ENGINEERING CHANGE NOTICE

Page 1 of 2

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Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	M.J. Hartman, Geosciences, H6-06, 6-9924		14 Dec., 1992
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12. Description of Change

Document was rewritten to incorporate recent groundwater monitoring data.

13a. Justification (mark one)						
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13b. Justification Details

The report is to be resubmitted to the Department of Ecology. It includes new data that have become available for interpretation.

14. Distribution (include name, MSIN, and no. of copies)

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15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
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Cog. Mgr. R.L. Jackson	21 Dec 92	QA	
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7. Abstract

The 1301-N and 1324-N/NA facilities are regulated under the Resource Conservation and Recovery Act of 1976. Both facilities are currently under groundwater quality assessment monitoring programs [40 CFR 265.93(d)(4)]. This report presents the results of assessment monitoring, as required by 40 CFR 265.93(d)(5). The primary constituents of concern are sulfate and sodium. Available data indicate that no hazardous waste constituents from the facilities have entered the groundwater. It is recommended that the monitoring program for the 1301-N facility revert to an indicator evaluation program, and the 1324-N/NA assessment program be revised to investigate the cause of elevated TOX and TOC.

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9. Impact Level 4

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RECORD OF REVISION	(1) Document Number WHC-SD-EN-EV-003, rev. 1	Page /

(2) Title

Results of Groundwater Quality Assessment Monitoring at the 1301-N and 1324-N/NA Facilities

CHANGE CONTROL RECORD

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RESULTS OF GROUNDWATER QUALITY ASSESSMENT MONITORING AT THE 1301-N AND 1324-N/NA FACILITIES

1.0 INTRODUCTION

The 1301-N and 1324-N/NA facilities are located in the northern portion of the Hanford Site, in the 100-N Area. They are regulated under the *Resource Conservation and Recovery Act of 1976* (RCRA). Since 1989, both facilities have been monitored under groundwater quality assessment programs, described by Gilmore and Jensen (1989) and Gilmore (1989). The original version of this report, WHC-SD-EN-EV-003, Rev. 0 (Hartman 1990), presented the results of assessment monitoring as required by 40 CFR 265.93(d)(5). Revision 1 includes additional data gathered from 1990 to present.

Results of groundwater assessment indicate that no hazardous waste constituents from the 1301-N facility have entered the groundwater. The monitoring programs for the 1301-N facility will revert to an indicator evaluation program (40 CFR 265.93[d][6]). The assessment program for the 1324-N/NA facilities will be revised to investigate the cause of elevated total organic halogen and total organic carbon in downgradient wells.

1.1 DESCRIPTION OF THE FACILITIES

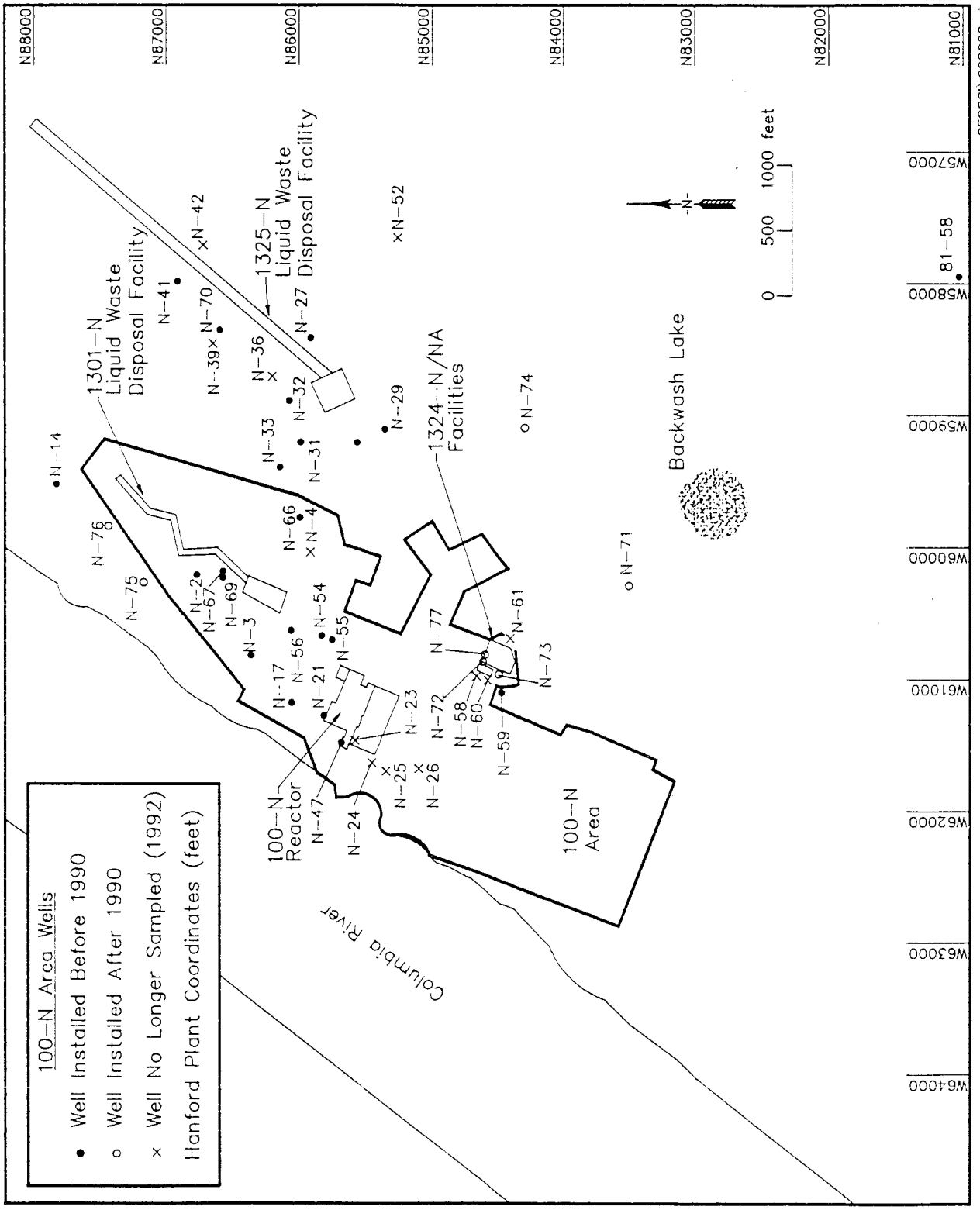
The 1301-N Liquid Waste Disposal Facility (LWDF) consists of a concrete trough connected to a rectangular basin and a long, zig-zag trench (Figure 1). The facility was used from 1962 until 1985. It is described in DOE (1987b).

The 1324-NA Percolation Pond is an unlined pond that was used to treat corrosive wastes from August 1977 to May 1986 and to dispose of neutralized wastes from May 1986 through the August 1990. The adjacent 1324-N Surface Impoundment was used to neutralize wastes from May 1986 to November 1988. It is a double-lined pond with a leachate collection system that currently is not in use. No leaks were detected throughout its period of use. The 1324-N and 1324-NA facilities are described in DOE (1986) and DOE (1987a), respectively.

The sediments in the vadose zone and uppermost aquifer in the 100-N Area are primarily unconsolidated gravel and sand, locally reworked by construction activities. Cobbles and boulders are common, particularly in the upper 20 ft of sediments. The base of the aquifer is believed to be a thick unit of interbedded hard silt, clay, and very dense sand, at a depth of approximately 110 ft (WPPSS 1974). Depth to groundwater beneath the 1301-N LWDF is approximately 70 ft. Changes in groundwater levels resulting from short-term fluctuations in the stage of the Columbia River are observed in wells near the river (Jensen 1987).

During the period of groundwater assessment, the hydrology of the 100-N Area was affected by artificial recharge from the 1324-NA Percolation Pond, the 1325-N LWDF, and the "backwash lake" (Figure 1). The backwash

Figure 1. Location of RCRA Facilities and Groundwater Monitoring Wells in the 100-N Area.



lake is a disposal site for filter backwash water from the 183-N Filtered Water Plant. It was put into service in 1983 and is not a hazardous waste facility. It is still used and receives effluent at an average of approximately 16,000 gallons per day.

Discharge to the 1325-N LWDF varied widely during 1988 and 1989 because of changes in the operation of N Reactor. Discharge to the 1325-N facility ceased in late 1991. In mid-1989, however, large volumes of liquid were disposed to the 1325-N LWDF (approximately 1.6 million gallons per day between May 11 and June 24). Artificial recharge from this liquid formed a groundwater mound that dominated groundwater flow in the 100-N Area.

Artificial recharge from the 1324-NA Percolation Pond also created a groundwater mound, although its influence was overshadowed by the larger 1325-N mound during most of 1989. Both groundwater mounds have largely dissipated because discharge to the facilities has ceased.

A *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) study is underway in the 100-N Area. Groundwater in the 100-N Area is part of the 100-NR-2 Operable Unit.

1.2 GROUNDWATER MONITORING AT THE 1301-N AND 1324-N/NA FACILITIES

Groundwater monitoring under RCRA at the 1301-N LWDF began in December 1987. Data collected from the first four quarters at the upgradient wells were used to determine background groundwater quality. Analyses of samples collected from downgradient wells in December 1988 were compared to background concentrations, in accordance with 40 CFR 265.92. Specific conductance was greater than background in downgradient well N-3. (The 100-N Area well numbers in this report are written without their 199- prefix.) The well was resampled, and elevated specific conductance was confirmed. The Washington State Department of Ecology was notified, and a groundwater quality assessment program (Gilmore and Jensen 1989) was developed and implemented as required by 40 CFR 265.93(d)(4).

The RCRA monitoring at the 1324-N/NA facility also began in December 1987. Data collected from the first four quarters at the upgradient well were used to determine background conditions. Analyses of samples collected from downgradient wells in March 1988 were compared to background concentrations. Specific conductance was greater than background in all of the four downgradient wells. It was not necessary to resample the wells to confirm the specific conductance values because they were consistent with the observed values throughout the first year. The Washington State Department of Ecology was notified, and a groundwater quality assessment program (Gilmore 1989) was developed and implemented as required by 40 CFR 265.93(d)(4).

The original indicator evaluation groundwater monitoring network for the 1301-N LWDF comprised two upgradient wells and five downgradient wells (Table 1). Eight wells were added to the 1301-N network in April 1989 to determine the source and extent of the elevated specific conductance in the groundwater. Five more wells were added to the monitoring network in

Table 1. Groundwater Monitoring Wells for the 1301-N and 1324-N/NA Sites, Initial Assessment Program.

Well	Comments
1301-N Liquid Waste Disposal Facility (Original Network)	
N-2	
N-3	
N-4	Upgradient well; went dry
N-14	
N-66	Upgradient well
N-67	
N-69	Monitors bottom of aquifer
1324-N/NA Facilities (Original Network)	
N-58	Went dry
N-59	
N-60	Went dry
N-61	Went dry
699-81-58	Upgradient well
Wells Monitored for Assessment Program	
N-16	Went dry
N-17	
N-18	Later removed from network
N-21	
N-23	Later removed from network
N-24	Went dry
N-25	Later removed from network
N-26	Later removed from network
N-47	
N-54	
N-55	
N-56	
N-57	Later used as upgradient well

May 1989, when assessment monitoring began at the 1324-N/NA facilities. These 13 wells provided groundwater quality assessment data for both the 1301-N and 1324-N/NA facilities. The assessment programs also increased the sampling frequency for selected constituents that could affect the specific conductance of the groundwater. Some of the assessment wells were later dropped from the network when they went dry or were no longer needed for assessment (Table 2).

2.0 WASTE CHARACTERISTICS

The wastes that were discharged to the 1301-N LWDF were generated in the N Reactor and associated facilities. Waste streams routed to the 1301-N LWDF are described more fully in DOE (1987b). Table 3 lists the results of chemical analysis of waste samples collected in August 1985. These wastes did not exhibit any dangerous waste characteristics and are not designated dangerous wastes as listed in WAC 173-303 (DOE 1987b). Radionuclide concentrations for 1985 are listed in Table 4. Major radioactive constituents include cobalt-60, cesium-137, strontium-90, and ruthenium-106. The 1301-N facility stopped receiving wastes in September 1985, when the wastes were diverted to the 1325-N LWDF.

The 1324-NA Percolation Pond was put into service in August 1977 to treat corrosive hazardous waste. The waste came from regeneration of cation and anion exchange column resins in the 163-N Demineralization Plant and, before 1983, from filter backwash water from the 183-N Filtered Water Plant. The wastes were treated in the 1324-NA Percolation Pond by the alternate addition of acidic cation column regeneration wastes and alkaline anion column regeneration wastes. Alternately adding adding low-pH and high-pH wastes partially neutralized the wastes in the pond. Use of the 1324-NA Percolation Pond as a treatment facility was discontinued in May 1986, when the 1324-N Surface Impoundment was used for this purpose.

The 1324-N Surface Impoundment was taken out of service in November 1988, when it was replaced by an elementary neutralization vessel. The 1324-NA Percolation Pond remained an active disposal facility for the treated wastes until August 1990.

The waste streams discharged to the 1324-N/NA facilities in the past included solutions of sodium hydroxide and sulfuric acid with pH varying from >12 to <2. The waste stream had high concentrations of sulfate, sodium, calcium, chloride, and magnesium. Table 5 is a partial listing of a chemical analysis of the waste stream. No listed hazardous wastes were present in the waste stream, but because of corrosivity, the waste was designated hazardous. The 1324-NA waste characteristics are described more fully in DOE (1987a) and WHC (1989).

3.0 RESULTS OF GROUNDWATER QUALITY ASSESSMENT

The groundwater quality assessment plans for 1301-N and 1324-N/NA (Gilmore and Jensen 1989; Gilmore 1989) describe a phased approach of investigation. Phase one for each project involved adding a number of wells

Table 2. Groundwater Monitoring Wells for the 1301-N and 1324-N/NA Sites, Current Assessment Program (August 1992).

Well	Comments
1301-N Liquid Waste Disposal Facility	
N-2	
N-3	
N-14	
N-57	Upgradient well
N-66	Upgradient well
N-67	
N-69	Monitors bottom of aquifer
N-75	Installed 1992
N-76	Installed 1992
1324-N/NA Facilities	
N-59	
N-71	Upgradient well; installed 1991
N-72	Installed 1991
N-73	Installed 1991
699-81-58	Upgradient well
Assessment Program Wells	
N-17	
N-21	
N-47	
N-54	
N-55	
N-56	

Table 3. 1301-N Liquid Waste Disposal Facility Waste Analysis (DOE 1987b). (sheet 1 of 2)

Parameter	Sample			
	1	2	3	Avg
pH (standard units)	6.58	6.56	6.97	6.70
Conductivity (μmhos)	148	155	190	164
Mercury (0.001 ppm)	LD	LD	LD	LD
Ethylene glycol (10 ppm)	LD	LD	LD	LD
Enhanced thiourea (0.2 ppm)	LD	LD	LD	LD
TOC (1 ppm)	0.00184	0.00200	0.00205	0.00197
Cyanide (0.01 ppm)	LD	LD	LD	LD
Barium (0.006 ppm)	0.030	0.027	0.027	0.028
Cadmium (0.002 ppm)	LD	LD	LD	LD
Chromium (0.01 ppm)	LD	LD	LD	LD
Lead (0.03 ppm)	LD	LD	LD	LD
Silver (0.01 ppm)	LD	LD	LD	LD
Sodium (0.1 ppm)	1.831	1.819	1.781	1.810
Nickel (0.01 ppm)	LD	LD	LD	LD
Copper (0.01 ppm)	LD	LD	LD	LD
Vanadium (0.005 ppm)	LD	LD	LD	LD
Antimony (0.1 ppm)	LD	LD	LD	LD
Aluminum (0.15 ppm)	LD	LD	LD	LD
Manganese (0.005 ppm)	LD	LD	LD	LD
Potassium (0.1 ppm)	0.647	0.608	0.606	0.620
Iron (0.05 ppm)	0.081	0.077	0.050	0.069
Beryllium (0.005 ppm)	LD	LD	LD	LD
Osmium (0.3 ppm)	LD	LD	LD	LD
Strontium (0.3 ppm)	LD	LD	LD	LD
Zinc (0.005 ppm)	LD	LD	LD	LD
Calcium (0.05 ppm)	14.400	13.970	14.050	14.140
Nitrate (0.5 ppm)	LD	LD	LD	LD
Sulphate (0.5 ppm)	12.416	11.532	11.970	11.973

Table 3. 1301-N Liquid Waste Disposal Facility Waste Analysis (DOE 1987b). (sheet 2 of 2)

Parameter	Sample			
	1	2	3	Avg
Fluoride (0.5 ppm)	LD	LD	LD	LD
Chloride (0.5 ppm)	1.578	1.478	1.533	1.530
Phosphate (1 ppm)	LD	LD	LD	LD
Phosphorus pesticides (0.005 ppm)	LD	LD	LD	LD
Chlorinated pesticides (0.001 ppm)	LD	LD	LD	LD
Enhanced ABN list	LD	LD	LD	LD
Citrus red (1 ppm)	LD	LD	LD	LD
Arsenic (0.005 ppm)	LD	LD	LD	LD
Ammonium ion (0.05 ppm)	LD	LD	LD	LD
Coliform (3 MPN)	--	0.023	0.009	0.016
Selenium (0.005 ppm)	LD	LD	LD	LD
Thallium (0.01 ppm)	LD	LD	LD	LD

NOTE: Data obtained from samples taken August 1985.
ABN = acid base neutral.
LD = less than detectable.
MPN = most probable number.
TOC = total organic carbon.

Table 4. Radioactive Constituents Released to the 1301-N and 1325-N* Liquid Waste Disposal Facility in 1985 (Rokkan 1986).

Radionuclide	Release, Ci	Average concentration, pCi/L	Peak concentration, pCi/L
^{3}H	2.7×10^{2}	7.4×10^{4}	3.9×10^{5}
^{32}P	2.2×10^{1}	5.9×10^{3}	3.2×10^{4}
^{51}Cr	7.5×10^{1}	2.0×10^{4}	8.5×10^{4}
^{54}Mn	7.1×10^{2}	1.9×10^{5}	7.2×10^{5}
^{58}Co	2.8×10^{1}	7.6×10^{3}	2.3×10^{4}
^{59}Fe	2.6×10^{2}	7.1×10^{4}	2.2×10^{5}
^{60}Co	5.9×10^{2}	1.6×10^{5}	6.8×10^{5}
^{65}Zn	1.5×10^{1}	4.0×10^{3}	6.0×10^{3}
^{89}Sr	3.9×10^{2}	1.1×10^{5}	8.3×10^{5}
^{90}Sr	2.4×10^{2}	6.5×10^{4}	6.5×10^{5}
$^{95}ZrNb$	3.2×10^{2}	8.7×10^{4}	2.9×10^{5}
$^{99m}MoTc$	7.8×10^{2}	2.1×10^{5}	1.7×10^{6}
^{103}Ru	5.4×10^{1}	1.5×10^{4}	7.1×10^{4}
^{106}Ru	8.0×10^{1}	2.2×10^{4}	7.0×10^{4}
^{124}Sb	6.1×10^{0}	1.7×10^{3}	4.3×10^{3}
^{125}Sb	1.2×10^{1}	3.4×10^{3}	6.7×10^{3}
^{131}I	3.7×10^{2}	1.0×10^{5}	4.6×10^{5}
^{133}Xe	2.9×10^{2}	8.0×10^{4}	2.7×10^{5}
^{134}Cs	5.7×10^{0}	1.6×10^{3}	4.3×10^{3}
^{137}Cs	8.8×10^{1}	2.4×10^{4}	2.1×10^{5}
$^{140}BaLa$	4.1×10^{3}	1.1×10^{6}	4.4×10^{6}
^{141}Ce	7.4×10^{1}	2.0×10^{4}	8.0×10^{4}
$^{144}CePr$	2.8×10^{2}	7.6×10^{4}	7.2×10^{5}
^{153}Sm	7.2×10^{1}	2.0×10^{4}	7.7×10^{4}
^{238}Pu	5.0×10^{-1}	1.4×10^{2}	9.7×10^{2}
$^{239/240}Pu$	3.4×10^{0}	9.4×10^{2}	6.5×10^{3}
^{239}Np	3.2×10^{2}	8.7×10^{4}	6.6×10^{5}
SLR	2.6×10^{4}	7.1×10^{6}	4.3×10^{7}

*Waste stream was split between 1301-N and 1325-N during most of 1985.
SLR = short-lived radionuclides (half-life <48 hours).

