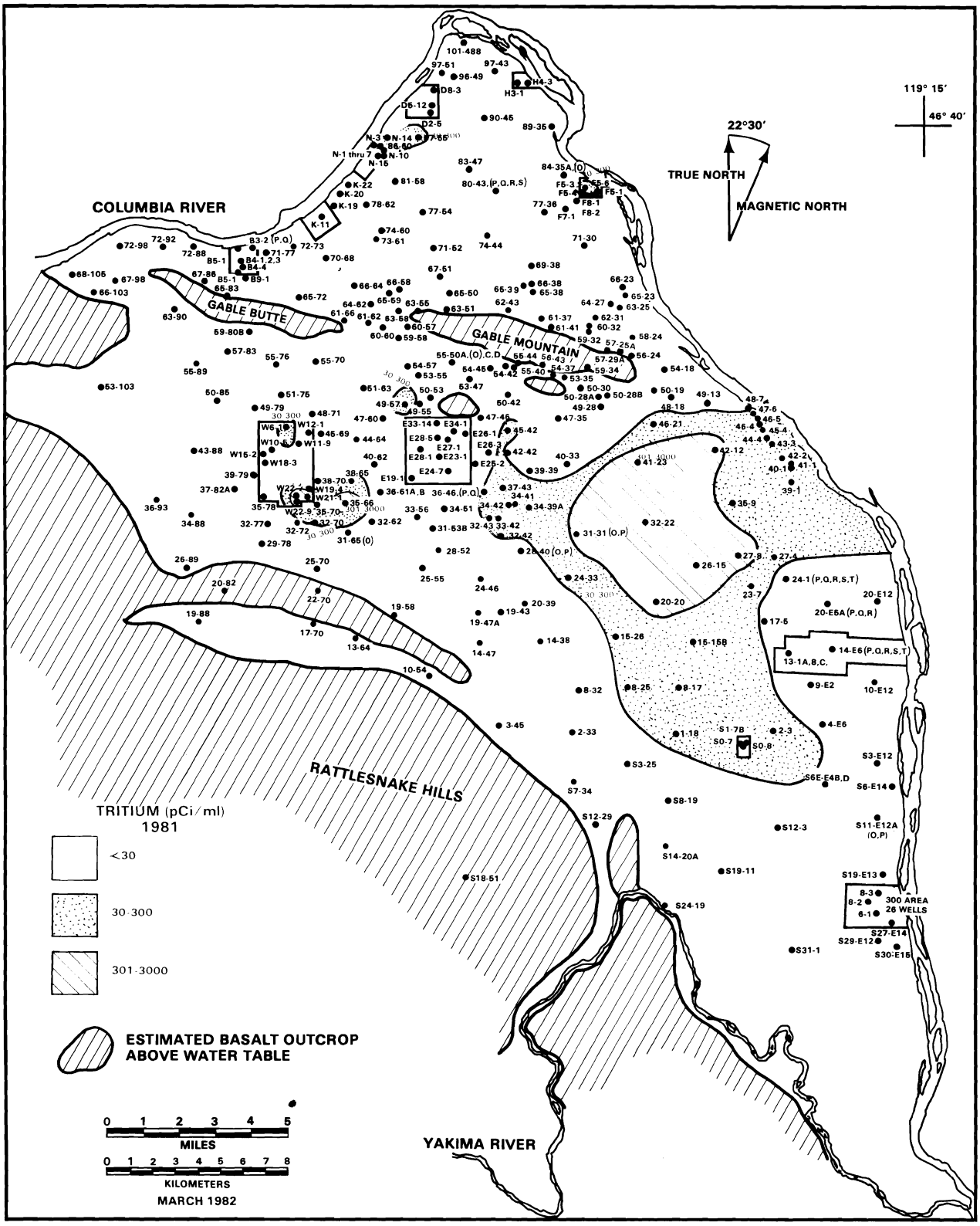


FIGURE 4. Tritium Distribution in Unconfined Ground Water

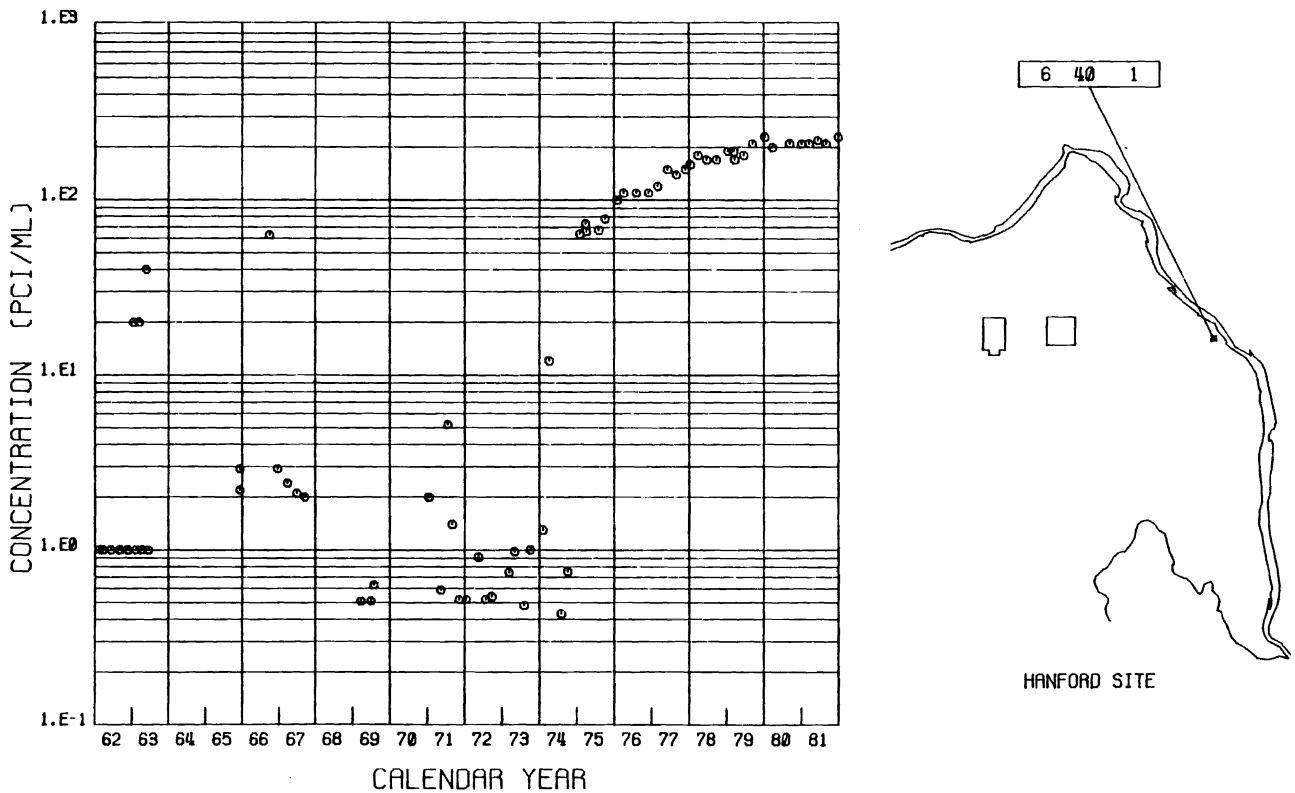


FIGURE 5. Concentration History for Tritium in Well 699-40-1

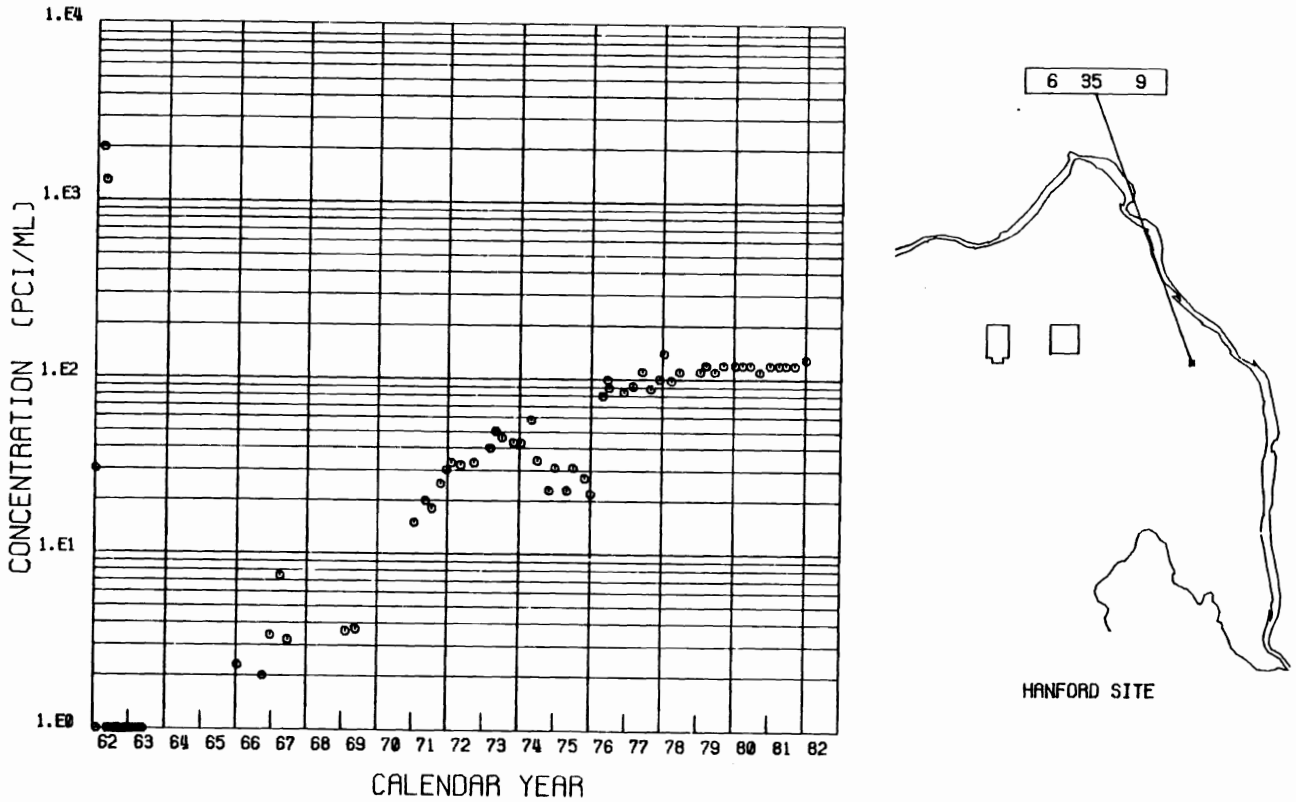


FIGURE 6. Concentration History for Tritium in Well 699-35-9

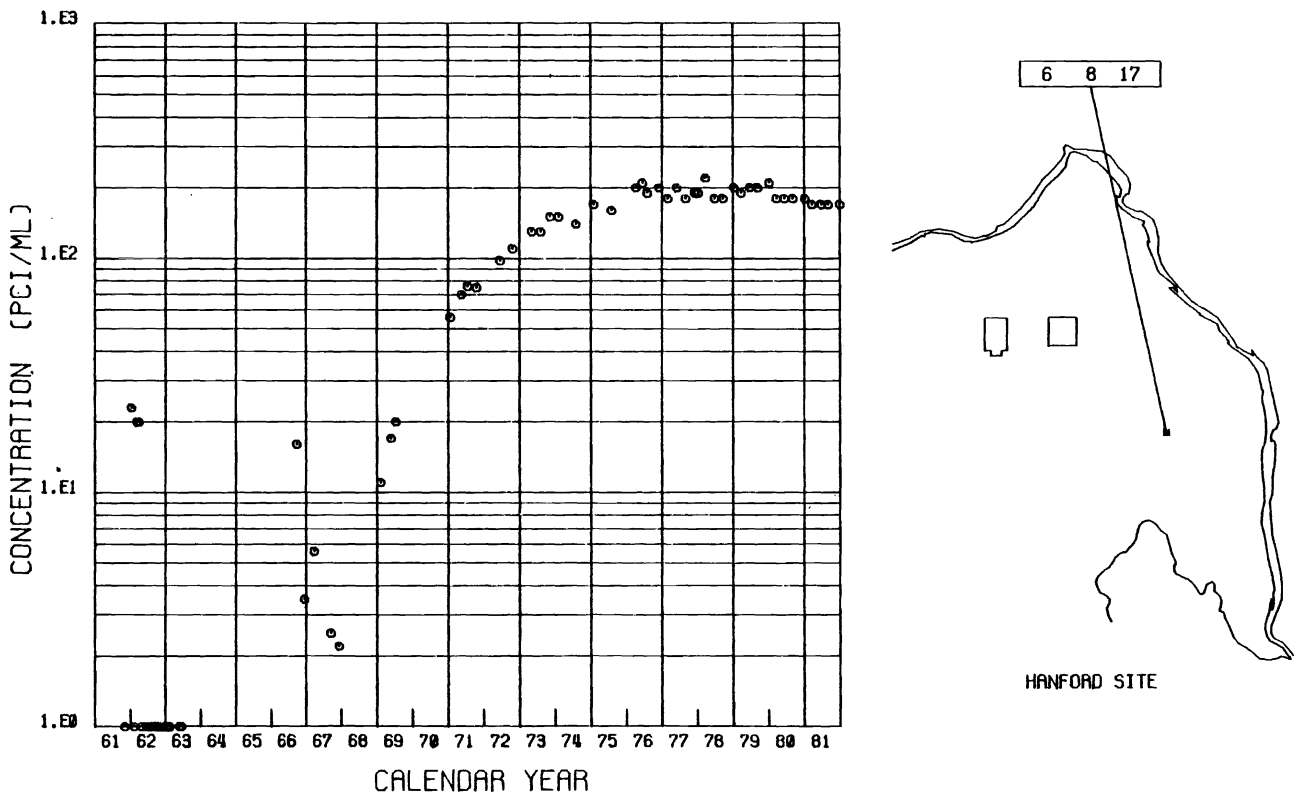
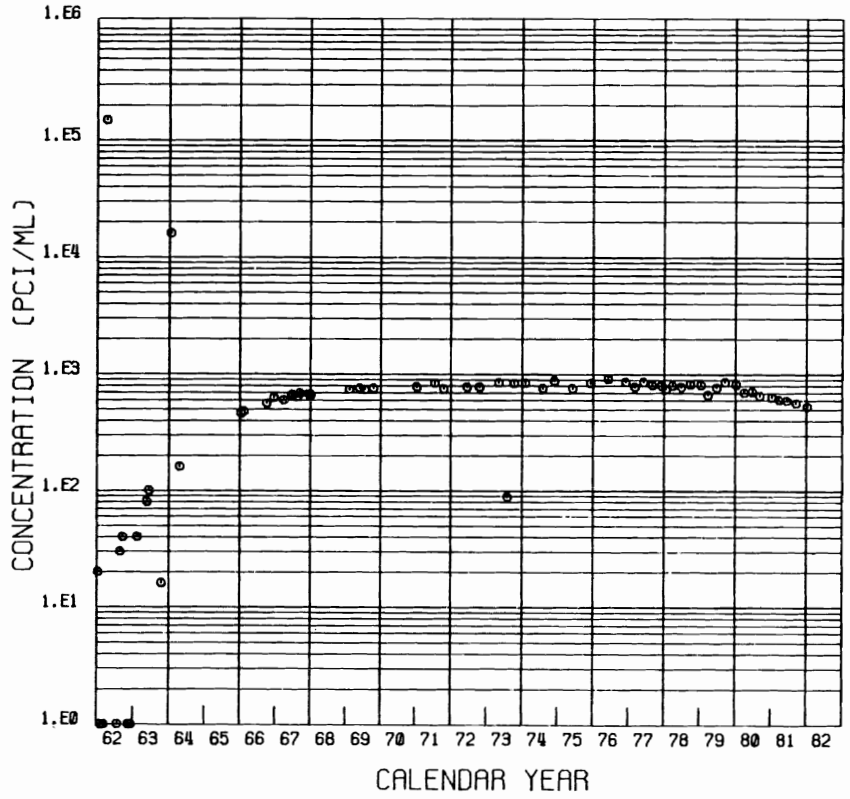


FIGURE 7. Concentration History for Tritium in Well 699-8-17



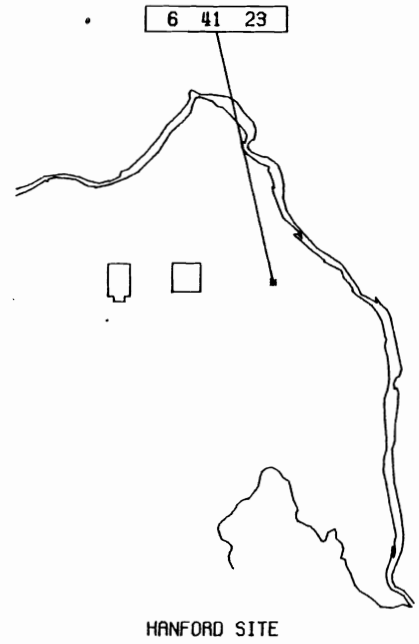


FIGURE 8. Concentration History for Tritium in Well 699-41-23

is beginning to decline. The concentration history of ^3H in Well 699-2-3 (Figure 9) is in apparent equilibrium at or near 110 pCi/mℓ. Ground-water flow in the vicinity of this well is such that concentrations should remain at or near this level for several years.

Figure 10 shows that the tritium concentration in Well 699-9-E2 dropped through mid-1972, had a gradual increase until 1978, and then declined to the present low level. Although Wells 699-9-E2 and 699-2-3 show different concentrations, both are used to monitor the southern portion of the ^3H plume. Well 699-9-E2 represents an area of low hydraulic conductivity, which retards the movement of ground water, and Well 699-2-3 represents an area through which ground water moves at a more rapid rate.

The combination of operational effects and hydrological events can be seen in Figure 11, which shows a concentration history for Well 699-87-55. The graph, with its sinusoidal pattern, illustrates a dynamic system which combines river flow, precipitation, reactor operations and geohydrology. This well is located about 1.8 km from N Reactor.

NITRATE CONCENTRATION IN THE UNCONFINED GROUND WATER

Figure 12 shows the concentration and distribution of nitrate (NO_3^-) in the ground water at Hanford. Appendix A contains data on the maximum, minimum and average concentrations. Data collected in 1981 indicate little areal change in the nitrate plume. Zones of elevated nitrate concentrations persist in the vicinity of the 200-E, 200-W, 100-F, and 100-H Areas, and in the central portion of the main ground-water contamination plume. A decrease of nitrate concentration continues in Well 699-34-42 (Figure 13), where a cyclical pattern reflects the operational history of the 200-E Area.

Well 199-H4-3 was drilled specifically to monitor a solar evaporation facility at the 100-H Area. The facility consists of a concrete basin used as a concentrator for waste generated by fuel fabrication activities in the 300 Area. Wastes placed in the basin normally contain copper, sodium, nitrate, and sulphate, with small amounts of other constituents, such as

