Ground-Water Surveillance at The Hanford Site for CY 1983

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SUMMARY

Operations at the Hanford Site since 1944 have resulted in the discharge of large volumes of process cooling water and other waste waters to the ground. These effluents, which have percolated down to the unconfined ground water, contain low levels of radioactive and chemical substances. The concentrations of these constituents in the unconfined aquifer are monitored by the Ground-Water Surveillance Program.

During 1983, 328 monitoring wells were sampled at various times for radioactive and chemical constituents. Three of these constituents, specifically tritium, nitrate, and gross beta activity, have been selected for detailed discussion in this report because they are more readily transported in the ground water than some of the other constituents. Transport of these constituents in the ground water has resulted in the formation of plumes that can be mapped by contouring the analytical data obtained from the monitoring wells. The plumes change with time in response to ground-water flow, radioactive decay, and ion exchange/adsorption. This report, which is one of a series prepared annually to document and evaluate the status of the ground water at the Hanford Site, describes recent changes in the configuration of the tritium, nitrate and gross beta plumes.

Maps showing the present configuration of the tritium and nitrate plumes have been included in this report. The gross beta activity in the unconfined aquifer has not been mapped this year because of its very limited distribution and low activity levels. It is, however, discussed in the text.

Changes or trends in contaminant levels in wells located within both the main plumes (originating from the 200 Areas) and the smaller plumes are discussed in this report. Higher concentrations are found within the main plumes, thus the majority of the discussion is focused on them. However, changes in the smaller plumes are also monitored and documented.

Tritium and nitrate in the main plumes originating from the 200 Areas continue to move generally eastward toward the Columbia River. The movement within these plumes is indicated by

analytical data from the monitoring wells; the concentrations in a well increase as the front of the plume or a higher-concentration zone within it reaches the well, and then they decrease as the plume or zone passes. Since ground water moves slowly, these changes occur gradually. The shapes of the present plumes are therefore very similar to the ones shown in previous reports. Slight changes in the graphical depiction of the plumes, particularly on the outer edges, have occurred. These changes have resulted primarily from addition of new sampling points or from alteration of the mapping conventions to better represent the data.

Two potential pathways for radionuclide transport from the ground water to the environment are discussed in this report, and the radiological impacts are examined. The pathways are: 1) human consumption of ground water from onsite wells, and 2) seepage of ground water into the Columbia River. In 1983, the annual whole body dose received as a result of drinking the ground water at the Fast Flux Test Facility (FFTF), one of four use points onsite, was calculated. The calculated dose was 0.4 millirem, based on an ingestion rate of 250 l/yr (approximately one-half of the average adult consumption per year) and a dose commitment of 50 years. This estimated whole body dose is ten percent of the Washington State drinking water standard. Detection of tritium in spring samples that were collected and analyzed in 1983 as part of a special study confirmed that constituents in the ground water are entering the river via springs and subsurface flow. Because of the difference in river and ground-water flow rates, the ground water entering the river is diluted by several orders of magnitude. Therefore, in 1983 the contribution of tritium to the river from ground-water seepage along the Hanford reach of the river was not sufficient to be accurately measured in the presence of background concentrations from worldwide fallout.

In addition to describing the present status of the ground water beneath the Hanford Site, this report contains the results of studies conducted in support of the ground-water surveillance

effort during CY 1983. One of these studies was an investigation of the interactions of the Columbia River and the unconfined aquifer near the old Hanford Townsite, where the main tritium and nitrate plumes reach the river. Results obtained indicated that bank storage of river water caused by the river's fluctuations resulted in seasonal changes in the tritium concentrations measured in wells along the riverbank. This information has been used to better evaluate

analytical data obtained from these wells. The second study involved an assessment of changes in the hydrologic system caused by use of a new disposal facility for liquid wastes at the 100-N Area. The results showed several changes in the hydrologic system, including development of a mound on the ground-water table beneath the new crib and flattening of the mound underneath the old crib.

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INTRODUCTION

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

To achieve these objectives, the Ground-Water Surveillance Program collects and analyzes ground-water samples and then interprets the results. The program also performs technical studies that provide additional information on the ground-water system and on the behavior of constituents within the system.

Each year, data collected by the Ground-Water Surveillance Program are evaluated, summarized, and published in an annual report. This document contains an evaluation of data collected during CY 1983. The primary purposes of this report are to describe the concentration and distribution of various constituents in the ground water and to assess their potential impact. In addition, the report describes the results of technical studies conducted in 1983.

Additional information on environmental surveillance at the Hanford Site may be found in two other reports issued annually. The most recent titles are:

- *Environmental Surveillance at Hanford for CY 1983* by Price et al. (1984), and
- *Environmental Status of the Hanford Site for CY 1982* by Sula et al. (1983).

SITE DESCRIPTION

The Hanford Site, which is operated by DOE, is located in southeastern Washington. The site, shown in Figure 1, occupies 1,476 km² (570 mi²) of the semiarid Pasco Basin. The site receives approximately 16 cm (6.3 in.) of precipitation annually, of which about 40% occurs during the winter months. The desert plains on which the site is situated rise gradually from an altitude of about 400 feet above mean sea level in the southeastern part of the site to about 700 feet in the northwestern part (Newcomb, Strand and Frank 1972). In places along the boundaries and in the center of the site, bedrock anticlines or ridges rise above the plains. The Columbia River flows through the northern part of the site and forms part of its eastern boundary, and the Yakima River flows along a portion of the site's southern boundary. The cities of Richland, Pasco, and Kennewick, known as the Tri-Cities, are situated on the Columbia River downstream of the site and have a combined population of about 90,000.

The concentrations and distribution of constituents in the ground water are affected both by

site activities and by properties of the subsurface. Therefore, brief discussions of these subjects are contained in the following sections.

SITE OPERATIONS

The Hanford Site was established in 1943 under the Manhattan Project to produce plutonium for nuclear weapons. At one time, nine production reactors were in operation at the site, but only one of these (N Reactor) is currently operating. The N Reactor is a dual purpose reactor, producing both plutonium for weapons and steam for power production. Another onsite reactor, the Fast Flux Test Facility, is used for research. At present, the main DOE-sponsored activities at the site include reactor operation, fuel fabrication and reprocessing, waste management, and energy-related research and development. Privately-owned facilities located onsite include the Washington Public Power Supply System (WPPSS) generating station adjacent to the N Reactor, the WPPSS power reactor (which is scheduled to begin operating in 1984), and a burial site, operated by U.S. Ecology, for commercially generated radioactive waste.

FIGURE 1. The Hanford Site

The DOE operations onsite have resulted in the production of large volumes of waste water. Some of these effluents, including process cooling water and water containing low-level radioactive wastes, have been discharged to the ground. Subsurface structures such as cribs have been used for disposal of the water containing radioactive wastes, while surface ponds and ditches have been used for the disposal of the uncontaminated cooling water (Graham et al. 1981). These disposal facilities are located at the various operating areas shown in Figure 1, including the 100 Areas, 200 Areas, and 300 Area. The majority of waste water has been released through disposal facilities at or near the chemical separations area (200 Areas), which is located on a plateau near the center of the site. Smaller amounts of waste water have been released through disposal facilities at the reactor sites (100 Areas) and at the fuel fabrication area (300 Area). Discharges of waste water to the ground at the FFTF site (400 Area) are minimal. Because the FFTF reactor is cooled by liquid sodium and the heat is discharged to the atmosphere, no water is required.

The discharge of waste water to the ground at the Hanford Site began in the mid-forties and reached a peak in 1955. It has declined since then because of the improved treatment of waste streams and the deactivation of various facilities (Graham 1981). Since the reactivation of operations at the PUREX reprocessing facility in late 1983, discharge of PUREX-related effluents to the ground has resumed.

GEOLOGY AND HYDROLOGY OF THE SITE

Geologic and hydrologic properties of the site's subsurface affect the movement of the waste water that has been discharged to the ground. Therefore, brief descriptions of the geology and hydrology are given below.

Geology

The main geologic units beneath the Hanford Site include, in ascending order, the Columbia River Basalt Group, the Ringold Formation, and a series of glaciofluvial sediments. A generalized geologic cross section of the site is shown in Figure 2.

The Columbia River Basalt Group, which is the bedrock beneath the site, is a thick series of lava flows extruded from fissures. These basalts have been warped and folded, producing anticlines that, in some places, crop out at the land surface. The Ringold Formation overlies the basalts, except in some localized areas where it has been removed by erosion. This formation is broken down into four units, the basal, lower, middle and upper units, which consist mainly of bedded silts and sands deposited in a lacustrine environment. Beneath the 200-West Area, sediment- of the upper Ringold Formation have been reworked by the wind and redeposited as a silt layer called the Palouse soil. The glaciofluvial sediments rest atop the Ringold Formation or, in places where the Ringold has been removed, the basalts. These sediments were deposited by the ancestral Columbia River when it was swollen by glacial meltwater. The glaciofluvial sediments are composed primarily of gravels, sands, and some silts (Newcomb, Strand and Frank 1972).

Hydrology

Both confined and unconfined aquifers are present beneath the Hanford Site. The confined aquifers, in which the ground water is under pressure greater than that of the atmosphere, are found mainly within the Columbia River Basalts. The unconfined or water-table aquifer is the uppermost aquifer, and it consists primarily of the Ringold Formation and to a lesser extent the glaciofluvial sediments (Gephart et al. 1979). Of all the aquifers beneath the site, the unconfined aquifer has been most affected by waste water disposal at Hanford; therefore, the ground-water surveillance effort is focused on this aquifer.

The saturated portion of the unconfined aquifer reaches a thickness of over 70 m (230 ft) in some areas and pinches out along the flanks of the basalt anticlines. The bottom of the aquifer is the top of the basalt or, in some locations, the clay zones of the lower unit of the Ringold Formation (Graham et al. 1981). On the Hanford Site, the depth to the water table ranges from less than 0.3 m (1 ft) near the Columbia River to over 106 m (350 ft) in the center of the site. Studies have shown that natural recharge through the thick

FIGURE 2. Generalized Geologic Cross Section of the Hanford Site (Modified from Tallman et al. 1979)

unsaturated zone is minimal. Some natural recharge occurs along the base of the bordering anticlines where precipitation and runoff infiltrate to the water table (Gephart et al. 1979). In addition, the aquifer is artificially recharged by the waste and cooling water released onsite.

Changes in the water-table configuration during the past 40 years are the result of disposal to the ground of more than 6.2×10^{11} liters (164 billion gallons) of process cooling water and more than 3.2×10^{10} liters (8.5 billion gallons) of other waste

waters. Ground-water mounds created by the discharge of water now exist near each of the chemical processing and waste management facilities (Figure 3). These mounds interrupt the general flow pattern in the aquifer, from the recharge areas in the west to the discharge areas (primarily the Columbia River) in the east. Ground-water levels have changed continuously over the years because of variations in the volume of waste water discharged to the ground. The movement of the ground water and its associated constituents has also changed with time and reflects the amount of effluent discharged.

FIGURE 3. Water Table Elevations - December, 1983

METHODS

Over 2,200 wells have been constructed on the Hanford Site from pre-Hanford Works days to the present. About 850 of these wells were drilled to the ground-water table, and about 780 still contain water. The others have become dry through infiltration of sediments or a general lowering of the water table in their vicinity (McGhan and Damschen 1979). The well network provides a means for obtaining ground-water samples and for conducting onsite investigations. Locations of selected sampling wells are shown in Figure 4.

Most of the wells drilled at Hanford are multi-purpose structures. As the wells are drilled, geologic and hydrologic information is obtained. After drilling is completed, the wells become sampling structures. Most of the wells are six or eight inches in diameter and have steel casings. The wells are usually perforated or screened along the upper portion of the saturated zone of the aquifer.

SAMPLE COLLECTION

Ground-water samples are obtained routinely from wells throughout the Hanford Site, according to a master schedule that is formulated each year (Blumer et al. 1982). All routine ground-water samples for 1983 referred to in this report were taken by the Environmental Evaluations Section of the Occupational and Environmental Protection Department of PNL. For the 1983 routine Ground-Water Surveillance Program, 328 wells were sampled. From these, 1,462 well-water samples were taken to provide 3,812 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, semi-annually, or annually, depending on the location of the well and constituents to be analyzed. The volume of each sample is determined by the number of constituents for which that particular sample will be analyzed.

Most of the ground-water samples are collected using submersible pumps. These pumps have been semipermanently installed in a majority of

the regularly sampled wells to prevent the cross contamination that may result from using a single pump to sample several wells. Bailers are used to sample the wells that will not produce enough water to sample by pumping. When a bailer must be used, the sample is collected by lowering a plastic bottle enclosed in a steel bailer. The bailed samples are collected just below the surface of the water table because this is where the greatest concentration of contaminants is usually observed (Eddy, Myers and Raymond 1978).

Most of the samples are collected from the unconfined aquifer. However, at a few locations where appropriate wells are available, samples are obtained from the confined aquifers.

SAMPLE ANALYSIS

The samples collected by the Ground-Water Surveillance Program each year are analyzed for a variety of radioactive and nonradioactive constituents. Most of the samples are analyzed for tritium (^3H) and nitrate (NO_3^-), because these constituents are readily transported in ground water with little decrease in concentration from adsorption or ion exchange. In addition, samples from selected wells are routinely analyzed at less frequent intervals for the radionuclides strontium-90, cesium-137, and cobalt-60. Gross beta activity is determined for samples from wells in the 300 Area, and gross alpha (as ^{239}Pu) emission is determined for two wells in the vicinity of the 200 Areas. Selected samples are also analyzed by gamma spectrometry to identify the mixture of radionuclides present.

A small number of samples are analyzed for iodine-129 and technetium-99. In addition, analyses for copper, natural uranium, fluoride (F^-), and chromium (Cr^{+6}) are made on ground-water samples collected from areas where these substances are present. The following water-quality analyses are conducted on samples collected annually from selected wells: pH, conductivity, total alkalinity, carbonate, bicarbonate, nitrate, sulfate, chloride, calcium, magnesium, sodium, potassium, boron, and total dissolved solids.

FIGURE 4. Locations of Selected Sampling Wells

Standard radiometric and chemical methods are used to analyze the ground-water samples (ASTM 1979). Most of the analyses described in the preceding paragraphs are performed by PNL's Radiological and Inorganic Chemistry Section. However, the iodine-129 and technetium-99 analyses are performed by PNL's Analytical and Nuclear Research Section, and the water-quality analyses are conducted by the Hanford Environmental Health Foundation. In addition, as part of the Ground-Water Surveillance Program's quality assurance effort, analyses for a variety of parameters are conducted independently by the U.S. Geological Survey (USGS) on samples from approximately 20 wells.

SPECIAL ORGANICS TESTING

Organic chemicals are not presently included in the routine analyses performed on the ground-water samples. However, special samples are now being collected and analyzed for organics in support of the Organics Task which was initiated in October 1983. The objectives of this task are to identify areas of the Hanford Site

where organics are present in the ground water, to determine the types and concentrations of these chemicals, and to decide if a routine organics sampling program should be added to the existing ground-water sampling program.

Existing monitoring wells are being used as sampling points for the Organics Task. However, some aspects of sample collection and preservation are different from those used by the routine ground-water sampling program. For instance, the regular sampling pumps are used to evacuate the well prior to sampling, but a special pump is used to actually collect the sample. This special pump is designed for sampling of ground water containing organics. It is made of nonreactive materials and minimizes contact between air and the sample. Special sample bottles made of glass are used, and, while stored, the samples are refrigerated and protected from sunlight and the atmosphere. Also, hydrochloric or sulfuric acid is added to the samples to preserve them during storage. The samples are analyzed by PNL's Geochemistry Section using methods approved by the Environmental Protection Agency.

DISTRIBUTION AND CONCENTRATIONS OF RADIONUCLIDES AND CHEMICALS IN THE GROUND WATER

Liquid effluents released to the ground at the waste disposal facilities onsite have percolated downward and laterally through as much as 100 m (328 feet) of unconsolidated sediments that overlie the saturated portion of the unconfined aquifer. As the wastes have moved through these sedimentary materials, adsorption and ion exchange have taken place between the minerals in the sediments and the substances in the waste water. Some of the radionuclides in the waste water, such as strontium-90, cesium-137, and plutonium-239, have good ion-exchange characteristics and have been held in the soil column as the waste water has percolated downward. Other radionuclides, such as tritium, iodine-129 and technetium-99, have poor ion-exchange characteristics. These radionuclides have moved through the soil column at varying rates, eventually entering the ground water. Subsequently, they have moved in a general down-gradient direction at a rate nearly equal to the velocity of the ground water. As the radionuclides have moved with the ground water, their concentrations have been further reduced by radioactive decay, ion exchange, diffusion, and hydrodynamic dispersion. Through the years, the Ground-Water Surveillance Program has monitored both the movement and concentrations of constituents in the ground water.

This chapter includes sections describing the distribution and concentrations of tritium, nitrate, and gross beta activity in the unconfined aquifer. Of all the constituents present in the ground water, these three have been selected for detailed discussion in this report because they are more readily transported in the ground water than some of the other constituents. Each section of this chapter (except for the one on gross beta) contains a map showing the distribution of the radionuclide or chemical described in that section. The isopleths on the maps show concentration zones rather than discrete contours since the data do not justify the additional detail.

EVALUATION OF GROUND-WATER SURVEILLANCE DATA

Radionuclide concentrations in the ground water beneath the Hanford Site are evaluated in terms of their respective DOE Concentration Guides (CGs) (U.S. Department of Energy 1981). Concentrations of radioactive materials are also compared with drinking water standards (DWS) promulgated by the U.S. Environmental Protection Agency (1981) and adopted by the state of Washington. The comparison between the actual concentration and 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, even though the use of the ground water is controlled. Table 1 shows the minimum detectable concentrations (MDC) and applicable CGs or DWS for primary radionuclides and various chemicals analyzed under the routine Ground-Water Surveillance Program.

Table 1. Minimum Detectable Concentrations and Lowest Applicable Concentration Guides or Drinking Water Standards for Various Radionuclides and Chemicals

	MDC, pCi/ml	DWS, pCi/ml	CGs, pCi/ml
Radionuclides			
Gross Beta (as ¹⁰⁶ Ru)	0.08	0.05	3.0
Total Alpha (as ²³⁹ Pu)	0.017	0.015	0.03
³ H	0.5	20	3,000.0
⁶⁰ Co	0.02	NA (a)	30.0
⁹⁰ Sr	0.03	0.008	0.3
¹⁰⁶ Ru	0.06	NA	10.0
¹²⁵ Sb	0.06	NA	100.0
¹²⁹ I	1 x 10 ⁻⁸	NA	0.06
¹³¹ I	0.01	NA	0.3
¹³⁷ Cs	0.02	NA	20.0
U (Natural)	0.03 (mg/l)	NA	0.6
Chemicals			
NO ₃ ⁻	0.5 (mg/l)	45 (mg/l) (b)	NA
F ⁻	0.08 (mg/l)	1.8 (mg/l)	NA
Cr+6	0.01 (mg/l)	0.05 (mg/l)	NA

(a) NA - Means Not Applicable.

(b) Calculated as NO₃⁻.

Appendix A contains analytical data for 1983 on the maximum, average, and minimum concentrations of tritium and nitrate. The average concentrations of these constituents were used to generate the isopleth maps. While published data from the 200 Areas were used to provide continuity in the maps (Wilbur, Graham and Lu 1983), these data were not included in Appendix A.

Table 2 shows the number of wells sampled, the number of samples taken, and the number of analyses made as part of the 1983 Ground-Water Surveillance Program for each area of the Hanford Site. The data shown in Appendices A (tritium and nitrate) and B (selected constituents in ground water) were derived from the analysis of these samples. The numerical data in Table 2 and the analytical data in the appendices do not include samples collected in support of special studies, special DOE-contractor support programs, or for quality control purposes.

TRITIUM CONCENTRATIONS IN THE UNCONFINED GROUND WATER

Because tritium enters 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 a good indication of the movement of ground water at the Hanford Site. Figure 5 shows the present distribution of tritium in the unconfined aquifer. Appendix A contains the concentrations of tritium found in samples collected in 1983.

Table 2. Numerical Data on the Routine Ground-Water Surveillance Program, 1983

Area	Number of Wells Sampled	Number of Samples Taken	Number of Analyses Made
100	48	223	499
200	22	96	264
300	28	136	848
400	6	24	108
600(a)	224	983	2093
Totals	328	1462	3812

(a) The 600 Area encompasses all of the Hanford Site not included in the other operating areas (100, 200, 300, and 400 Areas).

The 1983 plume map (Figure 5) shows four concentration zones instead of the three depicted in the 1982 map (Eddy, Prater, and Rieger 1983). The four zones are (in pCi/ml): <1, 1 to 30, 31 to 300, and >300. The zone for 1 to 30 pCi/ml was included on the map this year in the interest of showing additional information afforded by the samples analyzed; its inclusion does not indicate that there has been a change in tritium concentrations in the areas covered by this zone since last year. Mapping of these very low concentrations was possible because of the high sensitivity of the analytical techniques used and because of the sampling of wells all over the site, not just in areas of relatively high concentrations.