Table 5. Results of Chemical and Radiological Analysis of 163-N Demineralizer Wastewater -- Ion Exchanger Regenerate (1324-NA Waste Stream [WHC 1989]).

Constituent*	Results			
	1/21/88	3/22/88	6/16/88	9/27/88
Alpha activity (pCi/L)	3.05 E-01	8.67 E-01	NA	NA
Beta activity (pCi/L)	1.34 E+01	2.07 E+00	5.96 E+00	2.38 E+01
Aluminum	1.77 E+02	NA	NA	3.99 E+01
Barium	6.20 E+01	3.60 E+01	5.50 E+01	9.70 E+01
Calcium	4.98 E+04	1.83 E+04	3.29 E+04	2.39 E+05
Chloride	2.19 E+04	1.94 E+03	4.00 E+03	1.36 E+04
Chloroform blank	1.50 E+01	1.00 E+01	1.20 E+01	NA
Spec. Conductance (μmho/cm)	5.42 E+03	5.25 E+02	3.97 E+02	3.25 E+03
Copper	1.00 E+01	NA	NA	2.40 E+01
Fluoride (IC)	4.67 E+03	NA	NA	1.98 E+03
Fluoride (ISE)	2.55 E+03	1.79 E+02	3.46 E+02	1.08 E+03
Iron	2.75 E+02	3.90 E+01	5.70 E+01	2.92 E+02
Magnesium	1.22 E+04	3.95 E+03	7.49 E+03	5.35 E+04
Manganese	1.40 E+01	NA	1.40 E+01	3.60 E+01
Nitrate	5.22 E+03	6.49 E+02	NA	1.06 E+03
pH (standard units)	6.98 E+00	6.61 E+00	7.45 E+00	4.25 E+00
Potassium	2.43 E+03	6.01 E+02	1.22 E+03	7.11 E+03
Sodium	1.24 E+06	7.43 E+04	6.49 E+04	6.36 E+05
Strontium	2.37 E+02	8.50 E+01	1.35 E+02	1.01 E+03
Sulfate	2.42 E+06	1.65 E+05	1.52 E+05	2.02 E+06
Temperature (°C)	2.24 E+01	1.97 E+01	2.64 E+01	1.85 E+01
Total Organic Carbon	5.83 E+03	NA	2.12 E+03	3.20 E+03
Total Organic Halogen	8.97 E+01	3.20 E+01	8.65 E+01	1.04 E+02
1,1,1-Trichloroethane blank	5.00 E+00	NA	NA	NA
Uranium	3.08 E-01	6.35 E-01	2.70 E-01	2.94 E+00
Zinc	4.40 E+01	1.30 E+01	4.20 E+01	1.31 E+02

*Units are given in ppb unless otherwise indicated.
IC = ion chromatography.
ISE = ion selective electrode.
NA = not analyzed.

to the sampling network and increasing sampling frequency for selected constituents. Phase one was scheduled to end in August 1989 for the 1301-N Facility and in September 1989 for the 1324-N/NA Facilities. At that time, it was determined that a similar sampling program would continue for phase two in both projects.

The original version of this report presented the results of assessment through 1989. Because of termination of a laboratory contract, no RCRA groundwater sampling was conducted between June 1990 and June 1991. This revised report includes the original data (1989), plus subsequent data (early 1990 and late 1991 through early 1992). The new data support the conclusions of the original report.

After the original version of this report was published, several wells were dropped from the assessment network because they were no longer useful to the program. The declining water table in the 100-N Area left some wells dry, particularly near the 1324-N/NA facilities. New wells were installed to replace the dry wells. Table 2 includes a list of wells currently sampled for the 1301-N and 1324-N/NA facilities, including assessment wells.

3.1 POTENTIOMETRIC LEVELS

During the first 2 years of RCRA monitoring, groundwater flow in the 100-N Area was affected by artificial recharge from liquid wastes discharged to the 1325-N, 1324-NA, and backwash lake facilities, as well as by changes in river level and natural recharge.

Water levels are measured in the network monitoring wells at the time of sampling. Monthly measurements are also made in most of the usable wells in the 100-N Area. Water table maps for December 1988, August and November 1989, and March 1992 are presented in Figures 2 through 5. Data are presented in Appendix A. Monthly data are also published in the RCRA quarterly reports (e.g., Smith et al. 1989; DOE 1992c).

The amount of liquid discharged to the 1325-N facility fluctuated widely during 1988 and 1989. These changes in artificial recharge caused large variations in groundwater levels beneath the 100-N Area. In December 1988, the groundwater mound beneath the 1324-N/NA facilities was larger than the 1325-N mound, and groundwater flow included a north-flowing component from the 1324-N/NA facilities (Figure 2). The groundwater mound beneath the 1325-N LWDF grew larger in the following months, eventually eclipsing the 1324-N/NA mound. The mound beneath the 1325-N LWDF reached a maximum of over 413 ft above mean sea level in June 1989. This mound dominated the flow system in the 100-N Area for several months, with groundwater flowing primarily northwest, perpendicular to the Columbia River beneath the 1301-N LWDF (Figure 3). Artificial recharge from the 1325-N LWDF later decreased, and the groundwater mound began to dissipate. The water table map for November 1989 illustrates that the primary flow direction in the 100-N Area was toward the north or north-northwest (Figure 4). The water table has declined more than 10 ft since November 1989, but the direction of groundwater flow in March 1992 remained approximately the same (Figure 5).

Figure 2. Water Table in the 100-N Area, December 1988.

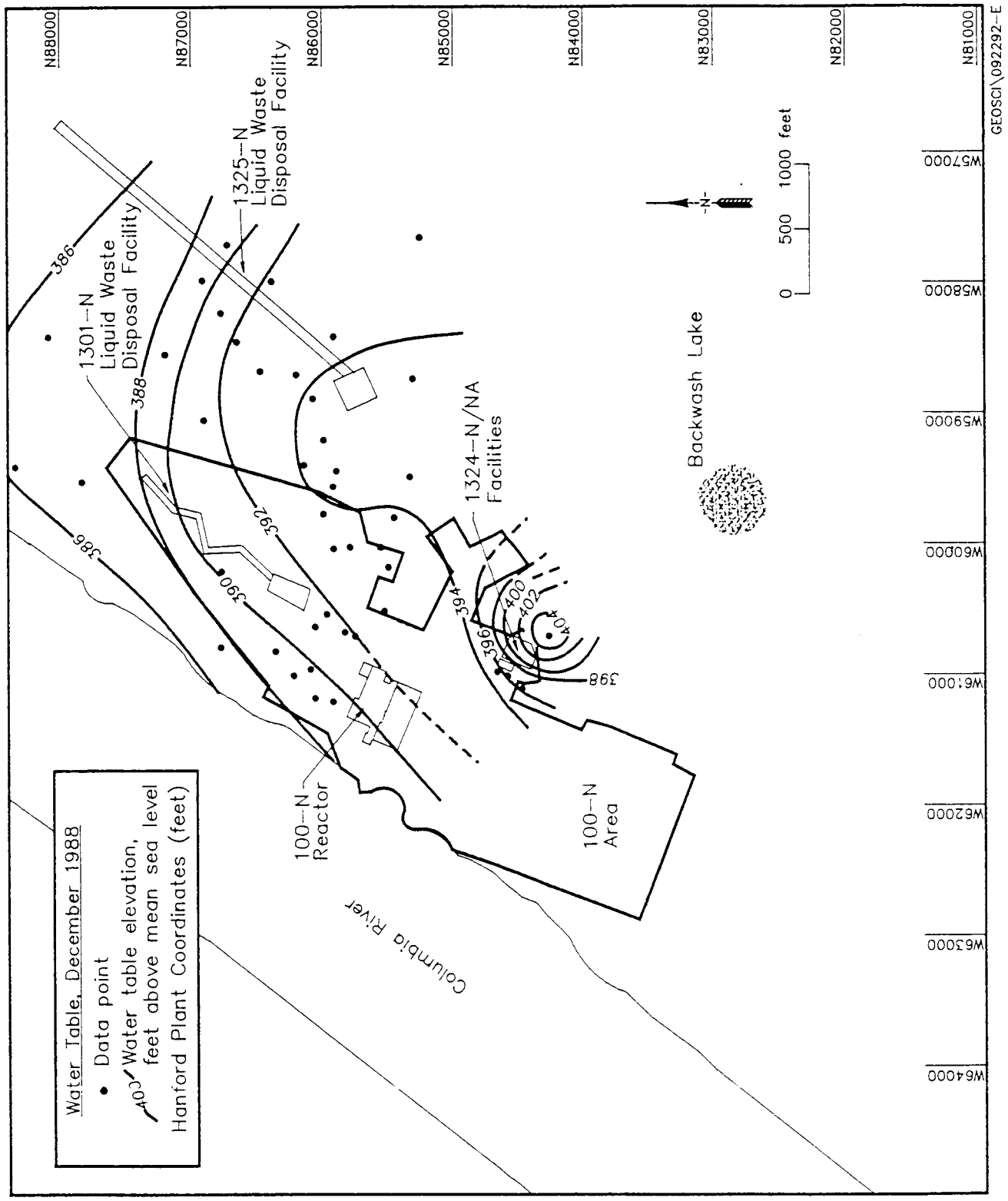


Figure 3. Water Table in the 100-N Area, August 1989.

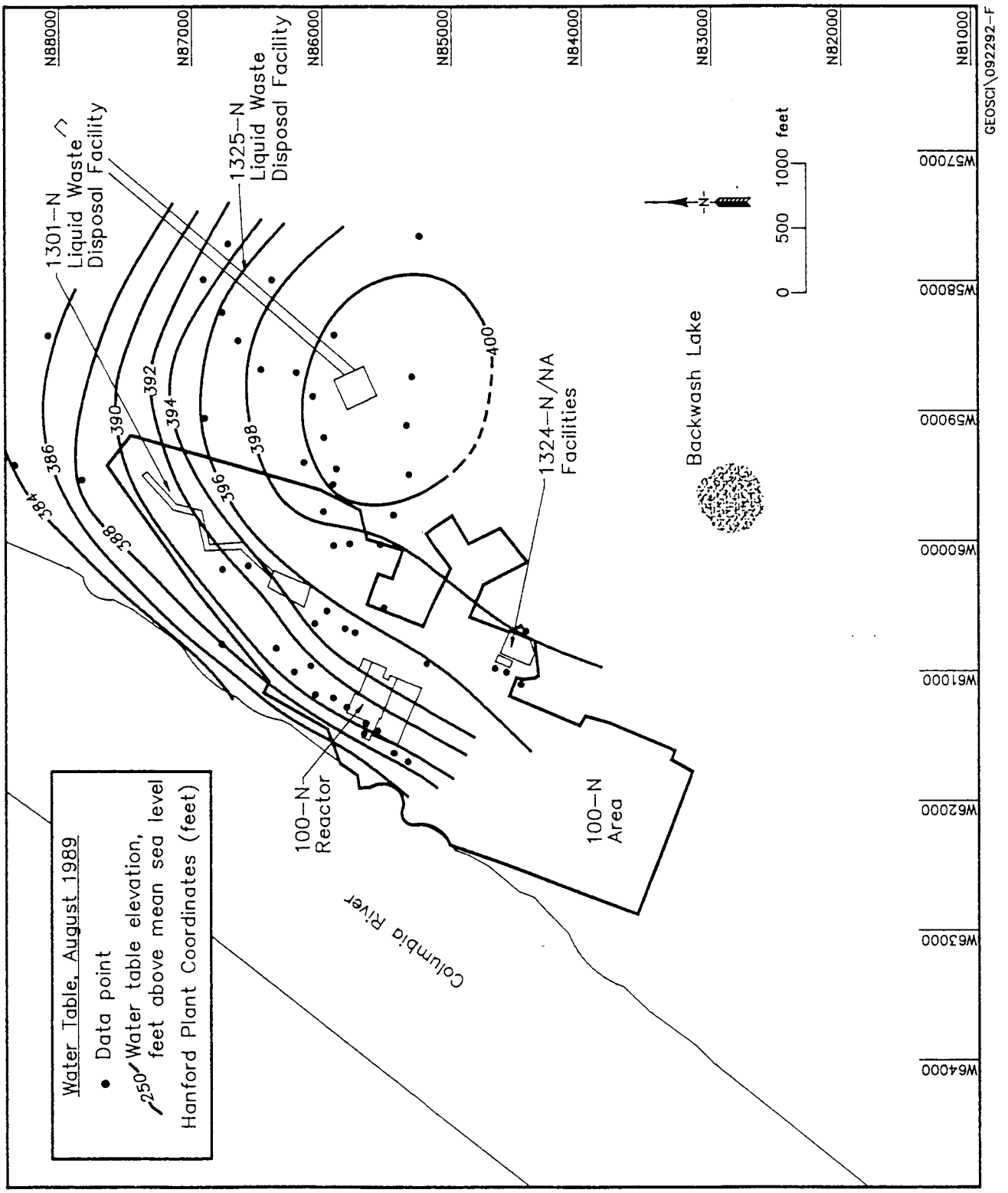


Figure 4. Water Table in the 100-N Area, November 1989.

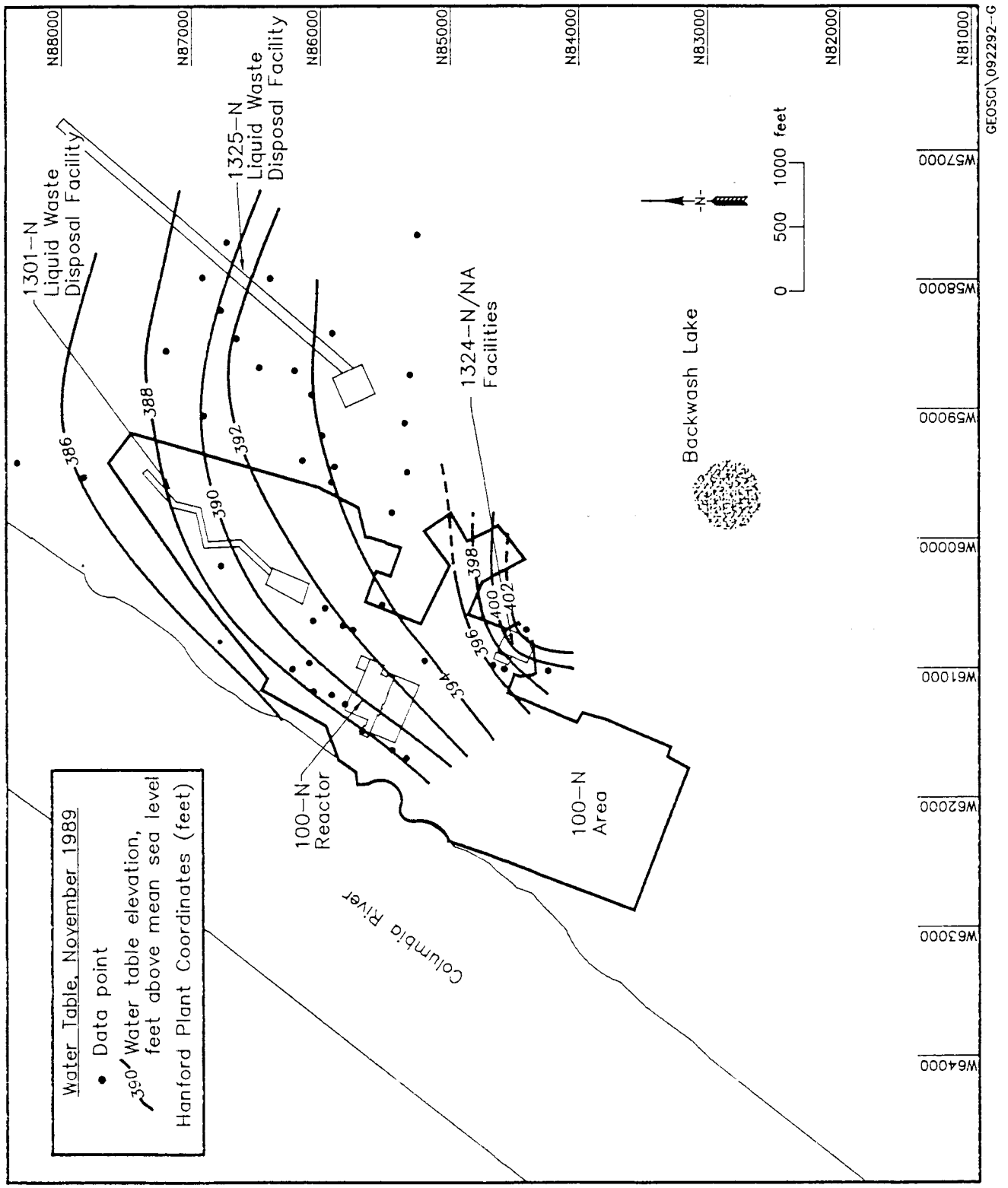
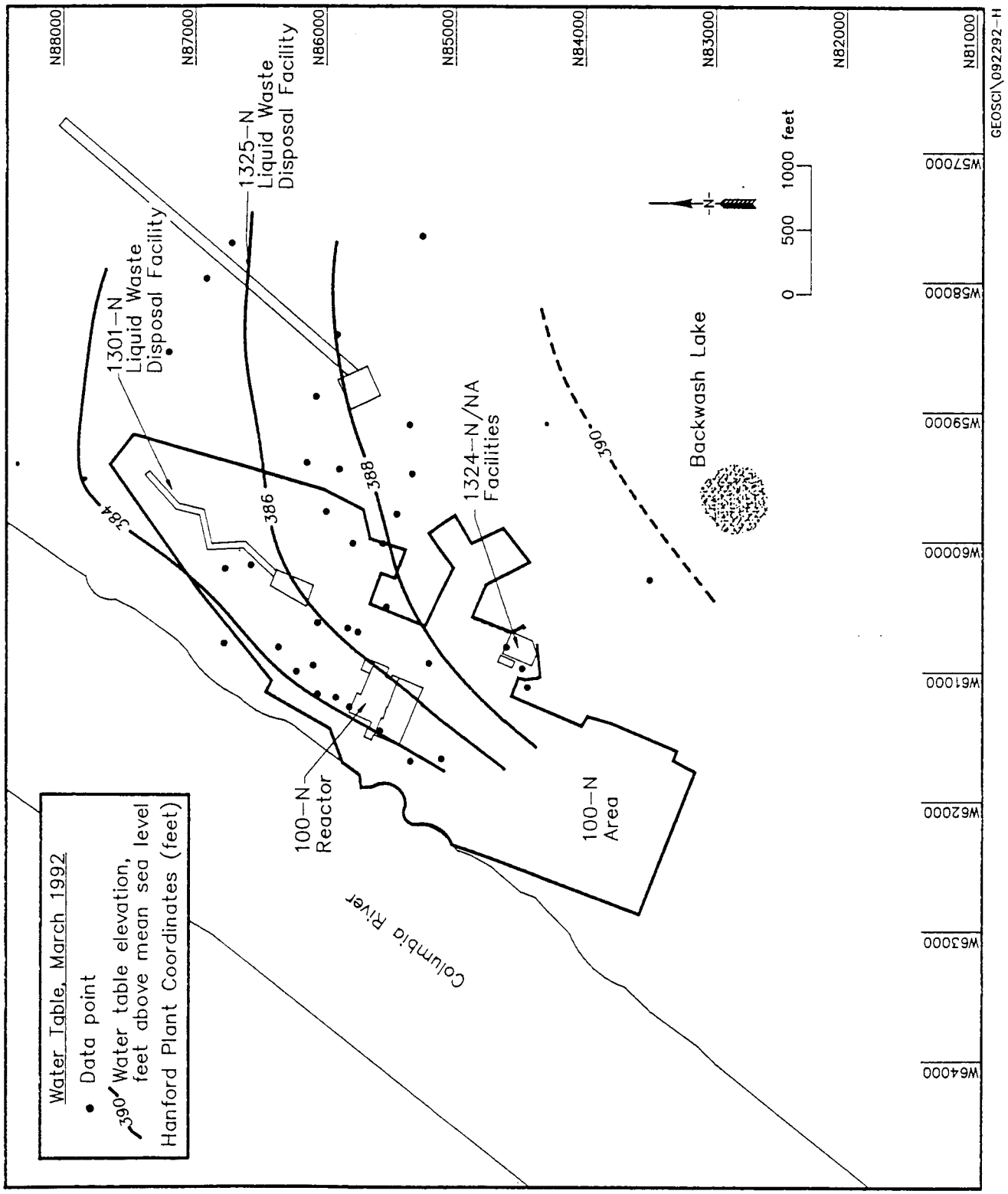


Figure 5. Water Table in the 100-N Area, March 1992.