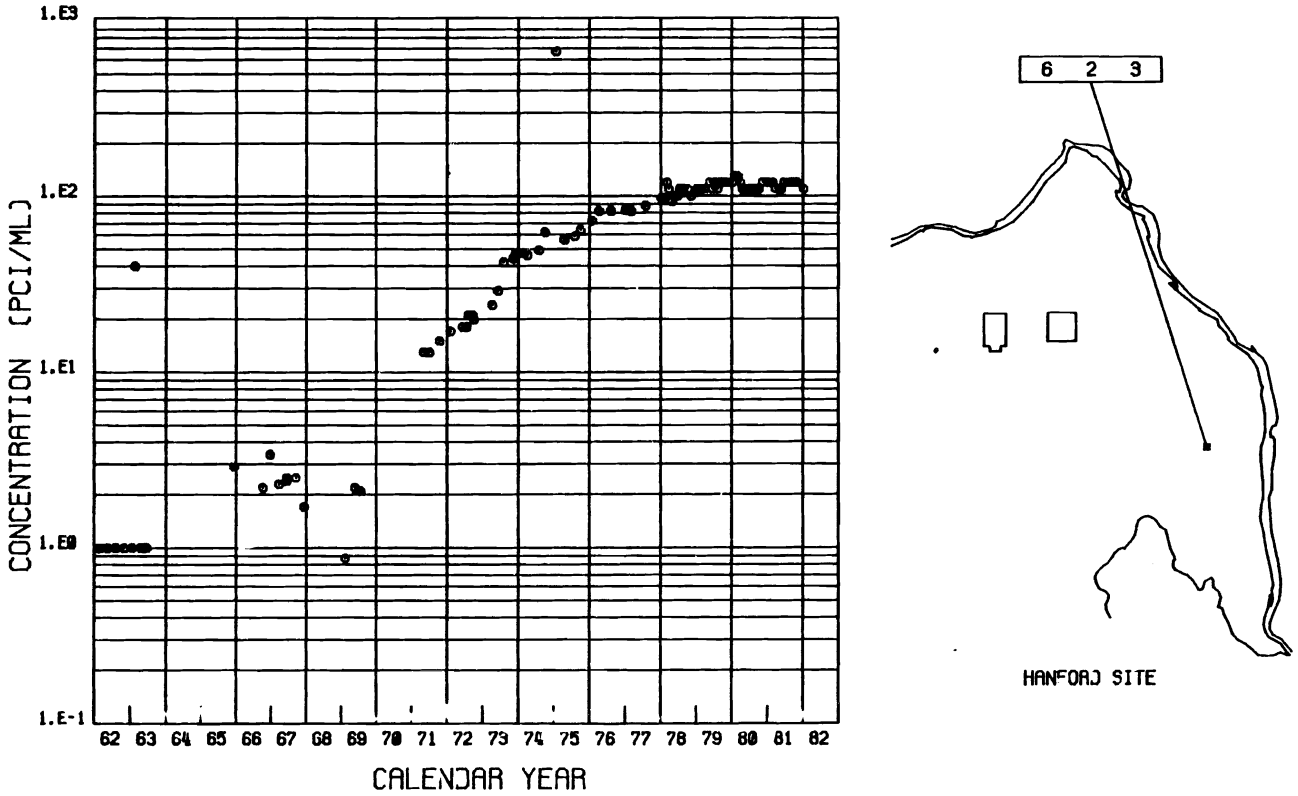


FIGURE 9. Concentration History for Tritium in Well 699-2-3

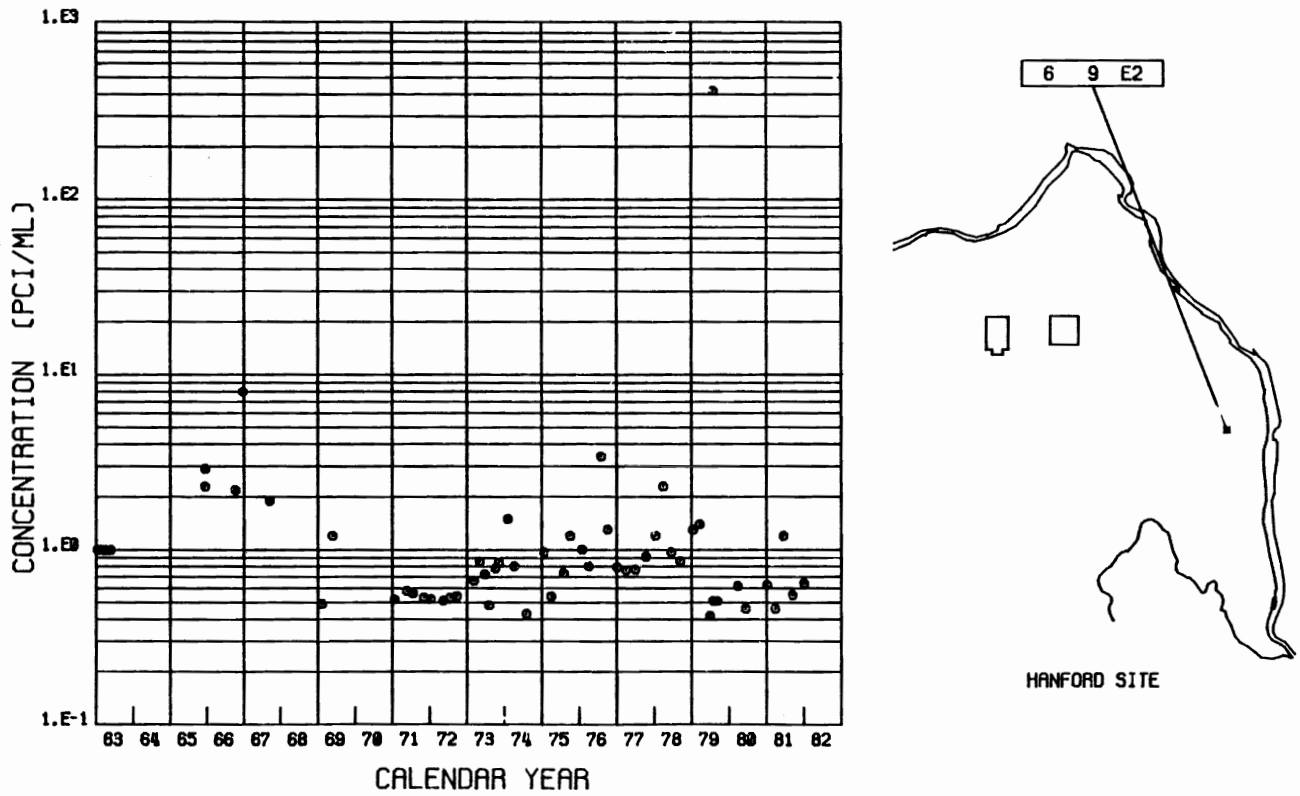


FIGURE 10. Concentration History for Tritium in Well 699-9-E2

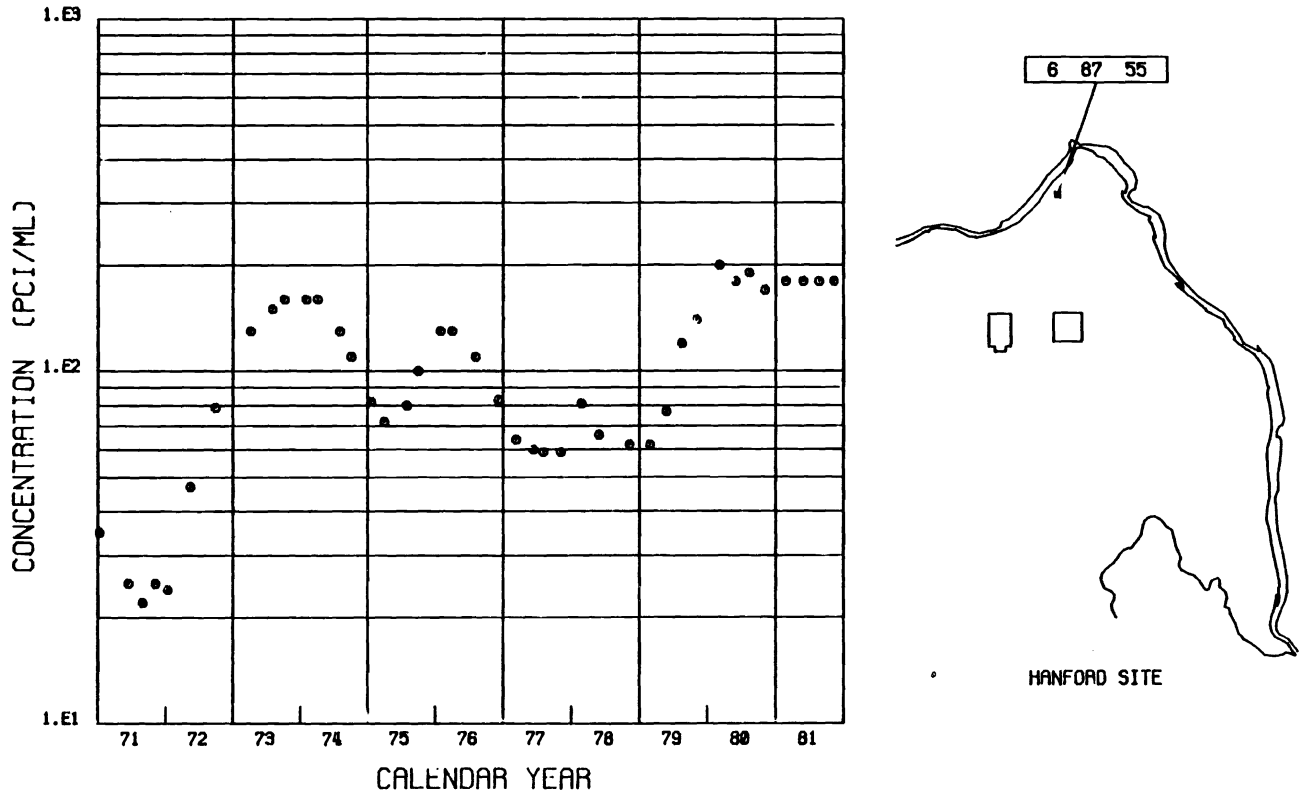


FIGURE 11. Concentration History for Tritium in Well 699-87-55

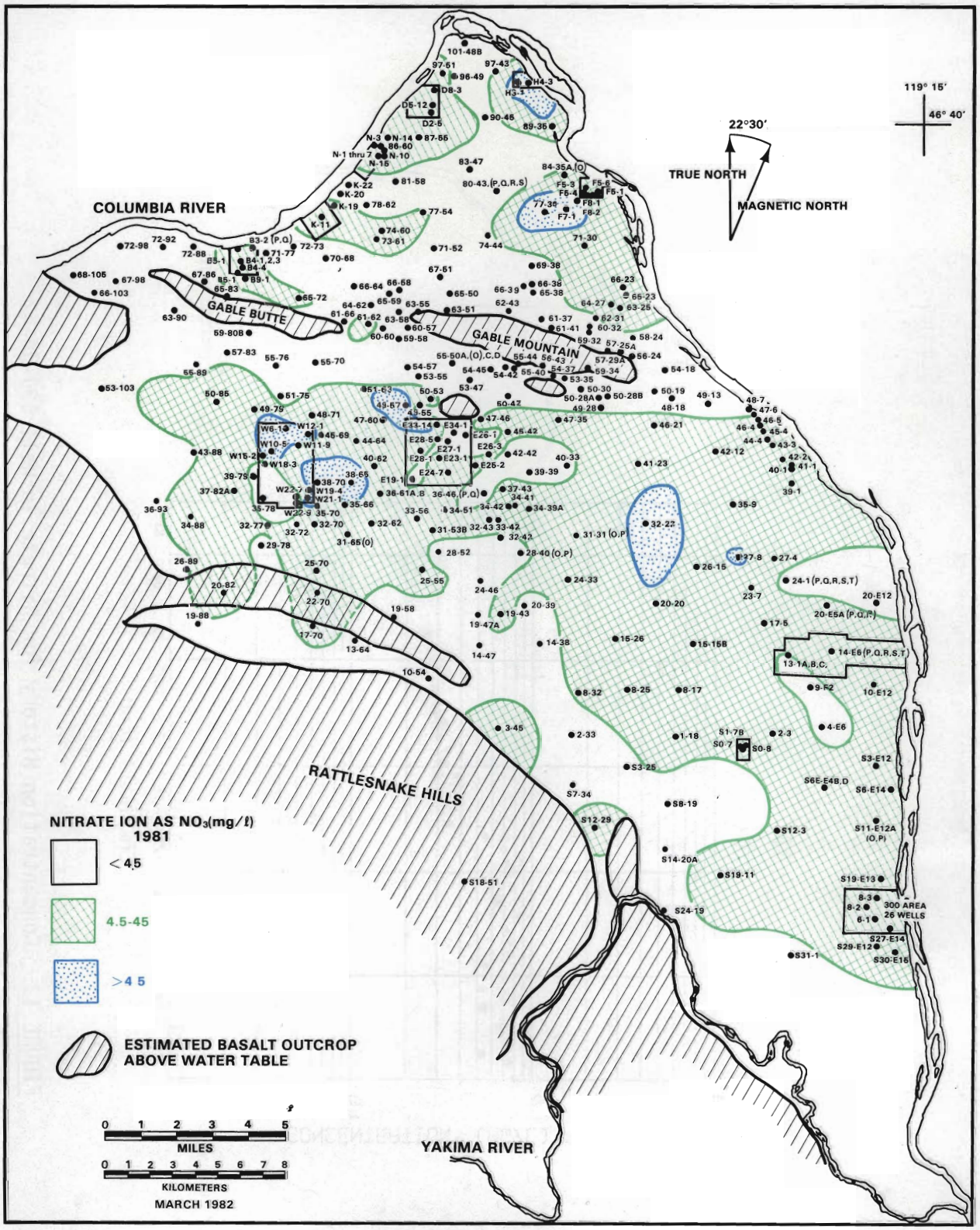
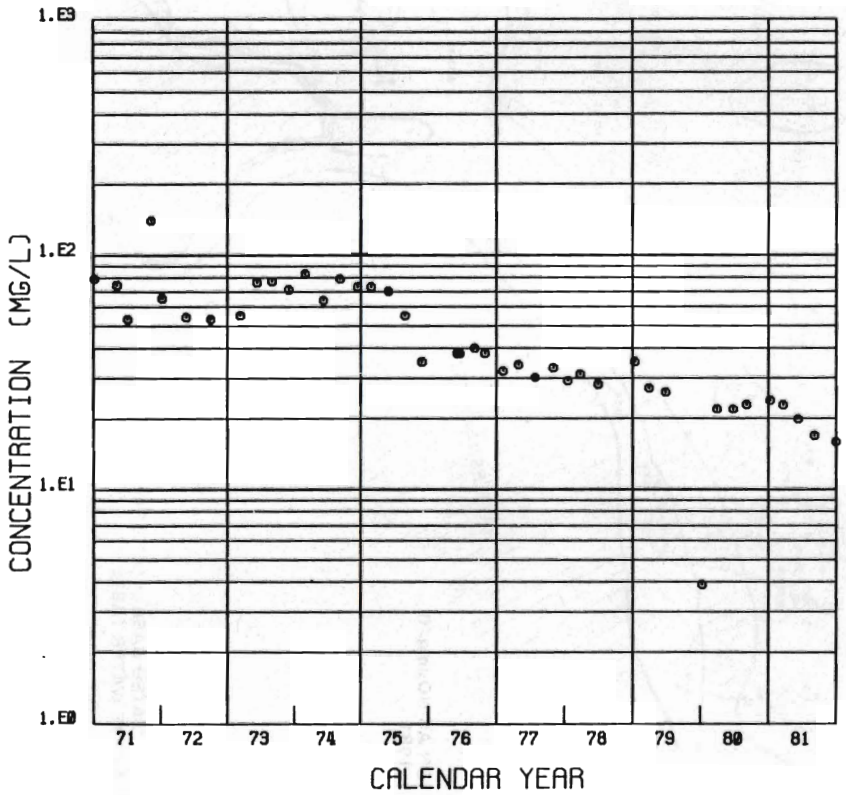


FIGURE 12. Nitrate Ion Distribution in Unconfined Ground Water



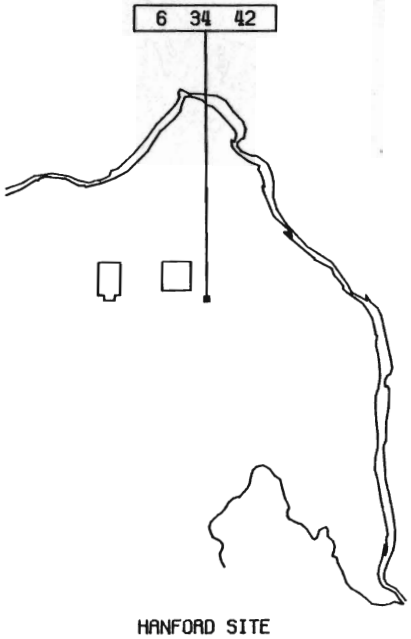


FIGURE 13. Concentration History for Nitrate in Well 699-34-42

chromium. The wastes do not contain radioactive materials other than trace amounts of uranium. An unknown quantity of the solute leaked from the basin through joints or fractures in the concrete and eventually reached the ground water. Corrective action was initiated in 1979, which included sealing the leak in the basin. As shown in Figure 14, there has been a general decline in the nitrate concentration in Well 199-H4-3 since the corrective work was done. Well 199-H4-3 will continue to be monitored as the level of contaminants declines to or near the general concentration level in the wells away from the facility.

Although the data appear to be scattered, the nitrate concentration in Well 699-SO-7 (Figure 15) is declining with time. The lowering of the nitrate level in this well is probably due to the development of a deeper portion of the aquifer that has a lower level of nitrate (Eddy, Myers, and Raymond 1978) rather than a decrease in the nitrate plume concentration in this area.

The configuration of the nitrate plume has not changed significantly. However, the high level of nitrate in Well 699-40-1 (Figure 16) indicates that the nitrate in the ground water has reached the Columbia River.

GROSS BETA CONCENTRATION IN THE UNCONFINED GROUND WATER

The concentration and distribution of gross beta (β_t) contamination in the Hanford ground water has been decreasing for several years, as shown in previous years' reports (Eddy and Wilbur 1981). As a result,the concentrations have decreased to insignificant levels. The areas of higher levels are located mainly at or very near the 200 West and 200 East Areas and the 100-N reactor site. Therefore, no attempt was made to generate a map of the gross beta distribution and concentration plume for the 1981 calendar year as was done in previous years.

Gross beta activity in and near the 200 Areas is the result of operating and maintaining the irradiated uranium fuels reprocessing facilities. The β_t activity in or near the 100-N reactor site is attributable to operations at the reactor site and the liquid waste disposal to the 1301-N trench.