The graphical depiction of the largest tritium plume, which lies between the 200 Areas and the Columbia River, has changed somewhat in the past year, primarily due to the addition of a new sampling point near the river. Data collected from this new well (699-39-E3) in 1983 showed that the zone of the plume having concentrations between 31 and 300 pCi/ml probably reaches the river over a much smaller area than was previously thought. The concentration of tritium in this well in 1983 averaged 10.5 pCi/ml, which is much lower than the concentrations measured in nearby wells slightly to the north. (For example, the tritium concentrations in well 699-40-1 averaged 227 pCi/ml in 1983.) The area to the south of well 699-39-E3 (where sand dunes prevent installation of wells) probably has very low concentrations of tritium, as indicated by the low concentrations found in the well and in special spring samples collected along this reach of the river in 1983 (Price et al. 1984). This area was therefore excluded from the plume shown in Figure 5.

The zone of higher concentration (300 to ~850 pCi/ml) within the largest plume is moving toward the river, as indicated by the decline in concentrations of tritium in wells on the western edge of the zone and the increase in tritium concentrations in wells on its eastern edge. The western edge of this zone has passed by well 699-31-31; the tritium concentrations in it have declined to less than 300 pCi/ml (Figure 6). The concentrations in well 699-41-23, which is further to the east, have continued to decline but have not yet dropped below 300 pCi/ml (Figure 7). Concentrations in well 699-40-1, located to the

FIGURE 5. Tritium Distribution in the Unconfined Ground Water

FIGURE 6. Concentration History for Tritium in Well 699-31 - 31

FIGURE 7. Concentration History for Tritium in Well 699-41-23

east of this zone, have continued to rise, indicating the approach of the zone's eastern edge (Figure 8).

The 1983 map also shows a change from the 1982 map near the east boundary of the 200-East Area. Specifically, this year's map shows the concentration zone for 31 to 300 pCi/ml extending into the southeast corner of the 200-East Area. This change in the plume's depiction was not caused by changes in tritium concentrations in the ground water resulting from operations in the 200 Areas; rather, this change resulted from resumed sampling of wells, such as 299-E17-4, that had not been included in the sampling network in recent years.

NITRATE CONCENTRATIONS IN THE UNCONFINED GROUND WATER

Figure 9 shows the concentration and distribution of nitrate in the unconfined ground-water system at Hanford. The nitrate plumes are divided into four concentration ranges: <4.5, 4.5 to 20, 21 to 45, and >45 mg/l. These ranges were revised from last year's map (Eddy, Prater and

Rieger 1983) to better represent the distribution of nitrate in the ground water. Elevated concentrations exist near the 200, 100-D, 100-F, and 100-H Areas, and to the southeast of Gable Mountain. Results of samples analyzed for nitrate in 1983 are contained in Appendix A.

Nitrate in the unconfined aquifer at the Hanford Site originated from many different sources. Sodium nitrate produced during fuel reprocessing operations was disposed to the ground near the 200-East and 200-West Areas. Nitrate in the ground water at the 100-H Area probably came from the 183-H solar evaporation basin, which receives wastes generated by fuel fabrication activities. Nitrate near the 100-F Area has been attributed to leaching of wastes from research animals. The origin of nitrate in the other 100 Areas and near the Rattlesnake Hills is uncertain, but may be associated with former or (at the Rattlesnake Hills location) present agricultural sources rather than Hanford Site operations.

The addition of well 699-39-E3 (Figure 9) to the sampling schedule has changed the depiction of

FIGURE 8. Concentration History for Tritium in Well 699-40-1

FIGURE 9. Nitrate Ion Distribution in the Unconfined Ground Water

the nitrate plume near the river. Data from this well showed that nitrate having concentrations from 21 to 45 mg/l reaches the river over a smaller area than was previously shown (Eddy, Prater and Rieger 1983). Concentrations in this well averaged only 5.3 mg/l in 1983, while concentrations in nearby wells to the north exceeded 30 mg/l. Nitrate concentrations in the ground water to the south of this well, where no sampling points are located because of the area's inaccessibility, are probably very low. This is indicated by the low concentrations found in the well and in special spring samples collected along this reach of the river in 1983 (Price et al. 1984). Therefore, this area has been excluded from the plume.

Nitrate in the main plume originating at the 200 Areas is gradually moving eastward in the general direction of the regional ground-water flow. An increase in the average nitrate concentrations in well 699-38-65 (Figure 10) indicates eastward migration of nitrate from the 200 Areas. A decrease in the average nitrate concentrations in well 299-W10-5 (Figure 11) also shows the

the plume to be moving eastward from the source.

Nitrate concentrations in well 699-27-8, which in recent years has been shown in the zone of highest concentration in the plume (>45 mg/l), have apparently begun to decline (Figure 12). This year's average concentration is the lowest value in nine years and has dropped below 45 mg/l. This decrease may indicate that the higher concentrations have passed to the east of this well or that the concentrations are being reduced in this area by dispersion.

Concentrations of nitrate and other constituents in well 199-H4-3 are used to monitor the 183-H solar evaporation facility at the 100-H Area. This facility is used as a concentrator for wastes containing nitrate, copper, sodium, and sulfate, with small amounts of other constituents, such as chromium. As shown in Figure 13, the average concentrations of nitrate in well 199-H4-3 have dropped sharply since 1978 when use of an unlined basin was discontinued. In recent years the concentrations of nitrate in this well appear to have stabilized.

FIGURE 10. Concentration History for Nitrate in Well 699-38-65

FIGURE 11. Concentration History for Nitrate in Well 299-W10-5

FIGURE 12. Concentration History for Nitrate in Well 699-27-8

FIGURE 13. Concentration History for Nitrate in Well 199-H4-3

GROSS BETA ACTIVITY IN THE UNCONFINED GROUND WATER

The concentration and distribution of gross beta radioactivity in the Hanford ground water have been decreasing for several years, as shown in previous years' reports (Eddy and Wilbur 1981). The concentrations are now at very low levels in most of the aquifer. The few remaining areas of higher levels are located at or near the 200-West and 200-East Areas and the 100-N and 100-H reactor sites. A map of gross beta distribution in the ground water was not generated for CY 1983 because of the minimal extent of the beta plume.

Gross beta activity in the ground water near the 200 Areas is the result of operating and maintaining the reprocessing facilities for spent nuclear fuels and disposing of the contaminated liquids to cribs and, to a lesser extent, ponds. The gross beta activity in or near the 100-N reactor site is caused by disposal of liquid wastes from the reactor to the 1301-N and 1325-N cribs. The activity that still persists within the 100-H Area is, apparently, the result of past leakage from the 183-H solar evaporation ponds (Greager 1982).

RADIOLOGICAL IMPACT

Ground-water transport of radionuclides at 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.

UNCONFINED AQUIFER

During 1983, drinking water for the FFTF, the Yakima barricade guardhouse, the Arid Land Ecology observatory and the Hanford Patrol firing range was obtained from the unconfined aquifer. Untreated water samples were collected quarterly from taps at the various sites and screened for gross beta. Further analysis was conducted on those samples which exceeded Federal and Washington State screen values (0.05 pCi/mL for gross beta), and calculations were performed to determine if the annual dose exceeded the four millirem (mrem) dose equivalent limit. Ground-water samples taken at the FFTF required further analysis.

The average concentration of tritium in wells at the FFTF during 1983 ranged from 26 to 71 pCi/mL. The lowest concentrations were found in samples from well 699-S0-7, which draws water from a lower portion of the aquifer containing less tritium. This well is therefore used as the principal source of drinking water at the FFTF. A concentration of 25 pCi/mL (the average obtained from samples taken directly from a drinking-water tap) was used to calculate the dose.

The annual whole body dose attributable to tritium and a combination of other radionuclides in the drinking water at the FFTF in 1983 was calculated to be 0.4 mrem, based on an ingestion rate of 250 L/yr (approximately one-half of the average adult consumption per year) and a dose commitment of 50 years. The whole body dose represented by tritium was 94% of the total, or 0.38 mrem. This estimated whole body dose is 10% of the Washington State DWS.

Additional monitoring of all DOE drinking water systems at Hanford is conducted by the Hanford

Environmental Health Foundation. Information on this effort can be obtained from Maas (1984).

COLUMBIA RIVER

Ground water from the unconfined aquifer enters the Columbia River via subsurface flow and springs that emanate from the riverbank. Since the tritium plume has reached wells along the riverbank, it has been assumed that tritium is entering the river from the unconfined aquifer. This assumption was verified by the presence of tritium in spring samples that were collected and analyzed as part of a special study conducted in 1983 (Price et al. 1984). The amount of tritium entering the river has been calculated, based on the average concentrations of tritium in wells near the river and the flow rate of ground water into the river. Each of these factors and the resulting calculations are discussed below.

Eastward migration of the tritium plume originating in the 200 Areas (Figure 5) has continued to cause increasing concentrations in wells near the Columbia River. During 1983, tritium concentrations measured in wells at the old Hanford Townsite, where the more concentrated portion of the plume reaches the river, were in the range of approximately 0.8 to 315 pCi/mL.

The annual average flow rate from the unconfined aquifer into the section of the Columbia River between river miles 360 and 356(a) (which includes the area where the concentration zone of 31 to 300 pCi/mL reaches the river) has been estimated to be about 3 cfs (0.085 m³/sec), as determined by the Variable Thickness Transient (VTT) ground-water flow model developed for the Hanford Site. Over one-half of this flow occurs between river miles 360 and 359. Figure 14 shows the model nodes and the area of shoreline used to calculate ground-water discharge to the river.

Ground water entering the Columbia River from the Hanford Site is diluted by several orders of magnitude because of the difference between the river and ground-water flow rates.

(a) The river miles are measured from the mouth of the Columbia River.

FIGURE 14. Model Nodes and Area of Shoreline Used to Calculate Ground-Water Discharge to the River

During 1983, the average Columbia River flow rate at Priest Rapids Dam was approximately 130,000 cfs(a) (3680 m³/sec).

Using the estimated 3-cfs ground-water discharge to the river from river miles 360 to 356, and the 130,000-cfs average annual discharge of the Columbia River, the tritium concentration in the river from ground water in this area was calcu-

(a) This number is the average of the monthly flow rates reported in Price et al. (1984).

lated to be approximately 0.004 pCi/ml. In actuality, however, the Hanford Site's contribution to tritium in the river was not sufficient to be accurately measured in the presence of background concentrations resulting from worldwide fallout. During 1983, the average background tritium concentration in the Columbia River upstream from the site was 0.10 ± 0.026 pCi/ml, and the average concentration downstream from the site was 0.13 ± 0.028 pCi/ml (Price et al. 1984). The difference was therefore not statistically significant.

QUALITY CONTROL

The quality control effort of the Ground-Water Surveillance Program at PNL was initiated in 1974 and includes all phases of the program. Much effort is expended to ensure that samples are representative of the unconfined aquifer system beneath the Hanford Site. This includes: 1) extensive data collection to eliminate an unrealistic reliance on only a few results, 2) documentation of instrument calibrations and procedures in the field and in the laboratory, 3) scheduled maintenance of wells to ensure their integrity as sampling structures, 4) inspection of wells using a downhole TV camera and geophysical logging devices, 5) use of dedicated sampling pumps to avoid cross contamination, and 6) performance of laboratory audits by submitting duplicate samples for analysis and then comparing the results.

Each year PNL audits are conducted on the efficiency of the analytical laboratory by submitting paired samples for analysis. The paired samples consist of one record sample and one duplicate sample. The record sample is labeled with the actual well number and the duplicate sample is labeled with a fictitious well number. Tables 3 and 4 contain the results for the paired samples

that were analyzed for tritium and nitrate in 1983. The first two columns in these tables show the analytical results of both the record sample and the duplicate sample. The third and fourth columns contain the differences, expressed in terms of the analytical units and as a percentage. For both tritium and nitrate, the agreement between the record and duplicate samples is fairly good.

As part of the quality assurance effort of the Ground-Water Surveillance Program, the USGS collects and analyzes ground-water samples from approximately 20 Hanford Site wells each year. By comparing the USGS data with PNL data from the same wells, the general agreement of the two data sets can be assessed. Table 5 shows a comparison of the USGS data for each well sampled in 1983 with the yearly average obtained by PNL for the same well. The variability that exists between the two data sets may have arisen during the sample collection and analysis processes, or it may be due to actual differences in the concentrations in the ground water since the samples were collected at different times. The larger differences in Table 5 were for wells that are very close to the river (e.g., 699-46-5, 699-43-3), where tritium concentrations in the ground

Table 3. Results of Duplicate Samples Analyzed for Tritium in 1983

Well Number	Record Sample, pCi/ml	Duplicate Sample, pCi/ml	Difference, pCi/ml(a)	Difference, %(b)
1	0.83 ± 0.44	0.73 ± 0.44	0.10	12
2	1.1 ± 0.44	1.4 ± 0.45	-0.3	-27
3	44 ± 0.83	45 ± 0.82	-1	-2
4	1.0 ± 0.45	0.66 ± 0.45	0.34	34
5	2.3 ± 0.48	2.5 ± 0.48	-0.2	-9
6	9.7 ± 0.56	9.6 ± 0.56	0.1	1
7	44 ± 0.81	41 ± 0.79	3	7
8	19 ± 0.62	21 ± 0.63	-2	-11
9	2.0 ± 0.46	1.8 ± 0.46	0.2	10
10	36 ± 0.75	44 ± 0.81	-8	-22
11	120 ± 1.2	120 ± 1.3	0	—
12	160 ± 1.4	150 ± 1.4	10	6

(a) Calculated as the result of the record sample minus the result of the duplicate.

(b) Calculated as the difference divided by the result of the record sample, multiplied by 100.

Table 4. Results of Duplicate Samples Analyzed for Nitrate in 1983

Well Number	Record Sample, mg/l	Duplicate Sample, mg/l	Difference, mg/l ^(a)	Difference, % ^(b)
1	0.14	0.14	0	—
2	3.0	2.7	0.3	10.0
3	15.0	11.0	4.0	26.7
4	19.0	17.0	2.0	10.5
5	9.8	11.0	-1.2	-12.2
6	7.3	6.9	0.4	5.5
7	8.0	8.6	-0.6	-7.5
8	15.0	19.0	-4.0	-26.7
9	14.0	15.0	-1.0	-7.1
10	23.0	29.0	-6.0	-26.1
11	8.3	7.7	0.6	7.2

(a) Calculated as the result of the record sample minus the result of the duplicate sample.

(b) Calculated as the difference divided by the result of the record sample, multiplied by 100.

Table 5. Comparison of USGS Data Points and PNL Averages for 1983

Well Number	Tritium, pCi/ml		Difference, pCi/ml ^(a)
	USGS	PNL	
699-10-E12	8.76	12.1	-3.34
699-39-E3	9.00	10.5	-1.5
699-39-01	235	233	+2
699-40-01	221	227	-6
699-41-01	238	228	+10
699-43-03	177	188	-11
699-44-04	209	153	+56
699-46-05	216	187	+29
699-47-06	45	104	-59
699-48-07	0.430	0.758	0.33
699-49-13	<0.2	0.767	— ^(b)
699-67-98	<0.2	0.388	— ^(b)
699-72-92	2.06	4.10	-2.04
699-72-88	4.21	4.77	-0.56

(a) Calculated as the result of the USGS sample minus the result of the PNL sample.

(b) The difference was not calculated because of the nonquantitative result obtained by the USGS.

water fluctuate seasonally as a result of the bank storage effect^(a). This may indicate that in these cases the most likely reason for the variability was collection of the samples at different times.

(a) Further information on the bank storage effect can be found in the section of this report entitled "Bank Storage Study."

Future analysis of split samples should provide more information on the source(s) of the variability.

Another quality control effort recently initiated by PNL uses a computer program called SCREEN. SCREEN detects whether a new analytical data point for a well conforms to the trend set by that well's recent history. Using the trend, the program computes the next predicted value and sets an upper and lower limit of 2.09 standard deviations. Exactly 95 percent of the values are expected to fall within these limits. When a new data point is received, SCREEN computes the position of the data point and determines whether it is above, below or within the limits. It also predicts the time when the concentration in that well is expected to exceed a critical safety limit or fall below a sensor detection limit. SCREEN is routinely run when PNL sampling data are received, but this year, it was also run using the 1983 USGS data for tritium. The purpose of this special run was to determine if the USGS data points fell within the limits computed by SCREEN. All of the tritium concentrations except one fell within the bounds set by the upper and lower limits.

In addition to providing quality assurance, the U.S.G.S. provides data on the chemistry of Hanford ground water. The 1983 data include wet chemical and spectrographic analyses (see Appendix C).

RESULTS OF SUPPORTING STUDIES

Each year technical studies are conducted in support of the Ground-Water Surveillance Program. These studies provide additional data to help characterize the ground-water system, refine the hydrologic and transport models, and determine the impact of site operations on the environment. The results of studies conducted during CY 1983 are described in this chapter.

BANK STORAGE STUDY

When a river rises, nearby ground-water levels are temporarily raised by inflow from the river. The volume of water stored and released after the river drops is called bank storage (Todd 1980).

The Bank Storage Study began in October 1981 and ended in September 1983. The purpose of

this study was to obtain information about interactions of the Columbia River and the unconfined aquifer in the area of the old Hanford Townsite. Since the main tritium and nitrate plumes have reached the Columbia River in this area, knowledge of the aquifer/river interactions can be used to help evaluate variations in the quantity of radionuclides and chemicals entering the Columbia River as a function of time.

Methods

One way to study bank storage is to compare changes in the water table at various distances from the river with changes in river stage. As a means of doing this, continuous water-level recorders were installed in wells near the old Hanford Townsite (Figure 15). These wells are

FIGURE 15. Locations of Wells Used in the Bank Storage Study

located 200 to 5,000 feet from the river. River-level measurements were obtained from a gage located just below Priest Rapids Dam (approximately 35 miles upstream from the Hanford Townsite). Later in the study, a pressure transducer and recorder were installed in the river near the wells to get a better record of nearby river levels.

Changes with time in tritium concentrations in the wells and in ^{129}I concentrations in the river were also studied as part of the Bank Storage Study. Most of the wells used in this study were sampled on a monthly basis for tritium (as part of the routine sampling program). The results were used to check for seasonal variations in tritium levels. Also, during a 24-hour period in August of 1983, samples were collected every hour from well 699-47-6 and analyzed for tritium to determine if there were diurnal variations in tritium concentrations resulting from bank storage effects. Iodine-129 concentrations in the river were measured both upstream and downstream of the site, using large-volume, continuous samplers operated as part of the routine river-monitoring effort (Price et al. 1984).

Results

Figure 16 shows a one-week record of water levels in well 699-48-7 compared to a record of water level in the Columbia River at the Hanford Townsite. Water-level changes in the well followed the same pattern as water-level changes in the river, although they were of a smaller magnitude. There was also a lag between peak levels in the well and the river due to the time needed for river water to infiltrate the bank.

Figure 17 shows a comparison of the changes in water level in two wells. Well 699-39-E3 is nearer to the river, and it showed larger fluctuations in water level. Well 699-45-4 is farther from the river and showed smaller changes. In addition, the lag time between peak level of the river and peak level in the well increased as the distance from the well to the river increased.

The bank storage effect was also indicated by seasonal fluctuations of the tritium concentrations in wells near the river. These concentrations declined as the river rose in the spring months and river water entered the bank; this trend was reversed when the river fell later in the year (Figure 18).

Results of the study indicated that bank storage also causes changes in contaminant levels measured in the Columbia River. As shown in Figure 19, concentrations of ^{129}I measured downstream of the Hanford Site decreased during periods of high river flow and increased during low flow. The magnitude of these changes was not entirely attributable to dilution. When the river flow rate increased by a factor of two, the ^{129}I concentration measured downstream of the site decreased by a factor of five. During periods of very high river flow, the ^{129}I concentrations measured upstream and downstream were essentially the same, indicating that the flow of contaminated ground water to the river was effectively stopped at these times (Figure 20) (Price et al. 1984).

Data collected under the Bank Storage Study also helped to determine the extent of the clay deposit discovered during installation of new monitoring wells near the old Hanford Townsite (Eddy, Prater and Rieger 1983). This clay deposit apparently acts as a partial barrier to ground-water flow between the river and the unconfined aquifer. This theory was supported by bank storage data, which showed that water levels in the wells west of the clay deposit were quite stable, while water levels in wells the same distance from the river, but located north or south of the clay deposit, showed marked fluctuations.

Discussion of Results

One of the initial goals of this study was to determine if the bank storage phenomenon causes changes in the concentrations of constituents in the ground water near the river. Knowledge of such changes, if they exist, could lead to: 1) a better understanding of how to interpret analytical data from wells near the river, and 2) possible alterations in the time of day or season of the year in which samples are collected so that the analytical results would more accurately reflect concentrations of constituents in the ground water. The study showed that seasonal variations are quite marked, but no significant diurnal fluctuations could be identified. Therefore, the analytical results of samples from wells very close to the river are apparently affected by the time of year in which the samples are taken but not by the time of day. No changes have been made to the sampling schedule at this time; the wells in the area affected by bank

FIGURE 16. A Comparison of Changes in Water Levels in Well 699-48-7 and the Columbia River

FIGURE 17. A Comparison of Changes in Water Levels in Well 699-39-E3 and 699-45-4

FIGURE 18. Changes in Tritium Concentrations in Well 699-48-7 Compared with Changes in the Flow Rate of the Columbia River

FIGURE 19. A Comparison of Changes in the Downstream Concentration of Iodine-129 and the River Flow Rate

FIGURE 20. A Comparison of Changes in the Upstream and Downstream Concentrations of Iodine-129 and the River Flow Rate

storage are still sampled during all seasons of the year. However, the bank storage effect will be taken into account when analytical data from these wells are evaluated and interpreted.