3.2 GROUNDWATER CHEMISTRY

Sampling and analytical methods are described in the assessment plans (Gilmore and Jensen 1989; Gilmore 1989). Results of the quality control program through 1989 are included in Appendix B. Quality control for samples collected between 1991 and the present are included in the RCRA quarterly reports.

3.2.1 Summary of Chemical Data

Selected results of analyses of groundwater samples from the 1301-N and 1324-N/NA monitoring wells are presented in Appendix C. These data are intended as a summary of the groundwater chemistry that is most pertinent to the assessment programs. Complete lists of the analytical results are reported in the RCRA quarterly reports (Smith et al. 1989; DOE 1992b).

Sulfate and specific conductance are the best constituents for tracing contamination from the 1324-NA Percolation Pond because specific conductance indicates the presence of ions in the groundwater, and sulfate was highly concentrated in the waste stream to the 1324-NA facility. Calcium is not a good indicator of contamination because it occurs naturally in the uppermost aquifer. The following discussion focuses on sulfate and specific conductance.

Chemistry of groundwater samples collected from wells N-58, N-59, N-60, and N-61, which are adjacent to the 1324-N/NA facilities, is characterized by high concentrations of sulfate, sodium, and calcium (Figure 6). Sulfate concentration in well N-59 was 1,170 ppm in July 1989. Specific conductance was 2,318 μmho/cm. By September 1991, sulfate concentration at well N-59 had declined to 210 ppm.

The groundwater samples from well N-3 collected in December 1988 and March 1989 contained elevated concentrations of sulfate and other constituents present in the waste discharged to the 1324-NA Percolation Pond (Figure 7). Sulfate concentration was highest in December 1988, at 249 ppm; specific conductance was 734 μmho/cm. In March 1989, the sulfate concentration had declined to 180 ppm. The sulfate concentration in December 1991 was 35 ppm.

Groundwater from wells closer than N-3 to the 1301-N facility (e.g., N-67, N-2) generally is characterized by elevated concentrations of strontium-90. Sulfate and sodium concentrations are lower at these wells than at well N-3 and the other wells located further south (Figure 8). Specific conductance and the concentration of ions in groundwater samples from well N-2 remained relatively constant through the period of assessment monitoring. Calcium concentrations were somewhat higher than the other ions but were comparable to calcium concentrations in the background wells, and are within the normal range for the unconfined aquifer on the Hanford Site.

Figure 6. Ion Concentration and Specific Conductance in Downgradient Well N-59.

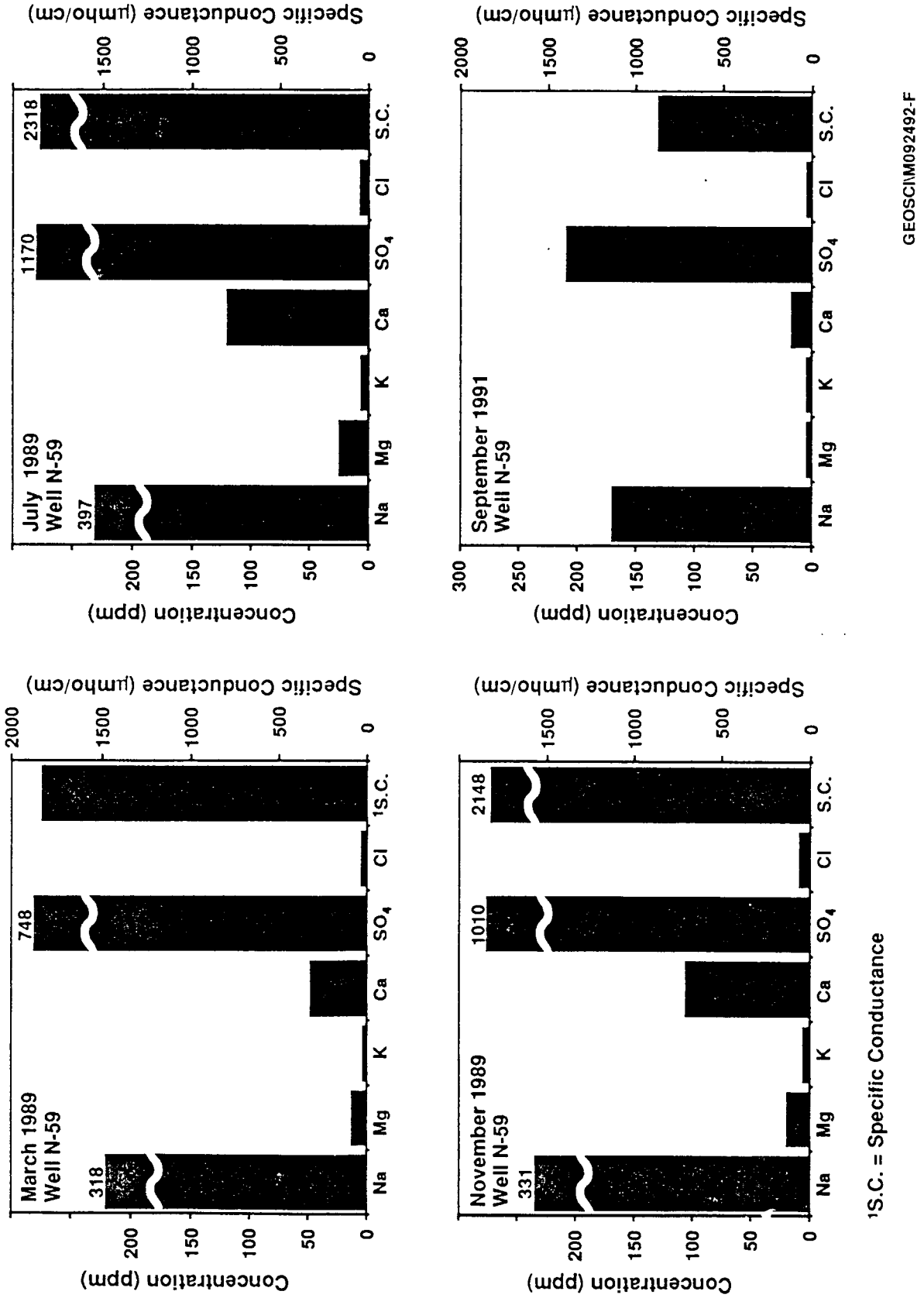


Figure 7. Ion Concentration and Specific Conductance in Downgradient Well N-3.

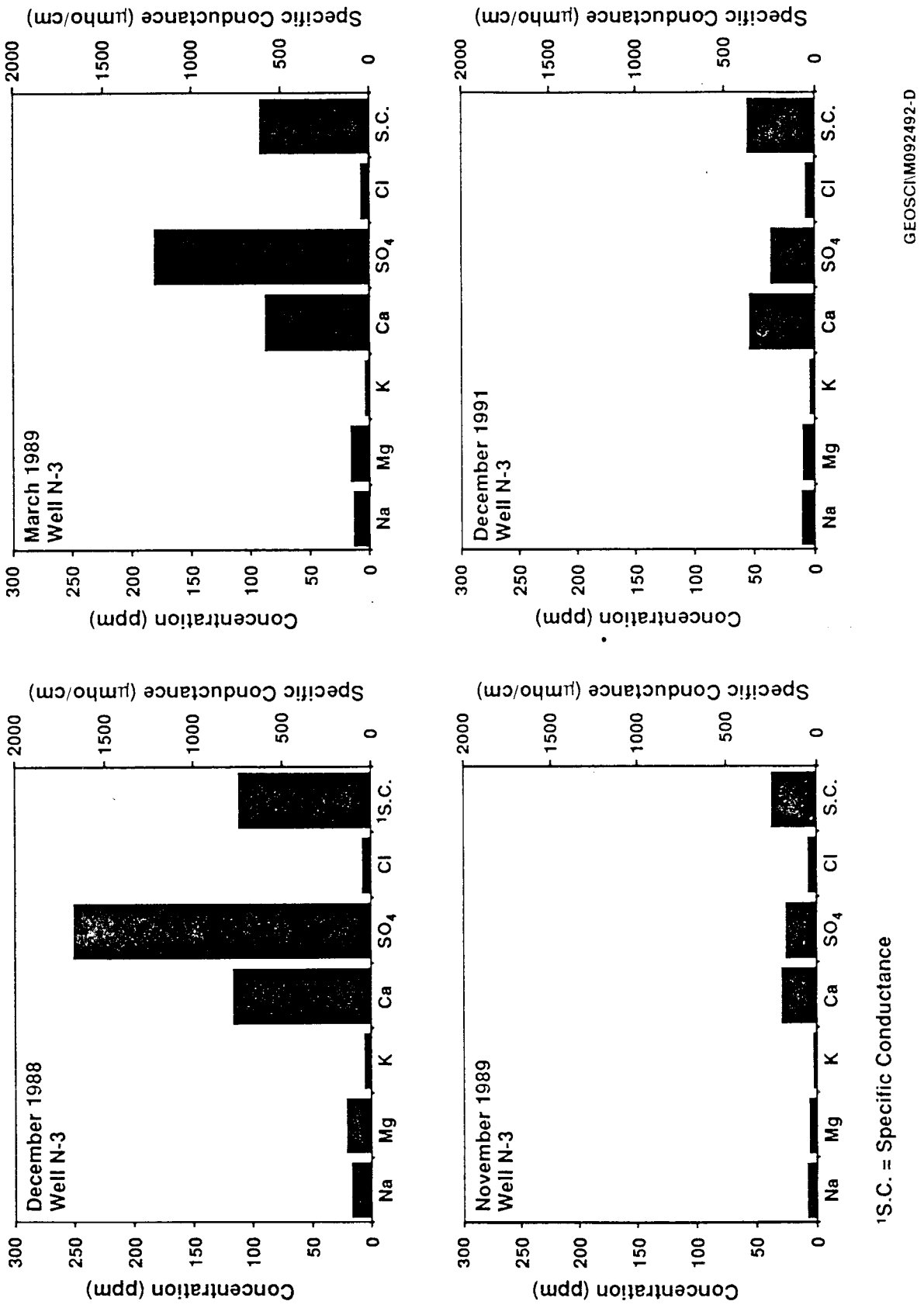
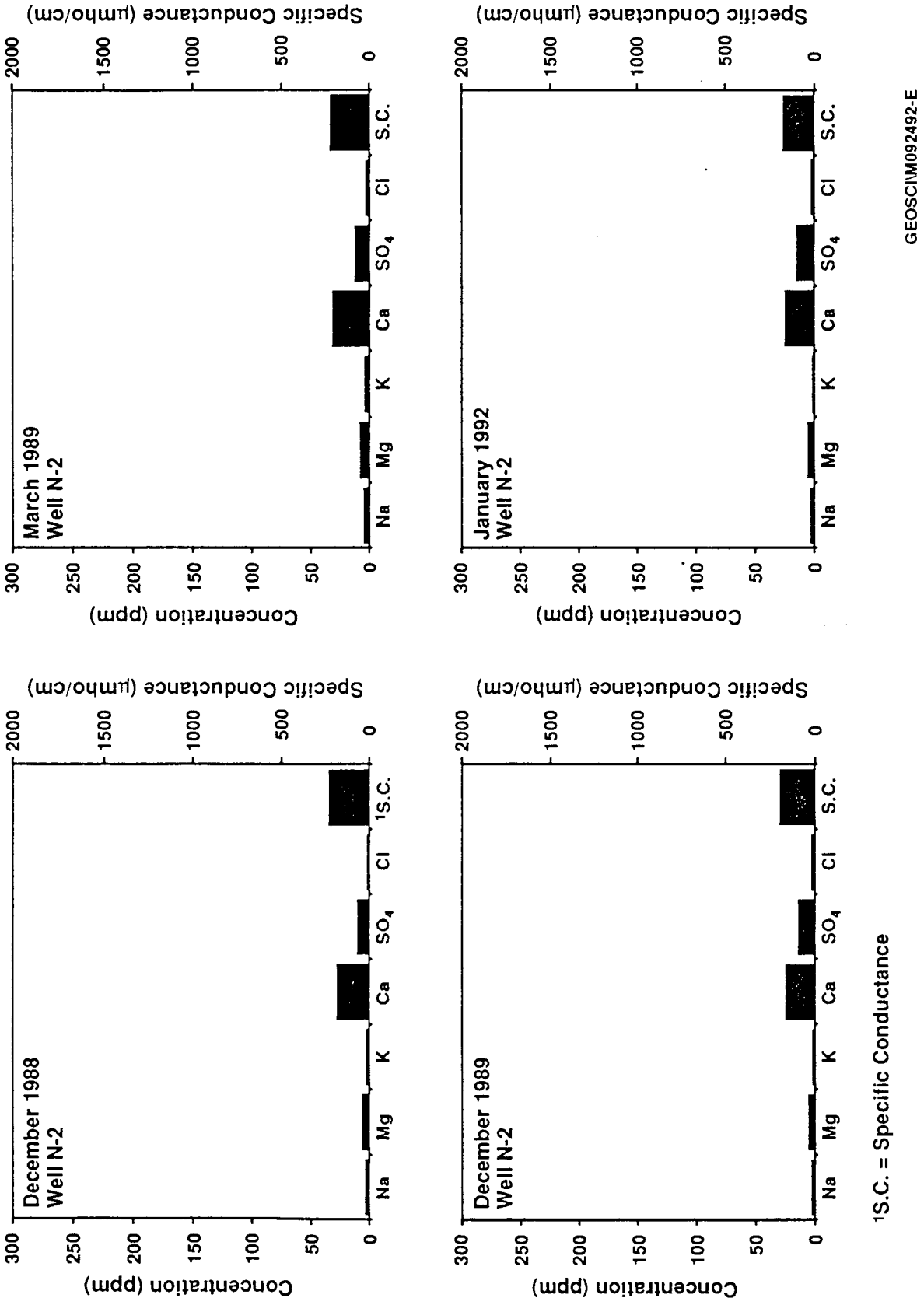


Figure 8. Ion Concentration and Specific Conductance in Downgradient Well N-2.



[1]S.C. = Specific Conductance

3.2.2 Rate and Extent of Migration

The distribution of sulfate in the uppermost aquifer beneath the 100-N Area at various times is illustrated in Figures 9, 10, and 11. Data indicate that a contaminant plume has formed beneath the 1324-NA Percolation Pond. The plume extends downgradient toward the Columbia River. In March 1989, the plume had extended far enough north to affect the groundwater at well N-3 (Figure 9). By July/August 1989, the plume was travelling more directly toward the river (Figure 10). Since discharge to the percolation pond has ceased, the plume has moved downgradient and appears to be dissipating. Note that the recent plume map (Figure 11) includes two new upgradient wells and two new downgradient wells, which affect the interpretation of plume's shape.

Data collected during the assessment program provide no evidence that the 1301-N LWDF has contributed hazardous constituents to the groundwater. The 1301-N LWDF has contributed radiological constituents to the groundwater; however, these constituents are not regulated under RCRA and are beyond the scope of the assessment program. Radiological constituents will be addressed under CERCLA studies in the 100-N Area (DOE 1992c). Groundwater sampling for CERCLA will begin in fiscal year 1993.

The rate of groundwater movement beneath the 1301-N LWDF has been estimated to be between 2 and 80 feet per day (DOE 1991). The rate of groundwater flow beneath the 1324-N/NA facilities was probably higher than normal when the percolation pond was in use and a groundwater mound was present, creating a steeper hydraulic gradient. Estimates of groundwater flow rates range from 2 feet per day when no mound was present to 40 feet per day when a mound was present (DOE 1992a). These estimates are for groundwater flow; contaminant movement could be retarded by sorption.

3.2.3 Variations in Groundwater Chemistry

Figures 12 and 13 show specific conductance and sulfate concentrations in downgradient wells N-3 and N-59, and in upgradient wells N-4 and 699-81-58 from December 1987 to early 1992. Specific conductance values and ion concentrations at well N-3 appear to be related to the direction of groundwater flow. In December 1988, when well N-3 was found to have elevated specific conductance, groundwater flow included a component from the direction of the 1324-N/NA Percolation Pond (see Figure 2). Specific conductance and sulfate concentrations decreased in well N-3 as the groundwater gradient shifted in the summer of 1989 with increased recharge from the 1325-N LWDF (see Figure 3). Changes in groundwater chemistry beneath the 1324-NA Percolation Pond (Figure 13) are probably related to variations in wastes discharged to the facility. Changes in the direction of groundwater flow also affect the chemistry in the 1324-N/NA wells by redistributing the contaminants already in the groundwater.

3.2.4 Data Limitations

Well construction materials and sampling methods used in assessment monitoring at the 1301-N and 1324-N/NA facilities have the potential to affect

Figure 9. Sulfate Concentration in the Uppermost Aquifer in the 100-N Area, March 1989.

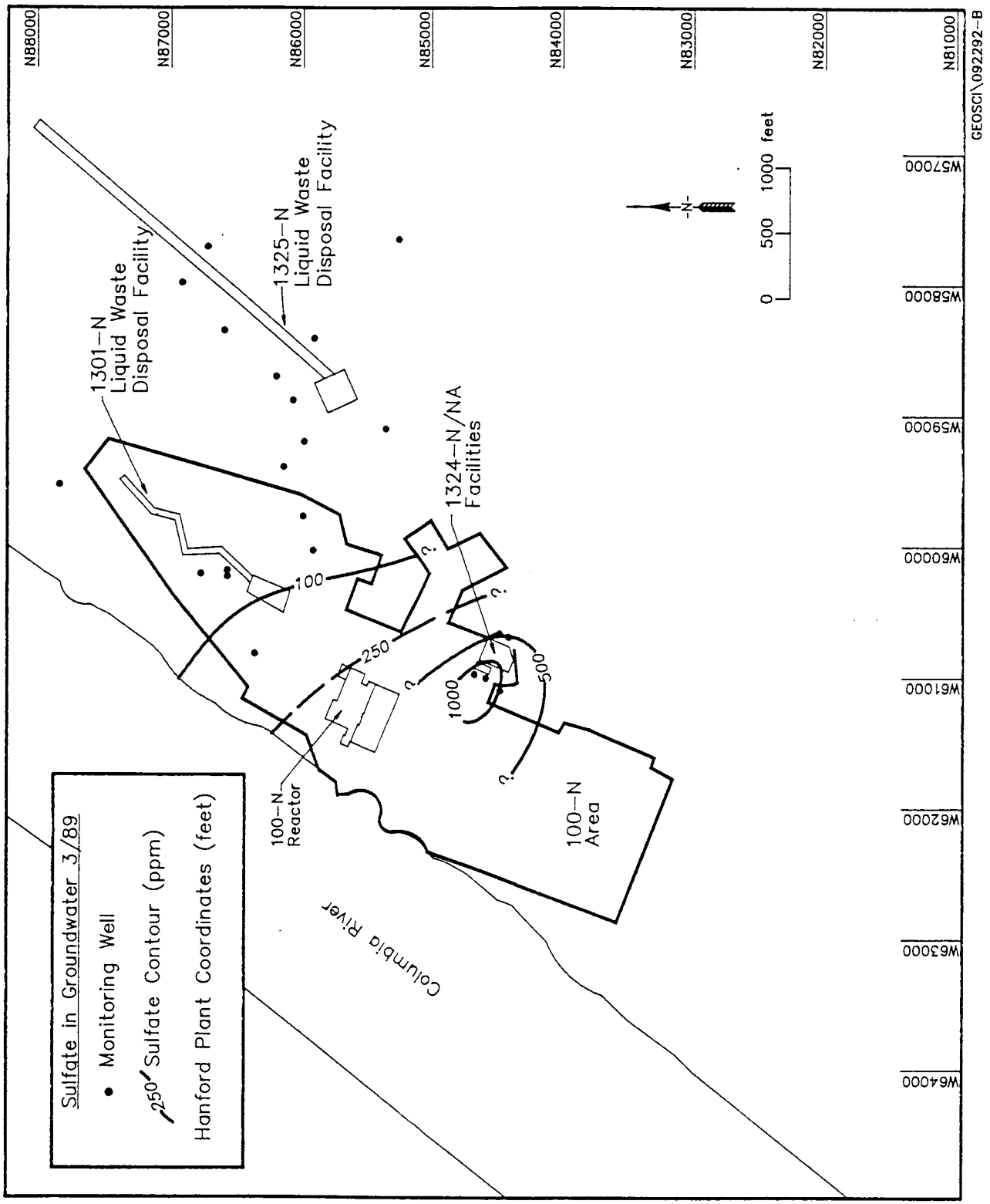


Figure 10. Sulfate Concentration in the Uppermost Aquifer in the 100-N Area, July - August, 1989.