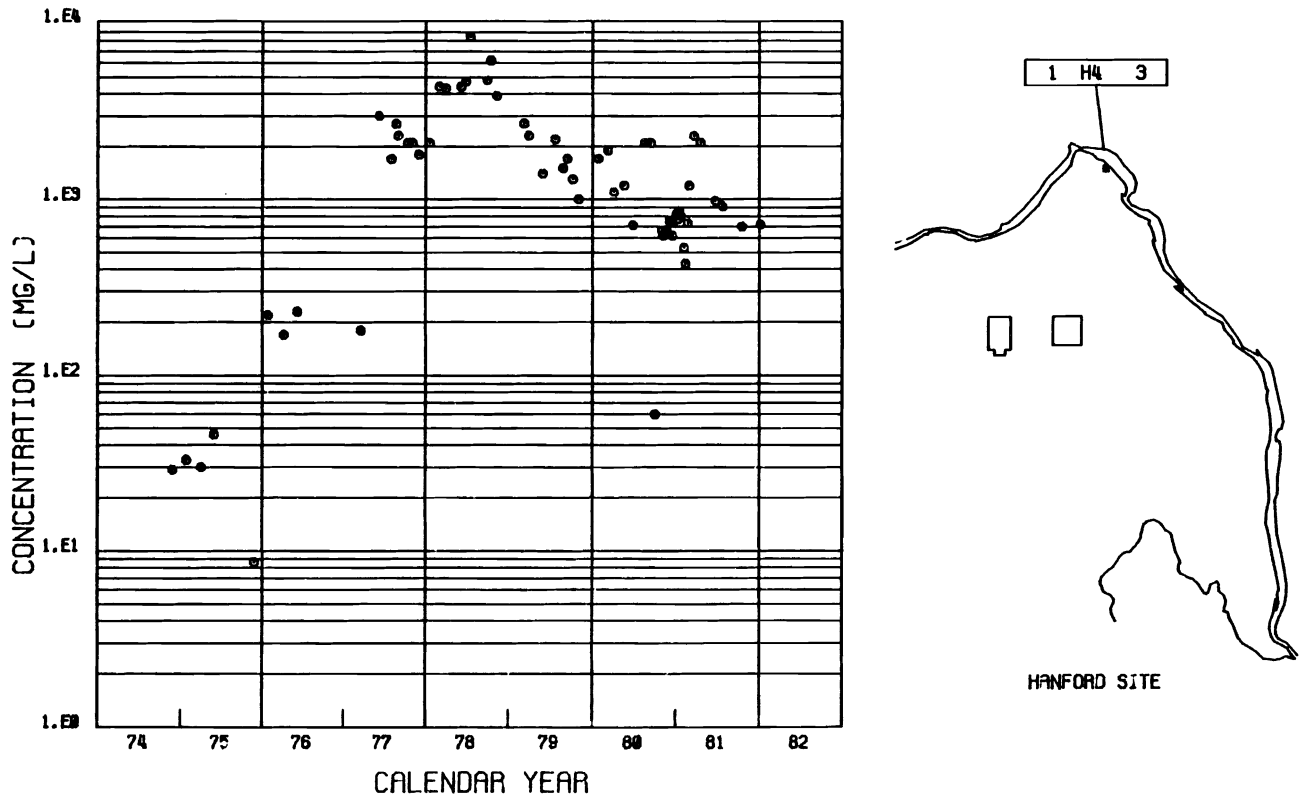


FIGURE 14. Concentration History for Nitrate in Well 199-H4-3

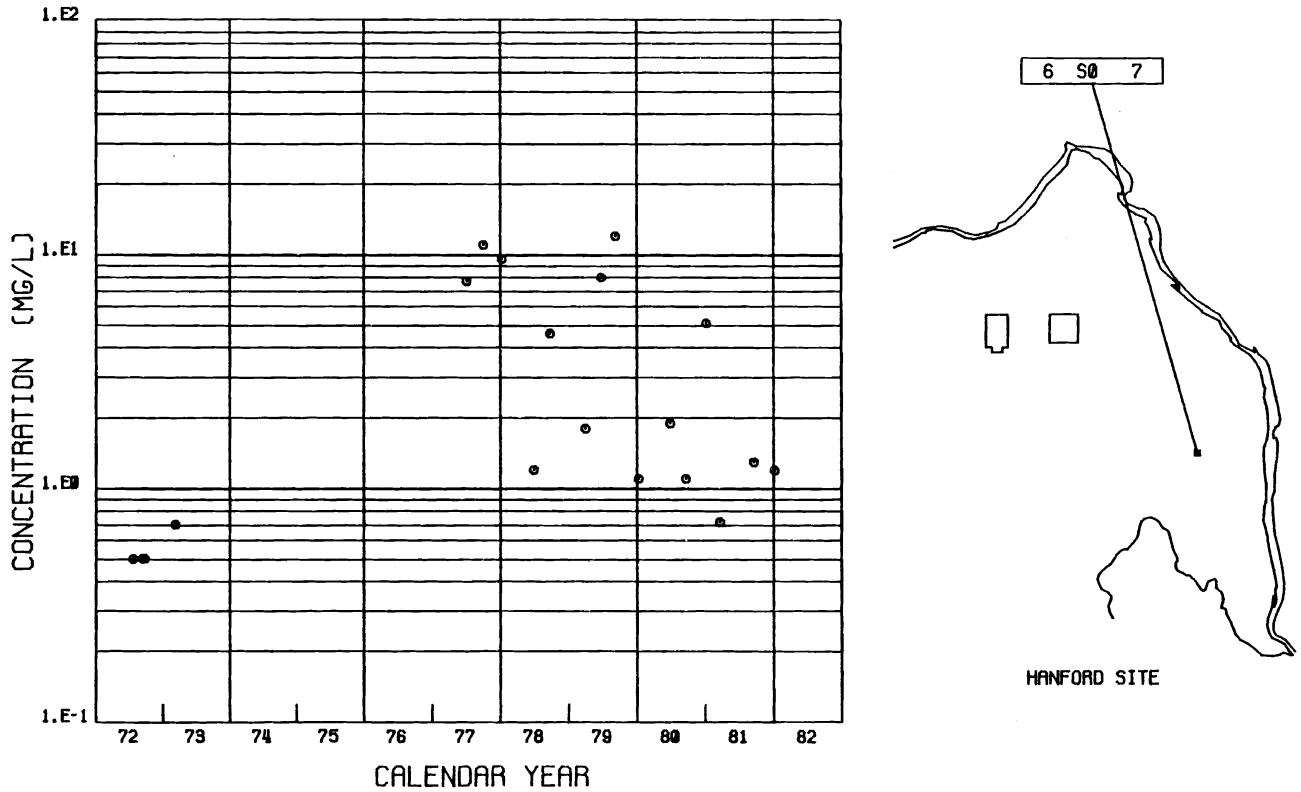


FIGURE 15. Concentration History for Nitrate in Well 699-SO-7

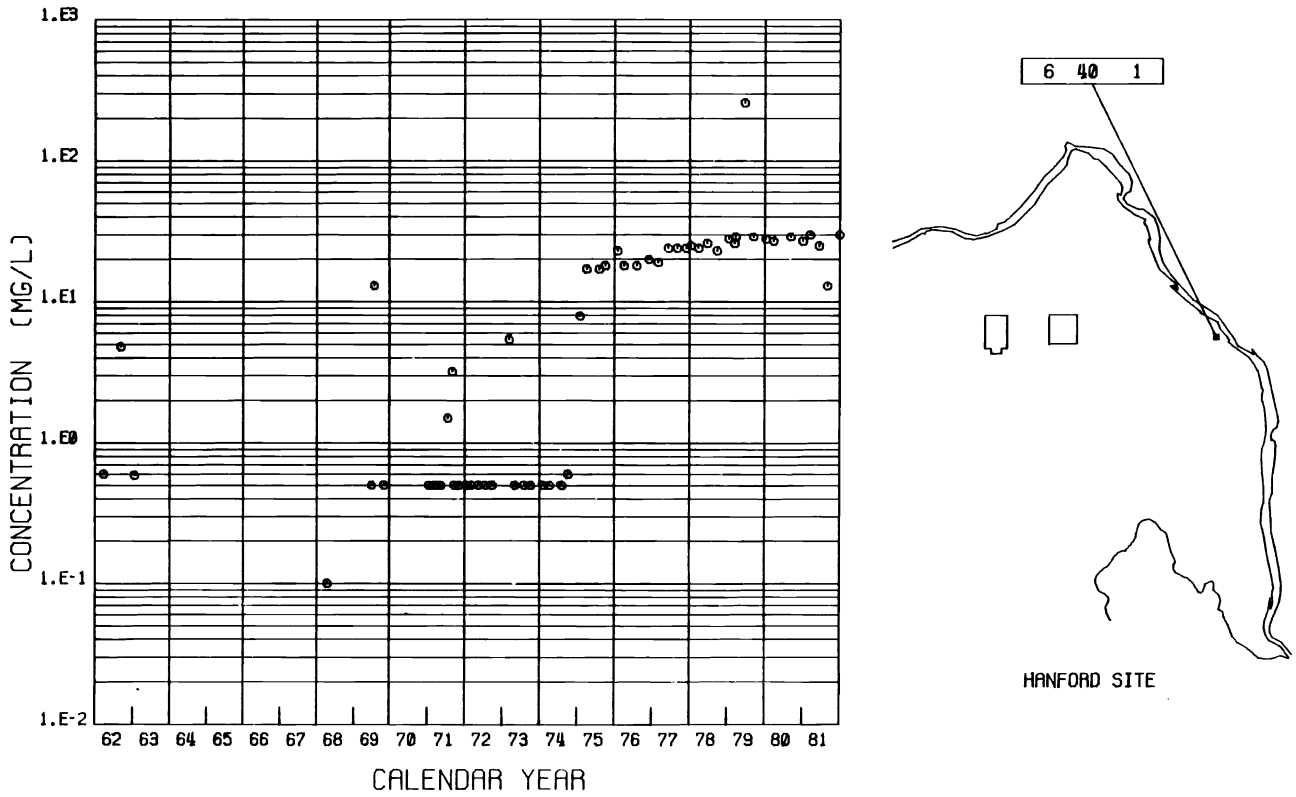


FIGURE 16. Concentration History for Nitrate in Well 699-40-1

The changes in gross beta activity result from the cyclical nature of the Hanford plants as they start up and shut down their operations. The β_t concentrations reached a peak in early 1971, and since then both the β_t concentration levels and the overall size of the plume have decreased. This trend will probably continue until the fuel reprocessing facilities are placed into operation.

RADIOLOGICAL IMPACT

Ground-water transport of contaminants within the Hanford Site represents a potential pathway for exposure to radiation via water obtained from wells that tap the unconfined aquifer or from the Columbia River into which the unconfined aquifer discharges. The following discussion examines these potential pathways.

GROUND WATER

During 1981, drinking water for the FFTF was obtained from the unconfined aquifer. The drinking water at FFTF contains elevated concentrations of ^{3}H from past effluent disposal in the 200 Areas (Figure 17).

The whole body dose attributable to the ^{3}H in drinking water at FFTF in 1981 (average ∿39,000 pCi/ℓ) is calculated to be 0.5 mrem, based on an ingestion rate of 220 liters/year. The 50-year dose commitment from ^{3}H is the same as the annual dose because of the relatively short biological half life of this radionuclide. This estimated whole body dose from Hanford operations is equal to the amount reported last year (Eddy and Wilbur 1981). This concentration of ^{3}H in FFTF drinking water is low compared to the guidelines in DOE Order 5480. The calculated dose is 10% of the state of Washington drinking water standards.

COLUMBIA RIVER

Ground water entering the Columbia River from the Hanford Site is diluted by a factor of about 1000 because of the difference between the river and ground-water flow rates. During 1981, the average Columbia River flow rate at Hanford was reported by the U.S. Geological Survey (1982) as 134,000 cfs (3795 m^3/sec). The flow rate from the unconfined aquifer was calculated to be about 100 cfs (2.8 m^3/sec).

Tritium (^{3}H) observed at the extreme outer boundaries of the contamination plume shown in Figure 4 indicates that the radionuclide would reach the river at a concentration between 30 and 300 pCi/mℓ. The Columbia River

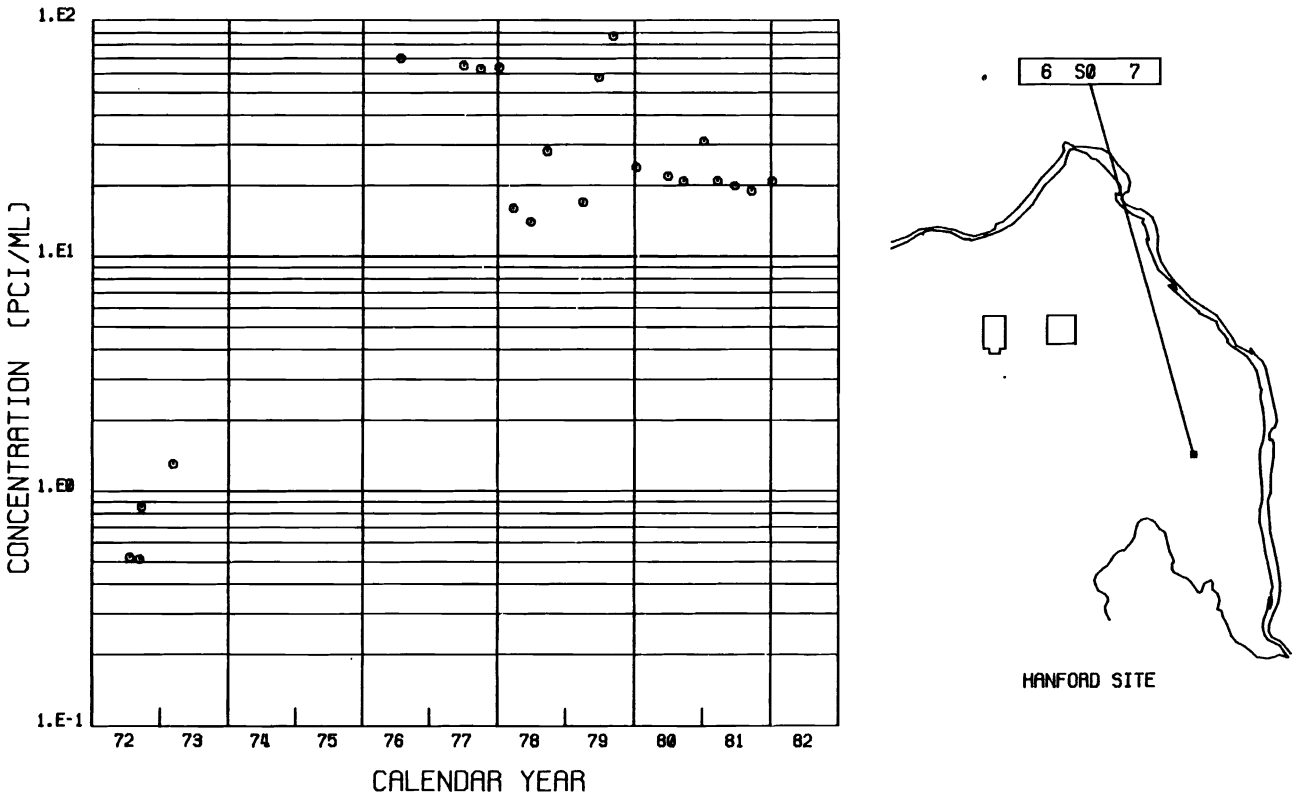


FIGURE 17. Concentration History for Tritium in Well 699-SO-7

transports approximately 20,000 Ci/yr of ^{3}H attributable to worldwide fallout and natural sources as reported in PNL-4211 (Sula et al. 1982). Tritium discharges from N Reactor during 1981 contributed an additional 80 Ci, which is <0.01% of the total from worldwide fallout (Fogel 1982). This contribution can not be distinguished from the ^{3}H that results from fallout level or ground water. Work is being conducted to determine the actual amount of ^{3}H being discharged to the Columbia River via the ground water at the Hanford Site.

GROUND-WATER STUDIES

During 1981, PNL provided various technical services in support of ground-water surveillance as part of the Hanford Environmental Surveillance Program. The additional data provided a greater analytical capability through modeling scenarios, field observations and quality assurance. The studies may be broken down into Data Base Maintenance, Data Assessment and Field Support.

DATA BASE MAINTENANCE

The maintenance of the Hanford Ground-Water Data Base is ongoing and involves prompt updating of the voluminous files of ground-water data that have been collected since the middle 1940's. Many of these records were kept in notebooks and file drawers prior to the development of the Comprehensive Information Retrieval and Model Input Sequence (CIRMIS) Data Base system. The CIRMIS system was developed to provide rapid access to the available ground-water information and to produce visual and/or hardcopy presentation of these data. Information presently available includes water quality histories of up to 32 different contaminants, water-level hydrographs, well structures and drillers' logs for over 300 wells. Data from aquifer tests and geophysical logs are just now being entered into the system and should be available in the near future.

During 1981, data for 473 wells were entered into the CIRMIS system. These data included the following: water quality samples analyzed by PNL, U.S. Testing and U.S. Geological Survey laboratories; hydrograph histories of wells measured by Rockwell personnel; and well structures and lithologic logs. The total number of wells in the CIRMIS Data Base is listed in Table 3. Figures 18 and 19 are examples of hydrograph and contaminant histories as accessed by the terminal and printer in the 300 Area.

TABLE 3. Total Wells in the CIRMIS Data Base

Area	Wells
100	120
200-E	553
200-W	832
300	39
600	848
1100	105
3000	9
	2506

DATA ASSESSMENT

Data assessment utilizes the available data stored in the CIRMIS system to provide trend analyses, quality assurance and model scenarios. These systems are described in the following paragraphs.

The sequential system (known as SCREEN) is designed to provide rapid assessment of trends in data stored in CIRMIS Data Base. This system was developed to run a statistical check on the contaminant data before entry into the data base. The program uses the previous five-year history for the contaminant and fits a trend line such that new data which are more than two standard deviations from this line will be flagged. The program will also predict, by the trend analysis, when a contaminant will exceed either the maximum permissible concentration (MPC) for drinking water, or DOE guidelines, or drop below the detection limit for the contaminant.

Three other systems that use the CIRMIS ground-water data are the Finite Element, Three Dimensional Ground Water (FE3DGW) model, the Multicomponent Mass Transport (MMT) model, and the Variable Thickness Transient (VTT) model. These models predict ground-water movement, contaminant leach rate, and radioactive chain decay.

The FE3DGW system is structured for simulating saturated ground-water systems using a Galerkin finite-element method. Spacing of nodes and vertical

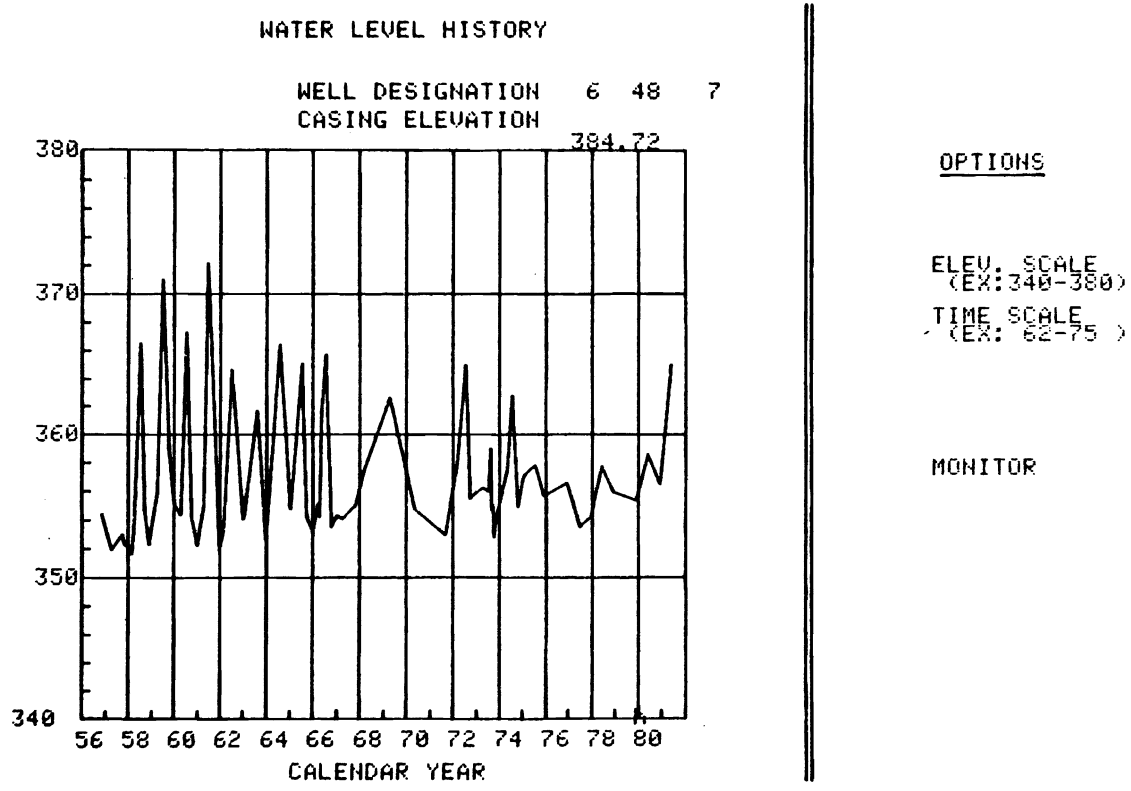


FIGURE 18. Example of Hydrograph Plot Accessed From 300 Area Terminal

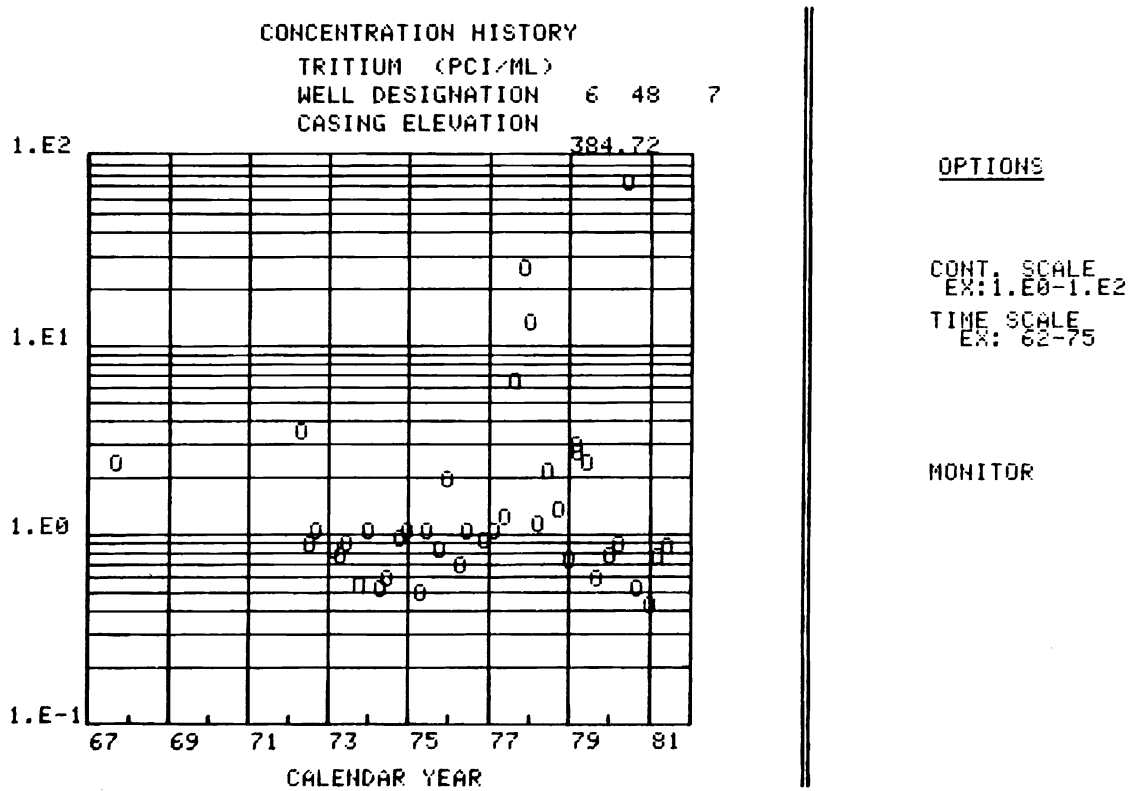


FIGURE 19. Example of Concentration History Plot Accessed From 300 Area Terminal

layers can be varied to describe the natural ground-water environment. The geologic data input are reduced to surface subdivisions and are described by hydrogeologic properties. The three-dimensional, finite-element, single-phase, unsaturated-zone system (UNSAT3D) is capable of predicting the movement of contaminants through the unsaturated materials overlying the water table. This system was developed in 1981 and was based on FE3DGW.

The MMT system is a second-level (intermediate complexity), one-dimensional, numerical model incorporating a discrete-parcel, random-walk-algorithm estimation. It is capable of analyzing the leach rate, movement, and dispersion of radionuclides in the ground water and calculating both the straight or branched decay chains of radionuclides.

The VTT system is one of the primary predictive models frequently used by the ground-water program. This is a second-level, two-dimensional, saturated, ground-water flow model using a Boussinesq finite-difference approximation. The VTT model is used to determine ground-water flow movement within different geologic layers of an aquifer. It has been used to predict the amount of ground-water mounding taking place at various discharge sites and the movement of tritium (^3H) towards the Columbia River.

The data files, upon which the steady state and transient models of the Hanford water table aquifer system are based, include the aquifer bottom elevations, transmissivity, boundary conditions, flow rate versus elevation, and liquid disposal to the ground. The water table data are used only for initial conditions during modeling. During FY-1982 (October 1, 1981 through September 30, 1982) this model is being updated. Data on effluent disposal rates and ground-water withdrawal rates at the Hanford Site are being entered into the data base and will be included in the VTT model update. Data from aquifer tests and logs from wells have been gathered from a number of sources and will be included in comparing old and new transmissivity calculations and redescribing the aquifer bottom boundaries.

Geophysical log interpretation is another data assessment tool that is being developed to use data more effectively. During 1981, existing well-log data were cataloged to form a digital data base system. The data were

originally to be stored in the CIRMIS data base; however, because of the large amounts of data, a separate file has been established. Quantitative techniques can be applied to these data to evaluate and analyze the subsurface environment.

During 1981, A Catalog of Borehole Geophysics on the Hanford Site, 1958 to 1980 (Blair, Law, and Lindberg 1981) was published. Geophysical logs for nearly 800 wells on and around the Hanford Site have been cataloged and maps for identifying and locating specific wells have been provided. Each well has been classified according to the amount of geophysical logging data available for that well. In addition, a cross-reference between the common well name and the Hanford grid designation was provided for several wells to eliminate confusion among various sources of data.

A data base system for handling geophysical well logs has been designed, coded, and tested. This system consists of four computer programs and is depicted schematically in Figure 20. The two main programs are for digitizing logs (DIGLOG1) and for storing and retrieving digitized data (LOGDAT). Two auxiliary programs, one for revising the digitized data and providing flexible output (LDGPLT), and a utility program for data base maintenance (LDGHDR), have also been written. These programs provide a system for handling geophysical logging data. Figure 21 depicts a series of computerized geophysical logs correlated to the lithologic logs.

Several logs for the following deep wells were digitized and entered into the data base system:

Wells	Type of Log
699-48-49	Density, Sonic, and Spontaneous Potential and Resistivity
699-84-33	Density, Sonic, and Spontaneous Potential and Resistivity
699-S15-E15	Density, Sonic, and Spontaneous Potential and Resistivity
699-10-54B	Density

The geophysical log-interpretation program will be completed by October 1982.