Another goal of the study was to define the distance from the river at which the bank storage effect could no longer be detected. A previous study of bank storage at the Hanford Site indicates that the inland extent of the bank storage effect is about one to two miles, depending on local geology (Raymond and Brown 1963). However, in the area covered by this study, the bank storage effect extended inland approximately 3/4 of a mile. In some places, because of variations in the local geology (such as low-permeability clay deposits), the distance was even

less. This information has helped to predict, prior to sampling, which wells will show a seasonal variation in constituent concentrations resulting from bank storage.

A HYDROLOGIC STUDY OF THE AREA AROUND THE 1325-N CRIB

This section describes the initial results of a hydrologic study conducted near a new crib at the 100-N Area of the Hanford Site (Figure 1). The study was initiated because of the need for the Ground-Water Surveillance Program to remain abreast of operational changes that affect the ground-water regime at the Hanford Site. The purpose of this effort was to determine the effects of the new crib on the ground-water flow

system and on the distribution and concentration of contaminants in the ground water. The study was initiated on October 10, 1983, when the new crib began operating. Results obtained through December of 1983 are included in this report.

Background

The new crib (called the 1325-N crib) is designed for disposal of liquid wastes containing low levels of radionuclides. These wastes percolate downward from the crib into the sediments

overlying the ground water, and many of the radionuclides in the wastes are removed during percolation by adsorption and ion exchange. The 1325-N crib is located at the northern end of the 100-N Area, approximately 1300 feet from the older 1301-N crib and trench (Figure 21). During November and December of 1983, both of these cribs were receiving water, with the flow rate to the new crib being about twice the flow rate to the old crib. This situation made it possible to examine some of the hydrologic effects of using both cribs simultaneously.

FIGURE 21. Locations of the 1301-N Crib, the 1325-N Crib, and Nearby Wells

Methods

Three methods were used to monitor changes in the ground water around the 1325-N crib: 1) water-level measurements in nearby wells, 2) collection and analysis of ground-water samples, and 3) measurements of ground-water temperatures.

The water-level measurements were taken twice a week in the monitoring wells near both the old and new cribs. Locations of the wells being used in this investigation are shown in Figure 21. The water-level measurements were taken with an electric water-level measuring device and an engineer's tape. These measurements were used to prepare water-table maps for the area being investigated.

Ground-water samples were collected periodically from ten selected wells:

199-N-6	199-N-29
199-N-14	199-N-30
199-N-15	199-N-32
199-N-27	199-N-33
199-N-28	699-86-60

Samples were collected twice a week for the first month of the new crib's operation; the frequency was then reduced to once a week. The samples from all wells except 699-86-60 were collected using submersible pumps mounted in the wells. (Well 699-86-60 does not have a pump and was sampled using a bailer.) The wells were routinely pumped for fifteen minutes prior to sample collection to remove standing water from the casing and ensure collection of a sample that represented the ground water around the well. These samples were analyzed for tritium in an attempt to track the movement of the water leaving the crib.

Ground-water temperature measurements were taken at the time of sample collection. These measurements were taken at the point of discharge from the pump using a portable temperature probe with a digital display.

Discussion of Results

The water-level measurements taken in the wells near the 1301-N and 1325-N cribs were used to produce a series of water-table maps for the area. These maps, which show the contoured surface of the ground water, were obtained by

subtracting depth-to-water in each well from the casing elevation. The water-table maps were used to assess the general hydrologic situation and to determine ground-water flow directions.

Figure 22 shows the water-table map for October 14, 1983. At that time, the new crib had been in operation for four days. The map clearly shows a ground-water mound developing beneath the new crib. The contour lines on the map represent equipotential lines (lines of equal head), and the direction of ground-water flow is perpendicular to these lines and away from areas of higher head toward areas of lower head. The highest equipotential line on this map is the 406-foot contour, which is beneath the 1325-N crib. Therefore, it can be concluded that ground-water was flowing away from the crib in all directions. This conclusion was supported by the ground-water temperature data that were collected (Figure 23). The effect of the warm effluent was detected in the wells on all sides of the crib. The decrease in temperature occurring in some of the wells in middle to late November was probably due to a decrease in the effluent flow rate or a drop in the effluent's temperature caused by addition of cold water from the emergency dump tank.

Additional evidence for the outward flow in all directions from the crib was provided by the results of the tritium analyses. The concentrations of tritium in the samples from nearby wells on all sides of the crib decreased with time. This decrease was apparently due to the fact that the effluent contained a lower concentration of tritium than was already in the ground water. In essence, the analytical results revealed the movement of less contaminated water (with respect to tritium) in all directions from the crib.

Figure 24 is the water-table map for October 27, 1983. By comparing it with the previous map, it can be seen that the mound underneath the new crib had continued to grow; the highest contour line at that time was 407 feet. This map also shows the equipotential lines in the area to the north of the crib. The hydraulic gradient was steep, both to the north (toward well N-14) and to the northwest (toward the 1301-N crib and the river).

Figure 25 shows the water-table map for December 9, 1983. The mound under the 1325-N

FIGURE 22. 100-N Area Water-Table Map (October 14, 1983)

crib had continued to grow; the highest contour line on this map is 408 feet. The gradient away from the crib had flattened some since October 27, probably as a result of water percolating from the 1301-N crib to the ground water and also the influence of a general rise in the river's level. The flattening of the gradient may have slightly decreased the velocity of the ground-water flow in this direction; however, the effect of this decrease on percolation rates from the new crib was probably very small. The water percolating from the 1301-N crib to the ground water did not cause a reversal in the hydraulic gradient; therefore, the direction of ground-water flow in this area was still toward the river from the new crib. This is shown in Figure 26, which is a schematic drawing of the hydrologic situation as determined from the available data. In this figure, the water table previous to addition of water to the

1301-N crib in November is shown by a solid line; the subsequent effect of percolation from this crib is shown by the dotted line. As indicated, the effect on the total ground-water flow system of using the 1301-N crib along with the 1325-N crib appeared to be minimal.

Conclusions

Start up of the new 1325-N crib caused changes in the ground-water system of the 100-N Area. In particular, a ground-water mound developed beneath the new crib. Also, the mound beneath the 1301-N crib declined somewhat, but not entirely, because this crib was still receiving some water. These changes in the flow system may, as a new equilibrium is reached, result in changes in the direction and velocity of contaminant transport. Continued surveillance in this area will help to define these effects.

FIGURE 23. Temperatures of Samples Collected from Wells Near the 1325-N Crib.

FIGURE 24. 100-N Area Water-Table Map (October 27, 1983)

FIGURE 25. 100-N Area Water-Table Map (December 9, 1983)

NOT TO SCALE

FIGURE 26. Schematic Drawing of the Hydrologic System Beneath the 1325-N and 1301-N Cribs

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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 MIN	1.30E+00*	
1	B3	2P	MAX AVE MIN	6.40E-01*	1.60E-01*
1	B3	2Q	MAX AVE MIN	6.85E-01*	3.30E-01*
1	B4	1	MAX AVE MIN	8.70E+00 4.80E+00 1.60E+00	8.60E+00 6.05E+00 3.60E+00
1	B4	2	MAX AVE MIN	3.10E+00 1.83E+00 1.10E+00	7.70E+00 5.32E+00 2.30E+00
1	B4	3	MAX AVE MIN	1.40E+01 5.75E+00 1.50E+00	6.60E+00 5.80E+00 3.50E+00
1	B4	4	MAX AVE MIN	2.55E+00*	5.00E+00*
1	B5	1	MAX AVE MIN	1.47E+00*	3.63E+00*
1	B9	1	MAX AVE MIN	1.35E+00*	1.19E+01*
1	D2	5	MAX AVE MIN	4.00E+00 3.58E+00 3.30E+00	9.90E+01 9.25E+01 8.40E+01
1	D5	12	MAX AVE MIN	3.10E+00 2.50E+00 1.80E+00	3.00E+01 2.68E+01 2.40E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)	
			-----	-----	
1	D8	3	MAX	4.50E+00	1.20E+01
			AVE	3.10E+00	7.24E+00
			MIN	2.10E+00	9.70E-01
1	F5	1	MAX	6.90E-01	6.30E+00
			AVE	3.15E-01	3.50E+00
			MIN	0.00E-01**	2.40E+00
1	F5	3	MAX	8.30E-01	7.90E+01
			AVE	4.53E-01	2.26E+01
			MIN	0.00E-01**	1.40E-01
1	F5	4	MAX	2.10E+01	3.30E+01
			AVE	1.95E+01	2.85E+01
			MIN	1.80E+01	2.30E+01
1	F5	6	MAX	1.90E+00	1.60E+01
			AVE	7.50E-01	5.49E+00
			MIN	1.10E-01	6.40E-01
1	F7	1	MAX	1.40E+00	1.90E+02
			AVE	1.12E+00	1.28E+02
			MIN	8.00E-01	7.00E+01
1	F8	1	MAX	1.30E+01	1.10E+02
			AVE	1.18E+01	1.03E+02
			MIN	1.10E+01	9.20E+01
1	F8	2	MAX	9.40E+00	9.00E+01
			AVE	7.80E+00	7.15E+01
			MIN	6.00E+00	4.00E+01
1	H3	1	MAX	6.70E+00	5.30E+01
			AVE	4.68E+00	4.80E+01
			MIN	3.30E+00	4.10E+01
1	H4	3	MAX	1.90E+00	2.10E+03
			AVE	1.36E+00	1.00E+03
			MIN	8.50E-01	3.40E+02
1	H4	4	MAX		
			AVE	8.80E-01*	3.80E+02*
			MIN		

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
1	H4	5	MAX AVE MIN	3.00E-01*	3.10E+00*
1	H4	6	MAX AVE MIN	4.60E+00*	2.50E+01*
1	K	7	MAX AVE MIN	4.40E+01*	1.90E+01*
1	K	11	MAX AVE MIN	1.40E+01 5.18E+00 2.00E+00	1.60E+01 1.07E+01 4.60E+00
1	K	19	MAX AVE MIN	4.90E+01 2.86E+01 6.30E+00	2.10E+01 1.53E+01 1.00E+01
1	K	20	MAX AVE MIN	2.00E+00 1.50E+00 1.20E+00	6.60E+00 5.18E+00 3.10E+00
1	K	22	MAX AVE MIN	1.40E+00 1.13E+00 8.20E-01	2.00E+00 1.40E+00 5.00E-01
1	K	27	MAX AVE MIN	4.30E+00 3.13E+00 2.60E+00	
1	K	28	MAX AVE MIN	2.60E+00 2.05E+00 1.70E+00	
1	K	29	MAX AVE MIN	5.60E+01 2.04E+01 7.20E+00	
1	K	30	MAX AVE MIN	7.90E+02 6.83E+02 6.00E+02	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
1	N	2	MAX	6.80E+01	1.50E+01
			AVE	4.70E+01	1.15E+01
			MIN	3.60E+01	6.00E+00
1	N	3	MAX		
			AVE	3.67E+01*	
			MIN		
1	N	4	MAX		
			AVE	2.90E+01*	1.05E+01*
			MIN		
1	N	5	MAX		
			AVE	4.27E+01*	1.08E+01*
			MIN		
1	N	6	MAX	4.40E+01	
			AVE	3.46E+01	
			MIN	2.00E+01	
1	N	7	MAX	4.10E+01	1.20E+01
			AVE	3.10E+01	8.23E+00
			MIN	1.80E+01	5.00E-01
1	N	14	MAX	4.90E+01	1.90E+01
			AVE	3.64E+01	1.47E+01
			MIN	3.20E+01	9.80E+00
1	N	15	MAX	3.80E+01	3.30E+01
			AVE	3.26E+01	1.75E+01
			MIN	2.50E+01	1.00E+01
1	N	16	MAX		
			AVE	9.50E-02*	1.09E+01*
			MIN		
1	N	17	MAX	3.90E+01	6.60E-01
			AVE	3.18E+01	3.97E-01
			MIN	2.80E+01	4.70E-02
1	N	18	MAX	2.60E+01	5.00E-01
			AVE	2.33E+01	2.26E-01
			MIN	2.10E+01	0.00E-01**

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
1	N	19	MAX	2.80E+01	4.60E+01
			AVE	2.45E+01	2.33E+01
			MIN	1.90E+01	7.30E+00
1	N	20	MAX	2.40E+01	2.80E+01
			AVE	1.55E+01	1.95E+01
			MIN	2.00E+00	1.30E+01
1	N	21	MAX	2.10E+01	2.10E+01
			AVE	9.83E+00	1.51E+01
			MIN	4.90E+00	7.50E+00
1	N	22	MAX		
			AVE	2.30E+00*	3.30E+01*
			MIN		
1	N	23	MAX	6.00E+00	1.10E+01
			AVE	2.83E+00	7.30E+00
			MIN	1.20E+00	4.90E+00
1	N	24	MAX	2.50E+01	2.30E+01
			AVE	9.03E+00	1.06E+01
			MIN	1.60E+00	5.40E+00
1	N	25	MAX		
			AVE	0.00E-01**	4.70E+00*
			MIN		
1	N	26	MAX		
			AVE	7.00E-02*	1.09E+01*
			MIN		
1	N	27	MAX	3.70E+01	
			AVE	2.05E+01	1.30E+01*
			MIN	1.40E+01	
1	N	28	MAX	3.60E+01	
			AVE	1.76E+01	1.24E+01*
			MIN	9.30E+00	
1	N	29	MAX	4.30E+01	
			AVE	1.73E+01	1.07E+01*
			MIN	9.20E+00	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
1	N	30	MAX AVE MIN	4.20E+01 1.94E+01 8.80E+00	1.30E+01*
1	N	31	MAX AVE MIN	3.45E+01*	9.30E+00*
1	N	32	MAX AVE MIN	3.50E+01 2.26E+01 1.70E+01	1.15E+01*
1	N	33	MAX AVE MIN	4.40E+01 2.82E+01 2.00E+01	9.33E+00*
1	N	34	MAX AVE MIN	3.25E+01*	9.35E+00*
2E	17	4	MAX AVE MIN	3.84E+01*	1.02E+01*
2E	19	1	MAX AVE MIN	1.10E+00 5.04E-01 0.00E-01**	5.20E-01 3.45E-01 1.30E-01
2E	23	1	MAX AVE MIN	8.60E+00 5.90E+00 4.10E+00	1.50E+01 1.12E+01 7.90E+00
2E	24	7	MAX AVE MIN	4.70E+00 3.58E+00 1.30E+00	1.70E+01 1.44E+01 9.70E+00
2E	26	1	MAX AVE MIN	6.00E-01 4.66E-01 2.30E-01	5.00E-01 3.22E-01 9.40E-03
2E	26	3	MAX AVE MIN	1.80E+01 1.28E+01 1.10E+01	7.80E+00 4.35E+00 2.30E+00

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
2E	27	1	MAX	3.00E+00	9.40E+00
			AVE	1.58E+00	7.15E+00
			MIN	3.80E-01	5.40E+00
2E	28	1	MAX	3.20E+00	2.00E+01
			AVE	1.68E+00	1.21E+01
			MIN	6.70E-02	5.20E-01
2E	28	5	MAX	6.80E-01	1.30E+01
			AVE	2.62E-01	1.05E+01
			MIN	0.00E-01**	8.10E+00
2E	33	14	MAX	5.80E-01	4.20E+01
			AVE	4.36E-01	3.93E+01
			MIN	2.20E-01	3.70E+01
2E	33	27	MAX		
			AVE	4.77E+01*	
			MIN		
2E	34	1	MAX	4.57E+01	2.70E+01
			AVE	4.34E+00	9.42E+00
			MIN	5.60E-02	2.80E+00
2W	6	1	MAX	3.80E+01	1.30E+02
			AVE	3.76E+01	1.20E+02
			MIN	3.70E+01	1.10E+02
2W	10	5	MAX	1.90E+01	1.10E+02
			AVE	1.80E+01	9.08E+01
			MIN	1.70E+01	8.00E+01
2W	11	9	MAX	2.80E+00	2.50E+01
			AVE	2.04E+00	7.03E+00
			MIN	1.30E+00	1.20E-01
2W	12	1	MAX	2.20E+00	3.00E+02
			AVE	1.60E+00	2.65E+02
			MIN	1.20E+00	2.40E+02
2W	15	2	MAX		
			AVE	2.91E-01*	8.00E+00*
			MIN		

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
2W	18	3	MAX	8.40E-01	1.10E+00
			AVE	4.56E-01	9.85E-01
			MIN	0.00E-01**	8.70E-01
2W	18	7	MAX		
			AVE	8.68E+00*	
			MIN		
2W	19	4	MAX		
			AVE	6.17E-01*	7.95E+00*
			MIN		
2W	21	1	MAX	7.00E+02	5.20E+01
			AVE	6.12E+02	4.80E+01
			MIN	4.60E+02	4.10E+01
2W	22	7	MAX	6.40E+02	5.00E-01
			AVE	5.58E+02	2.99E-01
			MIN	5.00E+02	5.60E-02
2W	22	9	MAX	1.10E+04	9.40E-01
			AVE	1.06E+04	5.09E-01
			MIN	9.90E+03	9.40E-02
2W	22	19	MAX		
			AVE	3.22E+00*	
			MIN		
2W	22	24Q	MAX		
			AVE	3.22E+00*	
			MIN		
2W	22	24R	MAX		
			AVE	3.62E+02*	
			MIN		
2W	22	24T	MAX	1.50E+02	
			AVE	2.02E+01	
			MIN	2.37E+00	
2W	26	6	MAX		
			AVE	3.93E-01*	1.30E+00*
			MIN		

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
3	1	1	MAX AVE MIN		1.88E+01*
3	1	2	MAX AVE MIN		2.03E+01*
3	1	3	MAX AVE MIN		2.30E+01*
3	1	4	MAX AVE MIN		2.17E+01*
3	1	5	MAX AVE MIN		2.10E+01*
3	1	6	MAX AVE MIN		1.63E+01*
3	2	1	MAX AVE MIN		1.22E+01*
3	2	2	MAX AVE MIN		1.88E+01*
3	2	3	MAX AVE MIN		2.13E+01*
3	3	1	MAX AVE MIN		1.42E+01*
3	3	2	MAX AVE MIN		3.47E+00*

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
3	3	3	MAX AVE MIN	7.20E+00*
3	3	6	MAX AVE MIN	1.60E+01 1.04E+01 8.00E+00
3	3	7	MAX AVE MIN	1.80E+01 1.17E+01 8.40E+00
3	3	9	MAX AVE MIN	1.65E+01*
3	3	10	MAX AVE MIN	1.05E+01*
3	3	11	MAX AVE MIN	1.48E+01*
3	3	12	MAX AVE MIN	2.60E+01 1.76E+01 1.10E+01
3	4	1	MAX AVE MIN	8.10E+00*
3	4	7	MAX AVE MIN	1.30E+01*
3	4	9	MAX AVE MIN	1.25E+01*
3	4	10	MAX AVE MIN	1.40E+01*

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
3	5	1	MAX AVE MIN		1.97E+01*
3	6	1	MAX AVE MIN		1.53E+01*
3	8	1	MAX AVE MIN		8.13E+00*
3	8	2	MAX AVE MIN		8.77E+00*
3	8	3	MAX AVE MIN		6.07E+00*
3	8	4	MAX AVE MIN		1.16E+01*
4	S1	7C	MAX AVE MIN		2.45E+01*
4	S1	8A	MAX AVE MIN		2.00E+01*
4	S1	8B	MAX AVE MIN		2.30E+01*
6	S31	1P	MAX AVE MIN	4.00E-01 8.00E-02 0.00E-01**	1.70E+00 1.64E+00 1.60E+00
6	S30E15A		MAX AVE MIN	3.20E+00*	1.50E+01 1.10E+01 8.00E+00

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.		TRITIUM (PCI/ML)	NITRATE (MG/L)
		-----	-----
6 S29 E12	MAX		1.40E+01
	AVE	3.00E+00*	1.30E+01
	MIN		1.20E+01
6 S27 E14	MAX		2.00E+01
	AVE		1.75E+01
	MIN		1.40E+01
6 S24 19	MAX		
	AVE		1.40E-02*
	MIN		
6 S19 E13	MAX		1.20E+01
	AVE	4.50E+00*	1.13E+01
	MIN		1.10E+01
6 S19 11	MAX		
	AVE		8.20E+00*
	MIN		
6 S18 51	MAX		4.30E+00
	AVE		1.29E+00
	MIN		1.50E-01
6 S14 20A	MAX		1.80E+00
	AVE		1.53E+00
	MIN		1.30E+00
6 S12 3	MAX	3.20E+00	6.10E+00
	AVE	8.49E-01	5.57E+00
	MIN	0.00E-01**	4.30E+00
6 S12 29	MAX		
	AVE		6.75E+00*
	MIN		
6 S11E12A	MAX	2.20E+00	2.90E+01
	AVE	8.95E-01	1.98E+01
	MIN	0.00E-01**	1.60E+01
6 S11E12AP	MAX	1.40E+00	1.50E+01
	AVE	4.13E-01	3.98E+00
	MIN	0.00E-01**	1.90E-02