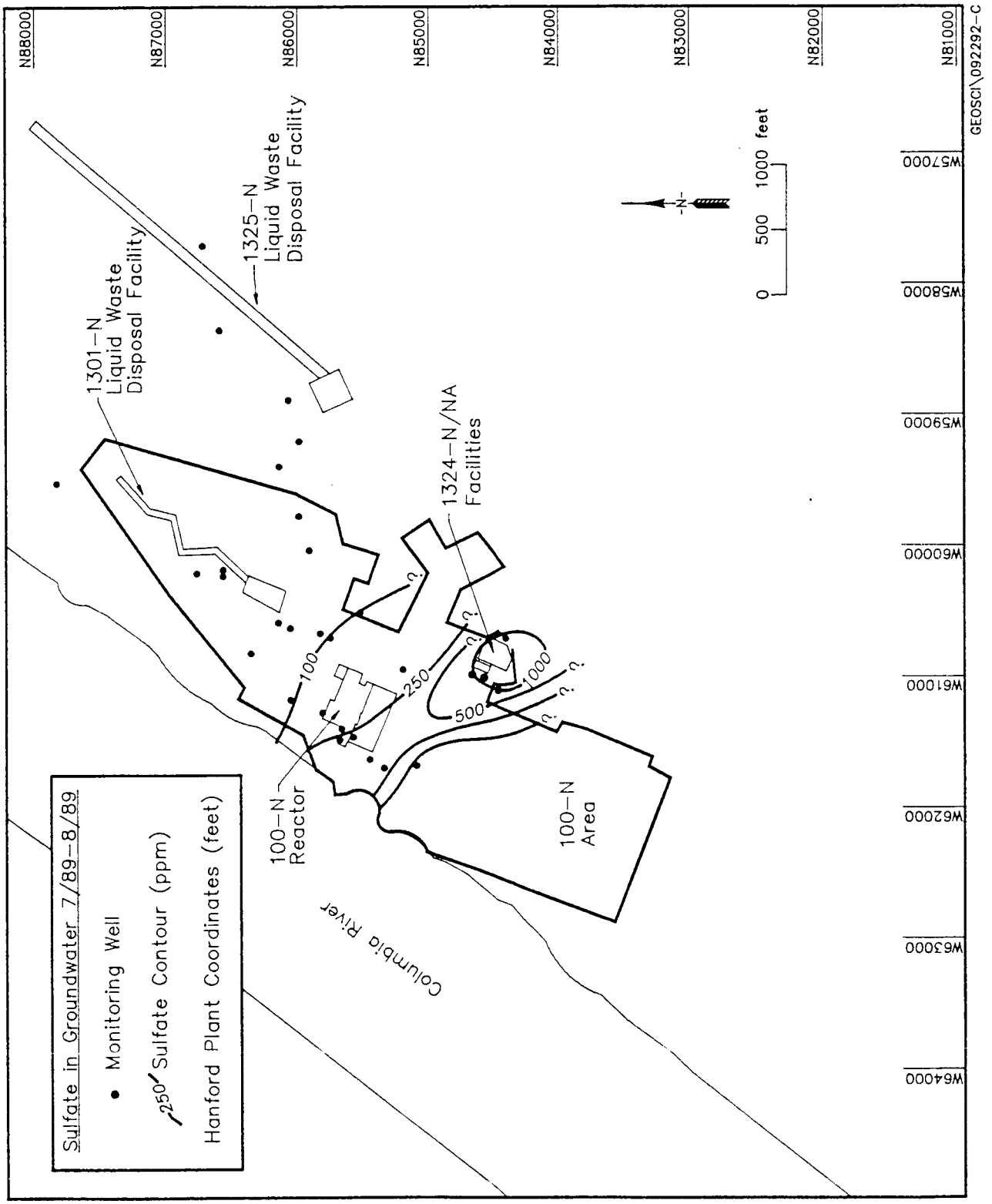


Figure 11. Sulfate Concentration in the Uppermost Aquifer in the 100-N Area, December 1991 - February 1992.

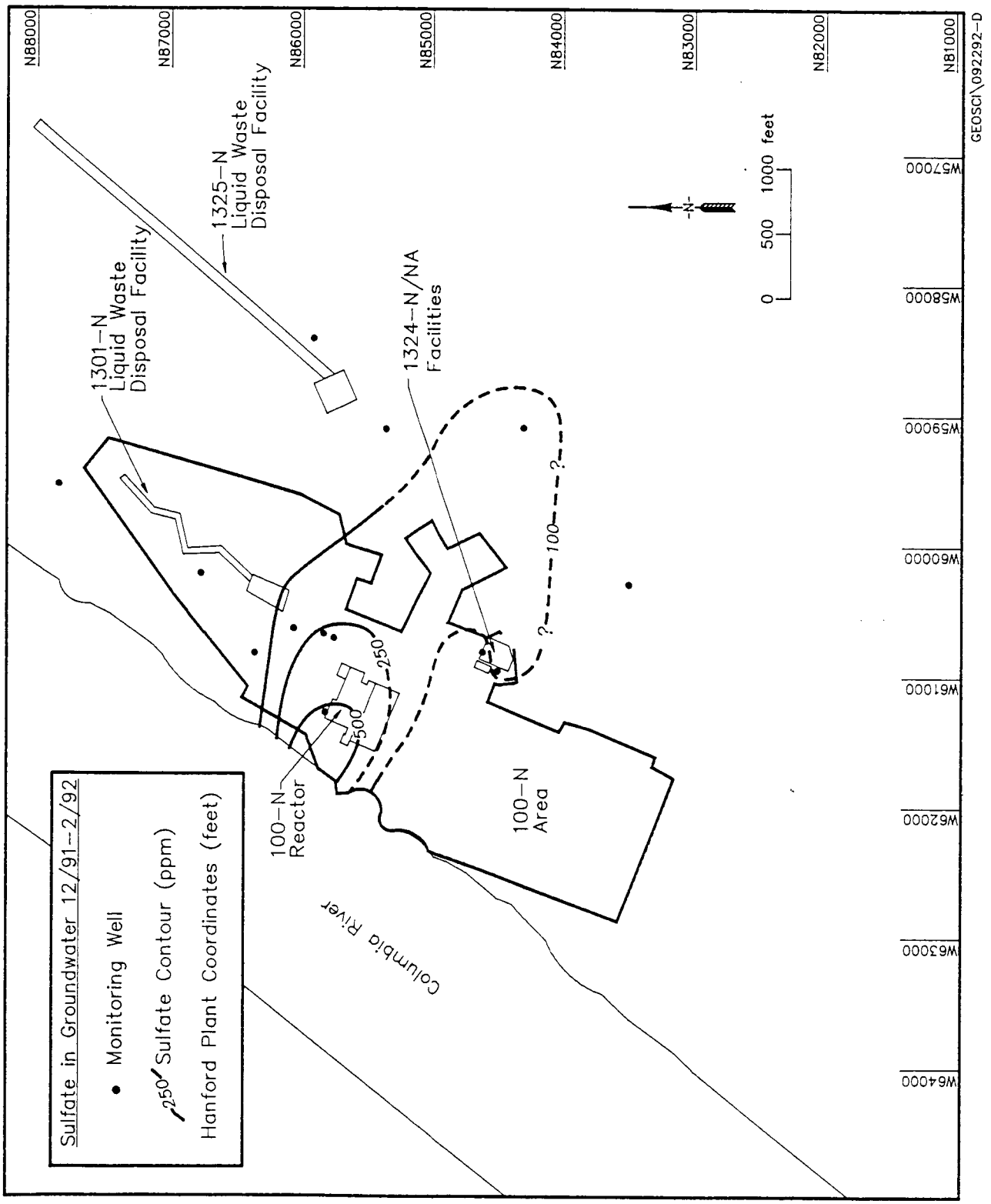


Figure 12. Sulfate Concentration and Specific Conductance versus Time in Wells N-3 and N-4.

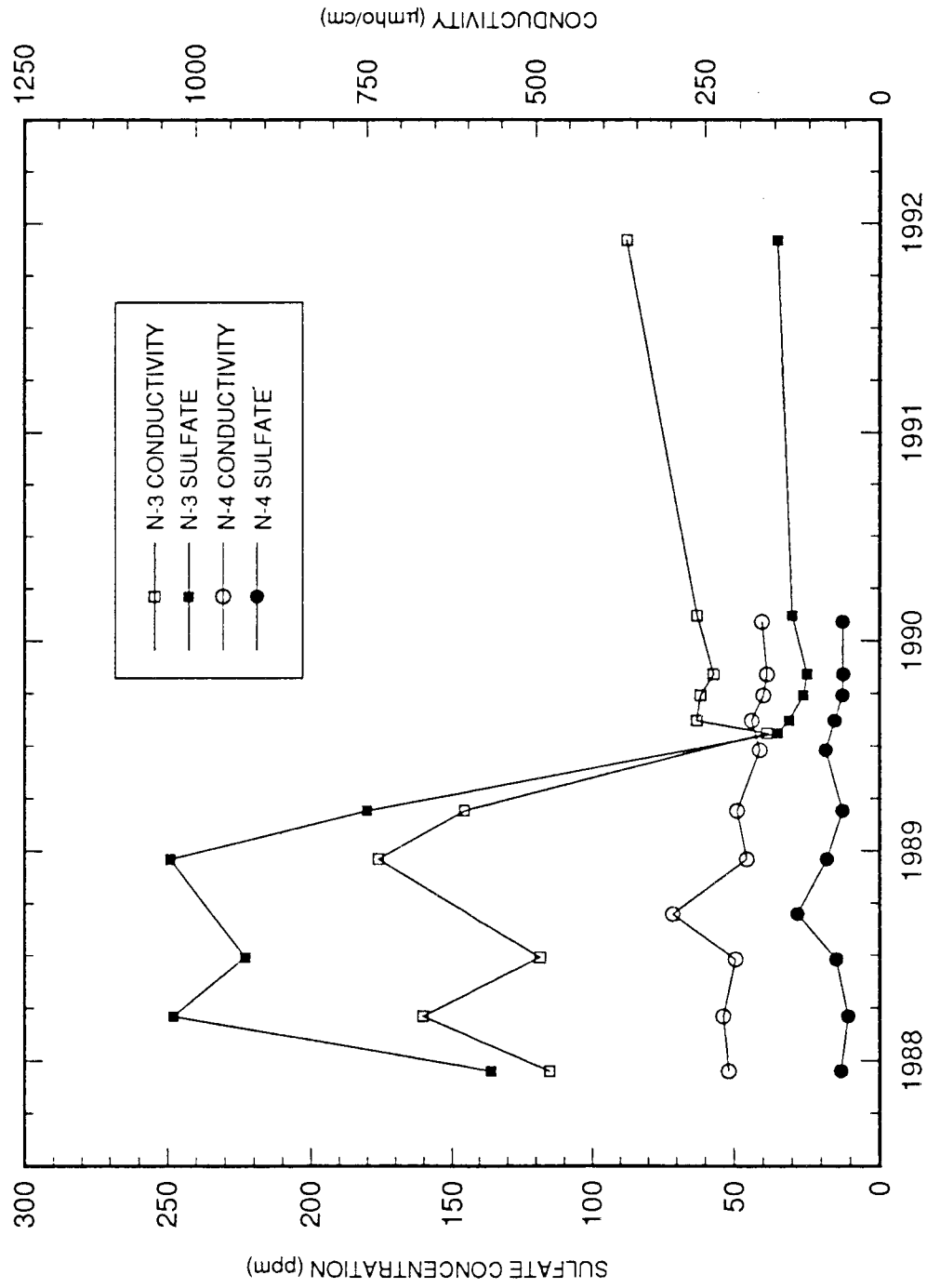
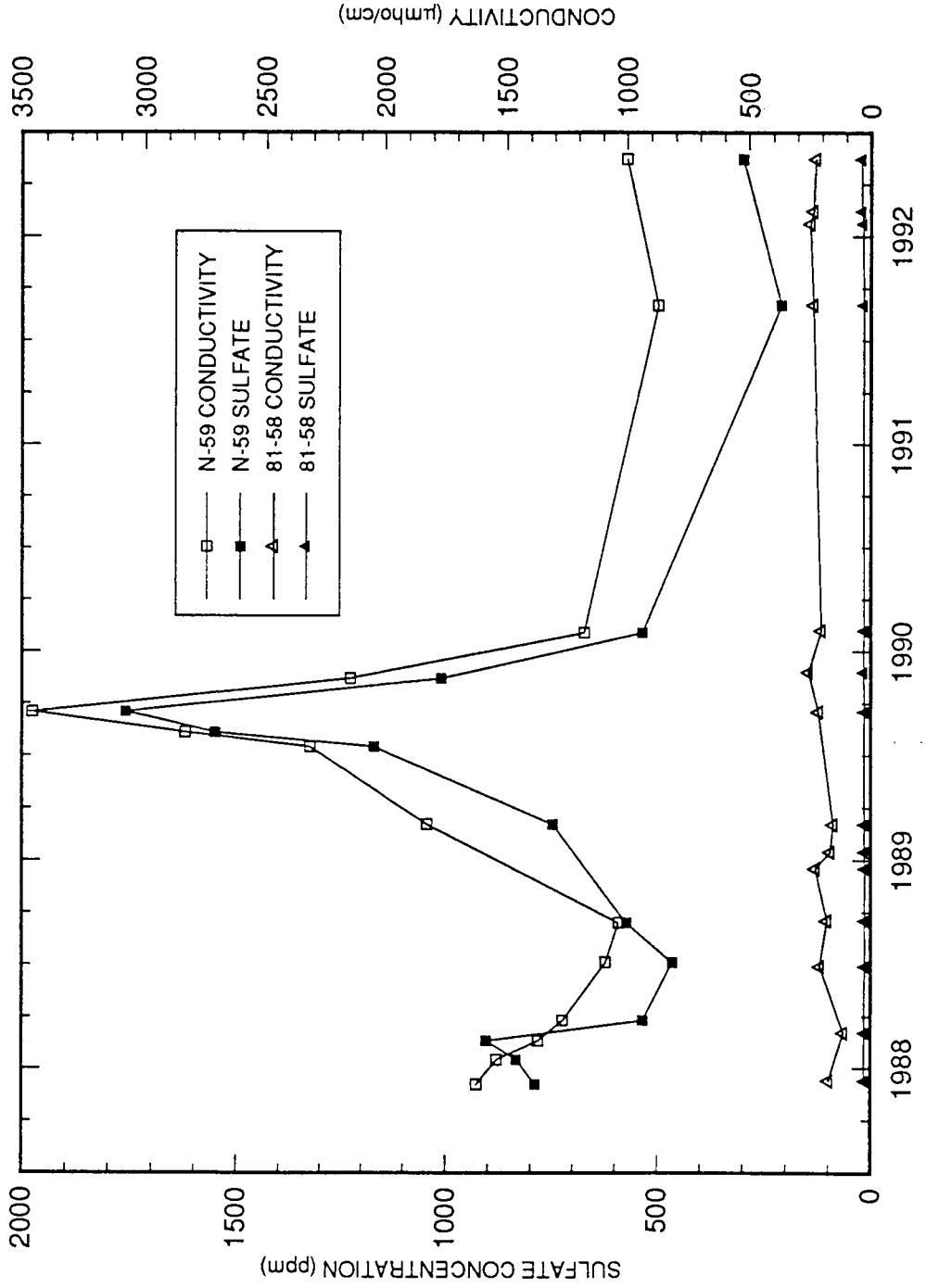


Figure 13. Sulfate Concentration and Specific Conductance versus Time in Wells N-59 and 699-81-58.



the results of sample analyses. These limitations and quality control data should be considered in interpreting the results of the assessment programs. The primary contaminants of concern in the 1301-N and 1324-N/NA assessment programs are sulfate and sodium. Casing materials, unpurged wells, and high turbidity are unlikely to affect the concentrations of these constituents significantly. Quality control data indicate no significant problems with the sulfate or sodium results.

Many of the wells in the groundwater monitoring networks for the 1301-N and 1324-N/NA facilities were not designed for RCRA monitoring and are constructed of carbon steel casing. Some of these wells have perforated intervals instead of screens. Concentration of certain metals in these samples (particularly iron in unfiltered samples) may be elevated, resulting from casing materials.

Some of the samples collected from the assessment wells in the first year of assessment were collected with bailers instead of sampling pumps. These wells were not purged of standing water before sampling and no filtered samples were collected. Not purging a well fully before sampling means that the water has been in contact with air, which can result in a loss of volatile constituents and reduced species. The bailed wells are identified in Appendix C.

Turbidity of samples from several of the assessment wells, particularly the bailed samples, was extremely high. There are no clear trends in the data from the 1301-N and 1324-N/NA assessment programs that indicate a relationship between turbidity and specific conductance. High turbidity does not appear to affect specific conductance, sulfate, or sodium values directly (i.e., high turbidity does not correspond to high specific conductance and vice versa).

Quality control data for the first year of assessment (Appendix B) indicate that laboratory results for sodium and sulfate are acceptable with one exception. Sodium was detected at 269 ppb in a blank in December 1988. Sodium concentrations in samples from the 1301-N monitoring wells in December 1988 were at least one order of magnitude higher than that; the sodium concentration in well N-3 was nearly two orders of magnitude higher. Thus, quality control data give no indication of unreliable data that would affect the outcome of the assessment program.

Quality control data for samples collected since 1991 are presented in the RCRA quarterly reports. These recent data also give no indication of unreliable data that would affect the outcome of the assessment program.

3.3 OTHER INDICATOR PARAMETERS

Measured concentrations of total organic carbon (TOC) and total organic halogen (TOX) in some wells downgradient of the 1324-N/NA facilities appear to be higher than upgradient concentrations. These constituents are plotted versus time in Figures 14 and 15 for two downgradient wells (N-59 and N-72) and upgradient well 81-58. Measured values below the contract required quantitation limits (CRQL) were reported before 1991 and are plotted on the figures. Recent data below the CRQL are reported and plotted at the CRQL.

Figure 14. Total Organic Carbon versus Time in 1324-N/NA Wells.