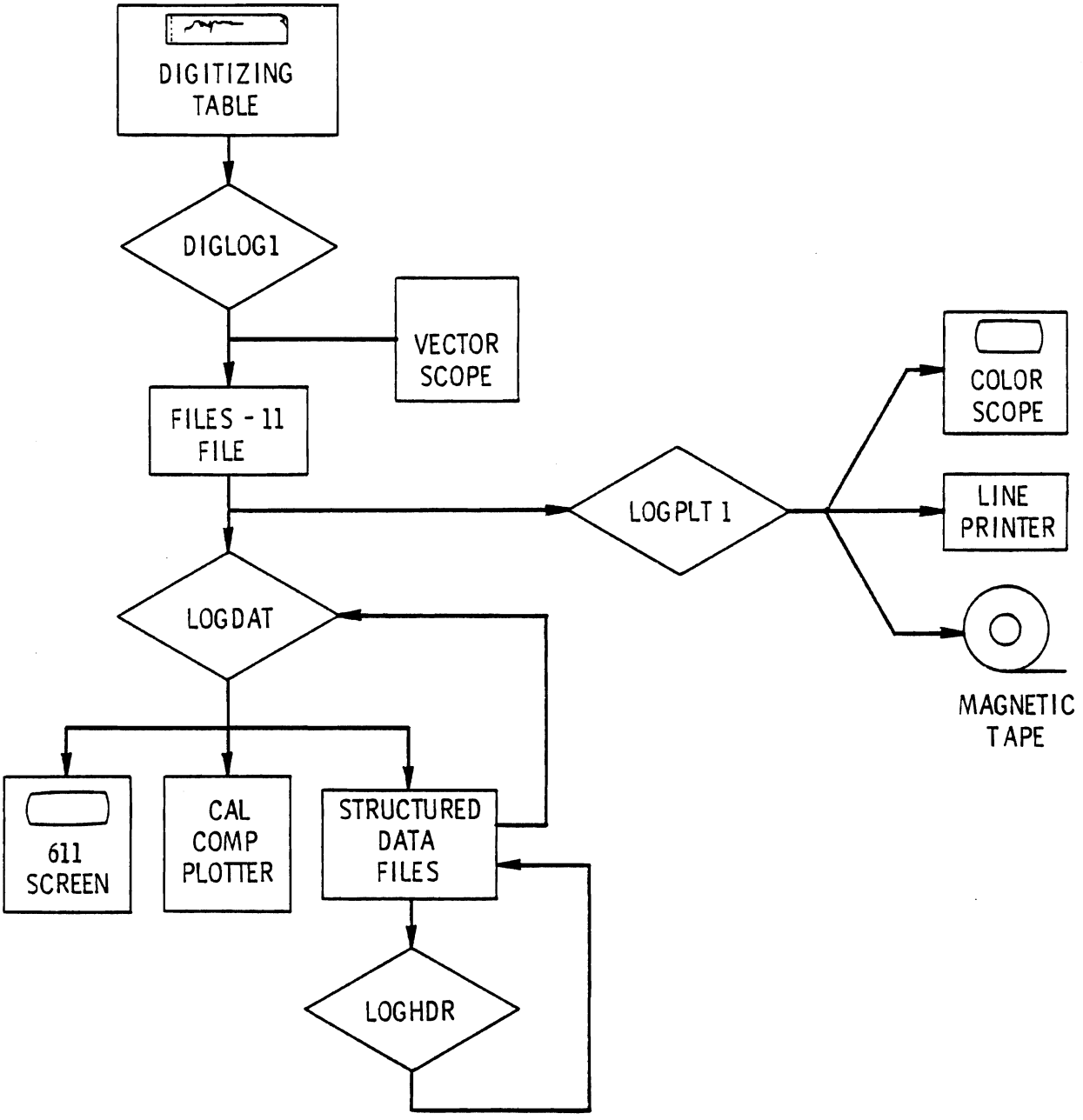


FIGURE 20. Schematic Diagram of Data Base System for Geophysical Well Log Data

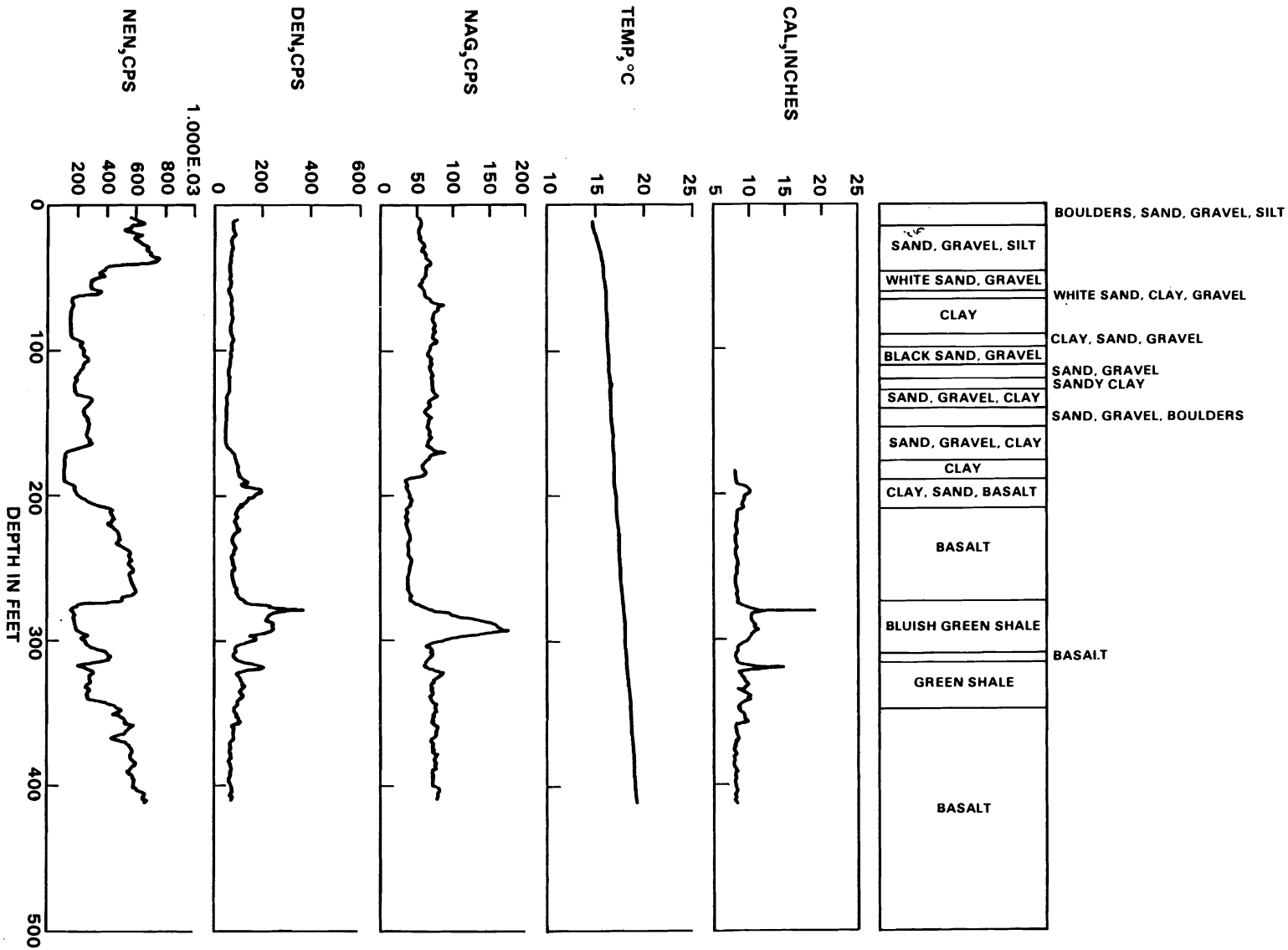


FIGURE 21. Digitized Geophysical Logs Correlated With Lithologic Log

FIELD SUPPORT

Field support includes well maintenance, geophysical logging, aquifer testing, and bank storage. It provides: 1) routine maintenance of sampling wells, 2) remedial work on pumps and wells, 3) surveys by downhole television camera and geophysical logs, 4) testing of the aquifer system by pumping and 5) monitoring of the effects of Columbia River bank storage on the ground water with a network of continuous water-level recorders.

Well Maintenance

Well maintenance is a continuing program that encompasses remedial well work, pump installation and safety work.

In FY-1978, a schedule was prepared for major well maintenance on a four- to five-year basis. However, since that time, a schedule for conducting routine maintenance on a continuing basis has been implemented. Wells that have deterioriated are repaired; wells receiving inadequate maintenance are rescheduled; and new wells are brought into conformance in order that representative samples can be assured. Treatment may include: brushing or swabbing the interior casing surface; bailing or pumping the well; perforating the casing; or placing screens in particular zones. Forty-one wells received remedial work during 1981 and are listed in Table 4.

TABLE 4. Wells Which Have Received Maintenance

199-B4-1	699-29-78	699-61-62	699-70-68
B9-1	32-22	61-66	72-92
D2-5	35-70	62-43F	699-83-47
F5-4	42-12A	63-90	
F8-1	46-21	64-62	399-1-4
H3-1	50-53	65-50	3-7
199-H4-3	59-32	65-59A	4-7
	60-32	65-83	6-1
699-S3-25	60-57	66-23	8-2
8-32	61-37	67-86	399-8-3
699-25-70	699-61-41	699-67-98	

Pump installation and repair entail a variety of jobs. Any pump that cannot be used to collect water samples must be repaired or replaced. A cracked pump column must be repaired and replaced; a pump that has fine sand in its system will "seizeup" and must be repaired. Problems in 1981 ranged from electrical problems and stolen pumps to a colony of bees in one of the well casings.

Safety work, like pump repair and remedial work, is continuous. Safety work may include the filling of holes adjacent to sampling wells, repair of roadways leading to wells, replacement of worn-out electrical equipment, or securing of pump and column to the casing to prevent the loss of equipment down the well.

During 1981, procedures for the installation and safety of sampling pumps were written to meet quality assurance requirements. New equipment was purchased to enhance the program. A new hydraulic-boom truck was obtained to retrieve and install pumps.

Geophysical Logging

One key to understanding the movement of ground water is related to the geophysical characteristics of the aquifer material. A comprehensive collection of borehole geophysical data is needed to define the aquifers at Hanford. Geophysical data, when correlated with geologic information from drillers' logs, will more fully describe the subsurface geology and boundaries that are input to the predictive models such as the VTT. All data collected are put into a format that will allow computer manipulation of the data to yield the maximum information and correlation. The data are automatically added to the Hanford ground-water data base. All available logging tools are used where appropriate. These tools include: natural gamma, density, neutron, caliper, temperature, flow meter, and downhole closed circuit television.

During 1981, 28 monitoring wells were logged and are listed below:

699- 4-E6	699-42-2	699-60-57	699-65-50
9-E2	43-3	61-37	65-83
17-5	45-4	61-41	67-86
20-E5	46-5	61-62	67-98
27-4	47-6	61-66	70-68
27-8	59-32	63-90	699-83-47
699-41-1	699-60-32	699-64-62	

Quality assurance was maintained on the geophysical logging system by calibrating each tool on a quarterly basis. Every three months a complete suite of logs is made of Well 399-5-2, established as a standard for the Hanford Site. The new logs can be compared with previous logs and any discrepancies that may be found can be corrected.

Aquifer Testing

Aquifer testing was begun in October, 1981. The objectives are to gain a better understanding of ground-water movement in the unconfined aquifer and to provide data that will be used to refine the ground-water models for the Hanford Site. Data obtained from testing will be used to determine aquifer characteristics such as transmissivity and storativity. Aquifer testing will continue for a five-year period.

Existing monitoring wells will be used for aquifer testing and will be selected for testing on the basis of a number of criteria. These include well location, casing diameter, total depth, specific capacity, and depth to water. The type of test to be conducted is the 24-hour constant rate test. Data obtained from testing will be analyzed by standard methods. A summary of the results of the first year's testing will be included in the annual report for 1982.

Bank Storage

Evaluation of the bank storage phenomenon was begun in October, 1981, to obtain information about the interactions of the Columbia River and the unconfined aquifer. Since the tritium and nitrate plumes have reached the Columbia River, knowledge of the aquifer/river interactions can assist in evaluating the quantity of contaminants entering the Columbia River.

A continuous water-level recorder has been installed in Well 699-48-7. Data obtained from this recorder indicate that the level of the water table near the river fluctuates greatly in response to increases or decreases in the river's flow. Such interactions of the river and the unconfined aquifer must have some effect on the discharge of contaminants to the Columbia River. Additional work will be directed toward defining this effect.

QUALITY CONTROL

The PNL program for quality control was initiated in 1974 and includes all phases of the Ground-Water Surveillance Program. The extensive effort to insure that samples are representative of the unconfined aquifer system beneath the site includes: 1) well maintenance, 2) visual and geophysical inspection of wells, and 3) installation of sampling pumps. In addition, blind and duplicate samples are analyzed by the PNL Technical Analysis Laboratory. Quality assurance analysis of ground-water samples by the U.S. Geological Survey has been continued. Results have shown that data received as part of the routine Ground-Water Surveillance Program are within the analytical limits of accuracy.

In addition to providing quality assurance, the U.S. Geological Survey provides data on the chemistry of Hanford ground water. These data, including wet chemical and spectrographic analysis, represent background information used in assessing the effects of plant operations. The results of the analyses made in 1981 are shown in Appendix C. These data analyses indicate that the quality of the ground water beneath the Hanford Site is comparable to that of other ground waters found in eastern Washington (Walters and Grober 1960).

At the laboratory level the documentation of laboratory instrument calibrations and all laboratory procedures are required. Documentation of field instrument calibration has also been implemented.

REFERENCES

American Society for Testing and Materials (ASTM). 1979. 1979 Annual Book of ASTM Standard, Part 31: Water. American Society for Testing and Materials, Philadelphia, Pennsylvania.

Blair, S. C., L. S. Law, and J. W. Lindberg. 1981. A Catalog of Borehole Geophysics on the Hanford Site, 1958 to 1980. PNL-3504, Pacific Northwest Laboratory, Richland, Washington.

Blumer, P. J., M. J. Sula, and P. A. Eddy. 1980. Master Schedule for CY-1981 Hanford Environmental Surveillance Routine Program. PNL-3639, Pacific Northwest Laboratory, Richland, Washington.

Eddy, P. A., D. A. Myers, and J. R. Raymond. 1978. Vertical Contamination in the Unconfined Ground Water at the Hanford Site, Washington. PNL-2724, Pacific Northwest Laboratory, Richland, Washington.

Eddy, P. A., and J. S. Wilbur. 1981. Radiological Status of the Ground Water Beneath the Hanford Site, January-December 1980. PNL-3768, Pacific Northwest Laboratory, Richland, Washington.

Fogel, P. A. 1982. UNC Nuclear Industries, Reactor and Fuels Production Facilities, 1981 Effluent Release Report. UNC Nuclear Industries, Richland, Washington.

Graham, M. J., and W. R. Brown. 1981. Results of the Separations Area Ground-Water Monitoring Network for 1980. RHO-LD-165, Rockwell Hanford Operations, Richland, Washington.

McGhan, V. L., and D. W. Damschen. 1979. Hanford Wells. PNL-2894, Pacific Northwest Laboratory, Richland, Washington.

Sula, M. J., et al. 1982. Environmental Surveillance at Hanford for CY-1981. PNL-4211, Pacific Northwest Laboratory, Richland, Washington.

Trescott, P. C., and G. F. Pinder. 1970. "Air Pump for Small-Diameter Piezometers," Ground Water, Vol. 8, No. 3.

U.S. Department of Energy. 1981. "Requirements for Radiation Protection." In DOE Order 5480.1, Chapter XI. U.S. Department of Energy, Washington DC.

U.S. Geological Survey. 1982. Water Resources Data for Washington, Water Year 1981. U.S. Geological Survey Water Data Report WA-81-2, Tacoma, Washington.

Walters, K. L., and M. J. Grolier. 1960. Geology and Ground Water Resources of the Columbia Basin Project Area, Washington, Volume 1. Water Supply Bulletin No. 8, Washington State Division of Water Resources, Olympia, Washington.

Wilbur, J. S. 1982. Water Table Measurement Data Maps - December 1981. Rockwell Hanford Operations, Richland, Washington.

APPENDIX A

TRITIUM AND NITRATE CONCENTRATIONS IN THE GROUND WATER (UNCONFINED AQUIFER)

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
1	B3	1	MAX		
			AVE	1.10E+00*	
			MIN		
1	B4	1	MAX		
			AVE	6.60E+00*	8.25E+00*
			MIN		
1	B4	2	MAX		8.40E+00
			AVE	2.53E+00*	6.97E+00
			MIN		6.20E+00
1	B4	3	MAX		1.10E+01
			AVE	1.22E+01*	9.30E+00
			MIN		8.30E+00
1	B4	4	MAX		
			AVE	1.70E+00*	4.25E+00*
			MIN		
1	B5	1	MAX		
			AVE	1.50E+00*	6.53E+00*
			MIN		
1	B9	1	MAX		
			AVE	1.13E+00*	7.10E+00*
			MIN		
1	D2	5	MAX		
			AVE	6.90E+00*	5.07E+01*
			MIN		
1	D5	12	MAX		3.10E+01
			AVE	6.00E+00*	2.45E+01
			MIN		2.00E+01
1	D8	3	MAX		2.00E+01
			AVE	5.00E+00*	8.03E+00
			MIN		1.50E+00
1	F5	1	MAX	1.00E+00	3.40E+00
			AVE	7.57E-01	2.38E+00
			MIN	5.80E-01	1.30E+00

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		
1	F5	3	AVE	7.73E-01*	8.83E+00*
			MIN		
			MAX	3.60E+01	
1	F5	4	AVE	2.95E+01	1.32E+01*
			MIN	2.50E+01	
			MAX	1.10E+00	<5.00E-01
1	F5	6	AVE	7.30E-01	<5.00E-01
			MIN	<4.60E-01	<5.00E-01
			MAX	1.30E+00	8.90E+01
1	F7	1	AVE	1.15E+00	5.99E+01
			MIN	1.10E+00	8.50E+00
			MAX	1.70E+01	9.20E+01
2	F8	2	AVE	1.80E+01	8.53E+01
			MIN	1.50E+01	6.80E+01
			MAX	1.30E+01	6.70E+01
1	F8	2	AVE	1.20E+01	5.62E+01
			MIN	1.00E+01	4.60E+01
			MAX	8.90E+00	
1	H3	1	AVE	6.73E+00	5.20E+01*
			MIN	4.30E+00	
			MAX	3.30E+00	2.30E+03
1	H4	3	AVE	2.41E+00	1.03E+03
			MIN	1.80E+00	4.30E+02
			MAX		
1	K	11	AVE	5.60E+00*	1.07E+01*
			MIN		
			MAX		
1	K	19	AVE	1.11E+01*	9.17E+00*
			MIN		
			MAX		
1	K	20	AVE	2.90E+00*	2.93E+00*
			MIN		

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		
1	K	22	AVE	1.50E+00*	<5.00E-01*
			MIN		
			MAX		
1	K	27	AVE	1.45E+03*	1.48E+01*
			MIN		
			MAX		
1	K	28	AVE	8.50E+00*	1.17E+01*
			MIN		
			MAX		
1	K	29	AVE	6.80E+00*	5.13E+00*
			MIN		
			MAX		
1	K	30	AVE	5.20E+02*	1.52E+01*
			MIN		
			MAX	4.60E+01	
1	N	2	AVE	2.51E+01	1.56E+01*
			MIN	6.30E+00	
			MAX	2.40E+01	
1	N	3	AVE	1.93E+01	
			MIN	9.20E+00	
			MAX	1.90E+01	9.70E+00
1	N	4	AVE	1.75E+01	6.45E+00
			MIN	1.60E+01	3.50E+00
			MAX	2.80E+01	
1	N	5	AVE	1.83E+01	3.10E+00*
			MIN	1.20E+01	
			MAX	2.50E+01	
1	N	6	AVE	1.55E+01	1.90E+01*
			MIN	9.80E+00	
			MAX	2.70E+01	
1	N	14	AVE	1.70E+01	8.03E+00*
			MIN	8.80E+00	

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX	2.40E+01	
1	N	15	AVE	2.05E+01	5.93E+00*
			MIN	1.80E+01	
			MAX		
1	N	16	AVE	6.83E-01*	3.20E+00*
			MIN		
			MAX		
1	N	17	AVE	1.97E+01*	7.15E-01*
			MIN		
			MAX		
1	N	18	AVE	1.24E+01*	<5.00E-01*
			MIN		
			MAX		
1	N	19	AVE	1.70E+01*	9.10E+00*
			MIN		
			MAX		
1	N	20	AVE	1.90E+01*	1.90E+01*
			MIN		
			MAX		
1	N	21	AVE	4.03E+01*	9.45E+00*
			MIN		
			MAX		
1	N	22	AVE	2.37E+00*	7.25E+00*
			MIN		
			MAX		
1	N	23	AVE	1.71E+00*	5.60E+00*
			MIN		
			MAX		
1	N	24	AVE	2.10E+00*	7.70E+00*
			MIN		
			MAX		
1	N	25	AVE	1.90E+00*	1.60E+01*
			MIN		

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		
1	N	26	AVE	2.00E+00*	1.10E+01*
			MIN		
			MAX		4.50E+01
2E	17	5	AVE		3.88E+01
			MIN		3.45E+01
			MAX	4.50E+00	1.20E+01
2E	19	1	AVE	1.67E+00	3.82E+00
			MIN	<5.10E-01	<5.00E-01
			MAX	7.80E+00	1.40E+01
2E	23	1	AVE	6.20E+00	1.17E+01
			MIN	4.40E+00	6.80E+00
			MAX	1.19E+03	
2E	24	2	AVE	5.30E+02	
			MIN	2.05E+02	
			MAX	3.10E+00	1.50E+01
2E	24	7	AVE	2.15E+00	1.30E+01
			MIN	6.90E-01	1.20E+01
			MAX	6.89E+01	8.30E+00
2E	25	2	AVE	5.77E+01	4.02E+00
			MIN	4.60E+01	2.50E-01
			MAX	5.09E+02	
2E	25	6	AVE	2.78E+02	
			MIN	2.02E+02	
			MAX	1.10E+00	<5.00E-01
2E	26	1	AVE	7.90E-01	<5.00E-01
			MIN	5.60E-01	<5.00E-01
			MAX		
2E	26	3	AVE	1.50E+01*	4.60E+00*
			MIN		
			MAX		
2E	26	4	AVE	3.12E+01*	
			MIN		