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	S8	19	MAX	0.00E-01**	3.30E+00
			AVE	0.00E-01**	2.98E+00
			MIN	0.00E-01**	2.80E+00
6	S7	34	MAX	7.20E-01	
			AVE	2.25E-01	3.36E+00*
			MIN	0.00E-01**	
6	S6E14A		MAX	1.50E+00	4.10E+00
			AVE	3.75E-01	3.03E+00
			MIN	0.00E-01**	1.70E+00
6	S6	E4B	MAX	2.30E+01	4.00E+01
			AVE	2.23E+01	1.81E+01
			MIN	2.10E+01	9.40E+00
6	S6	E4D	MAX	3.30E+01	1.70E+01
			AVE	3.28E+01	1.60E+01
			MIN	3.20E+01	1.50E+01
6	S3	E12	MAX		1.90E+01
			AVE	1.86E+00*	1.68E+01
			MIN		1.50E+01
6	S3	25	MAX	0.00E-01**	5.80E-01
			AVE	0.00E-01**	4.98E-01
			MIN	0.00E-01**	3.30E-01
6	S1	7B	MAX		
			AVE	7.10E+01*	1.64E+00*
			MIN		
6	S0	8	MAX		
			AVE	4.50E+01*	5.77E+00*
			MIN		
6	S0	7	MAX		
			AVE	2.57E+01*	1.65E+00*
			MIN		
6	1	18	MAX	8.60E+01	1.90E+01
			AVE	8.03E+01	1.85E+01
			MIN	7.40E+01	1.80E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	2	3	MAX	1.30E+02	2.70E+01
			AVE	1.20E+02	2.27E+01
			MIN	1.10E+02	9.00E+00
6	2	33A	MAX	1.10E-01	1.90E+00
			AVE	2.75E-02	1.31E+00
			MIN	0.00E-01**	2.30E-01
6	3	45	MAX		7.00E+00
			AVE	1.00E-01*	4.83E+00
			MIN		2.30E+00
6	4	E6	MAX	1.50E+00	8.10E+00
			AVE	3.75E-01	7.43E+00
			MIN	0.00E-01**	7.00E+00
6	8	17	MAX	1.70E+02	
			AVE	1.63E+02	2.73E+01*
			MIN	1.60E+02	
6	8	25	MAX	6.00E+01	1.70E+01
			AVE	5.70E+01	1.53E+01
			MIN	5.50E+01	1.30E+01
6	8	32	MAX	3.50E-01	4.20E+00
			AVE	8.75E-02	3.08E+00
			MIN	0.00E-01**	8.00E-01
6	9	E2	MAX	1.50E+00	7.00E-01
			AVE	3.90E-01	5.60E-01
			MIN	0.00E-01**	4.20E-01
6	10	E12	MAX	2.30E+01	1.50E+01
			AVE	1.21E+01	1.43E+01
			MIN	8.20E+00	1.30E+01
6	13	1C	MAX	8.00E-01	5.60E-01
			AVE	2.98E-01	4.23E-01
			MIN	0.00E-01**	2.70E-01
6	13	64	MAX	5.90E-01	
			AVE	1.67E-01	5.47E-01*
			MIN	0.00E-01**	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
6	14	E6T	MAX AVE MIN	3.07E+01*	8.05E+00*
6	14	38	MAX AVE MIN	2.00E+00 5.38E-01 0.00E-01**	1.73E+00*
6	14	47	MAX AVE MIN	2.70E+00 6.75E-01 0.00E-01**	2.01E-01*
6	15	15B	MAX AVE MIN	2.50E+00 6.58E-01 0.00E-01**	2.10E+01 1.98E+01 1.90E+01
6	15	26	MAX AVE MIN	1.50E+02 1.35E+02 1.20E+02	2.20E+01 2.08E+01 2.00E+01
6	17	5	MAX AVE MIN	1.50E+00 4.88E-01 0.00E-01**	6.40E+01 5.73E+01 4.80E+01
6	17	47	MAX AVE MIN	0.00E-01**	2.30E-01*
6	17	70	MAX AVE MIN	2.20E-01*	2.60E+01*
6	19	43	MAX AVE MIN	2.60E+00 6.50E-01 0.00E-01**	9.33E+00*
6	19	58	MAX AVE MIN		1.41E-01*
6	19	88	MAX AVE MIN		5.63E-01*

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)	
			-----	-----	
6	20	E5A	MAX AVE MIN	3.60E+01 2.56E+01 5.70E-01	1.53E+01*
		E5AP	MAX AVE MIN	4.65E-02*	2.80E-01*
		E5AQ	MAX AVE MIN	4.33E-01*	1.08E-01*
6	20	E5AR	MAX AVE MIN	2.67E-01*	1.87E-01*
		E12	MAX AVE MIN	2.70E-01*	3.20E+01*
		E12P	MAX AVE MIN	3.10E-01 1.33E-01 0.00E-01**	1.40E-01 1.21E-01 8.40E-02
6	20	20	MAX AVE MIN	3.90E+02 3.53E+02 3.10E+02	4.80E+01 4.35E+01 4.20E+01
		39	MAX AVE MIN	1.70E+00 4.98E-01 0.00E-01**	4.37E-01*
		82	MAX AVE MIN	6.00E-01 2.25E-01 0.00E-01**	1.21E+01*
6	22	70	MAX AVE MIN	4.00E-01 1.48E-01 0.00E-01**	8.80E+00*
		7	MAX AVE MIN	5.70E+01 5.36E+01 5.10E+01	3.90E+01 3.55E+01 2.80E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	24	1P	MAX AVE MIN	2.87E-01*	1.27E-01*
6	24	1Q	MAX AVE MIN	4.67E-02*	2.95E-01*
6	24	1R	MAX AVE MIN	8.50E-02*	1.40E-01*
6	24	1S	MAX AVE MIN	4.33E-02*	6.55E-02*
6	24	1T	MAX AVE MIN	9.20E+00 3.33E+00 0.00E-01**	4.40E+00 3.17E+00 4.70E-01
6	24	33	MAX AVE MIN	5.00E+01 4.60E+01 4.20E+01	1.57E+01*
6	24	46	MAX AVE MIN	2.80E+00 7.33E-01 0.00E-01**	1.20E+00*
6	25	55	MAX AVE MIN	1.90E+00 5.00E-01 0.00E-01**	1.13E+01*
6	25	70	MAX AVE MIN	1.81E+00*	1.40E+01*
6	26	15A	MAX AVE MIN	5.40E+02 5.05E+02 4.70E+02	3.80E+01 3.60E+01 3.10E+01
6	26	89	MAX AVE MIN		2.10E+00*

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	27	4	MAX	1.00E+02	2.50E+01
			AVE	8.95E+01	2.17E+01
			MIN	3.10E+01	1.90E+01
6	27	8	MAX	6.50E+02	4.60E+01
			AVE	6.00E+02	4.18E+01
			MIN	5.20E+02	3.80E+01
6	28	40	MAX		
			AVE	9.53E+00*	9.25E+00*
			MIN		
6	28	40P	MAX		
			AVE	1.58E-01*	1.75E-01*
			MIN		
6	28	52A	MAX	5.20E+00	
			AVE	1.38E+00	4.07E-02*
			MIN	0.00E-01**	
6	29	78	MAX	6.40E-01	
			AVE	5.03E-01	4.30E+00*
			MIN	4.10E-01	
6	31	31	MAX		
			AVE	2.37E+02*	2.10E+01*
			MIN		
6	31	31P	MAX		
			AVE	1.15E+01*	1.83E-01*
			MIN		
6	31	53B	MAX		
			AVE	1.33E-01*	4.95E+00*
			MIN		
6	31	65	MAX		
			AVE	5.48E-01*	
			MIN		
6	32	22	MAX	7.70E+02	
			AVE	7.18E+02	4.50E+01*
			MIN	6.60E+02	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	32	43	MAX	2.30E+01	
			AVE	2.15E+01	1.50E+01*
			MIN	2.00E+01	
6	32	62	MAX	8.20E-01	
			AVE	5.48E-01	2.50E+01*
			MIN	2.80E-01	
6	32	70	MAX	2.80E+02	
			AVE	2.73E+02	1.30E+01*
			MIN	2.60E+02	
6	32	77	MAX	6.80E-01	
			AVE	4.30E-01	2.70E+00*
			MIN	0.00E-01**	
6	33	42	MAX	8.20E+01	
			AVE	7.58E+01	1.53E+01*
			MIN	6.80E+01	
6	33	56	MAX	1.60E+00	
			AVE	4.05E-01	6.13E+00*
			MIN	0.00E-01**	
6	34	39A	MAX	1.60E+02	
			AVE	1.48E+02	1.73E+01*
			MIN	1.40E+02	
6	34	41	MAX	1.50E+02	
			AVE	1.43E+02	1.83E+01*
			MIN	1.30E+02	
6	34	42	MAX	1.60E+02	2.20E+01
			AVE	1.36E+02	1.78E+01
			MIN	1.10E+02	1.50E+01
6	34	51	MAX	6.20E-01	
			AVE	2.30E-01	5.90E+00*
			MIN	0.00E-01**	
6	34	88	MAX	6.90E-01	
			AVE	2.03E-01	1.41E+01*
			MIN	0.00E-01**	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	35	9	MAX	1.50E+02	2.40E+01
			AVE	1.45E+02	2.28E+01
			MIN	1.40E+02	2.10E+01
6	35	66	MAX	1.20E+03	
			AVE	1.13E+03	2.00E+01*
			MIN	1.10E+03	
6	35	70	MAX	3.10E+03	
			AVE	2.98E+03	2.70E+01*
			MIN	2.70E+03	
6	36	46P	MAX		
			AVE	0.00E-01**	3.80E-01*
			MIN		
6	36	46Q	MAX	7.00E-01	
			AVE	3.65E-01	3.27E-01*
			MIN	0.00E-01**	
6	36	46R	MAX		
			AVE	3.58E+02*	
			MIN		
6	36	61A	MAX		
			AVE		1.37E+01*
			MIN		
6	36	61B	MAX	4.00E-01	
			AVE	1.07E-01	1.98E-01*
			MIN	0.00E-01**	
6	36	93	MAX		
			AVE	1.30E-01*	1.02E+01*
			MIN		
6	37	43	MAX	1.20E+02	
			AVE	8.88E+01	4.46E+01*
			MIN	6.10E+01	
6	37	82A	MAX	4.00E-01	
			AVE	1.12E-01	2.63E+01*
			MIN	0.00E-01**	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	38	15	MAX	3.70E+01	
			AVE	2.33E+01	1.30E+01*
			MIN	1.60E+01	
6	38	65	MAX	2.10E+02	1.30E+02
			AVE	2.03E+02	1.10E+02
			MIN	1.90E+02	1.00E+02
6	38	70	MAX	3.40E+00	
			AVE	3.00E+00	2.63E+02*
			MIN	2.70E+00	
6	39	E3	MAX	1.10E+01	1.90E+01
			AVE	1.05E+01	5.27E+00
			MIN	8.70E+00	4.70E-02
6	39	1	MAX	2.40E+02	3.30E+01
			AVE	2.33E+02	3.16E+01
			MIN	2.10E+02	3.00E+01
6	39	39	MAX		
			AVE	2.10E-01*	4.70E-02*
			MIN		
6	39	79	MAX	5.30E+00	
			AVE	1.51E+00	6.80E-01*
			MIN	0.00E-01**	
6	40	1	MAX	2.40E+02	3.30E+01
			AVE	2.30E+02	3.10E+01
			MIN	2.10E+02	2.80E+01
6	40	33A	MAX	2.40E+00	
			AVE	6.38E-01	7.80E-02*
			MIN	0.00E-01**	
6	40	62	MAX	2.10E+01	
			AVE	1.90E+01	2.33E+01*
			MIN	1.70E+01	
6	41	1	MAX	2.40E+02	3.40E+01
			AVE	2.28E+02	3.25E+01
			MIN	2.10E+02	3.00E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	41	23	MAX	4.60E+02	
			AVE	4.10E+02	2.80E+01*
			MIN	3.40E+02	
6	42	2	MAX	2.20E+02	3.30E+01
			AVE	2.06E+02	2.99E+01
			MIN	1.80E+02	2.60E+01
6	42	12A	MAX	3.30E+02	3.60E+01
			AVE	3.15E+02	3.48E+01
			MIN	2.90E+02	3.30E+01
6	43	3	MAX	2.20E+02	3.00E+01
			AVE	1.88E+02	2.62E+01
			MIN	1.00E+02	1.90E+01
6	43	88	MAX	4.00E-01	
			AVE	1.91E-01	3.35E+00*
			MIN	0.00E-01**	
6	44	4	MAX	2.00E+02	3.10E+01
			AVE	1.53E+02	2.38E+01
			MIN	1.20E+02	1.90E+01
6	44	64	MAX	5.90E-01	
			AVE	2.90E-01	2.43E+01*
			MIN	6.90E-02	
6	45	4	MAX	1.20E+02	1.80E+01
			AVE	9.83E+01	9.63E+00
			MIN	8.60E+01	6.60E-01
6	45	42	MAX	8.90E+01	
			AVE	6.50E+01	3.90E+00*
			MIN	2.10E+01	
6	45	69A	MAX		
			AVE	2.97E-01*	2.07E+01*
			MIN		
6	46	5	MAX	2.30E+02	2.70E+01
			AVE	1.88E+02	2.31E+01
			MIN	1.40E+02	1.70E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	46	21A	MAX	3.80E+01	
			AVE	3.60E+01	8.77E+00*
			MIN	3.20E+01	
6	47	6	MAX	1.60E+02	1.90E+01
			AVE	1.04E+02	1.29E+01
			MIN	2.40E+01	9.40E-01
6	47	35A	MAX	4.00E-01	
			AVE	1.70E-01	1.78E+00*
			MIN	0.00E-01**	
6	47	46	MAX	8.70E-01	1.10E+01
			AVE	3.10E-01	1.02E+01
			MIN	0.00E-01**	9.40E+00
6	47	60	MAX	4.00E-01	
			AVE	1.40E-01	1.57E+01*
			MIN	0.00E-01**	
6	48	7	MAX	2.70E+00	4.60E+00
			AVE	7.58E-01	2.55E+00
			MIN	0.00E-01**	7.50E-01
6	48	18	MAX	1.50E+00	4.30E+00
			AVE	4.30E-01	3.80E+00
			MIN	0.00E-01**	3.30E+00
6	48	71	MAX	4.00E-01	
			AVE	1.63E-01	1.57E+01*
			MIN	0.00E-01**	
6	49	13A	MAX	2.30E+00	4.10E+00
			AVE	6.35E-01	3.78E+00
			MIN	0.00E-01**	3.30E+00
6	49	28	MAX	4.00E-01	
			AVE	1.31E-01	1.82E-01*
			MIN	0.00E-01**	
6	49	55A	MAX	5.40E-01	
			AVE	2.80E-01	3.01E+00*
			MIN	0.00E-01**	

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	49	57	MAX	3.50E+01	1.73E+02*
			AVE	3.18E+01	
			MIN	2.60E+01	
6	49	79	MAX	4.00E-01	3.43E+01*
			AVE	1.05E-01	
			MIN	0.00E-01**	
6	50	28B	MAX	4.00E-01	1.57E+00*
			AVE	2.05E-01	
			MIN	0.00E-01**	
6	50	30	MAX	4.00E-01	3.13E+00*
			AVE	1.17E-01	
			MIN	0.00E-01**	
6	50	42	MAX	2.40E+00	2.90E-01*
			AVE	2.05E+00	
			MIN	1.80E+00	
6	50	53	MAX	4.00E-01	1.67E+01*
			AVE	1.78E-01	
			MIN	0.00E-01**	
6	50	85	MAX	7.20E-01	1.83E+01*
			AVE	2.53E-01	
			MIN	0.00E-01**	
6	51	63	MAX	4.00E-01	5.13E+00*
			AVE	1.01E-01	
			MIN	0.00E-01**	
6	51	75	MAX	4.00E-01	1.16E+00*
			AVE	1.20E-01	
			MIN	0.00E-01**	
6	53	35	MAX	4.00E-01	9.82E-01*
			AVE	1.88E-01	
			MIN	0.00E-01**	
6	53	103	MAX	7.40E-01	5.00E-01
			AVE	3.33E-01	
			MIN	0.00E-01**	
				1.62E-01	0.00E-01**

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
6	54	18	MAX AVE MIN		3.05E+00*
6	54	34	MAX AVE MIN	4.00E-01 1.30E-01 0.00E-01**	2.00E+00*
6	54	37A	MAX AVE MIN	4.00E-01 1.40E-01 0.00E-01**	2.59E-01*
6	54	42	MAX AVE MIN		1.90E+00 1.27E+00 7.00E-01
6	54	45A	MAX AVE MIN	4.00E-01 1.00E-01 0.00E-01**	2.00E+00*
6	55	40	MAX AVE MIN	4.00E-01 1.06E-01 0.00E-01**	2.97E-01*
6	55	44	MAX AVE MIN	4.00E-01 1.00E-01 0.00E-01**	2.45E-01*
6	55	50A	MAX AVE MIN	5.30E-01 3.93E-01 1.90E-01	4.01E-01*
6	55	50C	MAX AVE MIN	6.40E-01 2.17E-01 0.00E-01**	8.57E-01*
6	55	50D	MAX AVE MIN	4.00E-01 2.60E-01 0.00E-01**	9.47E-01*
6	55	70	MAX AVE MIN	4.00E-01 1.54E-01 0.00E-01**	2.36E-01*

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----	
6	55	76	MAX AVE MIN	4.93E-01*	
6	55	89	MAX AVE MIN	1.93E+00*	
6	56	43	MAX AVE MIN	4.00E-01 1.00E-01 0.00E-01**	1.89E-01*
6	57	25A	MAX AVE MIN	3.60E-01 9.00E-02 0.00E-01**	2.30E+00 2.17E+00 2.00E+00
6	57	29	MAX AVE MIN	9.60E-01 6.63E-01 3.80E-01	1.40E+00 1.16E+00 9.50E-01
6	57	83	MAX AVE MIN		2.00E+00 1.52E+00 1.00E+00
6	58	24	MAX AVE MIN	1.94E-01*	1.48E+00*
6	59	32	MAX AVE MIN	1.20E+00 9.13E-01 6.50E-01	1.90E+00 1.73E+00 1.60E+00
6	59	58	MAX AVE MIN	1.80E+00 1.50E+00 1.30E+00	5.69E-01*
6	59	80B	MAX AVE MIN		4.10E-01*
6	60	32	MAX AVE MIN	1.30E+00 1.18E+00 9.30E-01	2.70E+00 2.55E+00 2.30E+00

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	60	57	MAX	1.10E+00	
			AVE	9.30E-01	2.15E-01*
			MIN	6.40E-01	
6	60	60	MAX	2.10E+00	
			AVE	1.80E+00	4.67E-01*
			MIN	1.30E+00	
6	61	37	MAX		1.93E+00*
			AVE		
			MIN		
6	61	41	MAX	6.00E-01	
			AVE	1.50E-01	9.17E-01*
			MIN	0.00E-01**	
6	61	62	MAX	9.40E+00	
			AVE	9.13E+00	1.00E+01*
			MIN	8.70E+00	
6	61	66	MAX	7.80E-01	
			AVE	2.40E-01	2.17E+00*
			MIN	0.00E-01**	
6	62	31	MAX		4.60E+00
			AVE		4.15E+00
			MIN		3.90E+00
6	62	43A	MAX		
			AVE	1.10E+00*	5.00E-01*
			MIN		
6	62	43F	MAX	2.00E+00	
			AVE	1.40E+00	1.28E+00*
			MIN	9.10E-01	
6	63	25A	MAX	5.20E-01	1.30E+01
			AVE	1.85E-01	1.20E+01
			MIN	0.00E-01**	1.10E+01
6	63	51	MAX		
			AVE	4.70E-01*	3.75E+00*
			MIN		

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	63	55	MAX	1.50E+00	6.60E-01
			AVE	7.88E-01	5.78E-01
			MIN	1.20E-01	5.00E-01
6	63	58	MAX	1.10E+00	2.90E+01
			AVE	7.23E-01	9.50E+00
			MIN	3.10E-01	5.00E-01
6	63	90	MAX	6.10E-01	3.30E+00
			AVE	3.59E-01	3.00E+00
			MIN	6.70E-02	2.60E+00
6	64	27	MAX		2.50E+01
			AVE	0.00E-01**	2.23E+01
			MIN		2.10E+01
6	64	62	MAX	6.80E+00	8.40E+00
			AVE	5.68E+00	6.30E+00
			MIN	4.60E+00	4.00E+00
6	65	23	MAX		
			AVE	1.15E-01*	6.00E-01*
			MIN		
6	65	50	MAX	1.70E+00	
			AVE	1.11E+00	8.60E-01*
			MIN	5.90E-01	
6	65	59	MAX	1.40E+00	5.20E-01
			AVE	8.35E-01	4.90E-01
			MIN	2.70E-01	4.70E-01
6	65	72	MAX	2.80E+00	6.30E+00
			AVE	2.33E+00	5.55E+00
			MIN	1.70E+00	4.70E+00
6	65	83	MAX	2.00E+00	1.90E+00
			AVE	1.85E+00	1.45E+00
			MIN	1.70E+00	1.00E+00
6	66	23	MAX		2.30E+01
			AVE		1.70E+01
			MIN		1.20E+01