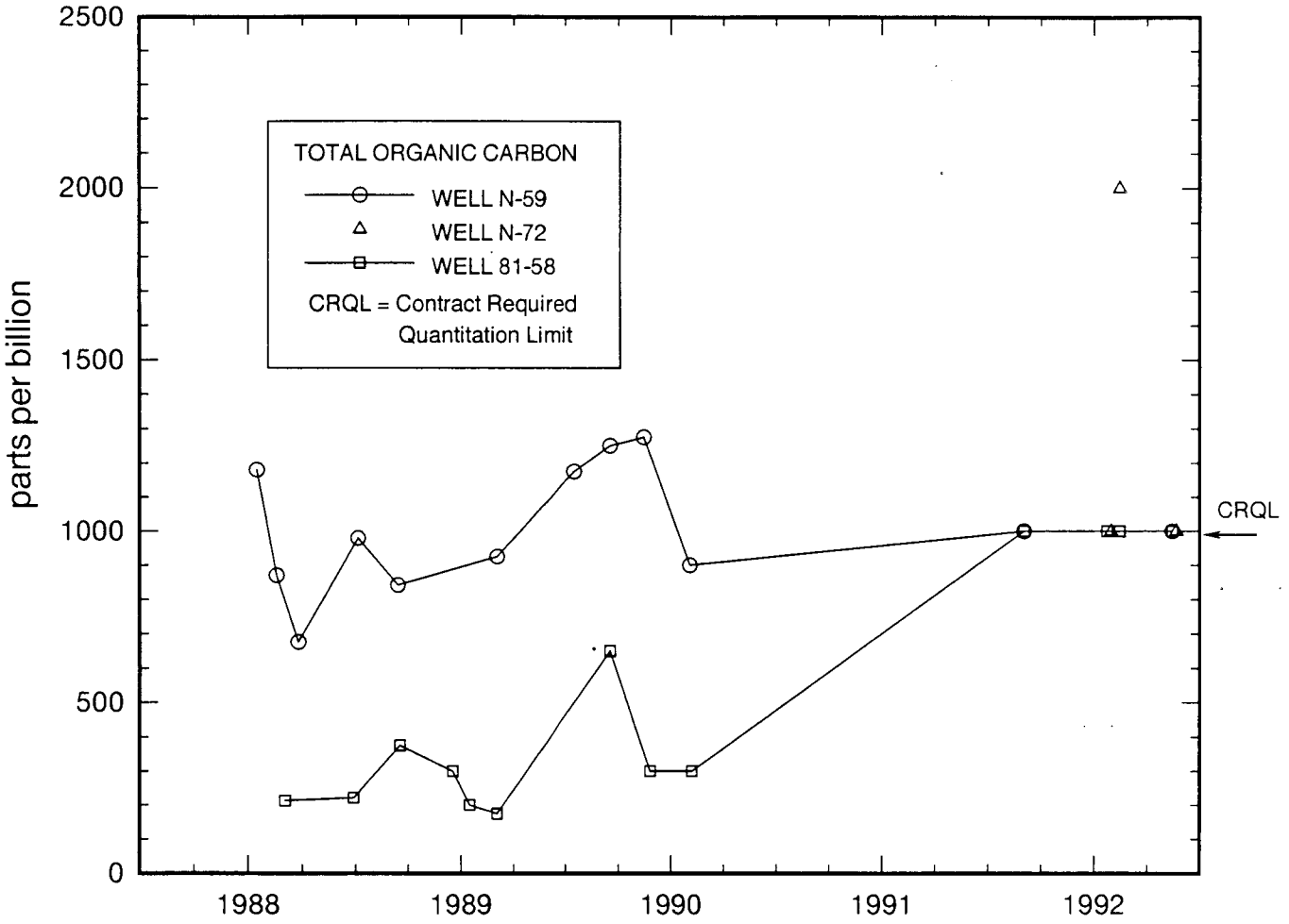
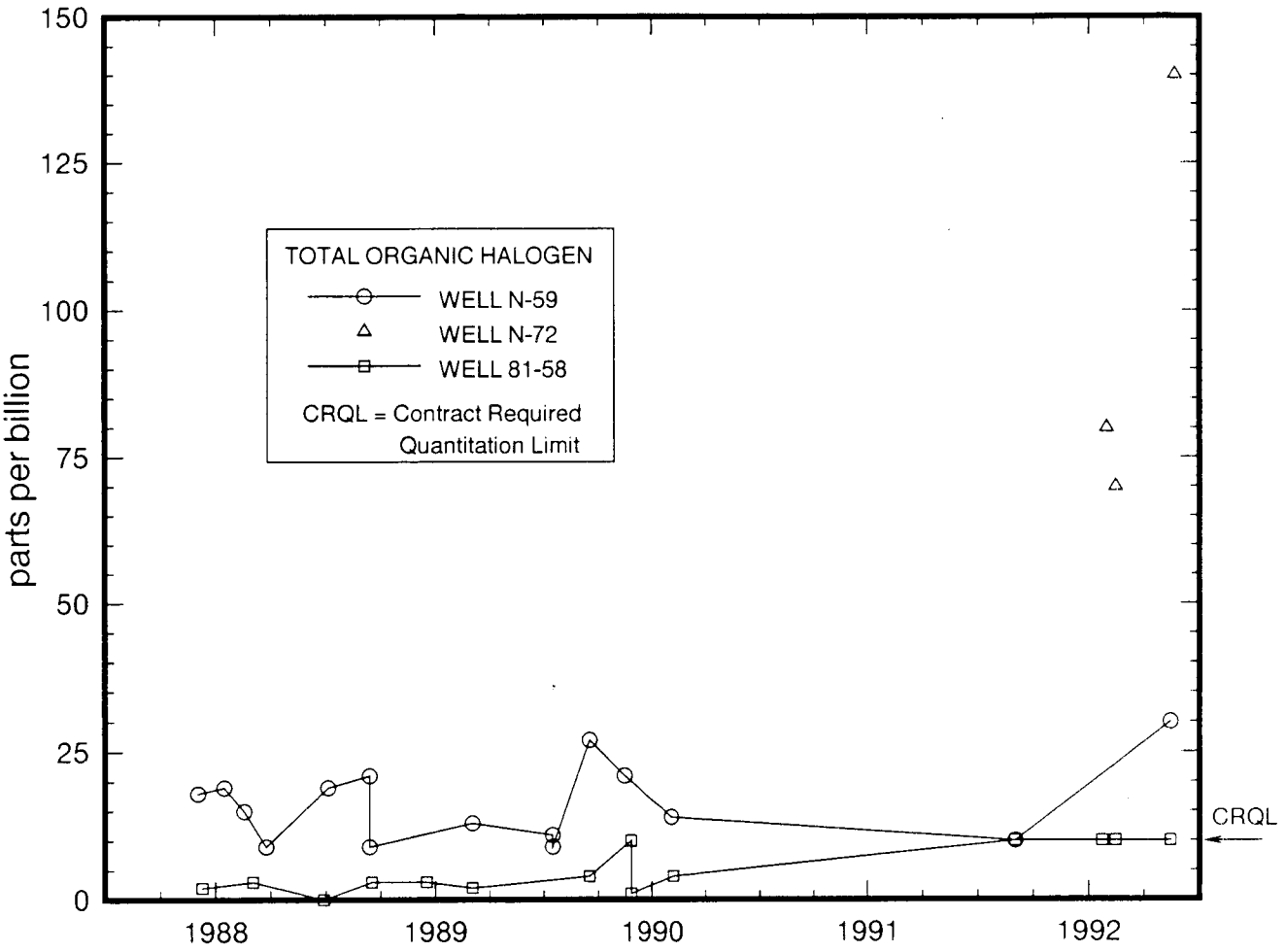


Figure 15. Total Organic Halogen versus Time in 1324-N/NA Wells.



All of the TOC values for the upgradient well, and many for well N-59, are below the CRQL (Figure 14). However, well N-59 appears elevated above background. Well N-59 exhibits a similar trend for TOX (Figure 15).

Three of the former downgradient wells for 1324-N/NA contain too little water to sample, now that the groundwater mound has dissipated. Two new wells (N-72 and N-73) were installed to replace the dry wells. Early TOX data from well N-72 are much higher than that for the upgradient well (Figure 15). One sample also contained TOC greater than the CRQL (Figure 14).

The cause of elevated TOC and TOX in the 1324-N/NA wells is unknown. The composition of the effluent to the facilities did not include organic species. Groundwater samples from well N-59 and the three other former downgradient wells were analyzed several times for an extensive list of constituents, including organic species. No constituents were found that would account for the apparently elevated TOC and TOX.

Additional investigation is required to identify the source of the elevated TOC and TOX data. A revised assessment plan for the 1324-N/NA facilities will be prepared to determine (1) whether TOC and/or TOX are actually elevated in the groundwater, and (2) what constituents are causing the elevated values.

4.0 CONCLUSIONS

Groundwater quality assessment data provide no evidence that elevated specific conductance in groundwater results from hazardous waste from the 1301-N or 1324-N/NA facilities. The elevated specific conductance observed in some of the downgradient monitoring wells results primarily from elevated concentrations of sulfate and sodium, which are non-regulated constituents. The elevated specific conductance observed in some groundwater samples from well N-3 reflects the influence of the 1324-NA Percolation Pond, not contamination from the 1301-N LWDF.

Evidence for these conclusions includes the following.

- Effluent characteristics--Discharges to the 1301-N LWDF were primarily low-level radionuclides, not chemical wastes. Effluents discharged to the 1324-NA Percolation Pond historically have been very high in sulfate, sodium, and other ions but lacked listed wastes.

- Groundwater chemistry--The groundwater chemistry of the December 1988 sample from well N-3 was similar to the groundwater chemistry of wells beneath the 1324-N/NA facilities (i.e., elevated sulfate and specific conductance). This indicates that groundwater carried contaminants from beneath the 1324-N/NA facilities through the portion of the aquifer monitored by well N-3. Sulfate is not a regulated waste constituent.

- Distribution of contaminants--The plume of groundwater contamination beneath the 1324-N/NA facilities extends toward the Columbia River, as seen in groundwater samples from the assessment monitoring wells. Well N-3 was located on the edge of that plume.

- Variations in chemistry with changes in groundwater flow--Specific conductance and ion concentrations in well N-3 were highest when a groundwater mound beneath the 1324-NA Percolation Pond was present. Specific conductance values and ion concentrations decreased as the groundwater gradient shifted under the influence of the 1325-N groundwater mound.

5.0 RECOMMENDATIONS

The 1301-N LWDF will return to indicator evaluation monitoring programs in accordance with 40 CFR 265.93(d)(6). The indicator evaluation groundwater monitoring program is described in Hartman (1991).

A revised assessment plan for the 1324-N/NA facilities will be prepared to determine (1) whether TOC and/or TOX are actually elevated in the groundwater, and (2) what constituents are causing the elevated values.

6.0 REFERENCES

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APPENDIX A

WATER-LEVEL AND CHEMISTRY DATA USED IN FIGURES

CONTENTS

APPENDIX A

WATER-LEVEL AND CHEMISTRY DATA USED IN FIGURES

This appendix contains data used to construct the figures presented in the text of this document. Table A-1 includes a listing of water level data from wells in the 100-N Area for the following dates: December 29, 1988; August 31, 1989; and November 30, 1989. Water levels in 1989 were measured with a steel tape using procedure WL-1 (PNL 1989). Recent water levels were measured per EII 10.2 (WHC 1988). Tables A-2, A-3, and A-4 include selected groundwater chemistry data.

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WHC, 1988, *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

Table A-1. Water Levels in 100-N Area Wells. (sheet 1 of 7)

Well	Date	Head
1-N-14	12/29/88	387.55
	8/31/89	389.24
	11/30/89	387.03
	3/30/92	384.13
1-N-15	12/29/88	392.95
1-N-16	8/31/89	395.48
	11/30/89	392.97
	3/30/92	386.92
1-N-17	12/29/88	389.42
	8/31/89	391.84
	11/30/89	389.48
	3/30/92	384.96
1-N-18	12/29/88	388.14
	8/31/89	389.36
	11/30/89	388.10
	3/30/92	384.59
1-N-19	12/29/88	388.53
	8/31/89	389.21
	11/30/89	388.19
	3/30/92	384.39
1-N-2	12/29/88	390.13
	8/31/89	392.87
	3/30/92	385.76
1-N-20	12/29/88	389.31
	8/31/89	391.69
	11/30/89	389.26
	3/30/92	385.07
1-N-21	8/31/89	390.48

Table A-1. Water Levels in 100-N Area Wells. (sheet 2 of 7)

Well	Date	Head
1-N-21	11/30/89	389.06
	3/30/92	384.98
1-N-23	8/31/89	387.89
	11/30/89	387.87
	3/30/92	384.73
1-N-24	8/31/89	385.01
	11/30/89	386.56
1-N-25	8/31/89	383.24
	11/30/89	386.13
	3/30/92	383.28
1-N-26	3/30/92	384.02
1-N-27	12/29/88	394.11
	8/31/89	400.01
	11/30/89	394.33
	3/30/92	388.09
1-N-28	12/29/88	394.56
	8/31/89	400.81
	11/30/89	395.27
1-N-29	12/29/88	395.12
	8/31/89	401.10
	11/30/89	395.17
	3/30/92	388.58
1-N-3	12/29/88	389.44
	8/31/89	391.71
	3/30/92	405.40
1-N-30	12/29/88	394.48

Table A-1. Water Levels in 100-N Area Wells. (sheet 3 of 7)

Well	Date	Head
1-N-31	12/29/88	396.48
	8/31/89	400.28
	11/30/89	394.14
1-N-32	12/29/88	394.18
	8/31/89	400.10
	11/30/89	393.11
	11/30/89	394.58
	3/30/92	387.61
1-N-33	8/31/89	399.64
	11/30/89	393.79
	3/30/92	387.32
1-N-34	12/29/88	394.25
	8/31/89	400.16
	11/30/89	394.35
	3/30/92	387.81
1-N-36	12/29/88	393.59
	8/31/89	399.39
	11/30/89	393.72
1-N-37	12/29/88	393.09
	8/31/89	398.63
	11/30/89	393.27
1-N-39	12/29/88	392.13
	8/31/89	397.87
	11/30/89	392.49
1-N-4	12/29/88	392.73
	8/31/89	397.50
1-N-40	12/29/88	390.99
	8/31/89	396.56
	11/30/89	391.39

Table A-1. Water Levels in 100-N Area Wells. (sheet 4 of 7)

Well	Date	Head
1-N-41	12/29/88	388.65
	8/31/89	392.66
	11/30/89	388.75
	3/30/92	385.16
1-N-42	12/29/88	389.27
	8/31/89	393.74
	11/30/89	389.38
	3/30/92	385.67
1-N-44	12/29/88	392.30
	8/31/89	397.98
	11/30/89	392.83
1-N-49	12/29/88	389.44
	8/31/89	393.99
	11/30/89	389.62
	3/30/92	385.16
1-N-50	12/29/88	386.28
	8/31/89	375.78
	3/30/92	373.96
1-N-51	12/29/88	386.37
	8/31/89	384.23
	11/30/89	385.17
	3/30/92	383.50
1-N-52	12/29/88	393.66
	8/31/89	399.86
	11/30/89	394.76
	3/30/92	388.96
1-N-53	12/29/88	391.50
	8/31/89	396.20
	11/30/89	391.72

Table A-1. Water Levels in 100-N Area Wells. (sheet 5 of 7)

Well	Date	Head
1-N-54	12/29/88	391.81
	8/31/89	395.63
	11/30/89	392.43
	3/30/92	386.31
1-N-55	12/29/88	391.80
	8/31/89	395.54
	11/30/89	392.45
	3/30/92	386.39
1-N-56	12/29/88	390.74
	8/31/89	394.39
	11/30/89	391.09
	3/30/92	385.75
1-N-57	12/29/88	392.76
	8/31/89	396.87
	11/30/89	393.46
	3/30/92	387.64
1-N-58	12/29/88	397.86
	8/31/89	397.75
	11/30/89	398.62
1-N-59	12/29/88	398.09
	8/31/89	397.44
	11/30/89	398.66
	3/30/92	388.25
1-N-6	12/29/88	394.64
	8/31/89	400.36
1-N-60	12/29/88	398.34
	8/31/89	397.57
	11/30/89	398.78
	3/30/92	388.74

Table A-1. Water Levels in 100-N Area Wells. (sheet 6 of 7)

Well	Date	Head
1-N-61	12/29/88	405.10
	8/31/89	399.87
	11/30/89	402.10
1-N-62	12/29/88	394.52
	8/31/89	400.00
	11/30/89	395.06
	3/30/92	388.73
1-N-63	12/29/88	393.88
	8/31/89	399.00
	11/30/89	394.49
	3/30/92	388.40
1-N-64	12/29/88	393.25
	8/31/89	397.86
	3/30/92	387.98
1-N-65	12/29/88	392.98
	8/31/89	397.63
	3/30/92	387.49
1-N-66	12/29/88	393.44
	8/31/89	398.82
	3/30/92	387.04
1-N-67	8/31/89	393.38
	3/30/92	385.61
1-N-71	3/30/92	389.81
1-N-72	3/30/92	389.41
1-N-73	3/30/92	388.62

Table A-1. Water Levels in 100-N Area Wells. (sheet 7 of 7)

Well	Date	Head
1-N-74	3/30/92	389.79
1-N-8S	12/29/88	386.88
	8/31/89	385.27
	11/30/89	385.78
	3/30/92	383.30

Table A-2. Specific Conductance and Sulfate. (sheet 1 of 3)

Well	Constituent	Date	Result (a)
1-N-3	Specific conductance	12/16/87	480
		3/18/88	668
		6/29/88	495
		12/19/88	734
		3/09/89	607
		3/14/89	640
		7/26/89	161
		8/15/89	262
		9/29/89	257
		11/08/89	238
		2/14/90	262
		3/25/91	363
		12/05/91	365
	Sulfate	12/16/87	136000
		3/18/88	248000
		6/29/88	223000
		12/19/88	249000
		3/09/89	180000
		7/26/89	34900
		8/15/89	31000
		9/29/89	26000
		11/08/89	24800
		2/14/90	29900
		12/05/91	35000
1-N-4	Specific conductance	12/16/87	216
		3/18/88	224
		6/27/88	207
		9/16/88	297
		12/19/88	190
		3/09/89	204
		6/26/89	171
		8/15/89	183
		9/29/89	166
		11/08/89	161
		2/02/90	168

Table A-2. Specific Conductance and Sulfate. (sheet 2 of 3)

Well	Constituent	Date	Result (a)
1-N-4	Sulfate	12/16/87	13200
		3/18/88	10800
		6/27/88	14900
		9/16/88	28100
		12/19/88	18000
		3/09/89	12700
		6/26/89	18400
		8/15/89	15300
		9/29/89	12700
		11/08/89	12400
		2/02/90	12700
1-N-59	Specific conductance	12/04/87	1623
		1/13/88	1539
		2/18/88	1369
		3/23/88	1266
		7/06/88	1088
		9/14/88	1034
		3/01/89	1827
		7/17/89	2318
		8/14/89	2835
		9/18/89	3458
		11/16/89	2148
		2/02/90	1178
		3/27/91	748
		9/03/91	872
		5/14/92	1001
	Sulfate	12/04/87	789000
		1/13/88	833000
		2/18/88	904000
		3/23/88	534000
		7/06/88	465000
		9/14/88	572500
		3/01/89	748000
		7/17/89	1170000
		8/14/89	1550000
		9/18/89	1760000
		11/16/89	1010000
		2/02/90	535000

Table A-2. Specific Conductance and Sulfate. (sheet 3 of 3)

Well	Constituent	Date	Result (a)
1-N-59	Sulfate	9/03/91	210000
		5/14/92	300000
6-81-58	Specific conductance	12/13/87	173
		3/02/88	112
		6/30/88	209
		9/19/88	180
		12/19/88	227
		1/16/89	166
		3/03/89	155
		9/18/89	215
		11/28/89	255
		2/07/90	203
		9/04/91	236
		1/23/92	249
		2/14/92	237
		5/14/92	226
	Sulfate	12/13/87	15300
		3/02/88	16100
		6/30/88	14600
		9/19/88	14900
		12/19/88	14800
		1/16/89	15900
		3/03/89	16000
		9/18/89	15400
		11/28/89	17300
		2/07/90	16400
		9/04/91	17000
		1/23/92	19000
		2/14/92	21000
		5/14/92	22000

(a) Sulfate concentration in ppb. Specific conductance in umho/cm.