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX	1.80E+01	3.80E+00
2E	27	1	AVE	1.73E+01	3.33E+00
			MIN	1.70E+01	3.00E+00
			MAX		
2E	28	1	AVE	6.67E+00*	4.82E+00*
			MIN		
			MAX	1.66E+02	
2E	28	12	AVE	1.17E+02	
			MIN	6.25E+01	
			MAX	9.03E+01	
2E	28	13	AVE	2.69E+01	
			MIN	3.70E+00	
			MAX	1.67E+02	
2E	28	18	AVE	1.04E+02	
			MIN	3.07E+01	
			MAX	3.04E+01	
2E	33	3	AVE	2.20E+01	
			MIN	1.04E+01	
			MAX	8.60E-01	4.90E+01
2E	33	14	AVE	5.93E-01	4.35E+01
			MIN	<4.30E-01	3.70E+01
			MAX	7.91E+00	1.12E+00
2E	34	1	AVE	1.54E+00	6.10E-01
			MIN	4.69E-01	1.00E-01
			MAX	3.70E+01	1.40E+02
2W	6	1	AVE	3.70E+01	1.25E+02
			MIN	3.70E+01	1.10E+02
			MAX	2.20E+01	1.30E+02
2W	10	5	AVE	1.69E+01	9.43E+01
			MIN	2.40E+00	7.10E+01
			MAX	2.90E+00	<5.00E-01
2W	11	9	AVE	1.87E+00	<5.00E-01
			MIN	9.70E-01	<5.00E-01

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX	<8.60E-01	2.50E+02
2W	12	1	AVE	<6.40E-01	2.33E+02
			MIN	5.20E-01	2.10E+02
			MAX	<7.30E-01	1.30E+00
2W	18	3	AVE	<5.50E-01	1.04E+00
			MIN	<3.70E-01	8.50E-01
			MAX	7.10E+00	1.50E+01
2W	19	3	AVE	2.21E+00	9.25E+00
			MIN	3.50E-01	5.60E+00
			MAX		
2W	19	4	AVE	1.40E+00*	1.50E+01*
			MIN		
			MAX		
2W	21	1	AVE	1.73E+03*	6.73E+01*
			MIN		
			MAX	3.40E+02	
2W	22	1	AVE	1.55E+02	
			MIN	5.08E+01	
			MAX	1.30E+03	<5.00E-01
2W	22	7	AVE	1.15E+03	<5.00E-01
			MIN	1.00E+03	<5.00E-01
			MAX	1.18E+04	<5.00E-01
2W	22	9	AVE	1.01E+04	<4.20E-01
			MIN	9.30E+03	1.80E-01
			MAX	3.26E+02	
2W	22	26	AVE	2.57E+02	
			MIN	1.82E+02	
			MAX	5.78E+01	1.51E+00
2W	23	4	AVE	2.68E+01	7.72E-01
			MIN	1.47E+00	1.00E-01
			MAX	2.80E+01	
2W	23	10	AVE	5.23E+00	
			MIN	4.84E-01	

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		1.20E+01
3	1	1	AVE		6.48E+00
			MIN		1.10E+00
			MAX		1.10E+01
3	1	2	AVE		6.30E+00
			MIN		1.20E+00
			MAX		1.00E+01
3	1	3	AVE		6.78E+00
			MIN		2.30E+00
			MAX		1.40E+01
3	1	4	AVE		8.18E+00
			MIN		5.30E+00
			MAX	2.00E+00	
3	1	5	AVE	8.44E-01	3.50E+00*
			MIN	<4.00E-01	
			MAX		1.40E+01
3	1	6	AVE		1.17E+01
			MIN		7.70E+00
			MAX		1.20E+01
3	2	1	AVE		7.28E+00
			MIN		1.40E+00
			MAX		1.10E+01
3	2	2	AVE		6.65E+00
			MIN		1.40E+00
			MAX		1.20E+01
3	2	3	AVE		9.50E+00
			MIN		3.00E+00
			MAX		1.20E+01
3	3	1	AVE		7.73E+00
			MIN		1.60E+00
			MAX		1.20E+01
3	3	2	AVE	7.30E-03*	6.15E+00
			MIN		<5.00E-01

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		1.10E+01
3	3	3	AVE	3.57E-01*	6.91E+00
			MIN		3.80E+00
			MAX		8.20E+00
3	3	6	AVE	6.50E-03*	5.02E+00
			MIN		<5.00E-01
			MAX		1.30E+01
3	3	7	AVE	8.90E-03*	6.35E+00
			MIN		<5.00E-01
			MAX		1.50E+01
3	3	9	AVE	1.20E-02*	1.13E+01
			MIN		3.70E+00
			MAX		1.30E+01
3	3	10	AVE		8.99E+00
			MIN		4.70E+00
			MAX		1.50E+01
3	3	11	AVE	<3.14E-02*	1.02E+01
			MIN		7.50E+00
			MAX		1.40E+01
3	3	12	AVE		1.04E+01
			MIN		8.50E+00
			MAX		
3	4	1	AVE		8.40E+00*
			MIN		
			MAX		
3	4	7	AVE		1.55E+01*
			MIN		
			MAX		1.40E+01
3	4	9	AVE	9.40E-03*	1.02E+01
			MIN		3.10E+00
			MAX		1.30E+01
3	4	10	AVE		1.25E+01
			MIN		1.20E+01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX		
3 5 1	AVE		1.75E+01*
	MIN		
	MAX		1.40E+01
3 6 1	AVE		1.02E+01
	MIN		4.60E+00
	MAX		6.90E+00
3 8 1	AVE		4.95E+00
	MIN		1.20E+00
	MAX		8.20E+00
3 8 2	AVE		6.48E+00
	MIN		4.70E+00
	MAX		1.50E+01
3 8 3	AVE		7.83E+00
	MIN		4.10E+00
	MAX		1.10E+01
3 8 4	AVE	7.10E-03*	8.13E+00
	MIN		6.10E+00
	MAX		
6 S31 1	AVE	1.56E+00*	1.20E+00*
	MIN		
	MAX		
6 S31 1P	AVE	<4.90E-01*	1.35E+00*
	MIN		
	MAX		3.80E+01
6 S30E15A	AVE		1.84E+01
	MIN		7.50E+00
	MAX		2.00E+01
6 S29 E12	AVE		1.43E+01
	MIN		1.20E+01
	MAX		1.60E+01
6 S27 E14	AVE	1.20E-02*	1.25E+01
	MIN		6.30E+00

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
6 S24 19	MAX		
	AVE		<5.00E-01*
	MIN		
6 S19 E13	MAX		
	AVE		1.17E+01*
	MIN		
6 S19 11	MAX		
	AVE		1.15E+01*
	MIN		
6 S18 51	MAX		<5.00E-01
	AVE		<5.00E-01
	MIN		<5.00E-01
6 S14 20	MAX		1.30E+00
	AVE		8.44E-01
	MIN		<5.00E-01
6 S12 3	MAX	1.80E+00	5.20E+00
	AVE	9.75E-01	4.72E+00
	MIN	<4.00E-01	4.30E+00
6 S12 29	MAX		9.40E+00
	AVE		8.25E+00
	MIN		7.30E+00
6 S11E12A	MAX		
	AVE	1.29E+00*	9.17E+00*
	MIN		
6 S11E12AP	MAX		
	AVE	9.03E-01*	7.67E-01*
	MIN		
6 S8 19	MAX	2.10E+00	3.30E+00
	AVE	8.90E-01	2.68E+00
	MIN	<5.30E-01	2.30E+00
6 S7 34	MAX		
	AVE	<5.07E-01*	<5.00E-01*
	MIN		

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
6	S6E14A	MAX		
		AVE	<6.00E-01*	<5.00E-01*
		MIN		
6	S6 E48	MAX	2.20E+01	1.20E+01
		AVE	2.00E+01	9.55E+00
		MIN	1.90E+01	8.40E+00
6	S6 E40	MAX	3.20E+01	2.40E+01
		AVE	2.98E+01	1.63E+01
		MIN	2.80E+01	1.30E+01
6	S3 E12	MAX		
		AVE	1.41E+00*	5.40E+00*
		MIN		
6	S3 25	MAX	1.60E+00	6.60E-01
		AVE	7.36E-01	5.42E-01
		MIN	<4.20E-01	<5.00E-01
6	S1 78	MAX	5.50E+01	5.80E+00
		AVE	3.98E+01	1.83E+00
		MIN	3.40E+01	5.00E-01
6	S0 8	MAX	7.70E+01	
		AVE	6.25E+01	8.03E+00*
		MIN	4.80E+01	
6	S0 7	MAX	3.10E+01	
		AVE	2.28E+01	2.37E+00*
		MIN	1.90E+01	
6	1 18	MAX	1.10E+02	2.00E+01
		AVE	1.01E+02	1.62E+01
		MIN	9.60E+01	9.00E+00
6	2 3	MAX	1.20E+02	2.60E+01
		AVE	1.18E+02	2.31E+01
		MIN	1.10E+02	2.00E+01
6	2 33A	MAX	2.80E+00	1.60E+00
		AVE	1.09E+00	1.05E+00
		MIN	<4.90E-01	<5.00E-01

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		8.90E+00
6	3	45	AVE	<4.85E-01*	7.70E+00
			MIN		7.00E+00
			MAX	2.10E+00	6.70E+00
6	4	E6	AVE	9.57E-01	3.42E+00
			MIN	<4.50E-01	<5.00E-01
			MAX	1.80E+02	3.00E+01
6	8	17	AVE	1.72E+02	2.70E+01
			MIN	1.70E+02	1.80E+01
			MAX	8.50E+01	1.80E+01
6	8	25	AVE	7.86E+01	1.52E+01
			MIN	7.10E+01	1.30E+01
			MAX	2.20E+00	5.60E+00
6	8	32	AVE	9.98E-01	5.13E+00
			MIN	<5.00E-01	4.40E+00
			MAX	1.20E+00	<5.00E-01
6	9	E2	AVE	7.10E-01	<5.00E-01
			MIN	<4.60E-01	<5.00E-01
			MAX		
6	10	E12	AVE	4.93E+00*	2.27E+01*
			MIN		
			MAX		
6	13	1A	AVE	2.55E+01*	3.30E+00*
			MIN		
			MAX		
6	13	1B	AVE	<5.37E-01*	<5.00E-01*
			MIN		
			MAX	<5.90E-01	<5.00E-01
6	13	1C	AVE	<4.63E-01	<5.00E-01
			MIN	<3.20E-01	<5.00E-01
			MAX		
6	13	64	AVE	<4.63E-01*	5.93E-01*
			MIN		

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX	<5.80E-01	6.60E-01
6 14 E6P	AVE	<5.12E-01	5.40E-01
	MIN	<3.70E-01	<5.00E-01
	MAX	<7.10E-01	<5.00E-01
6 14 E6Q	AVE	<5.82E-01	<5.00E-01
	MIN	<4.50E-01	<5.00E-01
	MAX	<6.80E-01	
6 14 E6R	AVE	<5.85E-01	<5.00E-01*
	MIN	<4.90E-01	
	MAX		
6 14 E6S	AVE	<5.05E-01*	<5.00E-01*
	MIN		
	MAX	2.50E+01	1.10E+01
6 14 E6T	AVE	2.23E+01	1.01E+01
	MIN	2.00E+01	8.40E+00
	MAX	1.20E+00	1.40E+00
6 14 38	AVE	7.66E-01	8.02E-01
	MIN	<5.20E-01	<5.00E-01
	MAX	9.30E-01	6.50E-01
6 14 47	AVE	7.24E-01	5.44E-01
	MIN	<4.90E-01	<5.00E-01
	MAX	1.90E+00	1.80E+01
6 15 15B	AVE	9.06E-01	1.60E+01
	MIN	<3.80E-01	1.40E+01
	MAX	2.20E+02	2.30E+01
6 15 26	AVE	2.04E+02	2.14E+01
	MIN	1.90E+02	2.00E+01
	MAX	7.80E-01	5.60E+01
6 17 5	AVE	5.28E-01	4.25E+01
	MIN	<3.60E-01	2.40E+01
	MAX	<7.30E-01	3.10E+01
6 17 70	AVE	<5.80E-01	2.98E+01
	MIN	<4.30E-01	2.80E+01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX	1.60E+00	9.40E+00
6 19 43	AVE	1.02E+00	7.98E+00
	MIN	<5.50E-01	6.50E+00
	MAX		<5.00E-01
6 19 58	AVE		<5.00E-01
	MIN		<5.00E-01
	MAX		9.00E-01
6 19 88	AVE	<3.50E-01*	7.33E-01
	MIN		<5.00E-01
	MAX	2.10E+01	1.30E+01
6 20 E5A	AVE	1.90E+01	1.12E+01
	MIN	1.70E+01	9.80E+00
	MAX	<8.70E-01	<5.00E-01
6 20 E5P	AVE	<6.13E-01	<5.00E-01
	MIN	<3.10E-01	<5.00E-01
	MAX	<5.60E-01	<5.00E-01
6 20 E5Q	AVE	<5.07E-01	<5.00E-01
	MIN	<3.80E-01	<5.00E-01
	MAX	<6.80E-01	5.10E-01
6 20 E5R	AVE	<4.75E-01	5.02E-01
	MIN	<3.00E-01	<5.00E-01
	MAX	1.10E+00	<5.00E-01
6 20 E12	AVE	6.93E-01	<5.00E-01
	MIN	<4.10E-01	<5.00E-01
	MAX		
6 20 E12P	AVE	3.26E+00*	<5.00E-01*
	MIN		
	MAX	5.50E+02	4.50E+01
6 20 20	AVE	5.25E+02	4.37E+01
	MIN	5.10E+02	4.00E+01
	MAX	1.60E+00	7.00E-01
6 20 39	AVE	8.90E-01	5.94E-01
	MIN	<5.50E-01	<5.00E-01

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
		MAX	<6.90E-01	2.00E+01
6	20	82	<6.08E-01	1.85E+01
		MIN	<5.60E-01	1.40E+01
		MAX	1.20E+00	1.10E+01
6	22	70	6.90E-01	8.50E+00
		MIN	<3.50E-01	5.00E+00
		MAX	4.70E+01	4.90E+01
6	23	7	4.34E+01	3.61E+01
		MIN	4.10E+01	4.10E+00
		MAX	<6.40E-01	<5.00E-01
6	24	1P	<4.83E-01	<5.00E-01
		MIN	<3.80E-01	<5.00E-01
		MAX		<5.00E-01
6	24	1Q	<5.77E-01*	<5.00E-01
		MIN		<5.00E-01
		MAX	<8.70E-01	<5.00E-01
6	24	1R	<5.50E-01	<5.00E-01
		MIN	<3.60E-01	<5.00E-01
		MAX	1.60E+00	<5.00E-01
6	24	1S	7.85E-01	<5.00E-01
		MIN	<4.00E-01	<5.00E-01
		MAX	6.20E+00	7.00E-01
6	24	1T	5.20E+00	5.50E-01
		MIN	4.70E+00	<5.00E-01
		MAX	8.30E+01	1.70E+01
6	24	33	7.30E+01	1.56E+01
		MIN	6.20E+01	1.50E+01
		MAX	1.80E+00	<5.00E-01
6	24	46	9.80E-01	<5.00E-01
		MIN	<4.20E-01	<5.00E-01
		MAX	2.20E+00	1.10E+01
6	25	55	9.43E-01	1.05E+01
		MIN	<4.00E-01	1.00E+01

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		
6	25	70	AVE	2.15E+00*	1.15E+01*
			MIN		
			MAX	7.30E+02	4.40E+01
6	26	15	AVE	6.82E+02	4.04E+01
			MIN	6.20E+02	3.50E+01
			MAX		
6	26	89	AVE		2.20E+00*
			MIN		
			MAX	2.10E+02	2.80E+01
6	27	4	AVE	7.02E+01	1.88E+01
			MIN	2.60E+01	8.60E+00
			MAX	7.90E+02	5.20E+01
6	27	8	AVE	7.58E+02	4.68E+01
			MIN	7.40E+02	4.10E+01
			MAX		
6	28	40	AVE	1.08E+01*	6.30E+00*
			MIN		
			MAX		
6	28	40P	AVE	4.68E+00*	3.53E+00*
			MIN		
			MAX	1.80E+00	<5.00E-01
6	28	52	AVE	8.05E-01	<5.00E-01
			MIN	<4.20E-01	<5.00E-01
			MAX		
6	29	78	AVE	6.87E-01*	3.67E+00*
			MIN		
			MAX		
6	31	31	AVE	3.87E+02*	2.70E+01*
			MIN		
			MAX	<6.10E-01	<5.00E-01
6	31	31P	AVE	<4.59E-01	<5.00E-01
			MIN	2.96E-01	<5.00E-01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
6 31 53B	MAX		
	AVE	2.00E+00*	6.60E+00*
	MIN		
6 32 22	MAX	1.10E+03	5.70E+01
	AVE	9.82E+02	5.46E+01
	MIN	9.30E+02	5.20E+01
6 32 42	MAX	2.80E+02	<5.00E-01
	AVE	2.74E+02	<5.00E-01
	MIN	2.70E+02	<5.00E-01
6 32 43	MAX	3.90E+01	1.50E+01
	AVE	3.58E+01	1.36E+01
	MIN	3.20E+01	1.20E+01
6 32 62	MAX		
	AVE	5.63E-01*	2.63E+01*
	MIN		
6 32 70	MAX		
	AVE	2.43E+02*	9.93E+00*
	MIN		
6 32 77	MAX	1.30E+00	4.80E+00
	AVE	6.87E-01	4.60E+00
	MIN	<3.20E-01	4.20E+00
6 33 42	MAX	2.70E+02	2.00E+01
	AVE	1.80E+02	1.39E+01
	MIN	1.30E+02	<5.00E-01
6 33 56	MAX		
	AVE	9.70E-01*	6.67E+00*
	MIN		
6 34 39A	MAX	2.70E+02	2.40E+01
	AVE	2.42E+02	1.90E+01
	MIN	2.10E+02	1.10E+01
6 34 41	MAX	2.50E+02	2.30E+01
	AVE	2.18E+02	2.06E+01
	MIN	1.90E+02	1.80E+01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX	2.30E+02	2.40E+01
6 34 42	AVE	2.06E+02	2.00E+01
	MIN	1.80E+02	1.60E+01
	MAX	2.40E+00	7.10E+00
6 34 51	AVE	1.06E+00	5.35E+00
	MIN	<3.80E-01	3.30E+00
	MAX	<7.10E-01	1.70E+01
6 34 88	AVE	<6.15E-01	1.58E+01
	MIN	<5.10E-01	1.50E+01
	MAX		
6 35 9	AVE	1.20E+02*	2.00E+01*
	MIN		
	MAX	9.70E+02	2.30E+01
6 35 66	AVE	9.37E+02	2.10E+01
	MIN	8.80E+02	2.00E+01
	MAX		
6 35 70	AVE	3.90E+03*	3.10E+01*
	MIN		
	MAX		
6 36 46P	AVE	7.43E-01*	<5.00E-01*
	MIN		
	MAX		
6 36 46Q	AVE	<5.33E-01*	5.30E-01*
	MIN		
	MAX		1.60E+01
6 36 61A	AVE		1.16E+01
	MIN		<5.00E-01
	MAX	<8.50E-01	1.40E+01
6 36 61B	AVE	<5.75E-01	3.88E+00
	MIN	<3.70E-01	<5.00E-01
	MAX		
6 36 93	AVE	<5.35E-01*	3.30E+00*
	MIN		

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
		MAX		
6	37	43 AVE	6.33E+01*	1.03E+01*
		MIN		
		MAX	7.20E-01	3.10E+01
6	37	82A AVE	5.55E-01	2.80E+01
		MIN	<4.30E-01	2.30E+01
		MAX		
6	38	65 AVE	1.27E+02*	8.83E+01*
		MIN		
		MAX		
6	38	70 AVE	6.55E+00*	2.60E+02*
		MIN		
		MAX	2.30E+02	3.20E+01
6	39	1 AVE	2.08E+02	2.53E+01
		MIN	1.20E+02	<5.00E+00
		MAX		
6	39	39 AVE	<7.15E-01*	<5.00E-01*
		MIN		
		MAX		
6	39	79 AVE	1.46E+00*	1.04E+00*
		MIN		
		MAX	2.30E+02	3.00E+01
6	40	1 AVE	2.16E+02	2.50E+01
		MIN	2.10E+02	1.30E+01
		MAX		
6	40	33A AVE	<5.15E-01*	<5.00E-01*
		MIN		
		MAX		
6	40	62 AVE	1.17E+01*	2.00E+01*
		MIN		
		MAX	2.20E+02	3.10E+01
6	41	1 AVE	1.97E+02	2.71E+01
		MIN	4.70E+01	2.30E+01

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
		MAX	6.40E+02	4.10E+01
6 41 23		AVE	6.05E+02	3.63E+01
		MIN	5.70E+02	2.90E+01
		MAX	2.10E+02	2.90E+01
6 42 2		AVE	1.84E+02	2.56E+01
		MIN	1.70E+02	2.00E+01
		MAX	3.30E+02	3.20E+01
6 42 12A		AVE	3.22E+02	2.82E+01
		MIN	3.20E+02	2.00E+01
		MAX	2.10E+02	2.90E+01
6 43 3		AVE	1.84E+02	2.33E+01
		MIN	1.30E+02	1.50E+01
		MAX	1.10E+00	1.00E+01
6 43 88		AVE	6.78E-01	4.00E+00
		MIN	<3.90E-01	<5.00E-01
		MAX	1.70E+02	2.70E+01
6 44 4		AVE	1.34E+02	1.79E+01
		MIN	5.70E+01	1.80E+00
		MAX		
6 44 64		AVE	2.77E+00*	2.07E+01*
		MIN		
		MAX	1.10E+02	1.50E+01
6 45 4		AVE	7.96E+01	1.08E+01
		MIN	5.60E+01	<5.00E-01
		MAX	1.40E+02	5.50E+00
6 45 42		AVE	1.30E+02	4.75E+00
		MIN	1.20E+02	3.60E+00
		MAX		
6 45 69		AVE	1.86E+00*	2.17E+01*
		MIN		
		MAX		
6 46 4		AVE	6.80E+01*	1.60E+00*
		MIN		