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	66	38	MAX		5.00E-01
			AVE		2.71E-01
			MIN		6.60E-02
6	66	39	MAX		5.00E-01
			AVE		2.13E-01
			MIN		4.70E-02
6	66	58	MAX	1.40E+00	1.20E+00
			AVE	1.03E+00	8.85E-01
			MIN	6.80E-01	5.80E-01
6	66	64	MAX	4.70E+00	5.60E+00
			AVE	3.90E+00	3.10E+00
			MIN	3.10E+00	3.80E-01
6	66	103	MAX		
			AVE	5.15E-01*	1.40E-01*
			MIN		
6	67	51	MAX	1.70E+00	
			AVE	1.19E+00	7.13E-01*
			MIN	7.70E-01	
6	67	86	MAX	1.50E+00	2.10E+00
			AVE	1.35E+00	1.70E+00
			MIN	1.10E+00	1.50E+00
6	67	98	MAX	6.50E-01	2.30E+00
			AVE	3.88E-01	2.15E+00
			MIN	9.00E-02	1.90E+00
6	68	105	MAX		
			AVE	8.80E-01*	1.05E+00*
			MIN		
6	69	38	MAX	6.50E-01	3.20E+00
			AVE	2.33E-01	1.07E+00
			MIN	0.00E-01**	2.60E-01
6	70	68	MAX		
			AVE	1.22E+00*	5.97E+00*
			MIN		

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML) -----	NITRATE (MG/L) -----
6	71	30	MAX AVE MIN	1.10E-01* 2.00E+01*
6	71	52	MAX AVE MIN	1.80E+00 4.00E+00 1.60E+00 3.65E+00 1.40E+00 3.30E+00
6	71	77	MAX AVE MIN	2.35E+00* 2.75E+00*
6	72	73	MAX AVE MIN	1.60E+00* 1.15E+00*
6	72	88	MAX AVE MIN	4.90E+00 4.70E+00 4.60E+00 3.13E+00 4.10E+00 1.90E+00
6	72	92	MAX AVE MIN	4.10E+00* 3.05E+00*
6	72	98	MAX AVE MIN	8.60E-01* 3.80E-01*
6	73	61	MAX AVE MIN	6.70E-01 5.40E+00 3.28E-01 4.72E+00 0.00E-01** 3.40E+00
6	74	44	MAX AVE MIN	4.80E-01 5.50E-01 2.52E-01 4.03E-01 1.80E-02 1.40E-01
6	77	36	MAX AVE MIN	8.20E-01 9.40E+01 5.35E-01 8.23E+01 0.00E-01** 6.80E+01
6	77	54	MAX AVE MIN	5.10E+01 1.62E+01 3.60E+00

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.			TRITIUM (PCI/ML)	NITRATE (MG/L)	
			-----	-----	
6	78	62	MAX AVE MIN	3.60E+00*	
6	80	43P	MAX AVE MIN	3.20E-01*	
6	80	43Q	MAX AVE MIN	3.90E-01*	
6	80	43R	MAX AVE MIN	3.65E-01*	
6	80	43S	MAX AVE MIN	1.76E+00*	
6	81	58	MAX AVE MIN	7.10E-01 2.43E-01 0.00E-01**	1.60E+00 1.22E+00 8.70E-01
6	83	47	MAX AVE MIN	9.05E-01*	
6	84	35AO	MAX AVE MIN	1.95E-01*	4.26E+00*
6	86	60	MAX AVE MIN	3.90E+01 2.81E+01 8.60E+00	
6	87	55	MAX AVE MIN	1.70E+02 1.50E+02 1.20E+02	1.30E+01 1.09E+01 8.60E+00
6	89	35	MAX AVE MIN		5.90E+00 5.23E+00 4.20E+00

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

**-- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

WELL NO.				TRITIUM (PCI/ML)	NITRATE (MG/L)
				-----	-----
6	90	45	MAX	1.10E+01	3.10E+00
			AVE	2.98E+00	7.94E-01
			MIN	6.30E-02	6.20E-02
6	90	47	MAX	9.50E+00	
			AVE	2.67E+00	
			MIN	2.61E-01	
6	92	14	MAX		
			AVE		2.45E+01*
			MIN		
6	96	49	MAX	4.40E+01	
			AVE	2.82E+01	9.33E+00*
			MIN	2.00E+01	
6	97	43	MAX	6.49E+01	3.09E+01
			AVE	3.14E+01	1.36E+01
			MIN	1.20E+01	5.70E+00
6	97	51A	MAX	1.40E+01	8.00E+00
			AVE	1.28E+01	7.10E+00
			MIN	1.20E+01	5.20E+00
6	101	48B	MAX		
			AVE	2.80E-01*	1.34E+00*
			MIN		

APPENDIX B
GROSS ALPHA, STRONTIUM-90, CESIUM-137,
COBALT-60, URANIUM, RUTHENIUM-106, CHROMIUM,
AND FLUORIDE CONCENTRATIONS IN THE GROUND WATER
(UNCONFINED AQUIFER)

(CY 1983)

PAGE 1

WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
1 B4 4 19-MAY-83 09-NOV-83				9.90E+01 2.50E+00				
1 D5 12 16-MAY-83 18-AUG-83 03-NOV-83			0.00E-01*	0.00E-01* 0.00E-01* 5.20E+00				
1 H4 3 16-FEB-83 16-MAY-83 11-AUG-83 13-DEC-83			0.00E-01*	1.20E+01 0.00E-01* 0.00E-01*	6.20E+01 1.80E+02 9.30E+01 5.20E+01		2.50E+00 4.20E+00 1.20E+00 2.70E+00	1.00E-01 7.00E-02 1.30E-01 2.60E-01
1 H4 4 13-DEC-83				0.00E-01*	4.90E+01		1.40E+00	2.50E-01
1 H4 5 13-DEC-83				0.00E-01*	6.70E+00		2.40E-02	1.20E-01
1 H4 6 13-DEC-83				8.60E+00	6.70E+00		9.00E-02	2.90E-01
1 K 11 23-MAY-83 01-NOV-83				4.90E+00 1.50E+01				
1 K 27 23-MAY-83 04-AUG-83 01-NOV-83				9.70E+00 0.00E-01* 2.10E+00		2.70E+02		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

(CY 1983)

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
1 K 28 23-MAY-83 04-AUG-83 01-NOV-83				3.60E+01 0.00E-01* 1.20E+01				
1 K 29 23-MAY-83 04-AUG-83 01-NOV-83				7.00E+01 0.00E-01* 5.30E+00				
1 K 30 23-MAY-83 04-AUG-83 01-NOV-83				3.20E+01 0.00E-01* 4.20E+00				
1 N 2 02-MAR-83 24-MAY-83 05-AUG-83 01-NOV-83		3.10E+03 3.10E+03		8.60E+01 2.00E+02 4.10E+01 6.70E+01		4.00E+02 3.40E+02		
1 N 3 02-MAR-83 24-MAY-83 01-NOV-83		5.10E+02 6.80E+02		3.60E+01 4.30E+01 3.80E+01		1.50E+02		
1 N 4 02-MAR-83 24-MAY-83		6.30E+00		2.60E+01 3.90E+01				
1 N 5 04-MAR-83 23-MAY-83 03-AUG-83		6.20E+01		3.00E+01 1.70E+02 5.10E+01				
1 N 6 02-MAR-83				3.60E+01				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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(CY 1983)

PAGE 3

WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
1 N 6								
24-MAY-83		6.60E+01		4.00E+01		9.80E+01		
05-AUG-83				7.30E+01				
28-OCT-83		2.80E+01		2.80E+01		3.00E+02		
1 N 7								
24-MAY-83		1.50E+00		3.00E+01		7.90E+01		
03-AUG-83				2.80E+01				
28-OCT-83		3.30E+00		2.40E+01		3.70E+02		
2E 16 2								
09-MAR-83		7.06E+00	1.41E-01	3.83E+00		0.00E-01*		
28-MAR-83		2.37E+00	0.00E-01*	0.00E-01*		6.05E+00		
20-APR-83		0.00E-01*	3.24E+00	0.00E-01*		0.00E-01*		
16-JUN-83		0.00E-01*	7.04E-01	0.00E-01*		5.84E+00		
18-JUL-83		3.34E+00	3.15E-01	0.00E-01*		0.00E-01*		
13-SEP-83		6.06E-01	0.00E-01*	5.95E+00		0.00E-01*		
12-NOV-83		0.00E-01*	0.00E-01*	0.00E-01*		0.00E-01*		
09-DEC-83		0.00E-01*	6.06E+00	5.61E-01		0.00E-01*		
2E 17 1								
06-JAN-83		0.00E-01*	7.55E+00	9.13E+00		8.67E+00		
01-FEB-83		1.40E+00	0.00E-01*	0.00E-01*		3.17E+01		
09-MAR-83		5.28E+00	0.00E-01*	0.00E-01*		1.65E+01		
28-MAR-83		0.00E-01*	6.92E-01	4.26E+00		0.00E-01*		
20-APR-83		8.33E-01	0.00E-01*	0.00E-01*		0.00E-01*		
27-MAY-83		0.00E-01*	0.00E-01*	9.32E+00		0.00E-01*		
17-JUN-83		1.92E+00	1.05E+01	6.70E+00		3.32E+01		
19-JUL-83		8.05E+00	0.00E-01*	0.00E-01*		9.87E+00		
22-AUG-83		3.05E+00	1.97E+00	1.28E+00		9.76E+00		
15-SEP-83		6.39E+00	8.30E-01	2.54E+00		2.58E+01		
17-OCT-83		2.45E+01	0.00E-01*	2.26E+00		4.58E+01		
15-NOV-83		0.00E-01*	0.00E-01	1.67E+00		0.00E-01*		
2E 17 9								
07-JAN-83		7.68E-01	7.21E+00	0.00E-01*		0.00E-01*		
01-FEB-83		3.13E+00	9.77E+00	0.00E-01*		0.00E-01*		
09-MAR-83		2.78E+00	0.00E-01*	2.97E+00		1.06E+01		
31-MAR-83		4.26E+00	2.08E+01	0.00E-01*		0.00E-01*		
01-JUN-83		6.94E+00	1.30E+01	0.00E-01*		1.56E+01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROS

(CY 1983)

PAGE 4

WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 17 9								
17-JUN-83		5.82E+00	0.00E-01*	4.09E+00		2.35E+01		
19-JUL-83		7.28E-01	3.47E+00	2.83E+00		0.00E-01*		
24-AUG-83		1.08E+01	0.00E-01*	0.00E-01*		0.00E-01*		
14-OCT-83		6.72E+00	0.00E-01*	1.02E+01		0.00E-01*		
15-NOV-83		4.06E-01	0.00E-01*	1.67E+00		0.00E-01*		
2E 19 1								
21-APR-83				0.00E-01*				
18-JUL-83				0.00E-01*				
13-OCT-83				1.80E+00				
2E 23 1								
20-APR-83				0.00E-01*				
19-JUL-83				8.90E+00				
13-OCT-83				2.60E+01				
2E 24 1								
06-JAN-83		0.00E-01*	1.23E+01	8.57E+00		3.73E+01		
09-MAR-83		0.00E-01*	0.00E-01*	1.12E+01		4.11E+01		
27-MAY-83		2.95E+00	0.00E-01*	1.93E+00		2.01E+01		
22-AUG-83		6.57E+00	5.81E+00	0.00E-01*		0.00E-01		
15-NOV-83		4.52E-01	3.79E+00	2.24E+00		0.00E-01*		
2E 24 2								
06-JAN-83		0.00E-01*	9.21E+00	0.00E-01*	2.34E+00	0.00E-01		
01-FEB-83		7.47E+00	6.46E+00	0.00E-01*		7.94E+01		
09-MAR-83		8.45E+00	1.41E-01	0.00E-01*		1.68E+01		
28-MAR-83		1.04E+01	0.00E-01*	8.05E+00		0.00E-01*		
20-APR-83		5.06E+00	8.68E+00	2.77E+00		4.49E+01		
27-MAY-83		2.61E+00	1.36E+00	3.04E+00		0.00E-01		
17-JUN-83		5.99E-01	1.84E-01	0.00E-01*		0.00E-01*		
19-JUL-83		2.37E+00	2.52E+00	6.59E+00		3.88E+01		
19-AUG-83		1.91E+00	3.95E+00	4.27E+00		6.39E+01		
14-SEP-83		3.61E-01	0.00E-01*	1.40E+00		0.00E-01*		
14-OCT-83		3.56E+00	0.00E-01*	0.00E-01*		2.01E+01		
15-NOV-83		0.00E-01*	0.00E-01*	3.68E+00		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

B.4

(CY 1983)

PAGE 5

WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
2E 24 4								
07-JAN-83		0.00E-01*	3.24E+00	0.00E-01*		3.94E+01		
08-MAR-83		3.04E+00	2.68E+00	2.13E-01		0.00E-01*		
01-JUN-83		2.14E+00	0.00E-01*	0.00E-01*		1.56E+01		
15-NOV-83		8.93E-01	0.00E-01*	0.00E-01*		0.00E-01*		
2E 24 7								
20-APR-83				5.20E+00				
19-JUL-83				4.50E+00				
13-OCT-83				1.50E+01				
2E 24 8								
06-JAN-83			1.53E+00	0.00E-01*		0.00E-01*		
02-FEB-83			0.00E-01*	0.00E-01*		0.00E-01*		
08-MAR-83			8.37E+00	7.82E+00		0.00E-01*		
28-MAR-83			9.31E+00	0.00E-01*		0.00E-01*		
21-APR-83			0.00E-01*	6.39E-01		0.00E-01*		
01-JUN-83			2.90E-02	0.00E-01		0.00E-01*		
17-JUN-83			0.00E-01*	6.37E-01		0.00E-01*		
19-JUL-83			8.31E-01	4.26E+00		0.00E-01*		
22-AUG-83			2.26E+00	5.12E+00		0.00E-01*		
20-SEP-83			1.94E+00	4.23E+00		0.00E-01*		
13-OCT-83			4.37E-01	0.00E-01*		6.76E+01		
15-NOV-83			3.47E+00	0.00E-01*		0.00E-01*		
22-DEC-83			0.00E-01*	8.50E-01		1.43E+01		
2E 24 12								
06-JAN-83					4.03E+01			
2E 25 2								
20-APR-83				3.50E+00				
20-JUL-83				5.30E+00				
17-OCT-83				1.10E+01				
2E 25 6								
03-FEB-83		0.00E-01*	0.00E-01*	0.00E-01*		4.34E+01		
09-MAR-83		0.00E-01*	3.95E+00	1.91E+00		0.00E-01*		
31-MAR-83		0.00E-01*	1.28E+01	2.25E+00		0.00E-01*		
19-APR-83		0.00E-01*	0.00E-01*	0.00E-01*		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

(CY 1983)

PAGE 6

WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 25 6								
01-JUN-83		3.50E+00	3.49E+00	0.00E-01*		0.00E-01*		
17-JUN-83		0.00E-01*	9.87E-01	2.13E+00		0.00E-01*		
18-JUL-83		5.62E-01	1.41E-01	2.35E+00		0.00E-01*		
24-AUG-83		3.37E+00	0.00E-01*	0.00E-01*		0.00E-01*		
14-SEP-83		0.00E-01*	1.13E+00	0.00E-01*		0.00E-01*		
14-OCT-83		7.95E-01	6.12E+00	0.00E-01*		0.00E-01*		
12-NOV-83		3.67E+00	4.36E+00	3.68E+00		0.00E-01*		
2E 25 9								
09-MAR-83		0.00E-01*	2.77E-01	4.67E+00		0.00E-01*		
31-MAR-83		0.00E-01*	7.85E-01	0.00E-01*		0.00E-01*		
19-APR-83		0.00E-01*	2.35E+00	1.70E+00		0.00E-01*		
01-JUN-83		1.25E+00	9.01E+00	8.28E-01		6.73E+01		
18-JUL-83		2.96E-01	0.00E-01*	0.00E-01*		0.00E-01*		
14-SEP-83		0.00E-01*	3.87E+00	0.00E-01*		0.00E-01		
12-NOV-83		1.79E+00	0.00E-01	3.36E+00		3.79E+01		
2E 25 10								
11-JAN-83			7.82E+00	3.31E+00	2.06E+00	2.85E+01		
03-FEB-83			0.00E-01*	0.00E-01*	2.55E+01	1.97E+00		
19-APR-83			0.00E-01*	2.99E+00	1.59E+00	3.57E+01		
18-JUL-83			0.00E-01*	1.71E+00	2.22E+00	0.00E-01*		
14-OCT-83			4.37E-01	6.19E+00	0.00E-01*	3.41E+01		
2E 25 11								
03-FEB-83		1.11E+00	1.63E+00	4.85E+00		3.15E+01		
09-MAR-83		0.00E-01*	9.35E+00	0.00E-01*		1.44E+00		
28-MAR-83		6.54E+00	0.00E-01*	5.61E+00		0.00E-01*		
20-APR-83		6.25E+00	0.00E-01	2.98E+00		2.38E+00		
27-MAY-83		4.34E+00	8.84E+00	0.00E-01*		0.00E-01*		
16-JUN-83		0.00E-01*	0.00E-01*	0.00E-01*		2.70E+01		
18-JUL-83		6.67E+00	5.05E+00	0.00E-01*		0.00E-01		
19-AUG-83		0.00E-01*	0.00E-01*	3.42E+00		3.18E+01		
13-SEP-83		7.53E+00	8.30E-01	0.00E-01*		0.00E-01*		
12-OCT-83		0.00E-01*	0.00E-01*	0.00E-01*		2.64E+01		
12-NOV-83		1.28E+00	0.00E-01*	5.53E+00		1.09E+01		
09-DEC-83		0.00E-01*	2.31E+00	5.57E+00		3.50E+01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 25 17 18-JUL-83 12-OCT-83		0.00E-01* 1.07E+00	4.41E+00 1.93E+00	0.00E-01* 5.62E+00		0.00E-01* 3.33E+01		
2E 25 18 18-JUL-83 12-OCT-83		7.61E+00 0.00E-01*	2.91E+00 1.14E+00	0.00E-01* 4.51E+00		3.14E+01 3.91E+01		
2E 25 19 20-JUL-83 14-OCT-83		5.56E+00 0.00E-01*	8.46E-01 0.00E-01	4.49E+00 5.64E+00		0.00E-01* 9.85E+00		
2E 25 20 03-FEB-83 19-APR-83 18-JUL-83 12-OCT-83		2.19E+00 0.00E-01* 4.48E+00 2.70E+00	0.00E-01* 5.61E+00 0.00E-01* 2.28E+00	0.00E-01* 0.00E-01* 1.92E+00 2.26E+00		2.57E+01 2.03E+01 2.34E+01 2.95E+01		
2E 25 21 28-JUL-83 12-OCT-83		5.64E+00 0.00E-01*	9.46E-01 0.00E-01*	0.00E-01* 6.77E+00		0.00E-01* 0.00E-01*		
2E 25 22 28-JUL-83 12-OCT-83		6.07E+00 0.00E-01*	6.30E+00 4.63E+00	2.58E+00 0.00E-01*		2.31E+01 0.00E-01*		
2E 25 23 28-JUL-83 12-OCT-83		0.00E-01* 0.00E-01*	4.20E+00 3.79E-01	3.14E+00 2.26E+00		0.00E-01* 6.55E+00		
2E 25 24 28-JUL-83 12-OCT-83		5.44E+00 9.63E-01	0.00E-01* 8.34E+00	0.00E-01* 0.00E-01*		0.00E-01* 1.31E+01		
2E 26 1 20-APR-83				2.10E+01				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 26 1 18-JUL-83 13-OCT-83				0.00E-01* 1.20E+01				
2E 26 3 19-APR-83 18-JUL-83 14-OCT-83				2.10E+00 0.00E-01* 4.50E+00				
2E 27 1 21-APR-83 19-JUL-83 13-OCT-83				0.00E-01* 0.00E-01* 1.20E+01				
2E 27 5 08-MAR-83 01-JUN-83 22-AUG-83 15-NOV-83			0.00E-01* 1.46E+01 0.00E-01* 3.05E+00	4.47E+00 9.69E+00 0.00E-01* 2.45E+00		0.00E-01* 0.00E-01* 3.90E+01 0.00E-01*		
2E 28 1 20-APR-83 20-JUL-83 13-OCT-83			1.40E+01	2.10E+00 0.00E-01* 1.60E+01				
2E 28 5 20-APR-83 13-OCT-83				3.40E+00 1.10E+01				
2E 28 12 06-JAN-83 01-FEB-83 08-MAR-83 04-APR-83 21-APR-83 01-JUN-83 15-JUN-83 20-JUL-83			1.56E+01 1.36E+00 7.65E+00 8.34E+00 2.68E+00 0.00E-01* 0.00E-01* 0.00E-01*	0.00E-01* 1.49E+00 1.93E+00 0.00E-01* 0.00E-01* 0.00E-01* 1.90E+00 1.50E+00		0.00E-01* 0.00E-01* 3.00E+01 2.65E+01 3.57E+01 0.00E-01* 0.00E-01 2.45E+00		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 28 12								
22-AUG-83			9.46E-01	4.70E-01		0.00E-01*		
20-SEP-83			1.41E+00	0.00E-01*		0.00E-01*		
13-OCT-83			1.52E+00	2.26E+00		0.00E-01*		
12-NOV-83			0.00E-01*	4.48E+00		0.00E-01*		
2E 28 13								
06-JAN-83			1.02E+01	0.00E-01*		0.00E-01*		
01-FEB-83			9.87E+00	0.00E-01*		4.33E+00		
08-MAR-83			0.00E-01	2.13E+00		2.40E+00		
04-APR-83			3.40E-01	8.33E-01		4.42E+00		
19-APR-83			0.00E-01*	3.36E+00		0.00E-01*		
01-JUN-83			1.53E+00	8.01E+00		4.02E+01		
15-JUN-83			5.67E+00	2.33E-01		1.32E+00		
20-JUL-83			0.00E-01*	1.07E+00		0.00E-01*		
22-AUG-83			0.00E-01	2.56E+00		0.00E-01*		
20-SEP-83			1.41E+00	2.55E+00		2.14E+01		
13-OCT-83			0.00E-01*	0.00E-01*		8.29E+01		
12-NOV-83			0.00E-01*	1.23E+00		0.00E-01*		
22-DEC-83			0.00E-01*	3.40E+00		0.00E-01*		
2E 28 18								
06-JAN-83		0.00E-01*	1.21E+01	0.00E-01		0.00E-01*		
01-FEB-83		0.00E-01*	2.34E+00	0.00E-01*		0.00E-01*		
08-MAR-83		3.01E+00	0.00E-01*	0.00E-01*		5.01E+01		
04-APR-83		7.08E+00	4.66E+00	8.24E+00		0.00E-01*		
19-APR-83		1.30E+00	0.00E-01*	0.00E-01*		1.19E+00		
01-JUN-83		3.81E+00	1.25E+00	0.00E-01*		0.00E-01*		
15-JUN-83		0.00E-01*	2.72E+00	3.85E+00		5.59E+00		
20-JUL-83		4.57E+00	0.00E-01*	0.00E-01*		1.48E+01		
24-AUG-83		3.42E+00	0.00E-01*	2.56E+00		0.00E-01*		
20-SEP-83		8.98E+00	2.77E-01	5.08E+00		4.65E+01		
13-OCT-83		0.00E-01*	6.07E+00	4.51E+00		0.00E-01*		
12-NOV-83		0.00E-01*	0.00E-01*	0.00E-01*	3.45E+01	0.00E-01*		
2E 28 21								
06-JAN-83			1.26E+01	8.95E+00		0.00E-01*		
01-FEB-83		0.00E-01*	0.00E-01*	0.00E-01*		0.00E-01*		
08-MAR-83		0.00E-01*	1.80E+00	2.33E+00		2.12E+01		
04-APR-83		0.00E-01*	3.24E+00	0.00E-01*		0.00E-01*		
19-APR-83		4.61E+00	0.00E-01*	1.06E+00		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2E 28 21								
01-JUN-83		3.56E+00	0.00E-01*	3.75E+00		3.38E+01		
15-JUN-83		8.10E+00	0.00E-01*	3.50E+00		1.58E+01		
20-JUL-83		3.51E+01	1.66E+00	5.54E+00		1.21E+00		
24-AUG-83		0.00E-01*	5.68E+00	0.00E-01		0.00E-01*		
20-SEP-83		8.77E+00	3.46E+00	1.40E+00		0.00E-01*		
13-OCT-83		0.00E-01*	7.73E+00	0.00E-01*		1.67E+01		
12-NOV-83		5.10E+00	0.00E-01*	3.68E+00		0.00E-01		
22-DEC-83		0.00E-01*	8.45E-01	0.00E-01*		0.00E-01*		
2E 28 23								
31-MAR-83		1.28E+04	3.52E+03	0.00E-01*		0.00E-01*		
17-JUN-83		9.61E+03	3.80E+03	3.59E+00		3.28E+01		
15-SEP-83		1.37E+04	3.66E+03	0.00E-01*		4.78E+01		
2E 33 1								
31-MAR-83			0.00E-01*	6.66E+01		0.00E-01*		
15-JUN-83			2.21E+00	2.73E+01		3.45E+00		
16-SEP-83			5.36E+00	6.46E+01		0.00E-01*		
2E 33 3								
31-MAR-83		2.45E+00	1.12E+01	8.82E+02		0.00E-01*		
15-JUN-83		0.00E-01*	1.46E+01	7.55E+02		0.00E-01*		
16-SEP-83		1.44E+00	1.20E+01	9.10E+02		2.20E+02		
2E 33 5								
31-MAR-83			2.63E+00	3.05E+01		0.00E-01*		
15-JUN-83			3.25E+00	1.26E+02		5.38E+01		
16-SEP-83			7.74E+00	1.44E+02		0.00E-01*		
2E 33 8								
04-APR-83			5.79E+00	9.72E+00		6.34E+01		
15-JUN-83			0.00E-01*	4.43E+00		2.63E+00		
16-SEP-83			2.54E+00	0.00E-01*		1.67E+01		
2E 33 9								
31-MAR-83		8.65E+00	1.39E+01	5.49E+01		1.47E+01		
17-JUN-83		0.00E-01*	5.35E+00	1.80E+01		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