Table A-3. Data for Histograms. (sheet 1 of 3)

Well	Constituent	Date	Result (a)
1-N-2	Calcium (filt)	12/19/88	27200
	Chloride		900
	Magnesium (filt)		4680
	Potassium (filt)		1590
	Sodium (filt)		2630
	Specific Conductance		226
	Sulfate		9700
	Calcium (filt)	3/09/89	28500
	Chloride		900
	Magnesium (filt)		5010
	Potassium (filt)		1630
	Sodium (filt)		2870
	Specific Conductance		211
	Sulfate		9700
	Calcium (filt)	12/21/89	24400
	Chloride		1400
	Magnesium (filt)		3960
	Potassium (filt)		1420
	Sodium (filt)		2480
	Specific Conductance		184
	Sulfate		13400
	Calcium (filt)	1/30/92	24000
	Chloride		1500
	Magnesium (filt)		4400
	Potassium (filt)		1300
	Sodium (filt)		2500
	Specific Conductance		167
	Sulfate		14000
1-N-3	Calcium (filt)	12/19/88	115000
	Chloride		6300
	Magnesium (filt)		19500
	Potassium (filt)		3630
	Sodium (filt)		15900

Table A-3. Data for Histograms. (sheet 2 of 3)

Well	Constituent	Date	Result (a)
1-N-3	Specific Conductance	12/19/88	734
	Sulfate		249000
	Calcium (filt)	3/09/89	87100
	Chloride		5700
	Magnesium (filt)		15100
	Potassium (filt)		3340
	Sodium (filt)		16900
	Specific Conductance		607
	Sulfate		180000
	Specific Conductance	3/14/89	640
	Calcium (filt)	11/08/89	27900
	Chloride		2500
	Magnesium (filt)		4680
	Potassium (filt)		1940
	Sodium (filt)		6720
	Specific Conductance		238
	Sulfate		24800
	Calcium (filt)	12/05/91	53000
	Chloride		5500
	Magnesium (filt)		8900
	Potassium (filt)		2700
	Sodium (filt)		9600
	Specific Conductance		365
	Sulfate		35000
1-N-59	Calcium (filt)	3/01/89	46650
	Chloride		3900
	Magnesium (filt)		11950
	Potassium (filt)		3225
	Sodium (filt)		318000
	Specific Conductance		1827
	Sulfate		748000

Table A-3. Data for Histograms. (sheet 3 of 3)

Well	Constituent	Date	Result (a)
1-N-59	Calcium (filt)	7/17/89	119000
	Chloride		5540
	Magnesium (filt)		24200
	Potassium (filt)		5340
	Sodium (filt)		397000
	Specific Conductance		2318
	Sulfate		1170000
	Calcium (filt)	11/16/89	105000
	Chloride		7700
	Magnesium (filt)		18100
	Potassium (filt)		4100
	Sodium (filt)		331000
	Specific Conductance		2148
	Sulfate		1010000
	Calcium (filt)	9/03/91	16000
	Chloride		2500
	Magnesium (filt)		2800
	Potassium (filt)		3000
	Sodium (filt)		170000
	Specific Conductance		872
	Sulfate		210000

(a) Ion concentration in ppb. Specific conductance in umho/cm.

Table A-4. Total Organic Halogen and Total Organic Carbon in Groundwater. (sheet 1 of 4)

Well	Constituent	Date	Result (a)	LT (b)
1-N-59	Total Organic Halogen, Lo	9/14/88	9	<
		9/14/88	20	
		9/14/88	21	
		3/01/89	13	
		3/01/89	14	
		7/17/89	9	<
		7/17/89	10	
		7/17/89	14	
		9/18/89	12	
		9/18/89	20	
		9/18/89	65	
		11/16/89	19	
		11/16/89	23	
		11/16/89	24	
		2/02/90	13	
		2/02/90	14	
		9/03/91	10	U
		5/14/92	30	
	Total organic carbon	12/04/87	1160	
		1/13/88	1180	
		2/18/88	870	<
		3/23/88	656	<
		3/23/88	659	<
		3/23/88	686	<
		3/23/88	704	<
		7/06/88	909	<
		7/06/88	924	<
		7/06/88	996	<
		7/06/88	1090	
		9/14/88	768	<
		9/14/88	800	<
		9/14/88	900	<
		3/01/89	900	<
		3/01/89	1000	<
		7/17/89	1100	<
		7/17/89	1200	<
		9/18/89	1200	<
		9/18/89	1400	<
		11/16/89	1200	<

Table A-4. Total Organic Halogen and Total Organic Carbon in Groundwater. (sheet 2 of 4)

Well	Constituent	Date	Result (a)	LT (b)
1-N-59	Total organic carbon	11/16/89	1300	<
		2/02/90	900	<
		9/03/91	1000	U
		5/14/92	1000	U
	Total organic halogen	12/04/87	18	<
		1/13/88	19	<
		2/18/88	15	<
		3/23/88	4	<
		3/23/88	9	<
		3/23/88	10	<
		3/23/88	11	<
		7/06/88	10	<
		7/06/88	15	<
		7/06/88	18	<
		7/06/88	34	<
1-N-72	Total Organic Halogen, Lo	1/28/92	80	
		2/13/92	70	
		5/22/92	140	
	Total organic carbon	1/28/92	1000	U
		2/13/92	2000	
		5/22/92	1000	U
6-81-58	Total Organic Halogen, Lo	12/13/87	2	<
		3/02/88	3	<
		9/19/88	-1	<
		9/19/88	0	<
		9/19/88	14	<
		12/19/88	1	<
		12/19/88	3	<
		12/19/88	5	<
		3/03/89	-1	<

Table A-4. Total Organic Halogen and Total Organic Carbon in Groundwater. (sheet 3 of 4)

Well	Constituent	Date	Result (a)	LT (b)
6-81-58	Total Organic Halogen, Lo	3/03/89	0	<
		3/03/89	4	<
		3/03/89	5	<
		9/18/89	3	<
		9/18/89	4	<
		9/18/89	13	
		9/18/89	58	
		11/28/89	-1	<
		11/28/89	6	<
		11/28/89	10	
		2/07/90	1	<
		2/07/90	4	<
		2/07/90	5	<
		2/07/90	6	<
		9/04/91	10	U
		1/23/92	10	U
		2/14/92	10	U
		5/14/92	10	U
	Total organic carbon	12/13/87	251	<
		3/02/88	213	<
		6/30/88	200	<
		6/30/88	220	<
		6/30/88	225	<
		6/30/88	240	<
		9/19/88	300	<
		9/19/88	400	<
		12/19/88	200	<
		12/19/88	300	<
		12/19/88	400	<
		1/16/89	200	<
		3/03/89	100	<
		3/03/89	200	<
		9/18/89	500	<
		9/18/89	700	<
		11/28/89	200	<
		11/28/89	300	<
		11/28/89	400	<
		2/07/90	300	<
		9/04/91	1000	U
		1/23/92	1000	U

Table A-4. Total Organic Halogen and Total Organic Carbon in Groundwater. (sheet 4 of 4)

Well	Constituent	Date	Result (a)	LT (b)
6-81-58	Total organic carbon	2/14/92	1000	U
	Total organic halogen	6/30/88	-7	<
		6/30/88	-5	<
		6/30/88	-2	<
		6/30/88	-1	<

(a) Units are ppb.
(b) "U" and "<" both signify constituent was not detected above the contractual quantitation limit.

APPENDIX B

QUALITY CONTROL DATA FOR 1301-N AND 1324-N/NA GROUNDWATER QUALITY ASSESSMENT

CONTENTS

CONTENTS (cont)

APPENDIX B

QUALITY CONTROL DATA FOR 1301-N AND 1324-N/NA GROUNDWATER QUALITY ASSESSMENT

This appendix contains the results of quality control analyses conducted in support of the 1301-N and 1324-N/NA assessment programs. The wells in the 1301-N and 1324-N/NA monitoring networks were usually sampled at the same time as those in the 1325-N network. Data from wells in that network are also included here because they are also applicable to the 1301-N and 1324-N/NA monitoring projects.

Quality control data include results of duplicate samples, interlaboratory comparisons, blind standards, and blanks. Duplicate and interlaboratory comparison data are presented here for samples from 100-N Area wells. Results of blanks and blind standards that were submitted the same months as 100-N Area sample collection events are also included. Quality control data for volatile organic analyses, pesticides, and semivolatiles are not included here because these constituents are not of primary interest in the 1301-N and 1324-N/NA assessment programs.

The quality control program was designed and implemented by Pacific Northwest Laboratory (PNL). It was based on draft guidance from the Environmental Protection Agency (EPA) Region 10 and EPA (1986a). The primary analytical laboratory was United States Testing Company, Incorporated (UST) in accordance with the current edition of EPA (1986b). The sitewide quality control program for RCRA is discussed in the RCRA quarterly reports (e.g., Smith et al. 1989).

Values from interlaboratory comparisons of field samples must fall within 2.8 standard deviations based on EPA Water Supply or Water Pollution Laboratory Performance Evaluations. This is equivalent to the 95% confidence interval for two independent samples for which a true value is not known. The calculation takes into account the uncertainties associated with these analyses.

Blind standards contain a mixture of constituents in known concentrations. They are prepared by the EPA for laboratory performance evaluation. Some of the constituents in these standards fall below UST or PNL detection limits. The target range for blind standard samples is 2.0 standard deviations, equivalent to the 95% confidence limit. If results fall outside the 99% confidence interval, a request for data verification is warranted (ASTM 1987).

Values outside the target range, duplicate samples not in agreement, or blanks containing an analyte are investigated through PNL's "request for data review" process; UST responds with a nonconforming data report. If the cause of the unacceptable QC data cannot be identified, the data are simply flagged so this information can be considered in interpreting project data. If a problem is persistent, further investigation is conducted to determine the cause and corrective actions.

Analytical units in the following tables are parts per billion for all except the radioactive constituents, which are reported in picocuries per liter. The PNL values reported in parentheses are near the PNL detection limit. Abbreviations used in the tables are listed below.

CLP	contract laboratory procedure
DL	detection limit
GFAA	graphite furnace atomic absorption
IC	ion chromatography
ICP	inductively coupled plasma
ISE	ion selective electrode
LDL	Low Detection Limit (for fluoride, analysis by electrode, rather than by ion chromatography)
PNL	Pacific Northwest laboratory
s.d.	standard deviations
UST	United States Testing Company
WP	Environmental Protection Agency Water Pollution laboratory performance evaluation
WS	Environmental Protection Agency Water Supply laboratory performance evaluation

REFERENCES

ASTM, 1987, "Standard Terminology of Statistical Methods" E456-83a, in *Annual Book of ASTM Standards*, Volume 1402, American Society for Testing and Materials, Philadelphia, Pennsylvania.

EPA, 1986a, *Resource Conservation and Recovery Act (RCRA) Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD)*, OSWER-9950, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986b, *Test Methods for Evaluating Solid Waste - Physical/Chemical Methods*, 3rd edition, EPA SW-846, U.S. Environmental Protection Agency, Washington, D.C.

Smith, R. M., D. J. Bates, and R. E. Lundgren, 1989, *Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period April 1 to June 30, 1989*, PNL-7134, Pacific Northwest Laboratory, Richland Washington.

DECEMBER 1988

Table B-1. Results of Nitrate/Fluoride Analysis (WS 03/78) -- December 1988.

Constituent	UST	PNL	True value	Target range
Nitrate	<500	340	363	[a]
Fluoride	<500	80	82	
LDL Fluoride	80	87	82	
Nitrate	3,500	3,700	3,630	3,280 - 3,990
Fluoride	900	760	820	
LDL Fluoride	710[b]	810	820	730 - 900

[a]Below range for which regression applies.
[b]Outside the 95% confidence interval, but within the 99% confidence interval (± 2.7 s.d.) specified by WP evaluations.

Table B-2. Results of EPA Minerals Samples Analysis (WP 09/87) -- December 1988.

Constituent	UST	PNL	True value	Target range
Sulfate	19,700 19,700	19,700 19,650	20,000	16,300 - 23,100
Fluoride	1,100[a] 1,100	835[b] 835[b]	1,000	890 - 1,090
Chloride	48,400 48,500	47,000[b] 47,300[b]	52,100	48,200 - 55,400
Alkalinity	27,700 27,800	--	27,300	24,100 - 30,500

[a]Within rounding error of target range.
[b]Outside target range.

Table B-3. Results of EPA Nutrient Sample #1 Analysis (WP 09/87) -- December 1988.

Constituent	UST	PNL	True value	Target range[a]
Ammonium ion (Sample 0799)	340 350	267 273	257	100 - 490
Ammonium ion (Sample 3999)	2,500 2,800[b]	2,380 2,480	2,313	1,900 - 2,680

[a]Based on statistics from EPA WP summary dated May 1987.
[b]Outside target range.

Table B-4. Results of Trace Metals Samples I and II Analysis (WP) -- December 1988.

Constituent	UST	PNL	True value	Target range[a]
Silver	<8[b] <6[b]	--	9	6.7 - 11
Antimony	<15[c] <11[c]	--	18	13 - 25
Thallium	14		18	13 - 25
Zinc	58 47	54	50	43 - 58
Cadmium	16[d] 12	12	12.5	10 - 14
Chromium	57 52	47	50	41 - 59
Nickel	50 51	48	50	42 - 59
Copper	53 46	51	50	43 - 56
Vanadium	134 117	127	125	107 - 143
Aluminum	261 238	272	250	205 - 318
Manganese	53 45	54	50	42 - 56
Iron	<30[d] 65	61	50	37 - 65
Beryllium	57[d] 48	46	50	44 - 56
Arsenic	47 47	55	50	39 -60
Selenium	13 12	(10)	12.5	8.1 - 15
Lead	57 54	40	50	40 - 61

[a]Based on regression equations from sample instructions.
[b]Reported as <10 ppb; values in table from chemist's report.
[c]Reported as <100 ppb; values in table from chemist's report.
[d]Out of target range. Believed to be caused by a laboratory instrument problem, which was subsequently remedied.

Table B-5. Results of Anion and Ammonium Analysis -- December 1988.

Well number	Constituent	UST	PNL[a]
Blank	nitrate	<500 --	40 40
199-N-52		25,200 25,000	26,000 26,200
Blank	sulfate	<500 --	260 250
199-N-52		15,200 15,000	13,400 15,500
Blank	fluoride	<500 <500	5 5
199-N-52		<500 <500	200 200
Blank	chloride	<500 --	20 20
199-N-52		1,500 1,500	1,800 1,800
Blank	phosphate	<1000	<200
199-N-52		<1,000	<200
Blank	ammonium	<50	<20
199-N-52		<50	<20

[a]PNL reports results of two analyses from a single sample; UST reports results from separate field samples.

Table B-6. Results of Filtered Metals Analysis -- December 1988.
(sheet 1 of 2)

Well number	Constituent	UST	PNL
Blank	zinc	7	<10
199-N-52		<5 <5	(11)
Blank	calcium	53	164
199-N-52		28,000 25,100	27,800
Blank	barium	<6	--
199-N-52		21 21	23
Blank	chromium	<10	--
199-N-52		<10	--
Blank	sodium	269	30
199-N-52		6,660 7,090	7,650
Blank	nickel	<10	--
199-N-52		<10	--
Blank	copper	<10	--
199-N-52		<10	--
Blank	vanadium	<5	--
199-N-52		27 27	29.1
Blank	manganese	<5	--
199-N-52		<5 <5	(2.0)
Blank	potassium	<100	--
199-N-52		3,530 3,700	4,810
Blank	iron	<30	6.8
199-N-52		<30 <30	--
Blank	magnesium	<50	<60
199-N-52		7,720 7,640	7,570

Table B-6. Results of Filtered Metals Analysis -- December 1988.
(sheet 2 of 2)

Well number	Constituent	UST	PNL
Blank	strontium	<20	--
199-N-52		163 161	168
Blank	arsenic	--	<10
199-N-52		6 6	<10
Blank	lead	<5	<10
199-N-52		<5	<10

SUMMARY OF QUALITY CONTROL DATA FOR DECEMBER 1988

Blind standards: Most results were within the target range; however, fluoride and chloride results for PNL were outside the target range. Ammonium ion results for UST were outside the target range.

Blanks: Three constituents from the filtered ICP metals analysis blanks were above the detection limit. These were zinc (7 ppb), calcium (53 ppb), and sodium (269 ppb). However, all of these are below the action level for CLP, or 20, 5,000, and 5,000 ppb, respectively.

Duplicates and interlaboratory comparisons: All results are consistent between laboratories.

MARCH 1989

Table B-7. Results of Nitrate/Fluoride Analysis (12 WS 03/78) -- March 1989.

Constituent	UST	PNL	True value	Target range
Sample 0599				
Nitrate	3,400 3,400	3,520 3,490	3,390	2,550 - 4,380
Fluoride	<500 <500	190 190	216	180 - 260 WP 203 - 225 WS
LDL Fluoride	200 210			
Sample 3999				
Nitrate	30,100 30,100	30,900 31,100	30,500	26,200 - 33,200
Fluoride	2,000 1,900	2,010 2,000	1,944	1,740 - 2,100 WP 1,830 - 2,020 WS
LDL Fluoride	1,700* 1,700*			

*Outside $\pm$ 2 s.d. limits for WP studies but within 2.7 s.d.

Table B-8. Results of Nutrient #1 Analysis (WP 09/87) -- March 1989.

Constituent	UST	True value	Target range
Ammonium ion (Sample 0799)	624[c] 611[c]	514	423 - 598[a]
Ammonium ion (Sample 3999)	3,520 3,500	3,600	3,212 - 3,913[b]

[a]Target range based on regression formula from instruction for nutrient sample; wider target ranges are given for WP statistics summary (330 - 770 ppb for a true value of 514).

[b]WP summary gives range of 3,020 - 4,050 for true value of 3,600.

[c]Outside target range.

Table B-9. Results of Trace Metals III Analysis (WP 06/86) -- March 1989.

Constituent	UST	True value	Target range (source)
Calcium	4,980 5,370	5,000	4,280 - 5,741 (WP)
Barium	5,040 5,440	5,000	4,358 - 5,366 (WS)
Sodium	1,100 1,150	1,000	754 - 1,666 (WP)
Potassium	946 1,010	1,000	714 - 1,261 (WP)
Magnesium	476 510	500	434 - 586 (WP)

Table B-10. Results of Trace Metals I Analysis (WP 02/87) -- March 1989. (sheet 1 of 2)

Constituent	UST	PNL	True value	Target range*
Sample 0799				
Zinc	24	24	20	15 - 26
Cadmium	5	(4.5)	5	3 - 6
Chromium	23	(22)	20	15 - 25
Nickel	26	--	20	15 - 26
Copper	21	21	20	15 - 25
Vanadium	57	50	50	40 - 60
Aluminum	<150	108	100	85 - 157
Manganese	22	21	20	14 - 24
Iron	<30	24	20	10 - 33
Beryllium	20	18	20	17 - 23
Arsenic	20	18	20	14 - 25
Selenium	5	<10	5	2 - 7 (WS)
Lead	22	23	20	16 - 24 (WS)
Mercury	1.04 1.15	--	1	0.6 - 1.3
Sample 3999				
Zinc	52 51	49	50	43 - 58
Cadmium	12 12	13	12.5	10 - 14 (WS)
Chromium	53 53	50	50	41 - 59
Nickel	57 56	45	50	42 - 59
Copper	50 49	52	50	43 - 56
Vanadium	134 132	125	125	108 - 143
Aluminum	264 264	251	250	214 - 317

Table B-10. Results of Trace Metals I Analysis (WP 02/87) -- March 1989. (sheet 2 of 2)

Constituent	UST	PNL	True value	Target range*
Manganese	53 51	52	50	42 - 56
Iron	52 51	52	50	37 - 65
Beryllium	51 47	45	50	44 - 56
Arsenic	49 48	--	50	39 - 60
Selenium	12 11	--	12.5	8 - 15 (WS)
Lead	51 51	--	50	40 - 60

*WP unless otherwise noted.

Table B-11. Results of Anion and Ammonium Analysis -- March 1989.