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
		MAX	2.00E+02	2.60E+01
6	46	5 AVE	1.53E+02	1.82E+01
		MIN	1.20E+02	1.40E+01
		MAX	3.30E+01	1.40E+01
6	46	21 AVE	3.25E+01	1.04E+01
		MIN	3.20E+01	8.10E+00
		MAX	1.90E+02	2.20E+01
6	47	6 AVE	1.06E+02	1.24E+01
		MIN	2.30E+01	1.70E+00
		MAX	8.60E-01	3.90E+01
6	47	35A AVE	5.53E-01	1.06E+01
		MIN	<4.30E-01	<5.00E-01
		MAX	3.70E+00	1.20E+01
6	47	46 AVE	1.32E+00	9.73E+00
		MIN	<4.20E-01	7.50E+00
		MAX		
6	47	60 AVE	5.87E-01*	1.63E+01*
		MIN		
		MAX		
6	48	7 AVE	6.60E-01*	1.18E+00*
		MIN		
		MAX	1.80E+00	4.50E+00
6	48	18 AVE	1.03E+00	3.75E+00
		MIN	<6.50E-01	1.70E+00
		MAX		
6	48	71 AVE	<4.63E-01*	1.67E+01*
		MIN		
		MAX	9.60E-01	3.50E+00
6	49	13 AVE	6.38E-01	2.66E+00
		MIN	<4.90E-01	<5.00E-01
		MAX	1.70E+00	<5.00E-01
6	49	28 AVE	8.80E-01	<5.00E-01
		MIN	<5.60E-01	<5.00E-01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX	1.30E+00	3.20E+00
6 49 55	AVE	8.53E-01	1.32E+00
	MIN	<3.90E-01	<5.00E-01
	MAX	7.50E+01	3.10E+02
6 49 57	AVE	6.80E+01	2.15E+02
	MIN	6.30E+01	7.90E+01
	MAX	<9.20E-01	3.60E+01
6 49 79	AVE	<6.88E-01	3.55E+01
	MIN	<3.80E-01	3.40E+01
	MAX	<8.10E-01	2.00E+00
6 50 288	AVE	<6.18E-01	1.33E+00
	MIN	<4.80E-01	<5.00E-01
	MAX	1.40E+00	2.80E+00
6 50 30	AVE	7.30E-01	1.11E+00
	MIN	<3.30E-01	<5.00E-01
	MAX	3.10E+00	<5.00E-01
6 50 42	AVE	2.20E+00	<5.00E-01
	MIN	1.20E+00	<5.00E-01
	MAX	<6.10E-01	1.90E+01
6 50 53	AVE	<5.15E-01	1.16E+01
	MIN	<4.30E-01	<5.00E-01
	MAX		
6 50 85	AVE	4.27E-01*	1.87E+01*
	MIN		
	MAX	<6.90E-01	6.40E+00
6 51 63	AVE	<4.83E-01	4.93E+00
	MIN	<3.50E-01	3.70E+00
	MAX	<7.50E-01	1.60E+00
6 51 75	AVE	<5.80E-01	9.40E-01
	MIN	<3.90E-01	6.40E-01
	MAX	9.80E-01	<5.00E-01
6 53 35	AVE	6.73E-01	<5.00E-01
	MIN	<4.90E-01	<5.00E-01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
6 53 103	MAX	<6.90E-01	<5.00E-01
	AVE	<4.98E-01	<5.00E-01
	MIN	<3.50E-01	<5.00E-01
6 54 18	MAX		
	AVE		2.60E+00*
	MIN		
6 54 34	MAX	<6.10E-01	2.10E+00
	AVE	<5.85E-01	9.10E-01
	MIN	<5.50E-01	<5.00E-01
6 54 37A	MAX	<8.10E-01	<5.00E-01
	AVE	<6.70E-01	<5.00E-01
	MIN	<3.60E-01	<5.00E-01
6 54 42	MAX		6.30E-01
	AVE	<4.85E-01*	5.62E-01
	MIN		<5.00E-01
6 54 45	MAX	<5.60E-01	<5.00E-01
	AVE	<4.85E-01	<5.00E-01
	MIN	<4.50E-01	<5.00E-01
6 54 57	MAX		
	AVE	8.67E-01*	1.03E+00*
	MIN		
6 55 40	MAX	1.10E+00	<5.00E-01
	AVE	6.23E-01	<5.00E-01
	MIN	<3.90E-01	<5.00E-01
6 55 44	MAX	7.90E-01	<5.00E-01
	AVE	4.75E-01	<5.00E-01
	MIN	<3.20E-01	<5.00E-01
6 55 50A	MAX		
	AVE	1.88E+00*	1.21E+00*
	MIN		
6 55 50C	MAX	1.30E+00	<5.00E-01
	AVE	6.95E-01	<5.00E-01
	MIN	<4.10E-01	<5.00E-01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX	1.50E+00	1.10E+00
6 55 50D	AVE	7.73E-01	7.43E-01
	MIN	<4.40E-01	<5.00E-01
	MAX	<7.40E-01	<5.00E-01
6 55 70	AVE	<5.78E-01	<5.00E-01
	MIN	<3.90E-01	<5.00E-01
	MAX		<5.00E-01
6 55 76	AVE		<5.00E-01
	MIN		<5.00E-01
	MAX		2.60E+00
6 55 89	AVE		2.10E+00
	MIN		1.50E+00
	MAX	8.50E-01	<5.00E-01
6 56 43	AVE	6.18E-01	<5.00E-01
	MIN	<4.20E-01	<5.00E-01
	MAX	4.30E+00	2.30E+00
6 57 25A	AVE	1.52E+00	2.05E+00
	MIN	5.30E-01	1.40E+00
	MAX	1.10E+00	1.50E+00
6 57 29	AVE	8.13E-01	1.22E+00
	MIN	6.50E-01	9.80E-01
	MAX		1.80E+00
6 57 83	AVE		1.58E+00
	MIN		1.20E+00
	MAX	<6.40E-01	2.70E+00
6 58 24	AVE	<5.23E-01	1.77E+00
	MIN	<3.70E-01	9.80E-01
	MAX	1.90E+00	2.00E+00
6 59 32	AVE	1.55E+00	1.53E+00
	MIN	1.30E+00	1.30E+00
	MAX	5.00E+00	1.10E+00
6 59 58	AVE	2.98E+00	7.72E-01
	MIN	2.10E+00	5.80E-01

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
	MAX		<5.00E-01
6 59 80B	AVE		<5.00E-01
	MIN		<5.00E-01
	MAX	1.30E+00	3.90E+00
6 60 32	AVE	1.15E+00	2.90E+00
	MIN	1.10E+00	2.30E+00
	MAX		
6 60 57	AVE	1.37E+00*	<5.00E-01*
	MIN		
	MAX	2.10E+00	2.70E+00
6 60 60	AVE	1.68E+00	2.00E+00
	MIN	1.30E+00	1.40E+00
	MAX		1.90E+00
6 61 37	AVE		1.63E+00
	MIN		1.30E+00
	MAX	<7.10E-01	2.30E+00
6 61 41	AVE	<5.55E-01	1.27E+00
	MIN	<3.80E-01	5.60E-01
	MAX	8.90E+00	7.50E+00
6 61 62	AVE	6.71E+00	6.68E+00
	MIN	8.40E-01	5.00E+00
	MAX		4.50E+00
6 62 31	AVE		4.07E+00
	MIN		3.60E+00
	MAX	2.00E+00	1.40E+00
6 62 43F	AVE	1.60E+00	1.11E+00
	MIN	1.30E+00	9.10E-01
	MAX	<6.00E-01	1.50E+01
6 63 25A	AVE	<5.48E-01	1.28E+01
	MIN	<4.80E-01	1.10E+01
	MAX		
6 63 51	AVE	7.30E-01*	<5.00E-01*
	MIN		

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX	1.80E+00	5.20E-01
6	63	55	AVE	1.33E+00	5.05E-01
			MIN	1.00E+00	<5.00E-01
			MAX	1.50E+00	3.30E+00
6	63	58	AVE	1.21E+00	1.50E+00
			MIN	<8.30E-01	<5.00E-01
			MAX	2.80E+00	4.10E+00
6	63	90	AVE	1.18E+00	3.45E+00
			MIN	<5.30E-01	2.80E+00
			MAX		2.50E+01
6	64	27	AVE	<8.60E-01*	2.05E+01
			MIN		1.30E+01
			MAX	4.30E+00	2.70E+00
6	64	62	AVE	3.40E+00	2.05E+00
			MIN	2.70E+00	1.30E+00
			MAX		
6	65	23	AVE	<4.80E-01*	6.65E+00*
			MIN		
			MAX		
6	65	38	AVE	<3.60E-01*	<5.00E-01*
			MIN		
			MAX	1.70E+00	9.20E-01
6	65	50	AVE	1.55E+00	7.22E-01
			MIN	1.40E+00	<5.00E-01
			MAX		<5.00E-01
6	65	59	AVE	1.37E+00*	<5.00E-01
			MIN		<5.00E-01
			MAX		
6	65	72	AVE	2.30E+00*	4.80E+00*
			MIN		
			MAX	4.60E+00	2.30E+00
6	65	83	AVE	2.29E+00	2.03E+00
			MIN	9.70E-01	1.70E+00

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

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
6 66 38	MAX		
	AVE		<5.00E-01*
	MIN		
6 66 39	MAX		<5.00E-01
	AVE		<5.00E-01
	MIN		<5.00E-01
6 66 58	MAX	1.60E+00	1.80E+00
	AVE	1.35E+00	1.30E+00
	MIN	1.10E+00	1.00E+00
6 66 64	MAX	2.20E+00	1.40E+00
	AVE	2.05E+00	1.13E+00
	MIN	1.80E+00	8.30E-01
6 66 103	MAX		
	AVE	<4.95E-01*	<5.00E-01*
	MIN		
6 67 51	MAX	1.90E+00	9.40E-01
	AVE	1.65E+00	8.05E-01
	MIN	1.50E+00	7.00E-01
6 67 86	MAX	2.00E+00	1.40E+00
	AVE	1.58E+00	1.25E+00
	MIN	1.10E+00	1.10E+00
6 67 98	MAX	<7.90E-01	3.10E+00
	AVE	<6.40E-01	2.75E+00
	MIN	<4.80E-01	2.30E+00
6 68 105	MAX		
	AVE	<5.35E-01*	1.07E+00*
	MIN		
6 69 38	MAX		
	AVE	<4.37E-01*	<5.00E-01*
	MIN		
6 70 68	MAX		
	AVE	1.75E+00*	6.60E-01*
	MIN		

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

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
			MAX		
6	71	30	AVE	<4.40E-01*	1.60E+01*
			MIN		
			MAX	2.00E+00	4.00E+00
6	71	52	AVE	1.73E+00	3.15E+00
			MIN	1.40E+00	1.60E+00
			MAX		
6	71	77	AVE	1.50E+00*	1.60E+00*
			MIN		
			MAX		
6	72	73	AVE	1.30E+00*	1.10E+00*
			MIN		
			MAX		
6	72	88	AVE	5.87E+00*	2.37E+00*
			MIN		
			MAX		
6	72	92	AVE	5.30E+00*	2.70E+00*
			MIN		
			MAX		
6	73	61	AVE	<6.03E-01*	6.70E+00*
			MIN		
			MAX	<6.80E-01	9.40E-01
6	74	44	AVE	<5.93E-01	6.10E-01
			MIN	<5.00E-01	<5.00E-01
			MAX	7.40E-01	1.30E+02
6	77	36	AVE	6.45E-01	1.18E+02
			MIN	<4.80E-01	1.00E+02
			MAX		
6	77	54	AVE	4.50E-03*	4.63E+00*
			MIN		
			MAX		
6	78	62	AVE	2.90E-03*	3.20E+00*
			MIN		

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

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)
		MAX	7.50E-01	
6	81	58 AVE	6.25E-01	6.57E-01*
		MIN	<5.20E-01	
		MAX		
6	83	47 AVE	6.50E-01*	
		MIN		
		MAX		
6	84	35AU AVE	<6.60E-01*	7.00E+00*
		MIN		
		MAX	1.80E+02	
6	87	55 AVE	1.80E+02	1.07E+01*
		MIN	1.80E+02	
		MAX		
6	89	35 AVE	5.80E-03*	6.10E+00*
		MIN		
		MAX		
6	90	45 AVE	1.30E+01*	3.15E+00*
		MIN		
		MAX	2.70E+01	
6	96	49 AVE	2.45E+01	<5.00E-01*
		MIN	2.30E+01	
		MAX	1.10E+01	
6	97	43 AVE	1.01E+01	4.57E+00*
		MIN	9.50E+00	
		MAX	2.40E+01	
6	97	51A AVE	1.85E+01	9.27E+00*
		MIN	1.30E+01	
		MAX		
6	101	48B AVE	1.44E+00*	<5.00E-01*
		MIN		

APPENDIX B

GROSS ALPHA, STRONTIUM, CESIUM, COBALT, URANIUM, RUTHENIUM, CHROMIUM, AND FLUORIDE CONCENTRATIONS IN THE GROUND WATER (UNCONFINED AQUIFER)

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHRUMIUM (MG/L)	FLUORIDE (MG/L)
1 D5 12								
18-NOV-81				1.40E-02				
1 H4 3								
19-JAN-81					7.40E-02		2.50E+00	1.20E-01
26-FEB-81				1.80E-02	<6.90E-03	1.20E-01	3.40E+00	<1.00E-01
17-MAR-81					1.40E-01		3.70E+00	<1.00E-01
16-APR-81					6.10E-02		7.70E-01	<1.00E-01
19-JUN-81	1.10E-01						2.80E+00	1.10E-01
20-JUL-81					5.80E-02		1.10E+00	<1.00E-01
14-OCT-81					7.50E-02		4.10E-01	1.70E-01
09-NOV-81					4.50E-02		1.20E-01	1.50E-01
1 N 2								
03-MAR-81				9.10E-02				
21-MAY-81		2.20E+00		1.10E-01				
03-SEP-81				4.60E-01				
17-NOV-81		2.40E+00		8.00E-02				
1 N 3								
03-MAR-81				4.50E-02				
21-MAY-81		2.70E-01		3.70E-02				
03-SEP-81			2.40E-02	1.80E-01				
17-NOV-81		3.40E-01		5.20E-02				
1 N 4								
03-MAR-81				4.10E-02				
21-MAY-81		3.40E-03		7.80E-02				
03-SEP-81				2.70E-02				
17-NOV-81		2.30E-03		2.60E-02				
1 N 5								
03-MAR-81				4.20E-02				
21-MAY-81		2.70E-03		3.30E-02				
03-SEP-81				1.80E-02				

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
1 N 5								
09-NOV-81		1.70E-02		6.10E-02				
1 N 6								
03-MAR-81				6.30E-02				
21-MAY-81		7.20E-03		6.10E-02				
03-SEP-81				4.20E-02				
17-NOV-81		3.60E-02		8.90E-02				
1 N 14								
03-MAR-81				1.10E-01				
21-MAY-81		1.30E-01		1.30E-01				
04-SEP-81				1.10E+01				
06-NOV-81		1.90E-01		1.10E-01				
1 N 15								
03-MAR-81				6.30E-02				
21-MAY-81		5.30E-03		3.60E-02				
03-SEP-81				1.70E+02				
06-NOV-81		6.90E-03		3.10E-02				
1 N 16								
18-JUN-81		1.90E-03						
06-NOV-81		7.90E-03						
1 N 17								
18-JUN-81		<1.30E-03		1.50E-02				
04-SEP-81				1.20E-02				
06-NOV-81		2.00E-03		1.80E-02				
1 N 18								
18-JUN-81		9.50E-03		1.30E-02				
06-NOV-81		2.90E-02						
1 N 19								
18-JUN-81		7.90E-02		1.30E-02				
06-NOV-81		4.70E-02		1.60E-02				

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
1 N 20								
18-JUN-81		8.70E-02		1.40E-02				
06-NOV-81		6.90E-02						
1 N 21								
18-JUN-81		3.10E-03						
06-NOV-81		<3.80E-03						
1 N 22								
18-JUN-81		<2.20E-03						
06-NOV-81		<3.00E-03						
1 N 23								
18-JUN-81		2.00E-03						
06-NOV-81		3.40E-03						
1 N 24								
18-JUN-81		3.60E-03		1.60E-02				
1 N 25								
18-JUN-81		2.30E-03						
1 N 26								
18-JUN-81		<1.70E-03						
2E 17 5								
10-MAR-81		<9.46E-03	<1.48E-03	<9.38E-05		1.04E-03		
02-JUN-81		0.00E-01	<4.28E-05	<1.40E-04		1.95E-02		
14-SEP-81		<1.35E-03	<1.02E-05	5.39E-05		7.33E-04		
13-NOV-81		<5.41E-03	<6.19E-03	<9.81E-05		5.59E-03		
2E 19 1								
30-APR-81			3.60E-02					
29-JUL-81				1.50E-02				
12-OCT-81				3.10E-02				

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2E 23 1								
12-OCT-81				2.80E-02				
2E 24 2								
10-JAN-81		<4.96E-03	<2.06E-03	<3.66E-03	1.35E-04	<1.51E-02		
09-FEB-81		<3.60E-03	5.77E-03	<2.09E-03	1.30E-03	<2.52E-02		
10-MAR-81		<1.80E-03	<5.98E-05	<2.64E-03	3.55E-03	<6.64E-03		
06-APR-81		<9.01E-04	<1.21E-05	<2.61E-03	2.05E-03	<2.17E-02		
29-APR-81		0.00E-01	<4.12E-04	<3.52E-03	7.94E-04	<5.18E-03		
16-JUN-81		<2.70E-03	<9.04E-05	<1.47E-04	1.23E-03	<2.89E-04		
29-JUN-81		<2.70E-03	2.73E-02	<4.69E-03	1.21E-03	<3.83E-03		
28-JUL-81		0.00E-01	1.33E-02	<3.22E-03	2.61E-03	1.08E-03		
14-SEP-81		<1.26E-02	<1.23E-04	<1.17E-03	8.04E-03	<1.01E-02		
18-SEP-81		0.00E-01	<1.12E-04	<1.76E-03	2.86E-03	<3.56E-04		
12-OCT-81		0.00E-01	5.56E-05	4.49E-04	4.65E-03	<4.15E-03		
13-NOV-81		<1.17E-02	<1.24E-04	<2.58E-04	3.66E-03	<2.10E-02		
02-DEC-81		0.00E-01	<1.45E-04	<2.62E-04	1.85E-03	<9.98E-03		
2E 24 7								
12-OCT-81				3.80E-02				
2E 25 6								
06-APR-81			<6.02E-05	<3.01E-04		<9.62E-04		
29-APR-81			<5.64E-03	<3.09E-04		5.82E-03		
02-JUN-81			<8.08E-03	<8.46E-03		4.71E-01		
16-JUN-81			<7.37E-03	<1.20E-02		<6.18E-02		
28-JUL-81			4.67E-02	<5.98E-03		<2.63E-02		
09-SEP-81			2.67E-06	<1.38E-07		<1.33E-04		
18-SEP-81			<6.61E-04	<1.46E-05		<5.35E-02		
13-OCT-81			<5.79E-03	<1.40E-03		2.92E-03		
13-NOV-81			<2.93E-03	<9.51E-05		2.44E-03		
02-DEC-81			<3.19E-05	<1.17E-04		<4.88E-04		
2E 26 1								
12-OCT-81				2.80E-02				
2E 27 1								
29-APR-81				1.90E-02				
12-OCT-81				3.50E-02				

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2E 27 5								
10-MAR-81			<1.30E-02	<1.76E-04		<1.03E-01		
16-JUN-81			5.58E-03	<7.53E-03		<2.46E-01		
14-SEP-81			3.48E-04	<7.54E-03		5.84E-03		
13-NOV-81			<7.29E-03	<9.92E-05		6.65E-03		
2E 28 12								
10-JAN-81			9.68E-03	3.21E-02		3.54E-01		
09-FEB-81			3.08E-02	<1.81E-02		<2.42E-01		
10-MAR-81			<1.26E-02	<3.14E-04		1.03E-02		
06-APR-81			<6.02E-05	<3.01E-04		<9.62E-04		
30-APR-81			1.98E-03	4.35E-05		<9.46E-02		
16-JUN-81			5.38E-06	<1.69E-05		<2.03E-04		
29-JUN-81			<1.47E-02	<1.57E-02		<2.19E-01		
29-JUL-81			<1.39E-03	<4.84E-03		<6.10E-02		
14-SEP-81			1.07E-03	<6.27E-03		<3.55E-02		
18-SEP-81			1.88E-04	<5.30E-03		3.11E-03		
12-OCT-81			<2.54E-05	<9.23E-05		<3.66E-04		
13-NOV-81			<5.56E-03	<9.76E-05		4.98E-03		
02-DEC-81			<2.55E-05	<9.34E-05		<3.90E-04		
2E 28 13								
10-JAN-81			<1.77E-02	<1.18E-02		3.20E-02		
09-FEB-81			3.08E-02	<1.94E-02		6.10E-01		
10-MAR-81			<5.80E-03	<7.41E-05		<1.87E-01		
06-APR-81			<3.95E-03	<1.36E-02		1.73E-02		
30-APR-81			<1.81E-04	<2.93E-04		<5.82E-04		
16-JUN-81			<5.07E-03	<1.08E-02		<2.97E-01		
29-JUN-81			<1.61E-03	<8.02E-03		<1.12E-01		
29-JUL-81			<5.74E-03	<6.86E-03		<1.26E-02		
14-SEP-81			<4.07E-04	<3.04E-03		<1.44E-02		
18-SEP-81			1.16E-03	<2.68E-04		<7.16E-02		
12-OCT-81			1.10E-03	<1.56E-05		<5.30E-02		
13-NOV-81			2.98E-04	<2.31E-05		<4.81E-02		
02-DEC-81			<2.55E-05	<9.34E-05		<3.90E-04		
2E 28 17								
06-APR-81					1.92E-02			
16-JUN-81					1.76E-02			
18-SEP-81					4.72E-02			
02-DEC-81					2.87E-02			