(CY 1983)

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
2E 33 9 16-SEP-83		3.49E+00	4.10E+00	1.50E+01		5.36E+00		
2E 33 14 20-APR-83 18-JUL-83 13-OCT-83				2.00E+00 0.00E-01* 4.80E+00				
2E 33 18 31-MAR-83 17-JUN-83 16-SEP-83		0.00E-01* 6.09E+00 3.84E+00	9.21E-02 2.05E+00 3.87E+00	2.22E+00 5.85E+00 4.24E-01		0.00E-01* 0.00E-01* 0.00E-01		
2E 33 20 31-MAR-83 17-JUN-83 16-SEP-83		1.45E+00 1.01E+01 7.96E+00						
2E 33 21 04-APR-83 15-JUN-83 28-SEP-83			2.02E+00 0.00E-01* 4.51E+00	3.33E+00 3.71E+00 0.00E-01*		3.98E+01 4.02E+01 0.00E-01*		
2E 33 24 31-MAR-83 15-JUN-83 16-SEP-83			9.31E+00 0.00E-01* 4.70E+00	5.99E+00 3.48E+01 1.47E+01		2.03E+01 8.61E+01 4.67E+00		
2E 33 26 31-MAR-83 15-JUN-83 16-SEP-83			4.02E+00 1.22E+01 5.26E+00	7.44E+01 1.15E+02 5.98E+01		2.34E+01 0.00E-01* 0.00E-01*		
2E 33 27 16-SEP-83			1.39E+03	1.31E+01		8.03E+01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

B.11

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 6 1 25-APR-83 13-JUL-83 18-OCT-83			0.00E-01*	0.00E-01* 0.00E-01* 5.00E+00				
2W 10 5 26-APR-83 13-JUL-83 18-OCT-83			0.00E-01*	5.60E+00 6.20E+00 9.30E+00				
2W 11 11 05-JAN-83 26-JAN-83 25-APR-83 15-JUL-83 24-OCT-83			0.00E-01* 1.46E+01 0.00E-01* 2.26E+00 3.03E+00	6.15E+00 7.07E+00 8.31E+00 9.85E+00 7.88E+00		0.00E-01* 2.34E+01 4.49E+01 0.00E-01* 4.52E+01		
2W 11 23 05-JAN-83 27-JAN-83 26-APR-83 13-JUL-83 24-OCT-83			0.00E-01* 8.83E+00 3.91E+00 2.36E+00 0.00E-01	1.74E+01 1.12E+01 1.94E+01 1.39E+01 1.58E+01		0.00E-01* 1.96E+01 0.00E-01* 0.00E-01* 0.00E-01*		
2W 11 24 05-JAN-83 27-JAN-83 26-APR-83 13-JUL-83 18-OCT-83			3.52E+00 4.55E-01 2.96E+00 0.00E-01* 0.00E-01*	1.55E+01 2.27E+01 1.53E+01 1.09E+01 1.05E+01		3.59E+00 2.74E+01 2.30E+01 0.00E-01* 0.00E-01*		
2W 11 9 25-APR-83 13-JUL-83 18-OCT-83			0.00E-01*	0.00E-01* 2.90E+00 8.00E+00				
2W 11 11 05-JAN-83			0.00E-01*	6.15E+00		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 11 11								
26-JAN-83			1.46E+01	7.07E+00		2.34E+01		
25-APR-83			0.00E-01*	8.31E+00		4.49E+01		
15-JUL-83			2.26E+00	9.85E+00		0.00E-01*		
24-OCT-83			3.03E+00	7.88E+00		4.52E+01		
2W 11 23								
05-JAN-83			0.00E-01*	1.74E+01		0.00E-01*		
27-JAN-83			8.83E+00	1.12E+01		1.96E+01		
26-APR-83			3.91E+00	1.94E+01		0.00E-01*		
13-JUL-83			2.36E+00	1.39E+01		0.00E-01*		
24-OCT-83			0.00E-01	1.58E+01		0.00E-01*		
2W 11 24								
05-JAN-83			3.52E+00	1.55E+01		3.59E+00		
27-JAN-83			4.55E-01	2.27E+01		2.74E+01		
26-APR-83			2.96E+00	1.53E+01		2.30E+01		
13-JUL-83			0.00E-01*	1.09E+01		0.00E-01*		
18-OCT-83			0.00E-01*	1.05E+01		0.00E-01*		
2W 12 1								
25-APR-83			0.00E-01*	0.00E-01*				
13-JUL-83				3.40E+00				
18-OCT-83				2.50E+00				
2W 14 10								
28-JAN-83		2.69E+00	1.60E+01	0.00E-01*		7.79E+00		
12-MAR-83		0.00E-01*	3.06E+00	1.12E+01		0.00E-01*		
29-MAR-83		4.49E-01	5.11E+00	0.00E-01*		0.00E-01*		
25-APR-83		0.00E-01*	2.63E+00	0.00E-01*		1.19E+01		
25-MAY-83		8.96E-01	1.58E-01	1.17E+00		2.46E+01		
22-JUN-83		2.55E+00	3.40E+00	1.93E+00		3.53E+01		
15-JUL-83		0.00E-01*	2.82E+00	0.00E-01*		0.00E-01*		
15-AUG-83		0.00E-01*	2.21E+00	4.71E+00		3.05E+01		
27-SEP-83		0.00E-01*	4.22E+00	0.00E-01*		0.00E-01*		
17-OCT-83		4.48E+00	1.90E+00	3.38E+00		3.92E+01		
19-NOV-83		5.29E+00	5.24E+00	4.91E+00		0.00E-01*		
30-DEC-83		0.00E-01*	0.00E-01*	0.00E-01*		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 15 2 25-APR-83 13-JUL-83			0.00E-01*	0.00E-01* 0.00E-01*				
2W 15 3 30-MAR-83 26-MAY-83 23-AUG-83 23-NOV-83			0.00E-01* 1.16E+01 5.67E+00 1.75E+00	6.36E+00 1.04E+01 1.41E+01 1.41E+01		1.80E+01 0.00E-01* 2.47E+01 0.00E-01*		
2W 15 7 12-MAR-83 26-MAY-83 23-AUG-83 23-NOV-83			1.39E+00 7.05E-01 0.00E-01* 0.00E-01*	6.71E+00 2.84E+01 1.98E+01 5.03E+01		3.91E+01 0.00E-01* 2.17E+01 0.00E-01*		
2W 18 15 04-JAN-83 26-JAN-83 12-MAR-83 29-MAR-83 21-APR-83 25-MAY-83 22-JUN-83 15-JUL-83 23-AUG-83 27-SEP-83 17-OCT-83 19-NOV-83 30-DEC-83			8.61E+00 0.00E-01* 0.00E-01* 2.49E+00 7.68E+00 0.00E-01* 8.16E+00 3.47E+01 0.00E-01* 1.97E+00 0.00E-01* 4.36E+00 0.00E-01*	0.00E-01* 5.60E+00 0.00E-01* 2.35E+00 4.86E+00 8.22E+00 8.82E+00 3.77E+00 0.00E-01* 0.00E-01* 9.02E+00 3.68E+00 0.00E-01*	3.73E+01	0.00E-01* 0.00E-01* 1.00E+01 0.00E-01* 7.43E+01 1.99E+00 0.00E-01* 0.00E-01 4.48E+01 3.27E+01 0.00E-01* 1.82E+01 0.00E-01*		
2W 18 17 28-JAN-83 21-APR-83 15-JUL-83 18-OCT-83			8.83E+00 0.00E-01* 0.00E-01* 2.32E+00	0.00E-01* 2.77E-01 1.89E+00 2.25E+00		2.54E+01 7.81E+01 8.38E+00 2.99E+01		
2W 18 18 28-JAN-83			4.85E+00	0.00E-01*		1.18E+01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 18 18								
21-APR-83			1.63E+00	0.00E-01*		0.00E-01*		
15-JUL-83			1.41E+00	1.71E+00		7.46E+00		
18-OCT-83			3.09E+00	4.49E+00		0.00E-01		
2W 18 19								
04-JAN-83			6.46E+00	7.47E+00		0.00E-01*		
26-JAN-83			0.00E-01*	1.87E+00		2.38E+01		
12-MAR-83			0.00E-01*	0.00E-01*		0.00E-01*		
29-MAR-83			2.58E+00	6.36E+00		0.00E-01*		
21-APR-83			0.00E-01*	0.00E-01*		0.00E-01*		
25-MAY-83			1.87E+00	0.00E-01*		0.00E-01*		
22-JUN-83			0.00E-01*	0.00E-01*		0.00E-01*		
15-JUL-83			3.15E-01	1.04E+01		0.00E-01*		
23-AUG-83			4.10E+00	0.00E-01*		3.08E+01		
28-SEP-83			2.65E+00	1.12E+00		0.00E-01*		
18-OCT-83			0.00E-01*	0.00E-01*		0.00E-01*		
19-NOV-83			5.24E+00	0.00E-01*		0.00E-01*		
2W 18 20								
04-JAN-83			9.75E+00	0.00E-01*		0.00E-01*		
26-JAN-83			3.69E+00	6.72E+00		2.78E+01		
12-MAR-83			0.00E-01*	0.00E-01*		8.60E+00		
29-MAR-83			0.00E-01*	0.00E-01*		8.85E+01		
21-APR-83			1.55E-01	0.00E-01*		3.02E+01		
25-MAY-83			0.00E-01*	9.14E+00		0.00E-01*		
22-JUN-83			1.23E+01	0.00E-01*		0.00E-01*		
15-JUL-83			8.31E-01	2.56E+00		0.00E-01*		
23-AUG-83			2.21E+00	2.83E+00		3.64E+01		
28-SEP-83			0.00E-01*	1.70E+00		1.19E+01		
17-OCT-83			2.32E+00	3.37E+00		0.00E-01*		
19-NOV-83			0.00E-01*	0.00E-01*		0.00E-01*		
30-DEC-83			0.00E-01*	0.00E-01*		0.00E-01*		
2W 19 2								
12-MAR-83					1.13E+00			
25-MAY-83					4.24E+00			
15-AUG-83					2.13E+00			
19-NOV-83					2.42E+00			

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 19 3								
12-MAR-83			0.00E-01*	1.27E+00	4.93E+01	0.00E-01*		
26-MAY-83			0.00E-01*	3.88E+00	6.11E+01	1.16E+01		
23-AUG-83			0.00E-01*	0.00E-01*	7.33E+01	1.92E+01		
23-NOV-83			0.00E-01*	2.45E+00	5.00E+01	0.00E-01*		
2W 19 4								
25-APR-83			0.00E-01*	3.50E-01				
15-JUL-83				0.00E-01*				
17-OCT-83				8.90E+00				
2W 19 12								
26-MAY-83			0.00E-01	0.00E-01*	6.55E+00	0.00E-01*		
15-AUG-83			4.10E+00	5.66E+00	5.31E+00	0.00E-01		
19-NOV-83			4.55E+00	2.24E+00	5.66E+00	3.16E+00		
2W 18 17								
28-JAN-83			8.83E+00	0.00E-01*		2.54E+01		
21-APR-83			0.00E-01*	2.77E-01		7.81E+01		
15-JUL-83			0.00E-01*	1.89E+00		8.38E+00		
18-OCT-83			2.32E+00	2.25E+00		2.99E+01		
2W 18 18								
28-JAN-83			4.85E+00	0.00E-01*		1.18E+01		
21-APR-83			1.63E+00	0.00E-01*		0.00E-01*		
15-JUL-83			1.41E+00	1.71E+00		7.46E+00		
18-OCT-83			3.09E+00	4.49E+00		0.00E-01		
2W 18 19								
04-JAN-83			6.46E+00	7.47E+00		0.00E-01*		
26-JAN-83			0.00E-01*	1.87E+00		2.38E+01		
12-MAR-83			0.00E-01*	0.00E-01*		0.00E-01*		
29-MAR-83			2.58E+00	6.36E+00		0.00E-01*		
21-APR-83			0.00E-01*	0.00E-01*		0.00E-01*		
25-MAY-83			1.87E+00	0.00E-01*		0.00E-01*		
22-JUN-83			0.00E-01*	0.00E-01*		0.00E-01*		
15-JUL-83			3.15E-01	1.04E+01		0.00E-01*		
23-AUG-83			4.10E+00	0.00E-01*		3.08E+01		
28-SEP-83			2.65E+00	1.12E+00		0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 18 19								
18-OCT-83			0.00E-01*	0.00E-01*		0.00E-01*		
19-NOV-83			5.24E+00	0.00E-01*		0.00E-01*		
2W 18 20								
04-JAN-83			9.75E+00	0.00E-01*		0.00E-01*		
26-JAN-83			3.69E+00	6.72E+00		2.78E+01		
12-MAR-83			0.00E-01*	0.00E-01*		8.60E+00		
29-MAR-83			0.00E-01*	0.00E-01*		8.85E+01		
21-APR-83			1.55E-01	0.00E-01*		3.02E+01		
25-MAY-83			0.00E-01*	9.14E+00		0.00E-01*		
22-JUN-83			1.23E+01	0.00E-01*		0.00E-01*		
15-JUL-83			8.31E-01	2.56E+00		0.00E-01*		
23-AUG-83			2.21E+00	2.83E+00		3.64E+01		
28-SEP-83			0.00E-01*	1.70E+00		1.19E+01		
17-OCT-83			2.32E+00	3.37E+00		0.00E-01*		
19-NOV-83			0.00E-01*	0.00E-01*		0.00E-01*		
30-DEC-83			0.00E-01*	0.00E-01*		0.00E-01*		
2W 19 12								
26-MAY-83			0.00E-01	0.00E-01*	6.55E+00	0.00E-01*		
15-AUG-83			4.10E+00	5.66E+00	5.31E+00	0.00E-01		
19-NOV-83			4.55E+00	2.24E+00	5.66E+00	3.16E+00		
2W 21 1								
25-APR-83			0.00E-01*	0.00E-01*				
15-JUL-83				0.00E-01*				
19-OCT-83				4.80E+00				
2W 22 1								
30-MAR-83		2.62E+02	1.02E+00	2.78E+00		7.43E+00		
22-JUN-83		2.09E+02	0.00E-01*	2.54E+00		0.00E-01*		
28-SEP-83		4.41E+02	0.00E-01*	0.00E-01		0.00E-01*		
2W 22 2								
30-MAR-83		0.00E-01*	0.00E-01*	0.00E-01*		7.49E+00		
22-JUN-83		0.00E-01*	3.06E+00	4.13E+00		5.65E+01		
28-SEP-83		6.64E+00	3.38E+00	0.00E-01*		7.16E+00		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 22 7 25-APR-83 15-JUL-83 17-OCT-83			0.00E-01*	0.00E-01* 0.00E-01* 1.50E+01				
2W 22 9 25-APR-83 15-JUL-83 17-OCT-83			0.00E-01*	0.00E-01* 0.00E-01* 8.10E+00				
2W 22 10 05-JAN-83 27-JAN-83 25-APR-83 13-JUL-83 24-OCT-83	1.70E+01 1.70E+01 1.10E+00 1.20E+01 1.70E+01	4.90E+00 4.20E+00 4.90E+00 4.40E+01 1.20E+02	0.00E-01*	0.00E-01* 1.60E+00				
2W 22 12 30-MAR-83 22-JUN-83 27-SEP-83		2.19E+00 4.55E-01 1.53E+00						
2W 22 20 29-MAR-83 22-JUN-83 27-SEP-83 30-DEC-83		5.10E+00 0.00E-01* 0.00E-01* 0.00E-01*						
2W 22 21 30-MAR-83 22-JUN-83 27-SEP-83 30-DEC-83		0.00E-01* 1.00E+00 3.67E+00 4.50E+00	0.00E-01* 6.30E-01 0.00E-01* 3.10E+00	0.00E-01* 3.74E+00 0.00E-01* 0.00E-01*		2.81E+01 0.00E-01* 2.58E+01 1.64E+01		
2W 22 22 25-JAN-83 25-MAY-83 22-JUN-83		0.00E-01* 1.05E+00 7.28E-01	9.76E+00 0.00E-01* 0.00E-01*	0.00E-01* 0.00E-01* 0.00E-01*	2.16E+00 1.17E+01 3.66E+00	1.91E+00 1.43E+01 0.00E-01*		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 22 22								
15-JUL-83		2.81E-01	0.00E-01*	0.00E-01*	1.19E-01	0.00E-01*		
23-AUG-83		4.15E+00	8.31E-01	1.71E+00	4.58E+00	0.00E-01*		
27-SEP-83		0.00E-01*	2.21E+00	0.00E-01*	1.63E+00	0.00E-01*		
17-OCT-83		0.00E-01*	3.41E+00	0.00E-01*	0.00E-01*	2.29E+01		
19-NOV-83		5.52E+00	0.00E-01*	5.59E-01	3.47E+00	0.00E-01*		
30-DEC-83		3.99E+00	0.00E-01*	0.00E-01*	1.82E+00	2.64E+00		
2W 22 26								
30-MAR-83		0.00E-01*	1.55E+00	1.50E+00		0.00E-01*		
22-JUN-83		0.00E-01*	0.00E-01*	7.43E-01		3.29E+01		
28-SEP-83		2.79E+00	0.00E-01*	5.93E+00		0.00E-01*		
2W 23 4								
29-MAR-83					2.88E+01			
22-JUN-83					2.83E+01			
28-SEP-83					3.14E+01			
30-DEC-83					4.33E+01			
2W 23 9								
25-JAN-83		8.32E-01	6.80E-01	0.00E-01*		0.00E-01*		
04-MAR-83		2.05E+00	6.92E-01	0.00E-01*		0.00E-01*		
29-MAR-83		0.00E-01*	0.00E-01*	1.11E+00		2.20E+01		
21-APR-83		1.44E+00	6.31E-01	0.00E-01*		0.00E-01*		
25-MAY-83		1.48E+00	5.64E-01	0.00E-01*		0.00E-01*		
23-JUN-83		3.60E+00	0.00E-01*	0.00E-01*		8.06E+00		
14-JUL-83		8.26E+00	0.00E-01*	2.57E+00		1.37E+01		
15-AUG-83		3.36E+00	0.00E-01*	0.00E-01*		3.40E+01		
27-SEP-83		3.63E+00	0.00E-01*	3.39E+00		0.00E-01*		
17-OCT-83		1.51E+00	1.93E+00	0.00E-01		3.33E+00		
19-NOV-83		1.57E+00	1.14E+00	4.49E+00		9.50E+00		
2W 23 10								
05-JAN-83		0.00E-01*	0.00E-01*	1.70E+00		3.64E+01		
25-JAN-83		0.00E-01*	9.51E+00	0.00E-01*		5.83E+01		
04-MAR-83		2.13E+00	2.91E+00	1.91E+00		0.00E-01*		
29-MAR-83		0.00E-01*	1.98E+00	2.99E+00		0.00E-01*		
21-APR-83		2.87E-01	2.12E+00	1.49E+00		1.71E+01		
25-MAY-83		2.26E+00	0.00E-01*	4.15E+00		6.81E+01		
23-JUN-83		0.00E-01*	0.00E-01*	0.00E-01*		1.54E+01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
2W 23 10								
14-JUL-83		9.41E-02	1.55E+00	0.00E-01*		1.11E+01		
15-AUG-83		0.00E-01*	0.00E-01*	3.41E+00		0.00E-01*		
27-SEP-83		8.47E+00	3.32E+00	0.00E-01*		0.00E-01*		
17-OCT-83		0.00E-01*	6.99E+00	0.00E-01*		5.26E+01		
19-NOV-83		5.87E+00	0.00E-01*	4.49E+00		4.75E+01		
29-DEC-83		0.00E-01*	2.83E+00	0.00E-01*		4.76E+01		
2W 23 11								
05-JAN-83			6.80E-01	0.00E-01*	1.39E+01	0.00E-01*		
04-MAR-83			1.41E-01	0.00E-01*		3.62E+00		
29-MAR-83			7.49E+00	8.32E+00		0.00E-01*		
21-APR-83			4.25E+00	0.00E-01*		0.00E-01*		
25-MAY-83			0.00E-01*	0.00E-01*		0.00E-01*		
23-JUN-83			2.99E+00	2.34E-01		0.00E-01*		
14-JUL-83			1.74E+00	0.00E-01*		0.00E-01*		
15-AUG-83			0.00E-01*	5.12E+00		0.00E-01*		
27-SEP-83			2.84E+00	0.00E-01		0.00E-01*		
17-OCT-83			0.00E-01*	4.94E+00		1.13E+01		
19-NOV-83			0.00E-01*	2.23E+00		0.00E-01*		
29-DEC-83			0.00E-01*	4.67E+00		3.43E+01		
3 1 1								
21-MAR-83					1.80E+01		5.70E-03	4.00E-01
20-JUN-83			0.00E-01*	0.00E-01*	1.60E+01		7.00E-03	1.90E-01
19-SEP-83				0.00E-01*	6.70E+00		5.00E-03	4.40E-01
05-DEC-83				0.00E-01*	1.20E+01		1.10E-02	4.50E-01
3 1 2								
22-MAR-83				1.50E+01	1.30E+01		1.10E-02	3.90E-01
20-JUN-83			0.00E-01*	0.00E-01*	1.80E+01		5.30E-03	3.30E-01
21-SEP-83				0.00E-01*	6.70E+00		5.80E-03	4.60E-01
02-DEC-83				1.10E+01	6.70E+00		1.40E-02	5.40E-01
3 1 3								
21-MAR-83					2.20E+01		1.00E-02	4.30E-01
20-JUN-83			0.00E-01*	3.10E+00	2.30E+01		6.60E-03	4.60E-01
19-SEP-83				0.00E-01*	1.60E+01		9.30E-03	6.30E-01
05-DEC-83				0.00E-01*	2.10E+01		1.40E-02	1.10E+00