Well number	Constituent	UST	PNL
Blank	nitrate	<500	30
199-N-36		4,800 4,600	5,090 5,110
Blank	sulfate	<500	<50
199-N-36		11,600 11,600	11,600 11,600
Blank	fluoride	<500	<10
199-N-36		<500 <500	90 90
Blank	chloride	<500	10
199-N-36		900 900	1,200 1,200
Blank	phosphate	<1,000	<200
199-N-36		<1,000 <1,000	--
Blank	ammonium	<50	27
199-N-36		<50 <50	<20

Table B-12. Results of Filtered Metals Analysis - March 1989. (sheet 1 of 2)

Well number	Constituent	UST	PNL
Blank	zinc	<5	--
199-N-36		<5 <5	--
Blank	calcium	<50	.246
199-N-36		16,600 16,800	18,700
Blank	barium	<6	--
199-N-36		8 8	10
Blank	chromium	<10	--
199-N-36		<10 <10	--
Blank	sodium	<200	--
199-N-36		1,650 1,660	1,760
Blank	vanadium	<5	--
199-N-36		<5 7	(9)
Blank	manganese	<5	--
199-N-36		<5 <5	--
Blank	potassium	<100	(600)
199-N-36		1,560 1,550	1,900
Blank	iron	<30	--
199-N-36		<30 <30	(5)
Blank	magnesium	<50	--
199-N-36		3,260 3,280	3,530
Blank	strontium	<10	--
199-N-36		90 90	85

Table B-12. Results of Filtered Metals Analysis - March 1989. (sheet 2 of 2)

Well number	Constituent	UST	PNL
Blank	arsenic	<5	<10
199-N-36		<5 <5	<10
Blank	lead	<5	<10
199-N-36		<5 <5	<10

SUMMARY OF QUALITY CONTROL RESULTS FOR MARCH 1989

Blind standards:

- Anions--UST LDL fluoride is slightly outside the target range for sample 3999.
- Ammonium--The results for the lower level sample fall slightly outside the target range, but are within the wider limits allowed based on WP studies.
- Metals--Trace metals III includes metals commonly present in water samples; trace metals I includes a variety of trace metals. All reported results are within the target range.

Blanks: No filtered metals detected.

Duplicates and interlaboratory comparisons:

- Anions and ammonium--No significant difference between labs, and duplicates in labs agreed well.
- Metals--Consistent between duplicates and between labs.

JUNE 1989

Table B-13. Results of Minerals 1 Sample Analysis (WP 03/84) -- June 1989.

Constituent	UST	PNL	True value	Target range (source)
Sulfate	97,800 97,800 95,800	91,000 92,000	95,300	84,000 - 104,000 (WP)
Fluoride	1,640* 1,630* 1,610*	1,000* 1,000*	1,300	1,160 - 1,410 (WP) 1,200 - 1,380 (WS)
Chloride	81,600 81,400 81,400	79,000 79,000	80,800	75,500 - 85,200 (WP)

*Value outside target range.

Table B-14. Results of Nitrate/Fluoride 5 Sample Analysis (WP 03/78) -- June 1989.

Constituent	UST	PNL	True value	Target range (source)
Nitrate	[a] [a]	3,700 3,800	3,630 3,630	3,017 - 4,194 (WP) 3,052 - 4,221 (WS)
Fluoride	[a] [a]	700[b] 700[b]	820	750 - 880 (WS)
Fluoride, LDL	917[b] 914[b] 930[b]	-- --	820 820	725 - 900 (WP) 750 - 880 (WS)

[a]Not reported.
[b]Outside target range.

Table B-15. Results of Nutrient #1 Sample Analysis (WP 09/87) -- June 1989.

Constituent	UST	True value	Target range (source)
Sample 0799			
Ammonium ion	345[b] 346[b]	257 257	191 - 322[a] 104 - 496 (WP)
Sample 3999			
Ammonium ion	2,810[c] 2,790[c] 2,740[c]	2,314 2,314	2,050 - 2,530[a] 1,900 - 2,680 (WP)

[a]Target range based on regression formula from nutrient sample instructions (WP 09/87).

[b]Value outside 2.0 s.d. limits based on EPA data.

[c]Value outside 2.8 s.d. limits based on information for nutrient sample, 1,950 to 2,630 ppb; within 2.8 s.d. based on WP (1,740 - 2,840 ppb).

Table B-16. Results of GFAA Analysis for Trace Metals #5 (WS 03/78), Sample 0799, and ICP-19 (WP 10/83), Sample 3999.

Constituent	UST	True value	Target range (source)
Sample 0799			
Arsenic	28 29	31	25 - 36 (WS)
Selenium	6 6	7	3.9 - 8.8 (WS)
Lead	34 35	34	28 - 40 (WS)
Sample 3999			
Arsenic	8 9	10.0	6 - 14 (WP)
Selenium	10 9	9.9	7 - 12 (WP)
Thallium	8 10	10.1	8 - 13 (WP)
Lead	10 10	10.1	5 - 17 (WP)

Table B-17. Results of Filtered Metals Analysis -- June 1989 Data.

Well number	Constituent	UST	PNL
Blank	arsenic	<5	<10
199-N-55		<5 <5	--
Blank	selenium	<5	<10
199-N-55		<5	<10
Blank	lead	<5	<10
199-N-55		<5	<10

SUMMARY OF QUALITY CONTROL RESULTS FOR JUNE 1989

Blind standards: Fluoride, chloride, and ammonium ion were outside target ranges on some samples for UST.

Blanks: The only analyte above detection was calcium. The calcium is of no consequence compared to environmental levels.

JULY 1989

Table B-18. Results of Nitrate/Fluoride #5 Sample Analysis (WP 03/78) -- July 1989.

Constituent	UST	True value	Target range (source)
Nitrate	3,800 3,830	3,630	3,017 - 4,194 (WP) 3,052 - 4,221 (WS)
Fluoride	847 879 891*	820	750 - 880 (WS)

*Value outside 2.0 s.d. limits based on EPA data.

Table B-19. Results of Analysis of ICP-19 Sample (WP 10/83).

Constituent	UST	PNL	True value	Target range (source)
Zinc	15 16[a]		10.1	6 - 15 (WP)
Cadmium	9 3[a]	(11)	9.4	7 - 11 (WP)
Chromium	<10(6)[c] <10(3)		10.3	5 - 15 (DL)[b]
Nickel	12 11		10.2	5 - 15 (DL)
Copper	<10(6) <10(2)	(11)	10.3	5 - 15 (DL)
Vanadium	11 18[c]		10.1	4 - 16 (WP)
Manganese	9 11	10	10.2	5 - 14 (WP)
Beryllium	12 <5(3)[a]		9.6	7 - 12 (WP)
Silicon	446 <200			-- (NA)

[a]Outside target range.

[b]DL - Sample concentration was near the detection limit; acceptance limits given are ± 0.5 times the detection limit. EPA limits are similar for these analyses: Chromium 7 - 14; Nickel 6 - 15; Copper 6 - 15.

[c]UST results in parentheses are from chemist's report; <detection limit was reported.

Table B-20. Results of Trace Metals #5 Sample Analysis (WS 03/78) -- July 1989.

Constituent	UST	PNL	True value	Target range (source)
Barium	332 318	306	285	239 - 332 (WS)
Cadmium	6 6		4.8	3 - 6 (WP)
Chromium	24 27	(32)	29	23 - 35 (WP)
Silver	32 43		38	32 - 44 (WP)

Table B-21. Results of Anion and Ammonium Analysis -- July 1989. (sheet 1 of 2)

Well number	Constituent	UST	PNL
Blank	nitrate	<500	<50
199-N-33		1,960 2,130	2,400
Blank	sulfate	<500	<80
199-N-33		15,500 15,700	15,100
Blank	chloride	<500	<80
199-N-33		1,710 1,870	1,900
Blank	phosphate	<1,000	<400
199-N-33		<1,000 <1,000	550
Blank	zinc	<5	<20*
199-N-33		8 <5	(70)
Blank	calcium	<50	459*
199-N-33		23,100 23,200	26,100
Blank	barium	<6	<2
199-N-33		12 13	12
Blank	cadmium	<2	<4
199-N-33		<2	--
Blank	chromium	<10	<20
199-N-33		<10 <10	--
Blank	sodium	<200	<10
199-N-33		1,910 1,940	2,080
Blank	nickel	<10	<20
199-N-33		<10	--
Blank	copper	<10	<4
199-N-33		<10	--
Blank	vanadium	<5	<10
199-N-33		8 7	--

Table B-21. Results of Anion and Ammonium Analysis -- July 1989. (sheet 2 of 2)

Well number	Constituent	UST	PNL
Blank	manganese	<5	<2
199-N-33		<5 <5	--
Blank	potassium	<100	<300
199-N-33		1,850 1,860	(700)
Blank	iron	<30	(12)
199-N-33		<30 <30	18
Blank	magnesium	<50	<60
199-N-33		3,770 3,840	4,250
Blank	strontium	<10	<2
199-N-33		102 104	109
Blank	arsenic	<5	<10
199-N-33		<5 <5	--

*PNL analysis shows some low-level zinc contamination.

SUMMARY OF QUALITY CONTROL RESULTS FOR JULY 1989

Blind standards: One UST value for fluoride was slightly outside the target range. The blind standard samples for metals were at very low concentrations, near the detection limits. Four values were outside target range. This lower accuracy was not unexpected because the standards were low concentrations.

Blanks: Some low-level contamination of the PNL blank was noted for zinc and calcium.

Duplicates and interlaboratory comparisons:

- Anions--Results for sulfate, fluoride, nitrate, and phosphate consistent between labs.
- Metals--Apparent high zinc results reported by PNL; potassium results were low, but the ICP method is not very accurate for potassium. Other metals are consistent between labs and between duplicates.

AUGUST 1989

Table B-22. Results of Filtered Metals Analysis -- August 1989. (sheet 1 of 3)

Well number	Constituent	UST	PNL
Blank	zinc	--	<20
199-N-2		<5	<20
199-N-60		<5 <5 <5	<20
Blank	calcium	--	(62)
199-N-2		26,500	29,200
199-N-60		145,500 145,000 152,000	139,000 138,000
Blank	barium	--	<2
199-N-2		18	19
199-N-60		36 36 38	34 (35)
Blank	cadmium	--	<4
199-N-2		2	<4
199-N-60		<2 <2 <2	<4
Blank	chromium	--	<20
199-N-2		<10	
199-N-60		<10 <10 <10	<20
Blank	sodium	--	<10
199-N-2		2,520	2,650
199-N-60		418,000 428,000 430,000	373,000 374,000

Table B-22. Results of Filtered Metals Analysis -- August 1989. (sheet 2 of 3)

Well number	Constituent	UST	PNL
Blank	nickel	--	<20
199-N-2		<10	<20
199-N-60		<10 <10 <10	580*
Blank	copper	--	<4
199-N-2		<10	<4
199-N-60		<10 <10 <10	<4
Blank	vanadium	--	<10
199-N-2		6	<10
199-N-60		<5 6 8	(13)
Blank	manganese	--	<2
199-N-2		<5	<10
199-N-60		<5 <5 <5	(4) 102*
Blank	potassium	--	<300
199-N-2		1,500	1,600
199-N-60		7,580 7,480 7,900	7,000 7,000
Blank	iron	--	<5
199-N-2		<30	<5
199-N-60		31 <30 <30	(5)
Blank	magnesium	--	<60
199-N-2		4,140	4,800
199-N-60		27,500 27,600 28,900	24,600 25,900

Table B-22. Results of Filtered Metals Analysis -- August 1989. (sheet 3 of 3)

Well number	Constituent	UST	PNL
Blank	strontium	--	<2
199-N-2		101	109
199-N-60		568 579 625	526 550
Blank	arsenic	--	<10
199-N-2		<5	<10
199-N-60		<5 <5 <5	
Blank	selenium	--	<10
199-N-2		<5	<10
199-N-60		<5 <5	
Blank	lead	--	<10
199-N-2		<5	<10
199-N-60		<5 <5 <5	<10 <10 <10

*PNL sample believed to be contaminated.

Table B-23. Results of Anion and Ammonium Analysis -- August 1989.

Well number	Constituent	UST	PNL
Blank	nitrate	<500	<80
199-N-2		20,100	20,300
199-N-60		2,100 2,100	2,100
Blank	sulfate	<500	<80
199-N-2		14,200	13,500
199-N-60		1,180,000 1,170,000	1,130,000
Blank	fluoride	<500	<80
199-N-2		<500	80
199-N-60		2,100[a] 2,100[a]	1,000
Blank	chloride	<500	<80
199-N-2		1,700	1,700
199-N-60		5,300 5,300	2,900[b]
Blank	phosphate	<1,000	<800
199-N-2		<1,000	<400
199-N-60		<1,000 <1,000	<400

[a]Matrix interference effect, probably from high sulfate concentration in sample. Reported value is maximum.
[b]PNL recovery for matrix spike was low.

SUMMARY OF QUALITY CONTROL DATA FOR AUGUST 1989

Blanks: PNL found calcium at 62 ppb in trip blank. This was reported in parentheses to indicate it is near the detection limit and thus suspect.

Fluoride by IC: There was an interference from other constituents that coeluted with fluoride. Maximum fluoride concentration estimated.

Interlaboratory comparisons: Samples analyzed by GFAA for arsenic, lead, and selenium; by ICP for the remainder. GFAA were consistent between laboratories and duplicates. The same samples were also analyzed by ICP and reported by both laboratories. Generally, the PNL results were slightly lower than UST because of different sample preparation procedures. PNL results for 199-N-60 were considerably higher for nickel, vanadium, and manganese. It is suspected that this PNL sample was contaminated.

SEPTEMBER 1989

Table B-24. Results of Metals Analyses (WS 03/78 IV) -- September 1989.

Constituent	UST	PNL	True value	Target range
Mercury (by cold vapor)	1.4 1.5	--	1.6	1.1 - 2.1
Filtered lead (by GFAA)	26.0 26.0 26.0	23.0	26.0	19.4 - 33.4

Table B-25. Results of Filtered Metals Analysis -- September 1989. (sheet 1 of 3)

Well number	Constituent	UST	PNL
Blank	zinc	<5	<20
199-N-14		<5 7	<20
199-N-31		--	<20
199-N-61		<5 <5	<20
Blank	calcium	<50	22
199-N-14		27,200 23,900	27,100
199-N-31		--	21,400
199-N-61		150,000 136,000	139,000
Blank	barium	<6	--
199-N-14		16 11	14
199-N-31		--	12
199-N-61		41 41	42
Blank	cadmium	<2	<4
199-N-14		<2 <2	<4 <4
199-N-31		--	<4
199-N-61		<2 <2	<4
Blank	chromium	<10	<20
199-N-14		<10 <10	<20 <20
199-N-31		--	<20
199-N-61		<10 <10	<20

Table B-25. Results of Filtered Metals Analysis -- September 1989. (sheet 2 of 3)

Well number	Constituent	UST	PNL
Blank	sodium	<200	(16)
199-N-14		3,380 2,900	3,210
199-N-31		--	2,170
199-N-61		774,000 707,000	725,000
Blank	nickel	<10	<20
199-N-14		<10 <10	<20 <20
199-N-31		--	<20
199-N-61		<10 <10	<20
Blank	copper	<10	<4
199-N-14		<10 <10	<4
199-N-31		--	<4
199-N-61		<10 <10	<5
Blank	vanadium	<5	<10
199-N-14		6 <5	<10
199-N-31		--	<10
199-N-61		<5 <5	<10
Blank	manganese	<5	<2
199-N-14		<5 <5	<2
199-N-31		--	--
199-N-61		<5 <5	(4)

Table B-25. Results of Filtered Metals Analysis -- September 1989. (sheet 3 of 3)

Well number	Constituent	UST	PNL
Blank	potassium	<100	<300
199-N-14		2,030 1,690	1,710
199-N-31		--	1,980
199-N-61		4,600 4,630	4,890
Blank	iron	<30	<5
199-N-14		<30 <30	(6)
199-N-31		--	(5)
199-N-61		<30 <30	(5)
Blank	magnesium	<50	<60
199-N-14		4,410 3,850	4,400
199-N-31		--	3,440
199-N-61		36,000 33,000	31,800
Blank	strontium	<10	<2
199-N-14		136 119	125
199-N-31		--	84
199-N-61		593 586	602
Blank	arsenic	<5	<10
199-N-14		<5 <5	--
199-N-31		<5 <5	--
199-N-61		<5 <5	--

Table B-26. Results of Anion and Ammonium Analysis -- September 1989 Data.

Well number	Constituent	UST	PNL
Blank	nitrate	<500	<80
199-N-14		8,700 8,800	9,300
199-N-31		2,400 2,400	2,900
199-N-61		4,300 4,200	5,000
Blank	sulfate	<500	<80
199-N-14		15,400 15,400	16,100
199-N-31		11,500 11,500	11,900
199-N-61		1,840,000 1,850,000	2,000,000
Blank	fluoride	<500	<80
199-N-14		<500 <500	100
199-N-31		<500 <500	100
199-N-61		3,900[a] 3,800[a]	1,700
Blank	chloride	<500	<80
199-N-14		2,600 2,700	2,600
199-N-31		1,800 1,800	1,900
199-N-61		14,000[a] 14,000[a]	7,400[b]
Blank	phosphate	<1,000	<800
199-N-14		<1,000 <1,000	<400
199-N-31		<1,000 <1,000	<400
199-N-61		<1,000 <1,000	<400

[a]Matrix interference effect, probably from high sulfate concentration in sample. Reported value is maximum.
[b]PNL recovery for matrix spike was low.

SUMMARY OF QUALITY CONTROL DATA FOR SEPTEMBER 1989

Blind standards: All constituents were within target range.

Blanks: UST reported no constituents in the trip blank. PNL measured calcium at 22 ppb. UST's detection limit is higher than PNL's. PNL also reported sodium at 16 ppb in the blank. Again, UST's detection limit is higher than PNL's. The sodium result was reported in parentheses to indicate that the measurement was near the detection limit. These levels of calcium and sodium are insignificant compared to natural concentrations in groundwater.

Duplicates and interlaboratory comparisons: Anion data were within $\pm$ 2.8 s.d. for most anions. UST results for well 199-N-61 fluoride were reported with a comment that there was a matrix interference effect; the reported concentrations of fluoride are maximum values. Metals data were all within $\pm$ 2.8 s.d.

APPENDIX C

SELECTED GROUNDWATER CHEMISTRY DATA FOR 100-N AREA

APPENDIX C

SELECTED GROUNDWATER CHEMISTRY DATA FOR 100-N AREA

This appendix contains results of analyses of groundwater samples from wells in the 1301-N and 1324-N/NA assessment networks. Samples were analyzed for the "regular" or "short" lists of constituents, as described in the assessment monitoring plans. The "regular" list consists of the following constituents:

- Total organic carbon
- Total organic halogen
- pH
- Specific conductance
- Turbidity
- Metals by the inductively coupled plasma method (filtered and unfiltered)
- Mercury
- Lead
- Selenium
- Arsenic
- Anions
- Pesticide
- Herbicide
- Radium
- Strontium-90
- Gross alpha
- Gross beta
- Gamma scan
- Uranium
- Tritium
- Phenol
- Coliform bacteria.

The "short" list comprises the following constituents:

- pH
- Specific conductance
- Turbidity
- Metals by the inductively coupled plasma method
- Mercury
- Lead
- Selenium
- Arsenic
- Anions.

Additional analyses were also run for the constituents listed in WAC 173-303-9905, as part of the Hanford Site liquid effluent study. Only those results most pertinent to the assessment program are presented in Table C-1. The remaining data are published in the RCRA quarterly progress reports. Data in this appendix include specific conductance, calcium, chloride, fluoride, magnesium, potassium, sulfate, sodium, strontium-90, gross

beta, and tritium. The data were retrieved from the Westinghouse Hanford Geosciences Group database. Well numbers in Table C-1 are abbreviated; the full prefix for each well is 199- (e.g., 1-N-2 is well 199-N-2).

Sampling methods for the wells are listed below. Filtered and unfiltered samples were collected for analysis at pumped wells; no filtered samples were collected from bailed wells. Pumped wells were purged prior to sampling; bailed wells were not.