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2E 28 18								
10-JAN-81			<1.43E-03	<3.02E-04		7.03E-04		
09-FEB-81			2.25E-02	<1.25E-02		<1.21E-01		
10-MAR-81		<1.35E-03	<3.84E-03	<9.12E-05				
06-APR-81		<3.15E-03	1.04E-04	<8.28E-05		<6.16E-03		
30-APR-81		0.00E-01	<2.48E-03	<7.00E-05		<1.51E-02		
16-JUN-81		<1.35E-03	<3.66E-03	<8.44E-05		<4.68E-03		
29-JUN-81		4.86E-02	4.54E+00	<1.25E-03		<2.35E-02		
29-JUL-81		<4.05E-03	6.43E-04	<6.39E-03		<1.54E-02		
14-SEP-81		<4.95E-03	<2.54E-03	<9.47E-05		2.05E-03		
18-SEP-81		0.00E-01	<4.79E-03	<6.30E-04		<7.61E-02		
12-OCT-81			5.11E-05	<2.93E-05		<4.33E-02		
13-NOV-81			2.17E-03	<6.49E-03		<8.73E-02		
02-DEC-81		0.00E-01	4.63E-05	3.38E-04		<1.87E-02		
2E 33 3								
06-APR-81		<1.35E-03	3.78E-02	9.38E-01		<9.25E-02		
29-JUN-81		<8.11E-03	<6.33E-03	8.44E-01		<6.61E-02		
21-SEP-81		<4.50E-04	6.38E-03	1.41E+00		3.78E-02		
02-DEC-81		0.00E-01	3.66E-03	1.48E+00		<2.47E-02		
2E 33 14								
12-OCT-81				3.20E-02				
2E 34 1								
10-JAN-81			5.65E-03	<1.48E-02		<2.23E-01		
09-FEB-81			2.13E-02	<1.72E-02		<6.18E-03		
10-MAR-81			<1.22E-02	<3.02E-04				
06-APR-81			<1.25E-02	<3.19E-04		1.41E-02		
29-APR-81			1.25E-02	<6.78E-05		<1.32E-02		
16-JUN-81			1.83E-03	<1.88E-04		<9.29E-02		
29-JUN-81			<5.06E-04	2.10E-04		4.22E-01		
29-JUL-81			3.70E-04	<1.19E-03		<1.62E-02		
14-SEP-81			<4.22E-03	<2.24E-03		5.18E-03		
21-SEP-81		0.00E-01	<2.99E-03	<8.60E-05		<3.99E-03		
12-OCT-81			<2.54E-05	<9.23E-05		<3.66E-04		
13-NOV-81			1.10E-02	<7.51E-05		<8.66E-03		
02-DEC-81			<3.64E-05	<1.33E-04		<5.57E-04		

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2W 6 1								
27-APR-81			2.40E-02	3.70E-02				
15-OCT-81				3.20E-02				
2W 10 5								
05-FEB-81				1.80E-02				
27-APR-81			1.80E-02	5.00E-02				
19-AUG-81				1.80E-02				
15-OCT-81				1.40E-02				
2W 10 8								
05-FEB-81			6.04E-03	3.93E-02		<1.53E-01		
27-APR-81			1.29E-03	3.08E-02		<8.92E-03		
19-AUG-81			2.41E-03	4.40E-02		4.01E-02		
15-OCT-81			1.46E-03	2.84E-02		5.05E-03		
2W 12 1								
27-APR-81				1.30E-02				
2W 15 7								
04-MAR-81			<7.12E-03	6.22E-02		<1.37E-01		
01-JUN-81			5.73E-03	4.32E-02		<1.23E-01		
19-AUG-81			<1.27E-03	3.54E-02		<6.61E-02		
12-NOV-81			2.74E-03	5.19E-02		<1.57E-02		
2W 19 3								
04-MAR-81			<8.29E-05	<2.05E-03	8.35E-03	<9.18E-03		
01-JUN-81			<1.29E-04	<2.58E-04	1.98E-02	<1.80E-02		
19-AUG-81			<1.13E-03	<2.91E-04	2.65E-02	<1.38E-02		
12-NOV-81			<1.25E-04	<1.17E-03	1.75E-02	<8.78E-03		
2W 21 1								
15-OCT-81				3.20E-02				
2W 22 1								
01-APR-81		3.94E+00	<5.35E-04	<5.12E-03		1.26E-01		
17-JUN-81		1.15E+00	<5.05E-03	<9.71E-05		4.50E-03		

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2W 22 1								
15-SEP-81		1.10E+00	<2.55E-05	<9.24E-05		<3.70E-04		
01-DEC-81		1.07E+00	<2.14E-04	<3.80E-03		<9.58E-02		
2W 22 9								
09-SEP-81			<2.54E-05	<9.23E-05		<3.67E-04		
2W 22 10								
01-APR-81	<1.70E-02	6.60E-03						
17-JUN-81	<1.70E-02	<1.20E-03		1.80E-02				
15-SEP-81	<1.70E-02	1.30E-01		6.50E-03				
01-DEC-81		0.00E-01	<2.55E-05	<9.32E-05		<3.86E-04		
2W 22 22								
01-APR-81					9.44E-04			
17-JUN-81					6.37E-04			
15-SEP-81					1.74E-03			
01-DEC-81					1.10E-03			
2W 22 26								
01-APR-81		<6.30E-03	<4.19E-04	<6.16E-03		6.37E-03		
17-JUN-81		<7.21E-03	<2.70E-03	<1.11E-05		<5.55E-02		
15-SEP-81		<2.25E-03	3.54E-05	<1.58E-03		6.26E-04		
01-DEC-81		0.00E-01	<2.17E-05	<1.87E-04		<3.21E-04		
2W 23 4								
01-APR-81					2.31E-02			
17-JUN-81					1.90E-02			
15-SEP-81					7.16E-02			
01-DEC-81					2.85E-02			
2W 23 10								
12-JAN-81		<4.10E-03			<6.90E-03			
05-FEB-81		<3.15E-03	<1.86E-03	5.13E-05		<9.83E-02		
04-MAR-81		<6.31E-04	8.50E-03	<1.00E-04		7.77E-03		
23-MAR-81		<8.56E-03	4.90E-04	3.20E-05		<8.53E-02		
27-APR-81		3.60E-03	<5.21E-03	<9.71E-05		4.60E-03		
01-JUN-81		1.80E-03	1.22E-03	<2.25E-03		<5.25E-02		

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
2W 23 10								
17-JUN-81		0.00E-01	<6.50E-03	<9.85E-05		5.92E-03		
29-JUL-81		<9.01E-04	<2.55E-05	<9.25E-05		<3.70E-04		
09-SEP-81		<3.60E-03	<1.37E-04	<4.09E-03		2.56E-03		
13-OCT-81		<2.61E-03	<2.55E-05	<9.25E-05		<3.70E-04		
12-NOV-81		<4.05E-03	1.51E-03	<8.52E-03		<1.02E-01		
01-DEC-81		4.50E-04	<2.33E-03	<4.32E-03		5.03E-03		
3 1 1								
09-JAN-81					1.10E-02		4.80E-03	3.90E-01
08-APR-81				1.40E-02	1.30E-02		5.80E-03	4.00E-01
24-JUN-81	3.40E-02				2.00E-02		7.70E-03	3.20E-01
16-SEP-81					2.10E-02		3.20E-02	4.30E-01
3 1 2								
09-JAN-81					2.20E-02		3.70E-03	2.90E-01
08-APR-81					2.20E-02		1.80E-02	2.80E-01
22-JUN-81	4.60E-02				2.80E-02		1.10E-02	2.80E-01
14-SEP-81					2.00E-02		6.10E-03	2.80E-01
3 1 3								
09-JAN-81					3.00E-02		4.20E-03	4.00E-01
24-JUN-81	4.40E-02				2.60E-02		7.70E-03	8.20E-01
16-SEP-81				7.00E-03	2.00E-02		1.50E-02	4.30E-01
3 1 4								
09-JAN-81					1.90E-02		4.20E-03	2.80E-01
08-APR-81					2.00E-02		5.10E-03	2.20E-01
22-JUN-81	<1.70E-02			1.70E-02	<6.00E-03		1.40E-02	3.60E-01
14-SEP-81					1.30E-02		4.30E-02	2.40E-01
3 1 5								
09-JAN-81					2.40E-02		4.20E-03	2.80E-01
29-JAN-81					3.30E-02		<3.00E-03	2.30E-01
11-MAR-81					1.70E-02		3.40E-03	2.80E-01
08-APR-81					1.00E-02		1.20E-02	1.90E-01
24-APR-81			2.10E-02		1.60E-02		1.50E-02	2.20E-01
03-JUN-81					2.00E-02		1.10E-02	3.70E-01
22-JUN-81	4.10E-02				2.50E-02		9.70E-03	4.60E-01

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 1 5								
22-JUL-81					1.00E-02		1.10E-02	4.60E-01
25-AUG-81					<6.70E-03		1.80E-02	4.00E-01
14-SEP-81					<6.70E-03		<3.00E-03	<1.00E-01
14-OCT-81					<6.70E-03		<3.00E-03	3.60E-01
04-NOV-81					<6.70E-03		4.50E-03	3.70E-01
3 1 6								
09-JAN-81					3.00E-02		<3.00E-03	2.80E-01
08-APR-81					1.20E-02		4.00E-03	2.60E-01
25-JUN-81	3.70E-02				2.20E-02		<3.00E-03	4.20E-01
14-SEP-81					<6.70E-03		<3.00E-03	2.60E-01
3 2 1								
09-JAN-81					<6.90E-03		3.50E-03	2.90E-01
08-APR-81					<6.90E-03		<3.00E-03	3.80E-01
24-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	4.80E-01
3 2 2								
09-JAN-81				1.40E-02	1.20E-02		<3.00E-03	4.70E-01
08-APR-81					1.90E-02		<3.00E-03	3.20E-01
24-JUN-81	4.40E-02				2.60E-02		<3.00E-03	5.00E-01
16-SEP-81					2.40E-02		1.20E-02	3.60E-01
3 2 3								
09-JAN-81					<6.90E-03		<3.00E-03	2.10E-01
08-APR-81					<6.90E-03		<3.00E-03	2.80E-01
24-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	5.50E-01
16-SEP-81					1.30E-02		<3.00E-03	3.30E-01
3 3 1								
09-JAN-81					<6.90E-03		3.50E-03	6.20E-01
08-APR-81					<6.90E-03		<3.00E-03	2.40E-01
24-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	4.60E-01
16-SEP-81					1.30E-02		<3.00E-03	3.00E-01
3 3 2								
08-JAN-81					1.30E-02		6.10E-03	2.80E-01

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 3 2								
29-JAN-81					1.80E-02		<3.00E-03	2.70E-01
11-MAR-81					<6.90E-03		4.80E-03	2.40E-01
08-APR-81					1.10E-02		7.00E-03	2.30E-01
24-APR-81					<6.70E-03		3.30E-03	2.20E-01
03-JUN-81					1.70E-02		1.10E-02	2.80E-01
22-JUN-81	2.60E-02				1.50E-02		2.10E-02	2.70E-01
22-JUL-81					2.60E-02		1.40E-02	3.50E-01
25-AUG-81					1.70E-02		<3.00E-03	3.10E-01
14-SEP-81					1.20E-02		<3.00E-03	1.30E-01
14-OCT-81					<6.70E-03		1.50E-02	2.40E-01
04-NOV-81					<6.70E-03		5.80E-03	2.20E-01
3 3 3								
14-JAN-81					1.10E-02		4.80E-03	2.20E-01
04-FEB-81		<4.00E-03			<6.90E-03		4.80E-03	2.30E-01
11-MAR-81					1.20E-02		5.10E-03	2.40E-01
08-APR-81					<6.90E-03		5.30E-03	2.20E-01
24-APR-81				1.30E-02	<6.70E-03		4.40E-03	2.20E-01
02-JUN-81					1.20E-02		5.00E-03	2.30E-01
22-JUN-81	<1.70E-02				<6.00E-03		6.20E-03	1.80E-01
22-JUL-81					1.20E-02		1.40E-02	2.70E-01
25-AUG-81					1.70E-02		3.90E-03	2.60E-01
14-SEP-81					1.50E-02		3.50E-03	1.60E-01
14-OCT-81					1.20E-02		6.30E-03	2.50E-01
04-NOV-81				8.40E-03	<6.70E-03		3.60E-03	2.30E-01
3 3 6								
29-JAN-81					<6.90E-03		<3.00E-03	2.20E-01
11-MAR-81					<6.90E-03		<3.00E-03	1.60E-01
08-APR-81					<6.90E-03		4.30E-03	2.40E-01
24-APR-81					1.20E-02		4.00E-03	2.90E-01
03-JUN-81					<6.70E-03		6.70E-03	3.00E-01
22-JUN-81	<1.70E-02			1.30E-02	<6.00E-03		9.70E-03	2.60E-01
22-JUL-81					<6.70E-03		7.80E-03	<1.00E-01
25-AUG-81					2.20E-02		3.90E-03	2.90E-01
14-SEP-81					1.60E-02		3.20E-03	2.90E-01
14-OCT-81				6.80E-03	1.00E-02		9.30E-03	2.50E-01
04-NOV-81					<6.70E-03		9.50E-03	2.20E-01

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 3 7								
29-JAN-81					1.10E-02		3.70E-03	3.30E-01
11-MAR-81					<6.90E-03		5.10E-03	2.40E-01
08-APR-81					<6.90E-03		<3.00E-03	1.60E-01
24-APR-81			2.40E-02	1.40E-02	<6.70E-03		<3.00E-03	1.90E-01
03-JUN-81					1.30E-02		5.00E-03	2.30E-01
22-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	2.00E-01
22-JUL-81					1.70E-02		5.70E-03	4.30E-01
25-AUG-81					2.10E-02		3.40E-03	3.50E-01
14-SEP-81					2.10E-02		5.60E-03	3.60E-01
14-OCT-81					1.90E-02		3.60E-03	3.50E-01
04-NOV-81					<6.70E-03		<3.00E-03	3.00E-01
3 3 9								
09-JAN-81		3.20E-03			1.20E-02		3.20E-03	4.80E-01
29-JAN-81		4.30E-03			1.30E-02		<3.00E-03	5.30E-01
11-MAR-81		<2.10E-03			<6.90E-03		<3.00E-03	3.80E-01
24-MAR-81		<2.50E-03			1.50E-02		3.10E-03	4.90E-01
24-APR-81		3.20E-03			1.30E-02		<3.00E-03	4.00E-01
02-JUN-81		1.90E-03		1.50E-02	2.40E-02		4.40E-03	6.50E-01
22-JUN-81	2.30E-02	2.10E-03			1.40E-02		<3.00E-03	6.70E-01
22-JUL-81		2.50E-03			1.80E-02		4.00E-03	4.70E-01
25-AUG-81		<4.50E-03			2.30E-02		<3.00E-03	3.50E-01
14-SEP-81		2.70E-03			2.50E-02		<3.00E-03	5.30E-01
14-OCT-81		2.00E-03			2.20E-02		<3.00E-03	4.70E-01
04-NOV-81		4.40E-03			1.90E-02		<3.00E-03	4.30E-01
3 3 10								
09-JAN-81		4.60E-03			1.90E-02		<3.00E+03	4.30E-01
29-JAN-81		5.80E-03			1.60E-02		<3.00E-03	5.20E-01
11-MAR-81		2.30E-03			1.50E-02		<3.00E-03	4.80E-01
24-MAR-81		2.80E-03			1.90E-02		<3.00E-03	3.90E-01
24-APR-81		1.10E-02			1.20E-02		<3.00E-03	2.90E-01
03-JUN-81		1.90E-03			1.10E-02		<3.00E-03	5.70E-01
22-JUN-81	2.90E-02	5.30E-03			1.70E-02		<3.00E-03	3.70E-01
22-JUL-81		1.90E-03			2.00E-02		5.10E-03	3.70E-01
25-AUG-81		3.00E-03			2.40E-02		<3.00E-03	4.80E-01
14-SEP-81		5.10E-03			2.30E-02		<3.00E-03	5.00E-01
14-OCT-81		1.20E-02			3.00E-02		<3.00E-03	5.00E-01
04-NOV-81		8.50E-03		1.30E-02	3.10E-02		<3.00E-03	3.70E-01

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 3 11								
14-JAN-81		2.20E-02			3.70E-02			
04-FEB-81		<1.70E-03			2.50E-02		4.10E-03	3.60E-01
11-MAR-81					1.80E-02		<3.00E-03	3.80E-01
08-APR-81		2.20E-03			2.00E-02		5.90E-03	2.10E-01
24-APR-81		<2.10E-03		1.60E-02	2.50E-02		<3.00E-03	3.40E-01
02-JUN-81		2.10E-03			2.70E-02		<3.00E-03	
22-JUN-81	4.60E-02	<2.30E-03			2.80E-02		4.50E-03	3.70E-01
22-JUL-81		6.20E-03			3.50E-02		1.10E-02	4.00E-01
25-AUG-81		7.10E-03			2.00E-02		<3.00E-03	3.80E-01
14-SEP-81		9.50E-03			2.70E-02		<3.00E-03	3.40E-01
14-OCT-81		8.50E-03			3.40E-02		<3.00E-03	3.90E-01
04-NOV-81		8.80E-03			2.80E-02		<3.00E-03	3.60E-01
3 3 12								
04-FEB-81					2.50E-02		3.60E-03	4.00E-01
11-MAR-81		1.90E-03			3.00E-02		3.90E-03	3.60E-01
24-MAR-81		<2.70E-03			1.80E-02		5.90E-03	4.10E-01
24-APR-81		<3.00E-03	2.10E-03		4.30E-02		4.30E-03	4.60E-01
03-JUN-81		2.70E-03			5.00E-02		6.30E-03	4.30E-01
3 4 1								
24-MAR-81					1.10E-02		<3.00E-03	3.40E-01
31-AUG-81					1.60E-02		3.30E-03	2.90E-01
3 4 7								
24-MAR-81					3.00E-02		<3.00E-03	4.40E-01
22-JUN-81	3.80E-02				2.30E-02		<3.00E-03	5.50E-01
3 4 9								
09-JAN-81		1.90E-03			1.20E-02		<3.00E-03	3.60E-01
29-JAN-81		2.50E-03			1.30E-02		3.20E-03	4.00E-01
11-MAR-81		6.90E-03			<6.90E-03		<3.00E-03	3.00E-01
24-MAR-81		3.20E-03			1.30E-02		3.40E-03	3.10E-01
24-APR-81		<3.20E-03	3.00E-02	2.30E-02	1.80E-02		<3.00E-03	1.90E-01
02-JUN-81		2.30E-03			1.10E-02		<3.00E-03	5.60E-01
22-JUN-81	<1.70E-02	2.20E-03			<6.00E-03		<3.00E-03	4.20E-01
22-JUL-81		3.20E-03			2.40E-02		6.40E-03	3.20E-01
25-AUG-81		7.00E-03			2.20E-02		<3.00E-03	3.40E-01
14-SEP-81		3.10E-03			2.40E-02		3.20E-03	4.30E-01

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 4 9								
14-OCT-81		<3.10E-03			2.40E-02		<3.00E-03	3.70E-01
04-NOV-81		<2.50E-03			<6.70E-03		<3.00E-03	2.90E-01
3 4 10								
09-JAN-81		3.50E-03			2.70E-02		3.70E-03	4.50E-01
24-MAR-81					<6.90E-03		4.50E-03	4.10E-01
22-JUN-81	3.10E-02				1.90E-02		4.40E-03	4.60E-01
14-SEP-81					2.50E-02		5.50E-03	3.60E-01
3 5 1								
22-JUN-81	<1.70E-02				<6.00E-03		9.70E-03	1.70E-01
31-AUG-81					<6.70E-03		4.00E-03	2.60E-01
3 6 1								
09-JAN-81					<6.90E-03		5.30E-03	2.00E-01
26-MAR-81					<6.90E-03		3.70E-03	2.20E-01
25-JUN-81	<1.70E-02				<6.00E-03		1.40E-02	2.40E-01
14-SEP-81					<6.70E-03		<3.00E-03	1.70E-01
3 8 1								
09-JAN-81					<6.90E-03		5.10E-03	2.40E-01
26-MAR-81					<6.90E-03		4.50E-03	2.20E-01
22-JUN-81	<1.70E-02				<6.00E-03		5.50E-03	2.80E-01
14-SEP-81					<6.70E-03		4.80E-03	1.50E-01
3 8 2								
09-JAN-81					<6.90E-03		5.30E-03	2.80E-01
26-MAR-81					<6.90E-03		6.30E-03	2.40E-01
25-JUN-81	<1.70E-02				<6.00E-03		6.30E-03	3.00E-01
14-SEP-81					<6.70E-03		3.20E-03	<1.00E-01
3 8 3								
09-JAN-81					<6.90E-03		4.00E-03	4.20E-01
26-MAR-81					<6.90E-03		<3.00E-03	2.60E-01
22-JUN-81	<1.70E-02			1.50E-02	<6.00E-03		7.10E-03	2.90E-01
14-SEP-81					<6.70E-03		<3.00E-03	2.10E-01