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
3 1 4								
22-MAR-83					1.10E+01		8.20E-03	5.10E-01
21-JUN-83				1.40E+01	1.10E+01		1.00E-02	5.40E-01
21-SEP-83				0.00E-01*	6.70E+00		9.10E-03	5.50E-01
02-DEC-83				9.40E+00	6.70E+00		1.20E-02	5.30E-01
3 1 5								
22-MAR-83					1.10E+01		1.10E-02	3.90E-01
21-JUN-83				3.40E+00	6.70E+00		7.90E-03	5.70E-01
21-SEP-83				6.50E+00	3.60E+01		1.20E-02	5.80E-01
05-DEC-83				0.00E-01*	2.80E+01		4.40E-03	5.80E-01
3 1 6								
22-MAR-83					6.70E+00		8.60E-03	2.60E-01
21-JUN-83				2.20E+00	6.70E+00		8.80E-03	5.50E-01
21-SEP-83				1.30E+01	6.70E+00		2.40E-03	6.40E-01
02-DEC-83				0.00E-01*	1.80E+01		9.50E-03	4.30E-01
3 2 1								
22-MAR-83					6.70E+00		4.20E-03	4.20E-01
21-JUN-83				7.30E+00	3.90E+01		5.10E-03	3.60E-01
21-SEP-83				0.00E-01*	6.70E+00		1.50E-02	4.60E-01
02-DEC-83				3.90E+00	6.70E+00		6.10E-03	4.20E-01
3 2 2								
22-MAR-83					1.20E+01		4.20E-03	4.30E-01
20-JUN-83			0.00E-01*	0.00E-01*	1.50E+01		3.20E-03	2.80E-01
21-SEP-83				8.20E+00	2.10E+01		1.30E-03	7.00E-01
02-DEC-83				0.00E-01*	1.30E+01		9.50E-03	7.10E-01
3 2 3								
21-MAR-83					6.70E+00			2.90E-01
20-JUN-83			0.00E-01*	0.00E-01*	6.70E+00		1.90E-03	3.10E-01
19-SEP-83				0.00E-01*	1.10E+01		2.10E-03	4.40E-01
05-DEC-83				1.50E+00	6.70E+00		1.30E-03	3.80E-01
3 3 1								
21-MAR-83					6.70E+00			4.30E-01

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
3 3 1 20-JUN-83 19-SEP-83 05-DEC-83			0.00E-01*	0.00E-01* 0.00E-01* 0.00E-01*	1.70E+01 6.70E+00 6.70E+00		3.90E-03 1.90E-03 6.70E-03	2.10E-01 3.10E-01 2.60E-01
3 3 2 22-MAR-83 21-JUN-83 21-SEP-83 06-DEC-83				1.10E+01 0.00E-01* 0.00E-01*	6.70E+00 1.10E+01 6.70E+00 6.70E+00		5.70E-03 3.00E-03 2.40E-02 6.90E-03	4.00E-01 4.80E-01 3.80E-01 3.10E-01
3 3 3 21-MAR-83 20-JUN-83 19-SEP-83 05-DEC-83			0.00E-01*	0.00E-01* 0.00E-01* 0.00E-01*	6.70E+00 1.10E+01 6.70E+00 6.70E+00		6.00E-03 6.70E-03 5.00E-03 7.70E-03	2.10E-01 2.00E-01 3.30E-01 2.40E-01
3 3 6 31-JAN-83 15-FEB-83 21-MAR-83 18-APR-83 19-MAY-83 20-JUN-83 21-JUL-83 17-AUG-83 19-SEP-83 08-OCT-83 14-NOV-83 05-DEC-83			0.00E-01*	0.00E-01* 4.40E+01 2.50E-01 0.00E-01* 0.00E-01* 0.00E-01* 0.00E-01* 0.00E-01* 7.70E-01 6.20E+00 0.00E-01*	1.20E+01 6.70E+00 6.70E+00 1.20E+01 1.20E+01 1.20E+01 6.70E+00 6.70E+00 6.70E+00 6.70E+00 6.70E+00 1.30E+01		3.90E-03 4.30E-03 8.20E-03 1.00E-02 7.40E-03 7.90E-03 3.50E-03 3.00E-03 5.00E-03 1.10E-03 8.80E-03 1.10E-02	3.20E-01 3.10E-01 2.80E-01 2.90E-01 2.30E-01 2.00E-01 3.00E-01 3.00E-01 3.20E-01 4.30E-01 3.60E-01 3.00E-01
3 3 7 31-JAN-83 15-FEB-83 22-MAR-83 18-APR-83 19-MAY-83 21-JUN-83 21-JUL-83 17-AUG-83				2.30E+00 7.00E+01 0.00E-01* 0.00E-01* 0.00E-01*	1.00E+01 6.70E+00 2.30E+01 6.90E+00 1.20E+01 6.70E+00 1.90E+01 1.70E+01		3.00E-03 3.00E-03 8.20E-03 7.80E-03 1.10E-02 9.10E-03 5.50E-03 3.50E-03	2.80E-01 2.50E-01 2.80E-01 2.50E-01 3.80E-01 3.80E-01 3.10E-01 3.40E-01

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
3 3 7								
21-SEP-83				4.80E+00	1.10E+01		0.00E-01	4.30E-01
08-OCT-83				1.30E+01	1.20E+01		0.00E-01	4.30E-01
14-NOV-83				4.90E+00	6.70E+00		9.00E-03	3.90E-01
06-DEC-83				3.90E+00	1.40E+01		3.50E-03	3.50E-01
3 3 9								
21-MAR-83		1.40E+00			6.70E+00		1.50E-03	5.00E-01
20-JUN-83		8.20E-01	0.00E-01*	6.90E+00	1.30E+01		2.10E-03	2.10E-01
21-SEP-83		2.10E+00		4.50E+00	1.90E+01		1.30E-03	3.60E-01
02-DEC-83		2.80E+00		9.60E+00	6.70E+00		5.80E-03	
3 3 10								
21-MAR-83		1.60E+00			6.70E+00		1.30E-03	4.40E-01
20-JUN-83		1.50E+00	0.00E-01*	2.30E+00	1.30E+01		1.40E-03	1.50E-01
19-SEP-83		1.70E+00		3.30E+00	1.20E+01		1.30E-03	4.80E-01
05-DEC-83		1.20E+00		0.00E-01*	2.00E+01		6.10E-03	3.60E-01
3 3 11								
22-MAR-83		7.30E+00			2.00E+01		4.00E-03	3.70E-01
20-JUN-83		5.50E+00	0.00E-01*	2.10E+00	1.90E+01			1.40E-01
21-SEP-83		5.60E+00		8.50E+00	1.80E+01		0.00E-01	3.50E-01
05-DEC-83		4.20E+00		0.00E-01*	2.90E+01		0.00E-01	3.40E-01
3 3 12								
31-JAN-83		2.90E+00			2.70E+01		6.40E-03	3.50E-01
15-FEB-83		1.70E+00		1.10E+01	2.40E+01		5.10E-03	3.90E-01
21-MAR-83		3.50E+00			2.30E+01		6.60E-03	3.90E-01
18-APR-83		6.00E+00		1.10E+01	1.50E+01		9.50E-03	3.40E-01
19-MAY-83		1.70E+00		7.40E+00	1.40E+01		5.50E-03	3.30E-01
20-JUN-83		3.10E+00	0.00E-01*	0.00E-01*	1.70E+01		5.60E-03	8.30E-01
21-JUL-83		2.20E+00		0.00E-01*	2.50E+01		6.90E-03	3.60E-01
17-AUG-83		2.00E+00		0.00E-01*	3.40E+01		5.50E-03	5.20E-01
21-SEP-83		1.90E+00		0.00E-01*	3.40E+01		2.40E-03	4.10E-01
30-SEP-83		1.50E+00		8.10E+00	3.20E+01		1.40E-03	4.30E-01
31-OCT-83		3.40E+00		2.60E+01	2.70E+01		6.90E-03	4.80E-01
02-DEC-83		1.80E+00		0.00E-01*	3.00E+01		1.00E-02	3.10E-01

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
3 4 1 21-MAR-83 20-JUN-83 19-SEP-83 05-DEC-83			0.00E-01*	0.00E-01* 0.00E-01* 0.00E-01*	1.60E+01 1.60E+01 6.70E+00 1.10E+01		4.10E-03 5.60E-03 5.80E-03 1.10E-02	3.20E-01 1.50E-01 3.30E-01 2.90E-01
3 4 7 21-MAR-83 20-JUN-83 19-SEP-83 05-DEC-83			0.00E-01*	4.60E+00 9.20E+00 0.00E-01*	1.80E+01 2.40E+01 2.40E+01 2.90E+01		1.70E-03 3.70E-03 7.10E-03 1.10E-02	4.00E-01 1.10E-01 4.60E-01 3.50E-01
3 4 9 21-MAR-83 20-JUN-83 21-SEP-83 02-DEC-83		2.20E+00 9.40E-01 2.30E+00 2.40E+00	0.00E-01*	0.00E-01* 5.80E+00 2.00E+00	6.70E+00 1.40E+01 1.80E+01 1.60E+01		1.30E-03 7.40E-04 8.80E-03 6.40E-03	4.10E-01 3.50E-01 4.70E-01 3.10E-01
3 4 10 21-MAR-83 20-JUN-83 19-SEP-83 05-DEC-83		5.30E+00 6.70E+00 1.50E+00 2.00E+00	0.00E-01*	0.00E-01* 0.00E-01* 0.00E-01*	6.70E+00 1.50E+01 2.40E+01 2.00E+01		1.30E-03 3.00E-03 7.10E-03 1.00E-03	3.80E-01 3.00E-01 4.20E-01 3.10E-01
3 5 1 22-MAR-83 23-JUN-83 21-SEP-83 02-DEC-83				1.10E+01 0.00E-01* 3.40E+00	6.70E+00 1.00E+01 6.70E+00 6.70E+00		7.80E-03 3.80E-03 1.90E-03 7.90E-03	3.30E-01 2.30E-01 4.00E-01 2.90E-01
3 6 1 22-MAR-83 21-JUN-83 21-SEP-83 02-DEC-83				3.60E+00 0.00E-01* 1.30E+01	6.70E+00 6.70E+00 6.70E+00 6.70E+00		4.10E-03 6.20E-03 3.90E-03 9.50E-03	2.80E-01 3.30E-01 3.50E-01 2.40E-01
3 8 1 22-MAR-83					6.70E+00		2.30E-03	2.70E-01

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
3 8 1 21-JUN-83 21-SEP-83 02-DEC-83				5.90E+00 0.00E-01* 9.90E+00	6.70E+00 6.70E+00 6.70E+00		4.40E-03 4.50E-03 8.80E-03	3.10E-01 2.90E-01 2.30E-01
3 8 2 22-MAR-83 21-JUN-83 21-SEP-83 02-DEC-83				2.50E+00 0.00E-01* 3.80E+00	6.70E+00 6.70E+00 6.70E+00		3.80E-03 7.20E-03 5.00E-03 1.10E-02	2.80E-01 3.80E-01 4.50E-01 3.00E-01
3 8 3 22-MAR-83 21-JUN-83 21-SEP-83 02-DEC-83				7.60E+00 2.20E+00 0.00E-01* 3.00E+00	6.70E+00 6.70E+00 6.70E+00 6.70E+00		6.00E-03 4.80E-03 2.60E-03 7.70E-03	3.20E-01 3.00E-01 4.90E-01 3.00E-01
3 8 4 22-MAR-83 21-JUN-83 21-SEP-83 02-DEC-83				6.80E-01 8.70E+00 0.00E-01*	6.70E+00 1.10E+01 6.70E+00 6.70E+00		6.30E-03 5.40E-03 0.00E-01 9.20E-03	2.90E-01 2.60E-01 4.10E-01 3.00E-01
6 15 15B 06-JUN-83 07-SEP-83 19-NOV-83				4.10E-01 0.00E-01* 1.00E+01				
6 15 26 08-JUN-83 31-AUG-83 27-DEC-83			2.00E+00	4.70E+00 0.00E-01*				
6 17 5 07-JUN-83 01-SEP-83 21-NOV-83				0.00E-01* 0.00E-01* 1.50E+00				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
6 S30E15A								
15-MAR-83					6.70E+00		3.00E-03	1.70E-01
06-JUN-83					6.70E+00		1.20E-02	2.70E-01
02-SEP-83					6.70E+00		2.40E-03	1.30E-01
19-NOV-83					6.70E+00		5.70E-03	1.20E-01
6 S29 E12								
15-MAR-83					6.70E+00			2.60E-01
06-JUN-83					6.70E+00			2.00E-01
02-SEP-83					6.70E+00			2.60E-01
19-NOV-83					6.70E+00			2.90E-01
6 S27 E14								
31-JAN-83					6.70E+00		3.70E-03	2.10E-01
15-FEB-83					6.70E+00		3.00E-03	2.10E-01
21-MAR-83					6.70E+00		3.50E-03	2.10E-01
18-APR-83					3.90E+00		6.10E-03	1.80E-01
19-MAY-83					3.60E+00		1.20E-02	7.80E-02
21-JUN-83					6.70E+00		5.40E-03	2.00E-01
21-JUL-83					6.70E+00		2.30E-03	1.90E-01
17-AUG-83					6.70E+00		1.40E-03	1.90E-01
19-SEP-83				0.00E-01*	6.70E+00		4.50E-03	2.80E-01
08-OCT-83					6.70E+00		0.00E-01	2.80E-01
31-OCT-83					6.70E+00		6.10E-03	2.80E-01
02-DEC-83					6.70E+00		7.50E-03	2.30E-01
6 S19 E13								
15-MAR-83					6.70E+00			2.80E-01
07-JUN-83					6.70E+00			1.80E-02
02-SEP-83					6.70E+00			2.70E-01
13-DEC-83					6.70E+00			3.30E-01
6 S18 51								
18-FEB-83								8.00E+00
24-MAY-83								5.50E+00
02-AUG-83								7.50E+00
14-NOV-83								7.50E+00

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
6 S6 E4B								
15-MAR-83					6.70E+00			
08-JUN-83					6.70E+00			
07-SEP-83					6.70E+00			
19-NOV-83					6.70E+00			
6 S6 E4D								
15-MAR-83					6.70E+00			
08-JUN-83					6.70E+00			
07-SEP-83					6.70E+00			
19-NOV-83					6.70E+00			
6 S1 7B								
08-JUN-83				0.00E-01*				
19-SEP-83				1.50E+00				
6 S0 8								
08-JUN-83				2.30E+00				
19-SEP-83				0.00E-01*				
6 S0 7								
23-MAR-83				6.80E+00				
08-JUN-83				1.60E+00				
19-SEP-83				2.10E+00				
6 2 3								
18-APR-83				8.80E+00				
12-JUL-83				3.80E+00				
30-SEP-83				3.70E+01				
6 8 17								
06-JUN-83				8.40E-01				
31-AUG-83				0.00E-01*				
19-NOV-83				8.40E-01				
6 8 25								
08-JUN-83				8.40E-01				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
6 8 25 31-AUG-83 21-NOV-83				0.00E-01* 6.90E+00				
6 13 1C 09-MAY-83 08-NOV-83				0.00E-01* 0.00E-01*				
6 15 15B 06-JUN-83 07-SEP-83 19-NOV-83				4.10E-01 0.00E-01* 1.00E+01				
6 15 26 08-JUN-83 31-AUG-83 27-DEC-83			2.00E+00	4.70E+00 0.00E-01*				
6 17 5 07-JUN-83 01-SEP-83 21-NOV-83				0.00E-01* 0.00E-01* 1.50E+00				
6 20 E5A 10-JUN-83 12-SEP-83 27-DEC-83			6.80E-01	0.00E-01* 3.00E+00				
6 20 20 16-MAR-83 08-JUN-83 07-SEP-83 29-NOV-83				7.30E+00 6.50E+00 0.00E-01* 2.10E+01				
6 24 33 14-JUN-83 07-SEP-83				1.20E+01 0.00E-01*				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
6 24 33 30-NOV-83				0.00E-01*				
6 26 15A 16-MAR-83 09-JUN-83 12-SEP-83 13-DEC-83				1.20E+01 6.30E+00 8.60E+00 6.90E+00				
6 27 8 23-MAR-83 07-JUN-83 01-SEP-83 01-DEC-83				1.70E+01 1.20E+01 8.50E+00 1.30E+01				
6 28 40 14-JUN-83 12-SEP-83				8.40E+00 5.10E+00				
6 28 40P 14-JUN-83 12-SEP-83				0.00E-01* 1.80E+01				
6 28 52A 21-JUN-83 13-SEP-83 30-NOV-83				5.20E-01 5.90E+00 2.00E+00				
6 31 31 14-JUN-83 12-SEP-83				1.10E+01 2.80E+00				
6 31 31P 14-JUN-83 12-SEP-83				1.60E+01 1.60E+00				