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
3 8 4								
09-JAN-81					<6.90E-03		<3.00E-03	2.80E-01
29-JAN-81					<6.90E-03		<3.00E-03	2.90E-01
11-MAR-81					1.50E-02		3.40E-03	2.30E-01
26-MAR-81					<6.90E-03		3.50E-03	2.50E-01
24-APR-81			3.10E-02	2.30E-02	<6.70E-03		<3.00E-03	2.80E-01
03-JUN-81					<6.70E-03		3.80E-03	2.70E-01
25-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	3.20E-01
22-JUL-81					<6.70E-03		4.00E-03	2.70E-01
25-AUG-81			1.00E-02		<6.70E-03		<3.00E-03	3.00E-01
14-SEP-81					<6.70E-03		<3.00E-03	2.70E-01
14-OCT-81					6.70E-03		<3.00E-03	2.40E-01
04-NOV-81					<6.70E-03		<3.00E-03	2.20E-01
6 S30E15A								
24-MAR-81					<6.90E-03		4.50E-03	1.30E-01
24-JUN-81	<1.70E-02				<6.00E-03		<3.00E-03	1.90E-01
02-SEP-81					<6.70E-03		<3.00E-03	3.00E-01
31-DEC-81					<6.70E-03		<3.00E-03	1.90E-01
6 S29 E12								
24-MAR-81					<6.90E-03		3.90E-03	2.30E-01
24-JUN-81	<1.70E-02				<6.00E-03			2.40E-01
02-SEP-81					<6.70E-03			1.50E-01
30-DEC-81					<6.70E-03			2.60E-01
6 S27 E14								
29-JAN-81					<6.90E-03		4.10E-03	2.20E-01
11-MAR-81					<6.90E-03		3.40E-03	1.50E-01
24-MAR-81					<6.90E-03		4.50E-03	1.90E-01
24-APR-81					<6.70E-03		3.20E-03	1.60E-01
02-JUN-81					<6.70E-03		7.10E-03	2.50E-01
22-JUN-81	<1.70E-02				<6.00E-03		7.50E-03	2.10E-01
20-JUL-81					<6.70E-03		7.80E-03	1.80E-01
25-AUG-81					<6.70E-03		<3.00E-03	2.10E-01
14-OCT-81					<6.70E-03		<3.00E-03	1.40E-01
04-NOV-81					<6.70E-03		<3.00E-03	1.30E-01
6 S19 E13								
25-MAR-81	<1.70E-02						3.70E-03	2.40E-01

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
6 S19 E13								
19-JUN-81	<1.70E-02							2.50E-01
02-SEP-81					<6.70E-03			2.00E-01
6 S18 51								
21-MAY-81								9.60E+00
24-AUG-81								8.10E+00
30-OCT-81								8.10E+00
6 S6 E4B								
05-JAN-81					<6.90E-03			
15-JUN-81					<6.70E-03			
02-SEP-81					<6.70E-03			
6 S6 E4D								
05-JAN-81					<6.90E-03			
15-JUN-81					<6.70E-03			
02-SEP-81					<6.70E-03			
6 S0 8								
17-JUN-81				1.90E-02				
6 2 3								
15-JUN-81				1.80E-02				
6 8 17								
19-MAR-81				1.40E-02				
30-DEC-81				1.30E-02				
6 15 158								
09-JUN-81				1.50E-02				
6 20 20								
08-JAN-81				2.10E-02				
08-JUN-81				1.50E-02				

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
6 24 33								
26-MAR-81				1.40E-02				
30-DEC-81				1.60E-02				
6 26 15								
15-JUN-81				4.00E-02				
01-SEP-81				1.20E-02				
6 27 8								
05-JAN-81				3.20E-02				
25-MAR-81				4.60E-02				
15-JUN-81				4.10E-02				
6 28 52								
23-MAR-81				1.30E-02				
6 31 31								
26-MAR-81			2.00E-02	2.40E-02				
12-JUN-81				2.70E-02				
6 31 31P								
21-MAY-81			<6.02E-05	<3.00E-04		<9.57E-04		
6 31 53B								
02-JUN-81	<1.70E-02							
6 32 22								
08-JAN-81				2.70E-02				
26-MAR-81				4.10E-02				
08-JUN-81				2.60E-02				
04-SEP-81				1.30E-02				
6 32 62								
27-JAN-81	<1.70E-02							
20-APR-81	<1.70E-02							
29-SEP-81	<1.70E-02							

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
6 32 70								
30-SEP-81				2.40E-02				
6 33 56								
09-JAN-81					<6.90E-03			
23-MAR-81	<1.70E-02							
08-JUN-81	<1.70E-02							
6 34 42								
18-MAR-81				2.30E-02				
6 35 9								
31-MAR-81				1.30E-02				
12-JUN-81				1.70E-02				
11-SEP-81				8.90E-03				
6 35 70								
29-SEP-81				8.20E-03				
6 37 43								
23-MAR-81				1.20E-02				
6 38 65								
28-OCT-81				5.60E-02				
6 40 1								
05-JAN-81				1.60E-02				
16-MAR-81				1.80E-02				
6 41 23								
11-SEP-81				7.00E-03				
6 42 12A								
15-JUN-81				2.20E-02				

(CY-1981)

WELL NO. DATE	TOTAL ALPHA (PCI/ML)	STRONTIUM (PCI/ML)	CESIUM (PCI/ML)	COBALT (PCI/ML)	URANIUM (MG/L)	RUTHENIUM (PCI/ML)	CHROMIUM (MG/L)	FLUORIDE (MG/L)
6 45 42								
30-SEP-81				9.70E-03				
6 45 69								
19-MAY-81				2.70E-02				
6 46 21								
17-MAR-81				2.00E-02				
6 47 60								
15-JUL-81				1.10E-02				
6 49 55								
22-JAN-81				2.90E-02		2.40E-01		
6 49 57								
22-JAN-81				3.50E-01				
15-APR-81				5.20E-01				
15-JUL-81				2.40E-01				
29-SEP-81				1.30E-01				
6 50 53								
15-JUL-81				7.00E-03				
6 55 50C								
28-OCT-81				2.80E-02				
6 66 103								
19-MAY-81				1.30E-02				
6 68 105								
19-MAY-81				3.50E-02				

APPENDIX C

CHEMICAL AND SPECTROGRAPHIC ANALYSES FROM VARIOUS WELLS SAMPLED

TABLE C.1. Chemical and Spectrographic Analyses from Various Wells Sampled

Constituents	Units	699-S19-E13	699-19-43	699-24-46	699-43-88	699-46-21	699-48-18	699-49-55
Aluminum	µg/ℓ	300	100	100	300	100	100	100
Antimony	µg/ℓ	70	<30	70	50	100	<30	70
Arsenic	µg/ℓ	7	4	1	0	5	1	2
Barium	µg/ℓ	50	50	50	40	100	40	30
Beryllium	µg/ℓ	<1	<1	<1	<1	<1	<1	<1
Bicarbonate	mg/ℓ	160	140	190	73	150	145	9
Bismuth	µg/ℓ	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000
Boron	µg/ℓ	<5	<5	<5	<5	<5	<5	<5
Bromide	mg/ℓ	0.1	0.1	0.0	.3	.1	0.1	.2
Cadmium	µg/ℓ	1	<1	1	1	3	<1	3
Calcium	mg/ℓ	40	44	32	42	42	44	64
Carbonate	mg/ℓ	0	0	0	0	0	0	11
Chloride	mg/ℓ	24	7.4	3.4	21	17	11	26
Chromium	µg/ℓ	<50	<50	<50	<50	70	<50	70
Chromium Hexavalent	µg/ℓ	0	3	0	0	5	0	0
Cobalt	µg/ℓ	<5	<5	<5	<5	7	<5	7
Color	PT-CO	5	0	15	15	5	5	5
Copper	µg/ℓ	<10	<10	<10	<10	<10	<10	<10
Cyanide	mg/ℓ	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoride	mg/ℓ	.4	.4	.4	.3	.5	0.2	.3
Gallium	µg/ℓ	50	<30	50	50	100	<30	100
Germanium	µg/ℓ	100	70	100	100	300	100	100
Hardness Noncarb	mg/ℓ	25	41	0	78	53	49	140
Hardness Total	mg/ℓ	150	150	130	130	160	160	170
Iodide	mg/ℓ	0.00	0.00	.01	0.00	0.00	0.00	0.00
Iron	µg/ℓ	20	<5	50	30	30	5	20
Lead	µg/ℓ	500	300	1000	300	500	300	300
Lithium	µg/ℓ	10	10	10	10	10	10	10
Magnesium	mg/ℓ	11	10	12	6.3	14	12	1.4
Manganese	µg/ℓ	5	1	70	30	7	30	3
Molybdenum	µg/ℓ	10	<10	10	10	30	<10	50
Nickel	µg/ℓ	<50	<50	<50	<50	70	<50	70
Nitr NO_2 as N	mg/ℓ	0.00	0.01	0.00	.57	0.0	.01	0.00
Nitr NO_3 as N	mg/ℓ	3.1	2.8	0.10	5.1	3.8	.80	1.1
Nitr NH_4 as N	mg/ℓ	.03	0.04	0.03	.14	.02	.07	.03
NO_2 + NO_3 as N	mg/ℓ	3.1	2.8	0.1	5.7	3.8	.81	1.1
pH Field		7.9	7.6	7.9	7.7	7.8	7.9	10.0
pH Lab		7.9	7.9	7.9	7.8	8.1	8.0	9.5
Phosphorus as P	mg/ℓ	.04	0.03	.01	.01	.01	.03	.01
Phosphorus	mg/ℓ	.02	0.01	.01	.01	.01	.01	.01
Potassium	mg/ℓ	6	5.6	6	4.6	4.7	5.7	12
Residue Calc Sum	mg/ℓ	267	265	238	218	280	228	394
Residue 180C	mg/ℓ	257	267	232	216	280	231	396
Selenium	µg/ℓ	2	2	0	3	3	10	7
Silica	mg/ℓ	37	29	62	15	37	20	17
Silver	µg/ℓ	10	<10	10	<10	30	<10	30
Sodium	mg/ℓ	22	19	16	14	21	13	41
Sodium Percent		24	21	20	18	21	15	33
Sp Conductance Fld	µmhos	395	400	325	365	425	370	590
Sp Conductance Lab	µmhos	398	402	323	366	425	371	601
Strontium	µg/ℓ	300	300	100	100	300	300	300
Sulfate	mg/ℓ	41	71	22	57	61	52	210
Tin	µg/ℓ	100	<50	100	100	300	<50	100
Titanium	µg/ℓ	<5	<5	<5	<5	7	<5	10
Turbidity	NTU	1.6	0.8	28	170	1.6	7.5	14
Vanadium	µg/ℓ	10	<10	<10	<10	30	<10	10
Water Temp	C°	17.1	17.5	20.5	18.0	16.9	17.2	17.0
Zinc	µg/ℓ	<5	700	<5	<5	<5	10	<5
Zirconium	µg/ℓ	<5	<5	<5	<5	7	<5	10
Cesium-137	pCi/ℓ	<1	<1	<1	<1	<1	<1	<1
Cobalt-60	pCi/ℓ	<1	<1	<1	<1	<1	<1	<1
Gross-B,Cs-137	pCi/ℓ	7	9.9	5.4	3.8	4.8	6.7	14
Gross-B,Sr-90	pCi/ℓ	6.8	9.3	5.1	3.7	4.4	6.3	13
Gross Alpha,U-Nat	µg/ℓ	<6	<5.6	<4.6	<5.2	<7.0	<5.3	<6.2
Potassium-40	pCi/ℓ	4.5	4.2	4.5	3.4	3.5	4.3	9.0
Strontium-90	pCi/ℓ	<.7	<0.4	<.4	<.4	<.4	<.4	<.4
Tritium	pCi/ℓ	920	<200	<200	<200	33,000	<200	<200

TABLE C.1 (continued)

Constituents	Units	699-50-85	699-55-50C	699-55-76	699-57-83	699-62-31	699-63-25A	699-63-90
Aluminum	µg/ℓ	300	100	100	100	100	100	100
Antimony	µg/ℓ	100	100	50	100	70	<30	100
Arsenic	µg/ℓ	2	4	0	1	0	4	2
Barium	µg/ℓ	40	20	30	20	50	50	20
Beryllium	µg/ℓ	<1	<1	<1	<1	<1	<1	<1
Bicarbonate	mg/ℓ	150	96	53	140	170	190	150
Bismuth	µg/ℓ	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000
Boron	µg/ℓ	<5	<5	<5	<5	<5	<5	<5
Bromide	mg/ℓ	0.0	0.0	.2	.1	0.0	0.1	.1
Cadmium	µg/ℓ	5	3	1	3	5	<1	3
Calcium	mg/ℓ	38	29	28	30	36	64	34
Carbonate	mg/ℓ	0	0	0	0	0	0	0
Chloride	mg/ℓ	11	3	17	7.5	5.3	11	21
Chromium	µg/ℓ	70	70	<50	70	70	<50	70
Chromium Hexavalent	µg/ℓ	2	0	0	1	0	0	1
Cobalt	µg/ℓ	7	7	<5	7	10	<5	7
Color	PT-CO	10	5	10	5	40	5	10
Copper	µg/ℓ	10	<10	<10	<10	<10	<10	<10
Cyanide	mg/ℓ	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoride	mg/ℓ	0.3	.2	.3	.3	.4	.3	.3
Gallium	µg/ℓ	100	100	30	100	100	<30	100
Germanium	µg/ℓ	300	100	100	100	100	100	300
Hardness Noncarb	mg/ℓ	24	10	51	14	3	73	24
Hardness Total	mg/ℓ	140	110	90	120	120	210	130
Iodide	mg/ℓ	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron	µg/ℓ	20	40	20	20	500	<5	30
Lead	µg/ℓ	500	300	100	500	500	500	500
Lithium	µg/ℓ	10	10	10	10	10	10	10
Magnesium	mg/ℓ	12	7.9	4.9	12	8.1	13	12
Manganese	µg/ℓ	5	3	70	5	100	1	3
Molybdenum	µg/ℓ	30	30	10	30	30	<10	30
Nickel	µg/ℓ	100	70	<50	70	70	<50	100
Nitr NO_2 as N	mg/ℓ	0.01	0.00	.00		.01	.01	0.00
Nitr NO_3 as N	mg/ℓ	4.8	.13	.02		1.4	4.3	1.3
Nitr NH_4 as N	mg/ℓ	0.02	.03	.07	.03	.08	.02	.01
NO_2 + NO_3 as N	mg/ℓ	4.8	.18	.02	.49	1.4	4.3	1.3
pH Field		8.0	7.9	7.7	7.7	7.3	7.8	7.8
pH Lab		8.1	8.0	7.8	7.9	7.6	8.0	8.0
Phosphorus as P	mg/ℓ	.02	.04	0.00	.01	.01	.05	.01
Phosphorus	mg/ℓ	.02	.04	.01	.01	.01	.04	.02
Potassium	mg/ℓ	3.9	4.3	4.8	3.5	5.2	5.2	4.4
Residue Calc Sum	mg/ℓ	232	146	146	183	221	337	227
Residue 180C	mg/ℓ	232	147	156	181	223	345	220
Selenium	µg/ℓ	11	0	0	0	1	0	0
Silica	mg/ℓ	42	24	12	34	37	36	42
Silver	µg/ℓ	30	30	<10	30	10	<10	30
Sodium	mg/ℓ	10	5.0	9.6	7.6	20	24	11
Sodium Percent		13	9	18	11	25	19	15
Sp Conductance Fld	µmhos	333	235	255	285	338	515	325
Sp Conductance Lab	µmhos	338	233	254	285	339	518	318
Strontium	µg/ℓ	100	100	100	100	100	500	100
Sulfate	mg/ℓ	21	15	46	20	31	80	30
Tin	µg/ℓ	300	300	100	300	300	50	300
Titanium	µg/ℓ	10	7	<5	7	7	<5	7
Turbidity	NTU	2.8	1.0	6.1	2.8	16	1.1	1.5
Vanadium	µg/ℓ	30	10	<10	30	10	<10	30
Water Temp	C°	20.0	16.8	17.0	17.3	17.5	16.8	17.0
Zinc	µg/ℓ	7	<5	<5	10	3,000	7	7
Zirconium	µg/ℓ	10	7	<5	7	7	<5	7
Cesium-137	pCi/ℓ	<1	<1	<1	<1	<1	<1	<1
Cobalt-60	pCi/ℓ	<1	<1	<1	<1	<1	<1	<1
Gross-B,Cs-137	pCi/ℓ	4.2	4.8	4.5	3.1	5.1	4.4	4.2
Gross-B,Sr-90	pCi/ℓ	3.8	4.4	4.3	2.8	4.7	4.1	3.9
Gross Alpha,U-Nat	µg/ℓ	<4.2	<3.0	<3.8	<3.6	<4.6	<6.5	<4.4
Potassium-40	pCi/ℓ	2.9	3.2	3.6	2.6	3.9	3.9	3.3
Strontium-90	pCi/ℓ	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Tritium	pCi/ℓ	<200	<200	<200	<200	<200	<200	<200

TABLE C.1 (continued)

Constituents	Units	699-65-50	699-66-39	699-66-58	699-66-64	699-71-52	699-90-45
Aluminum	µg/ℓ	300	100	300	100	100	100
Antimony	µg/ℓ	100	100	100	100	<30	70
Arsenic	µg/ℓ	13	1	7	6	2	2
Barium	µg/ℓ	20	20	20	20	40	50
Beryllium	µg/ℓ	<1	<1	<1	<1	<1	<1
Bicarbonate	mg/ℓ	140	21	130	150	130	190
Bismuth	µg/ℓ	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000
Boron	µg/ℓ	<5	<5	<5	<5	<5	<5
Bromide	mg/ℓ	0.0	.1	0.0	0.0	.1	0.0
Cadmium	µg/ℓ	5	3	3	3	<1	3
Calcium	mg/ℓ	24	9.3	27	27	30	35
Carbonate	mg/ℓ	0	8	0	0	0	0
Chloride	mg/ℓ	7.2	21	6.2	5.0	7.3	3.7
Chromium	µg/ℓ	70	70	70	70	<50	50
Chromium Hexavalent	µg/ℓ	0	0	0	0	16	0
Cobalt	µg/ℓ	7	7	7	7	<5	10
Color	PT-CO	10	15	5	5	60	40
Copper	µg/ℓ	<10	<10	<10	10	<10	<10
Cyanide	mg/ℓ	0.00	0.00	0.00	0.00	0.00	0.00
Fluoride	mg/ℓ	1.1	.3	0.8	0.5	.4	.6
Gallium	µg/ℓ	100	100	100	100	<30	70
Germanium	µg/ℓ	100	100	100	100	70	100
Hardness Noncarb	mg/ℓ	0	0	2	0	16	0
Hardness Total	mg/ℓ	94	29	100	100	120	130
Iodide	mg/ℓ	0.00	0.00	0.00	0.00	0.00	0.00
Iron	µg/ℓ	50	20	40	30	<5	500
Lead	µg/ℓ	500	100	500	500	300	500
Lithium	µg/ℓ	10	10	10	10	10	10
Magnesium	mg/ℓ	8.2	1.3	8.4	8.3	10	11
Manganese	µg/ℓ	3	3	3	3	3	500
Molybdenum	µg/ℓ	50	50	30	30	<10	30
Nickel	µg/ℓ	100	70	70	100	<50	50
Nitr NO_2 as N	mg/ℓ	.01	.00	0.00	.00	0.00	0.00
Nitr NO_3 as N	mg/ℓ	.29	.01	0.42	0.4	0.78	.57
Nitr NH_4 as N	mg/ℓ	.03	.23	0.03	0.02	0.01	.86
NO_2 + NO_3 as N	mg/ℓ	.30	.01	0.42	0.4	0.78	.57
pH-Field		8.0	9.6	7.9	7.9	7.9	7.4
pH Lab		8.1	9.2	8.1	7.8	7.8	7.6
Phosphorus as P	mg/ℓ	.05	0.00	0.04	.03	0.01	.03
Phosphorus	mg/ℓ	.04	.01	.04	.03	0.01	.04
Potassium	mg/ℓ	5.0	1.3	5.4	5.5	5.5	5.7
Residue Calc Sum	mg/ℓ	186	223	181	184	212	219
Residue 180C	mg/ℓ	172	221	181	188	214	220
Selenium	µg/ℓ	1	9	0	9	2	0
Silica	mg/ℓ	38	8.0	37	37	28	37
Silver	µg/ℓ	30	30	30	30	<10	10
Sodium	mg/ℓ	19	61	14	16	22	16
Sodium Percent		29	81	22	24	28	20
Sp Conductance Fld	µmhos	280	375	286	283	328	345
Sp Conductance Lab	µmhos	280	378	277	282	332	345
Strontium	µg/ℓ	100	100	100	100	100	300
Sulfate	mg/ℓ	16	100	20	17	45	23
Tin	µg/ℓ	300	100	300	300	50	100
Titanium	µg/ℓ	10	7	7	10	<5	7
Turbidity	NTU	1.1	1.4	1.4	2.0	100	12
Vanadium	µg/ℓ	30	10	30	30	<10	10
Water Temp	C°	18.0	17.5	16.9	17.4	17.5	16.5
Zinc	µg/ℓ	10	<5	100	100	<5	30
Zirconium	µg/ℓ	10	7	7	10	<5	5
Cesium-137	pCi/ℓ	<1	<1	<1	<1	<1	<1
Cobalt-60	pCi/ℓ	<1	<1	<1	<1	<1	<1
Gross-B,Cs-137	pCi/ℓ	4.7	<2.6	4.0	9.4	5.6	6.6
Gross-B,Sr-90	pCi/ℓ	4.3	<2.5	3.7	8.7	5.2	6.1
Gross Alpha,U-Nat	µg/ℓ	<3.6	<3.5	<3.7	<3.6	<4.6	<4.6
Potassium-40	pCi/ℓ	3.7	1.0	4.0	4.1	4.1	4.3
Strontium-90	pCi/ℓ	<.4	<.4	<.6	<.4	<0.4	<.4
Tritium	pCi/ℓ	1,500	<200	1,600	1,900	1,500	13,000

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