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

(CY 1983)

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
6 31 53B 03-JAN-83 14-JUN-83 27-DEC-83	1.70E+01		3.50E+00	4.90E+00				
6 49 55A 08-JUL-83 04-OCT-83				3.90E+00 2.00E+01				
6 49 57 18-JAN-83 13-APR-83 08-JUL-83 04-OCT-83				1.30E+02 1.10E+01 6.60E+01 1.10E+02				
6 50 53 13-APR-83 08-JUL-83 04-OCT-83				1.00E+01 1.10E+01 1.50E+01				
6 53 47A 11-JAN-83 18-JAN-83 28-FEB-83 30-MAR-83 14-APR-83 10-MAY-83 16-JUN-83 06-JUL-83 08-AUG-83 06-SEP-83 12-OCT-83 07-NOV-83 23-NOV-83		2.51E+01 3.45E+01 2.13E+01 2.20E+01 2.20E+01 2.94E+01 2.78E+01 3.25E+01 3.26E+01 5.07E+01 3.62E+01 4.51E+01 4.03E+01	1.87E+00 0.00E-01* 3.72E+00 2.08E+00 0.00E-01* 2.35E+00 0.00E-01* 6.12E+00 3.32E+00 1.41E+00 3.79E-01 0.00E-01* 4.80E+00	4.69E+00 3.85E+00 1.04E+01 0.00E-01* 0.00E-01* 2.54E+00 3.34E+00 1.10E+00 1.71E+00 0.00E-01* 0.00E-01* 0.00E-01* 4.46E+00 0.00E-01		0.00E-01* 4.93E+01 1.89E+00 1.22E+00 1.74E+01 0.00E-01* 0.00E-01* 0.00E-01* 0.00E-01* 0.00E-01* 0.00E-01* 9.59E+00 7.25E+00		
6 53 55A 11-JAN-83 18-JAN-83 28-FEB-83		0.00E-01* 0.00E-01* 1.18E+00	9.18E+00 1.23E+01 5.95E+00	1.10E+00 5.57E+00 2.19E+00		4.72E+01 8.88E+01 4.15E+00		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

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WELL NO. DATE	TOTAL ALPHA PCI/L	STRONTIUM PCI/L	CESIUM PCI/L	COBALT PCI/L	URANIUM PCI/L	RUTHENIUM PCI/L	CHROMIUM MG/L	FLUORIDE MG/L
-----	-----	-----	-----	-----	-----	-----	-----	-----
6 53 55A								
30-MAR-83		5.01E+00	0.00E-01*	6.41E-01		3.67E+00		
14-APR-83		9.27E-02	1.87E+00	3.36E+00		0.00E-01*		
10-MAY-83		0.00E-01*	0.00E-01*	3.39E+00		1.77E+01		
16-JUN-83		0.00E-01*	0.00E-01*	0.00E-01*		9.80E+00		
06-JUL-83		0.00E-01*	1.25E+01	0.00E-01*		0.00E-01*		
08-AUG-83		0.00E-01*	3.16E+00	0.00E-01*		4.50E+01		
06-SEP-83		6.68E-01	0.00E-01*	6.57E+00		3.55E+01		
12-OCT-83		3.66E+00	1.90E+00	5.64E+00		3.60E+01		
07-NOV-83		0.00E-01*	0.00E-01*	0.00E-01*		1.81E+01		
23-NOV-83		0.00E-01*	5.67E+00	3.68E+00		0.00E-01		

* -- NEGATIVE ANALYTICAL VALUES APPEAR AS ZEROES

APPENDIX C
CHEMICAL AND SPECTROGRAPHIC ANALYSES
FROM VARIOUS WELL SAMPLES

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

Constituents	Units	Wells				
		399-1-1	399-2-1	399-3-1	699-10-E12	699-39-E3
Alk. Tot. Lab.	mg/l	62	55	59	178	120
Aluminum	µg/l	<50	<50	<50	<50	<50
Antimony	µg/l	<30	<30	<30	30	<30
Arsenic	µg/l	1	1	1	5	5
Barium	µg/l	50	50	55	50	30
Beryllium	µg/l	<1	<1	<1	<1	<1
Bicarbonate, field	mg/l	74	69	49	221	143
Bismuth	µg/l	<1000	<1000	<1000	<1000	<1000
Boron	µg/l	50	50	50	30	30
Bromide	mg/l	0.04	<0.01	0.01	0.04	0.04
Cadmium	µg/l	<1	1	<1	<1	<1
Calcium	mg/l	26	19	22	49	31
Carbonate, field	mg/l	0.0	0.0	0.0	0.0	0.0
Carbon dioxide	mg/l	4.7	14	39	5.6	2.9
Chloride	mg/l	7.9	9.8	8.5	9.4	6.0
Chromium	µg/l	<50	<50	<50	<50	<50
Chromium hex.	µg/l	<1	<1	<1	<1	<1
Cobalt	µg/l	<5	<5	<5	<5	<5
Color	PT-CO	<1	<1	<1	<1	<1
Copper	µg/l	<10	<10	<10	<10	<10
Cyanide	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/l	0.5	0.5	0.4	0.3	0.3
Gallium	µg/l	<30	<30	<30	<30	<30
Germanium	µg/l	<30	30	<30	70	50
Hardness	mg/l	84	64	73	188	123
Hardness, noncarb.	mg/l	22	9	14	10	3
Iodide	mg/l	0.002	0.002	0.002	0.002	<0.001
Iron	µg/l	7	50	10	10	10
Lead	µg/l	<30	<30	<30	<30	<30
Lithium	µg/l	<5	<5	<5	10	10
Magnesium	mg/l	4.7	4.1	4.5	16	11
Manganese	µg/l	3	1	<1	5	7
Molybdenum	µg/l	<10	<10	<10	<10	<10
Nickel	µg/l	<50	—	<50	<50	<50
Nitrogen (NO ₂ as N)	mg/l	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrogen (NO ₂ + NO ₃ as N)	mg/l	4.4	2.6	3.3	4.1	5.1
Nitrogen (NH ₄ as N)	mg/l	<0.060	<0.060	<0.060	<0.060	<0.060
pH field		7.4	6.9	6.3	7.8	7.9
Phosphorus, dissolved	mg/l	0.080	0.100	0.120	.030	0.030
Potassium	mg/l	2.2	2.6	2.9	5.9	5.0
Solids, residue at 180°C	mg/l	130	116	124	274	201
Solids, sum of constit.	mg/l	119	111	109	278	195
Selenium	µg/l	1	<1	<1	3	2
Silica	mg/l	13	13	15	42	36
Silver	µg/l	<10	<10	<10	<10	<10
Sodium	mg/l	9.7	11	12	19	15
Sodium adsorption ratio		0.5	0.6	0.6	0.6	0.6
Sodium percent		20	26	25	17	20
Sp conductance field	µmhos	212	183	200	424	310
Strontium	µg/l	100	100	100	300	300
Sulfate	mg/l	18	17	19	28	20
Tin	µg/l	50	<50	70	100	100
Titanium	µg/l	<5	<5	<5	<5	<5
Turbidity	NTU	0.20	0.50	0.20	0.20	2.8
Vanadium	µg/l	<10	<10	<10	10	10
Water temp.	°C	17.1	17.1	16.4	17.8	17.0
Zinc	µg/l	10	10	<9	10	<9
Zirconium	µg/l	<5	<5	<5	<5	<5
Cesium-137	pCi/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt-60	pCi/l	<1.0	<1.0	<1.0	<1.0	<1.0
Gross Alpha, U-Nat	µg/l	34	20	20	<8.3	<6.6
Gross Beta, Cs-137	pCi/l	16	11	11	7.4	12
Gross Beta, Sr/Y-90	pCi/l	16	11	11	7.2	12
Strontium-90	pCi/l	<0.4	<0.4	<0.4	<0.4	0.5
Tritium	pCi/l	430	3450	<200	8760	9000

Table C.1 Contd

Constituents	Units	Wells				
		699-39-1	699-40-1	699-40-33	699-41-1	699-43-3
Alk. Tot. Lab.	mg/l	124	129	172	128	130
Aluminum	µg/l	<50	<50	<50	<50	<50
Antimony	µg/l	<30	30	<30	<30	<30
Arsenic	µg/l	5	6	10	5	5
Barium	µg/l	70	70	100	70	50
Beryllium	µg/l	<1	<1	<1	<1	<1
Bicarbonate, field	mg/l	159	157	215	155	157
Bismuth	µg/l	<1000	<1000	<1000	<1000	<1000
Boron	µg/l	30	30	50	30	30
Bromide	mg/l	0.04	<0.04	0.02	0.01	0.05
Cadmium	µg/l	<1	1	<1	1	<1
Calcium	mg/l	43	44	16	42	41
Carbonate, field	mg/l	0.0	0.0	0.0	0.0	0.0
Carbon dioxide	mg/l	4.0	3.1	3.4	2.5	4.0
Chloride	mg/l	11	12	6.9	12	12
Chromium	µg/l	<50	<50	<50	<50	<50
Chromium hex.	µg/l	3	6	<1	<1	4
Cobalt	µg/l	<5	<5	<5	<5	<5
Color	PT-CO	<1	<1	<1	<1	<1
Copper	µg/l	<10	<10	<10	<10	<10
Cyanide	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/l	0.4	0.4	0.9	0.4	0.4
Gallium	µg/l	<30	<30	<30	<30	<30
Germanium	µg/l	50	70	<30	50	50
Hardness	mg/l	157	159	56	154	152
Hardness, noncarb.	mg/l	33	30	0	26	22
Iodide	mg/l	0.001	0.002	0.010	<0.001	0.002
Iron	µg/l	5	10	100	7	7
Lead	µg/l	<30	<30	<30	<30	<30
Lithium	µg/l	7	10	10	10	10
Magnesium	mg/l	12	12	4.0	12	12
Manganese	µg/l	1	<1	50	<1	1
Molybdenum	µg/l	<10	<10	<10	<10	<10
Nickel	µg/l	<50	<50	<50	<50	<50
Nitrogen (NO ₂ as N)	mg/l	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrogen (NO ₂ + NO ₃ as N)	mg/l	7.7	6.9	<0.10	7.0	6.1
Nitrogen (NH ₄ as N)	mg/l	<0.060	<0.060	<0.060	<0.060	<0.060
pH field		7.8	7.9	8.0	8.0	7.8
Phosphorus, dissolved	mg/l	0.020	0.040	0.040	0.020	0.020
Potassium	mg/l	5.7	5.7	7.1	5.6	5.1
Solids, residue at 180°C	mg/l	258	265	219	264	258
Solids, sum of constit.	mg/l	242	242	242	240	243
Selenium	µg/l	2	2	<1	2	2
Silica	mg/l	38	38	44	38	38
Silver	µg/l	<10	<10	<10	<10	<10
Sodium	mg/l	18	18	56	19	20
Sodium adsorption ratio		0.6	0.6	3.4	0.7	0.7
Sodium percent		19	19	65	20	22
Sp conductance field	µmhos	390	393	320	390	390
Strontium	µg/l	300	300	100	300	300
Sulfate	mg/l	36	35	0.8	35	37
Tin	µg/l	<50	100	<50	100	100
Titanium	µg/l	<5	<5	<5	<5	<5
Turbidity	NTU	0.40	0.20	0.50	0.30	3.9
Vanadium	µg/l	10	10	<10	10	10
Water temp.	°C	18.4	17.8	18.1	17.7	18.0
Zinc	µg/l	<9	<9	10	<9	<9
Zirconium	µg/l	<5	<5	<5	<5	<5
Cesium-137	pCi/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt-60	pCi/l	9.0	9.0	<1.0	9.0	7.0
Gross Alpha, U-Nat	µg/l	<9.5	13	<5.3	<8.8	8.0
Gross Beta, Cs-137	pCi/l	37	30	6.4	54	26
Gross Beta, Sr/Y-90	pCi/l	36	26	5.5	52	25
Strontium-90	pCi/l	0.5	<0.4	<0.4	0.7	0.8
Tritium	pCi/l	235,000	221,000	<200	238,000	177,000

Table C.1 Contd

Constituents	Units	Wells				
		699-44-4	699-45-4	699-46-5	699-47-6	699-48-7
Alk. Tot. Lab.	mg/l	128	122	123	124	73
Aluminum	µg/l	<50	<50	<50	<50	<50
Antimony	µg/l	<30	30	<30	30	<30
Arsenic	µg/l	6	6	5	4	<1
Barium	µg/l	50	30	50	30	30
Beryllium	µg/l	<1	<1	<1	<1	<1
Bicarbonate, field	mg/l	155	152	149	151	86
Bismuth	µg/l	<1000	<1000	<1000	<1000	<1000
Boron	µg/l	30	30	30	30	10
Bromide	mg/l	0.04	0.05	0.04	0.04	<0.01
Cadmium	µg/l	<1	1	<1	1	<1
Calcium	mg/l	44	40	42	37	22
Carbonate, field	mg/l	0.0	0.0	0.0	0.0	0.0
Carbon dioxide	mg/l	3.9	4.8	12	4.8	6.8
Chloride	mg/l	14	13	14	7.4	1.4
Chromium	µg/l	<50	<50	<50	<50	<50
Chromium hex.	µg/l	6	5	5	<1	<1
Cobalt	µg/l	<5	<5	<5	<5	<5
Color	PT-CO	<1	<1	<1	<1	<1
Copper	µg/l	<10	<10	<10	<10	<10
Cyanide	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/l	0.4	0.4	0.4	0.4	0.2
Gallium	µg/l	<30	<30	<30	<30	<30
Germanium	µg/l	70	70	70	50	30
Hardness	mg/l	159	145	158	125	76
Hardness, noncarb.	mg/l	31	23	35	1	3
Iodide	mg/l	0.002	0.001	0.002	0.002	<0.001
Iron	µg/l	10	7	10	10	7
Lead	µg/l	<30	30	<30	<30	<30
Lithium	µg/l	10	10	10	7	<5
Magnesium	mg/l	12	11	13	8.0	5.2
Manganese	µg/l	<1	<1	<1	1	<1
Molybdenum	µg/l	<10	10	<10	<10	<10
Nickel	µg/l	<50	<50	<50	<50	<50
Nitrogen (NO ₂ as N)	mg/l	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrogen (NO ₂ + NO ₃ as N)	mg/l	6.9	5.5	5.4	2.3	0.31
Nitrogen (NH ₄ as N)	mg/l	<0.060	<0.060	<0.060	0.070	<0.060
pH field		7.8	7.7	7.3	7.7	7.3
Phosphorus, dissolved	mg/l	0.030	0.030	0.020	0.050	0.020
Potassium	mg/l	5.4	5.2	5.2	4.4	1.4
Solids, residue at 180°C	mg/l	266	244	275	217	102
Solids, sum of constit.	mg/l	244	236	257	216	108
Selenium	µg/l	2	2	3	2	1
Silica	mg/l	38	36	37	32	15
Silver	µg/l	<10	<10	<10	<10	<10
Sodium	mg/l	19	18	22	21	6.6
Sodium adsorption ratio		0.7	0.7	0.8	0.8	0.3
Sodium percent		20	21	22	26	16
Sp conductance field	µmhos	385	379	410	320	165
Strontium	µg/l	300	300	300	100	100
Sulfate	mg/l	35	38	50	31	14
Tin	µg/l	100	100	100	100	70
Titanium	µg/l	<5	<5	<5	<5	<5
Turbidity	NTU	0.30	0.70	35	0.20	0.20
Vanadium	µg/l	10	30	10	10	<10
Water temp.	°C	17.8	17.1	17.5	17.1	11.3
Zinc	µg/l	10	<9	<9	<9	<9
Zirconium	µg/l	<5	<5	<5	<5	<5
Cesium-137	pCi/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt-60	pCi/l	8.0	5.0	8.0	<1.0	<1.0
Gross Alpha, U-Nat	µg/l	14	12	<8.8	<5.4	<3.1
Gross Beta, Cs-137	pCi/l	27	24	73	8.2	1.9
Gross Beta, Sr/Y-90	pCi/l	23	21	63	7.9	1.9
Strontium-90	pCi/l	<0.4	<0.4	<0.4	<0.4	0.5
Tritium	pCi/l	209,000	126,000	216,000	45,000	430

Table C.1 Contd

Constituents	Units	Wells			
		699-49-13	699-67-98	699-72-88	699-72-92
Alk. Tot. Lab.	mg/l	138	129	101	111
Aluminum	µg/l	<50	<50	<50	<50
Antimony	µg/l	<30	30	<30	<30
Arsenic	µg/l	6	2	2	1
Barium	µg/l	30	10	30	30
Beryllium	µg/l	<1	<1	<1	<1
Bicarbonate, field	mg/l	172	161	127	141
Bismuth	µg/l	<1000	<1000	<1000	<1000
Boron	µg/l	30	30	30	10
Bromide	mg/l	0.03	0.06	0.03	0.05
Cadmium	µg/l	<1	1	<1	<1
Calcium	mg/l	34	38	38	36
Carbonate, field	mg/l	0.0	0.0	0.0	0.0
Carbon dioxide	mg/l	5.5	5.1	6.4	4.5
Chloride	mg/l	4.6	6.7	6.9	6.0
Chromium	µg/l	<50	<50	<50	<50
Chromium hex.	µg/l	<1	<1	21	<1
Cobalt	µg/l	<5	<5	<5	<5
Color	PT-CO	<1	<1	<1	<1
Copper	µg/l	<10	<10	<10	<10
Cyanide	mg/l	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/l	0.4	0.3	0.2	0.2
Gallium	µg/l	<30	<30	<30	<30
Germanium	µg/l	—	50	50	<30
Hardness	mg/l	115	136	126	127
Hardness, noncarb.	mg/l	0	7	25	16
Iodide	mg/l	0.002	<0.001	0.001	<0.002
Iron	µg/l	10	10	7	<5
Lead	µg/l	<30	<30	<30	<30
Lithium	µg/l	7	10	7	<5
Magnesium	mg/l	7.2	10	7.6	9.1
Manganese	µg/l	3	<1	<1	<1
Molybdenum	µg/l	<10	<10	<10	<10
Nickel	µg/l	<50	<50	<50	<50
Nitrogen (NO ₂ as N)	mg/l	<0.020	<0.020	<0.020	<0.020
Nitrogen (NO ₂ + NO ₃ as N)	mg/l	1.3	0.90	0.81	1.2
Nitrogen (NH ₄ as N)	mg/l	<0.060	<0.060	<0.060	<0.060
pH field		7.7	7.7	7.5	7.7
Phosphorus, dissolved	mg/l	0.050	0.040	0.060	0.030
Potassium	mg/l	5.5	4.5	4.3	4.1
Solids, residue at 180°C	mg/l	208	193	188	185
Solids, sum of constit.	mg/l	221	207	198	191
Selenium	µg/l	1	1	1	1
Silica	mg/l	35	35	34	32
Silver	µg/l	<10	<10	<10	<10
Sodium	mg/l	27	13	9.7	8.6
Sodium adsorption ratio		1.1	0.5	0.4	0.3
Sodium percent		33	17	14	12
Sp conductance field	µmhos	321	290	282	282
Strontium	µg/l	100	100	100	100
Sulfate	mg/l	23	20	35	26
Tin	µg/l	70	100	100	<50
Titanium	µg/l	<5	<5	<5	<5
Turbidity	NTU	0.40	0.20	0.30	0.90
Vanadium	µg/l	10	<10	<10	<10
Water temp.	°C	16.8	16.7	20.9	17.8
Zinc	µg/l	10	<9	<9	<9
Zirconium	µg/l	<5	<5	<5	<5
Cesium-137	pCi/l	<1.0	<1.0	<1.0	<1.0
Cobalt-60	pCi/l	<1.0	<1.0	<1.0	<1.0
Gross Alpha, U-Nat	µg/l	<6.5	<5.9	<4.6	<4.9
Gross Beta, Cs-137	pCi/l	7.3	3.4	4.2	4.4
Gross Beta, Sr/Y-90	pCi/l	7.1	2.9	4.0	4.2
Strontium-90	pCi/l	0.4	<0.4	<0.4	<0.4
Tritium	pCi/l	<200	<200	4210	2060

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