Well	Sampler
199-N-2	pump (Hydrostar[a])
199-N-3	pump (Hydrostar)
199-N-4	pump (Hydrostar)
199-N-14	pump (Hydrostar)
[b]199-N-16	6/89--bailer; later dates--pump (submersible)
[b]199-N-17	6/89--bailer; later dates--pump (submersible)
[b]199-N-18	6/89--bailer; no other samples collected
[b]199-N-21	6/89--bailer; later dates--pump (submersible)
[b]199-N-23	6/89--bailer
[b]199-N-24	6/89--bailer
[b]199-N-25	6/89--bailer
[b]199-N-26	6/89--bailer
[b]199-N-47	pump (submersible); well not purged 9/89, 12/89
[b]199-N-54	pump (Hydrostar)
[b]199-N-55	pump (Hydrostar)
[b]199-N-56	pump (Hydrostar)
[b]199-N-57	pump (Hydrostar)
199-N-58	pump (Hydrostar)
199-N-59	pump (Hydrostar)
199-N-60	pump (Hydrostar)
199-N-61	pump (Hydrostar)
199-N-66	pump (Hydrostar)
199-N-67	pump (Hydrostar)
199-N-69	pump (Hydrostar)
199-N-71	pump (Hydrostar)
199-N-72	pump (Hydrostar)
199-N-74	pump (Hydrostar)
699-81-58	pump (submersible)

[a]HydroStar is a trademark of Instrumentation Northwest, Redmond, WA.
[b]These wells are shared with the 1324-N monitoring network.

Table C-1. Selected Groundwater Chemistry Data. (sheet 1 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	12/16/87	Gross beta	2370	
		Specific conductance	208	
		Sulfate	10300	
		Fluoride	500	<
		Chloride	966	
		Calcium, filtered	28800	
		Sodium, filtered	3910	
		Potassium, filtered	1860	
		Magnesium, filtered	5010	
	1/29/88	Tritium	36600	
		Gross beta	2010	
		Strontium-90	1090	
	3/18/88	Gross beta	2440	
		Specific conductance	230	
		Sulfate	9770	
		Fluoride	500	<
		Chloride	940	
		Calcium, filtered	29800	
		Sodium, filtered	3550	
		Potassium, filtered	1690	
		Magnesium, filtered	4820	
	4/13/88	Tritium	121000	
		Gross beta	2120	
		Strontium-90	1100	
	6/29/88	Tritium	112000	
		Gross beta	2330	
		Strontium-90	957	
		Specific conductance	155	
		Specific conductance	155	
		Specific conductance	155	
		Specific conductance	157	
		Sulfate	44800	
		Fluoride	500	<
		Chloride	886	
		Calcium, filtered	25300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 2 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	6/29/88	Sodium, filtered	3120	
		Potassium, filtered	1580	
		Magnesium, filtered	4110	
	8/01/88	Tritium	106000	
		Gross beta	1750	
		Strontium-90	1440	
	9/15/88	Specific conductance	157	
		Specific conductance	157	
		Specific conductance	158	
		Specific conductance	160	
		Sulfate	9940	
		Fluoride	500	<
		Chloride	797	
		Calcium, filtered	34100	
		Sodium, filtered	3670	
		Potassium, filtered	2160	
		Magnesium, filtered	3550	
	10/26/88	Tritium	93100	
		Gross beta	1410	
		Strontium-90	1160	
	12/14/88	Tritium	91400	
		Gross beta	2240	
		Strontium-90	1080	
		Specific conductance	198	
		Sulfate	9200	
		Fluoride	500	<
		Chloride	800	
		Calcium, filtered	28800	
		Sodium, filtered	3800	
		Potassium, filtered	1990	
		Magnesium, filtered	4930	
	1/05/89	Specific conductance	198	

Table C-1. Selected Groundwater Chemistry Data. (sheet 3 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	3/09/89	Tritium	93100	
		Gross beta	1080	
		Strontium-90	1040	
		Specific conductance	221	
		Specific conductance	222	
		Specific conductance	222	
		Specific conductance	223	
		Sulfate	8800	
		Fluoride	500	<
		Chloride	700	
		Calcium, filtered	28200	
		Sodium, filtered	3580	
		Potassium, filtered	1850	
		Magnesium, filtered	4800	
	7/27/89	Tritium	43500	
		Gross beta	1940	
		Strontium-90	1110	
		Specific conductance	147	
		Specific conductance	148	
		Specific conductance	149	
		Specific conductance	149	
		Sulfate	28600	
		Fluoride	500	<
		Chloride	8100	
		Calcium, filtered	32700	
		Sodium, filtered	3380	
		Potassium, filtered	1810	
		Magnesium, filtered	5110	
	8/15/89	Specific conductance	209	
		Specific conductance	209	
		Specific conductance	210	
		Specific conductance	210	
		Sulfate	18600	
		Fluoride	500	<
		Chloride	3700	
		Calcium, filtered	31600	
		Sodium, filtered	3700	
		Potassium, filtered	1970	
		Magnesium, filtered	5050	

Table C-1. Selected Groundwater Chemistry Data. (sheet 4 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	9/26/89	Tritium	34600	
		Tritium	34900	
		Gross beta	1840	
		Gross beta	2030	
		Strontium-90	1010	
		Strontium-90	1110	
		Specific conductance	180	
		Specific conductance	181	
		Specific conductance	184	
		Specific conductance	184	
		Sulfate	15400	
		Sulfate	15400	
		Fluoride	500	<
		Fluoride	500	<
		Chloride	2600	
		Chloride	2700	
		Calcium, filtered	23900	
		Calcium, filtered	27200	
		Sodium, filtered	2900	
		Sodium, filtered	3380	
		Potassium, filtered	1690	
		Potassium, filtered	2030	
		Magnesium, filtered	3850	
		Magnesium, filtered	4410	
	11/14/89	Tritium	36200	
		Gross beta	2000	
		Gross beta	2140	
		Strontium-90	1090	
		Specific conductance	187	
		Specific conductance	187	
		Specific conductance	187	
		Specific conductance	187	
		Sulfate	15500	
		Sulfate	15600	
		Fluoride	500	<
		Fluoride	500	<
		Chloride	2400	
		Chloride	2500	
		Calcium, filtered	24500	
		Calcium, filtered	25500	
		Sodium, filtered	3020	
		Sodium, filtered	3150	

Table C-1. Selected Groundwater Chemistry Data. (sheet 5 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	11/14/89	Potassium, filtered	1590	
		Potassium, filtered	1660	
		Magnesium, filtered	3870	
		Magnesium, filtered	4020	
	2/01/90	Tritium	43500	
		Gross beta	2100	
		Strontium-90	987	
		Specific conductance	182	
		Specific conductance	182	
		Specific conductance	182	
		Specific conductance	182	
		Sulfate	13900	
		Fluoride	500	<
		Chloride	1800	
		Calcium, filtered	23900	
		Sodium, filtered	3130	
		Potassium, filtered	1750	
		Magnesium, filtered	3830	
	7/31/90	Tritium	53000	
		Strontium-90	366	
	10/17/90	Tritium	71000	
		Gross beta	469	
	9/18/91	Tritium	80300	
		Tritium	81600	
		Tritium	82000	
		Gross beta	1060	
		Gross beta	1140	
		Gross beta	1170	
		Strontium-90	513	
		Strontium-90	841	
		Strontium-90	910	
		Specific conductance	161	
		Sulfate	11000	
		Sulfate	11000	
		Fluoride	140	
		Fluoride	150	

Table C-1. Selected Groundwater Chemistry Data. (sheet 6 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	9/18/91	Chloride	1200	
		Chloride	1200	
		Calcium, filtered	24000	
		Calcium, filtered	24000	
		Sodium, filtered	3000	
		Sodium, filtered	3200	
		Potassium, filtered	1500	
		Potassium, filtered	1600	
		Magnesium, filtered	3700	
		Magnesium, filtered	3700	
	12/05/91	Tritium	8560	
		Tritium	85300	
		Gross beta	1930	
		Gross beta	2090	
		Strontium-90	953	
		Strontium-90	986	
		Specific conductance	162	
		Specific conductance	162	
		Sulfate	10000	
		Sulfate	10000	
		Fluoride	500	
		Fluoride	500	
		Chloride	1300	
		Chloride	1400	
		Calcium, filtered	24000	
		Calcium, filtered	53000	
		Sodium, filtered	3200	
		Sodium, filtered	9700	
		Potassium, filtered	2100	
		Potassium, filtered	2700	
		Magnesium, filtered	3800	
		Magnesium, filtered	8800	
	2/20/92	Calcium, filtered	24000	
		Sodium, filtered	3000	
		Potassium, filtered	1900	
		Magnesium, filtered	3900	
	2/21/92	Tritium	85500	
		Gross beta	1860	

Table C-1. Selected Groundwater Chemistry Data. (sheet 7 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-14	2/21/92	Strontium-90	956	
		Sulfate	12000	
		Fluoride	200	
		Chloride	1300	
	5/12/92	Tritium	82400	
		Gross beta	2020	
		Strontium-90	978	
1-N-16	11/22/87	Tritium	46	<
	3/22/88	Tritium	190	<
		Gross beta	12	
		Strontium-90	0	<
	4/28/88	Tritium	-159	<
		Gross beta	8	
		Strontium-90	0	<
	6/20/89	Tritium	1130	
		Gross beta	13	
		Strontium-90	-0	<
		Specific conductance	1291	
		Sulfate	463000	
		Fluoride	1300	
		Chloride	54600	
	8/18/89	Specific conductance	897	
		Specific conductance	899	
		Specific conductance	899	
		Specific conductance	900	
		Sulfate	168000	
		Fluoride	600	
		Chloride	31000	
		Calcium, filtered	59000	
		Sodium, filtered	111000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 8 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-16	8/18/89	Potassium, filtered	6900	
		Magnesium, filtered	11600	
	9/28/89	Specific conductance	1238	
		Specific conductance	1238	
		Specific conductance	1238	
		Specific conductance	1240	
		Sulfate	392000	
		Fluoride	1600	
		Chloride	30000	
		Calcium, filtered	108000	
		Sodium, filtered	189000	
		Potassium, filtered	9720	
		Magnesium, filtered	18500	
	11/13/89	Tritium	3010	
		Gross beta	9	
		Strontium-90	0	<
		Specific conductance	1544	
		Specific conductance	1546	
		Specific conductance	1550	
		Specific conductance	1558	
		Sulfate	283000	
		Fluoride	1600	
		Chloride	19800	
		Calcium, filtered	107000	
		Sodium, filtered	179000	
		Potassium, filtered	9060	
		Magnesium, filtered	17800	
	2/01/90	Specific conductance	471	
		Specific conductance	472	
		Specific conductance	473	
		Specific conductance	660	
		Sulfate	5700	
		Fluoride	500	<
		Chloride	4800	
		Calcium, filtered	65200	
		Sodium, filtered	26100	
		Potassium, filtered	11200	
		Magnesium, filtered	11900	

Table C-1. Selected Groundwater Chemistry Data. (sheet 9 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-16	5/31/90	Specific conductance	8	
		Specific conductance	786	
		Specific conductance	793	
		Specific conductance	794	
		Sulfate	269000	
		Fluoride	500	<
		Chloride	15000	
1-N-17	6/20/89	Specific conductance	821	
		Sulfate	128000	
		Fluoride	500	<
		Chloride	8700	
	8/18/89	Specific conductance	658	
		Specific conductance	660	
		Specific conductance	672	
		Specific conductance	681	
		Sulfate	69000	
		Fluoride	500	
		Chloride	8000	
		Calcium, filtered	78600	
		Sodium, filtered	51400	
		Potassium, filtered	4370	
		Magnesium, filtered	12500	
	9/26/89	Specific conductance	571	
		Specific conductance	576	
		Specific conductance	579	
		Specific conductance	580	
		Sulfate	68000	
		Fluoride	500	<
		Chloride	7000	
		Calcium, filtered	69000	
		Sodium, filtered	37200	
		Potassium, filtered	4130	
		Magnesium, filtered	10400	

Table C-1. Selected Groundwater Chemistry Data. (sheet 10 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-17	11/10/89	Tritium	19400	
		Gross beta	226	
		Strontium-90	111	
		Specific conductance	502	
		Specific conductance	502	
		Specific conductance	502	
		Specific conductance	502	
		Sulfate	64000	
		Fluoride	500	<
		Chloride	5600	
		Calcium, filtered	56400	
		Sodium, filtered	30900	
		Potassium, filtered	3390	
		Magnesium, filtered	8360	
	2/01/90	Specific conductance	502	
		Specific conductance	505	
		Specific conductance	505	
		Specific conductance	509	
		Sulfate	68600	
		Fluoride	500	<
		Chloride	2900	
		Calcium, filtered	63200	
		Sodium, filtered	30200	
		Potassium, filtered	3690	
		Magnesium, filtered	9590	
	9/05/91	Specific conductance	1118	
		Sulfate	160000	
		Fluoride	780	
		Chloride	10000	
		Calcium, filtered	170000	
		Sodium, filtered	47000	
		Potassium, filtered	5800	
		Magnesium, filtered	25000	
	1/28/92	Sulfate	310000	
		Fluoride	1200	
		Chloride	10000	
		Calcium, filtered	200000	
		Sodium, filtered	58000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 11 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-17	1/28/92	Potassium, filtered	6500	
		Magnesium, filtered	29000	
	2/19/92	Sulfate	310000	
		Fluoride	100	U
		Chloride	11000	
		Calcium, filtered	180000	
		Sodium, filtered	56000	
		Potassium, filtered	5400	
		Magnesium, filtered	28000	
1-N-18	11/22/87	Tritium	27700	
		Strontium-90	541	
	3/21/88	Tritium	21800	
		Gross beta	1570	
		Strontium-90	669	
	4/28/88	Tritium	26500	
		Gross beta	1420	
		Strontium-90	658	
	8/17/88	Tritium	20500	
		Gross beta	8150	
		Strontium-90	1350	
	11/30/88	Tritium	12500	
		Gross beta	1030	
		Strontium-90	391	
	6/20/89	Tritium	8660	
		Gross beta	1200	
		Strontium-90	415	
		Specific conductance	1148	
		Sulfate	109000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 12 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-18	6/20/89	Fluoride	500	<
		Chloride	10800	
	1/31/90	Specific conductance	866	
	1/28/92	Strontium-90	460	
1-N-2	12/16/87	Gross beta	1130	
		Specific conductance	202	
		Sulfate	11600	
		Fluoride	500	<
		Chloride	1200	
		Calcium, filtered	27700	
		Sodium, filtered	3170	
		Potassium, filtered	1820	
		Magnesium, filtered	5020	
	3/18/88	Tritium	83500	
		Gross beta	2860	
		Gross beta	3920	
		Strontium-90	1640	
		Specific conductance	223	
		Sulfate	12600	
		Fluoride	500	<
		Chloride	1280	
		Calcium, filtered	28300	
		Sodium, filtered	2710	
		Potassium, filtered	1630	
		Magnesium, filtered	4880	
	4/28/88	Tritium	87600	
		Gross beta	3910	
		Strontium-90	2150	
	6/27/88	Tritium	89000	
		Gross beta	5620	

Table C-1. Selected Groundwater Chemistry Data. (sheet 13 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-2	6/27/88	Strontium-90	2360	
		Specific conductance	193	
		Specific conductance	193	
		Specific conductance	195	
		Specific conductance	195	
		Sulfate	10400	
		Fluoride	500	<
		Chloride	1080	
		Calcium, filtered	27800	
		Sodium, filtered	3030	
		Potassium, filtered	1730	
		Magnesium, filtered	4870	
	9/16/88	Tritium	85200	
		Gross beta	3750	
		Strontium-90	1340	
		Specific conductance	188	
		Specific conductance	188	
		Specific conductance	188	
		Specific conductance	189	
		Sulfate	10600	
		Fluoride	500	<
		Chloride	928	
		Calcium, filtered	31700	
		Sodium, filtered	2970	
		Potassium, filtered	1870	
		Magnesium, filtered	5230	
	12/19/88	Tritium	91400	
		Gross beta	4390	
		Strontium-90	1820	
		Specific conductance	225	
		Specific conductance	226	
		Specific conductance	227	
		Specific conductance	227	
		Sulfate	9700	
		Fluoride	500	<
		Chloride	900	
		Calcium, filtered	27200	
		Sodium, filtered	2630	
		Potassium, filtered	1590	
		Magnesium, filtered	4680	

Table C-1. Selected Groundwater Chemistry Data. (sheet 14 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-2	3/09/89	Tritium	95600	
		Gross beta	4180	
		Strontium-90	2550	
		Specific conductance	211	
		Specific conductance	211	
		Specific conductance	211	
		Specific conductance	212	
		Sulfate	9700	
		Fluoride	500	<
		Chloride	900	
		Calcium, filtered	28500	
		Sodium, filtered	2870	
		Potassium, filtered	1630	
		Magnesium, filtered	5010	
	7/26/89	Tritium	66300	
		Gross beta	4080	
		Strontium-90	3610	
		Specific conductance	120	
		Specific conductance	120	
		Specific conductance	120	
		Specific conductance	120	
		Sulfate	13100	
		Fluoride	500	<
		Chloride	1300	
		Calcium, filtered	29500	
		Sodium, filtered	2950	
		Potassium, filtered	1690	
		Magnesium, filtered	4680	
	8/15/89	Specific conductance	193	
		Specific conductance	194	
		Specific conductance	207	
		Specific conductance	210	
		Sulfate	14200	
		Fluoride	500	<
		Chloride	1700	
		Calcium, filtered	26500	
		Sodium, filtered	2520	
		Potassium, filtered	1500	

Table C-1. Selected Groundwater Chemistry Data. (sheet 15 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-2	8/15/89	Magnesium, filtered	4140	
	12/21/89	Tritium	54200	
		Gross beta	3610	
		Strontium-90	1840	
		Specific conductance	177	
		Specific conductance	187	
		Specific conductance	187	
		Sulfate	13400	
		Fluoride	500	<
		Chloride	1400	
		Calcium, filtered	24400	
		Sodium, filtered	2480	
		Potassium, filtered	1420	
		Magnesium, filtered	3960	
	2/02/90	Tritium	60000	
		Gross beta	3320	
		Strontium-90	1960	
		Specific conductance	168	
		Specific conductance	169	
		Specific conductance	169	
		Specific conductance	171	
		Sulfate	13300	
		Fluoride	500	<
		Chloride	1300	
		Calcium, filtered	23800	
		Sodium, filtered	2600	
		Potassium, filtered	1480	
		Magnesium, filtered	4110	
	1/30/92	Tritium	30100	
		Gross beta	637	
		Strontium-90	336	
		Specific conductance	167	
		Sulfate	14000	
		Fluoride	100	
		Chloride	1500	
		Calcium, filtered	24000	
		Sodium, filtered	2500	
		Potassium, filtered	1300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 16 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-2	1/30/92	Magnesium, filtered	4400	
1-N-21	11/22/87	Tritium	1450	
		Tritium	1750	
		Tritium	1780	
		Strontium-90	6	
		Strontium-90	6	
		Strontium-90	8	
	3/22/88	Tritium	1460	
		Tritium	1490	
		Gross beta	22	
		Strontium-90	7	
		Strontium-90	8	
	4/28/88	Tritium	1470	
		Gross beta	24	
		Strontium-90	7	
	8/17/88	Tritium	809	
		Gross beta	29	
		Strontium-90	11	
	11/30/88	Tritium	494	
		Gross beta	21	
		Strontium-90	11	
	7/17/89	Specific conductance	938	
		Specific conductance	939	
		Specific conductance	940	
		Specific conductance	955	
		Sulfate	312000	
		Fluoride	720	
		Chloride	18000	
		Calcium, filtered	88200	
		Sodium, filtered	98900	

Table C-1. Selected Groundwater Chemistry Data. (sheet 17 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-21	7/17/89	Potassium, filtered	6190	
		Magnesium, filtered	15900	
	8/21/89	Specific conductance	666	
		Specific conductance	667	
		Specific conductance	668	
		Specific conductance	669	
		Sulfate	168000	
		Fluoride	500	<
		Chloride	13000	
		Calcium, filtered	44000	
		Sodium, filtered	74800	
		Potassium, filtered	4500	
		Magnesium, filtered	8660	
	9/28/89	Specific conductance	564	
		Specific conductance	565	
		Specific conductance	566	
		Specific conductance	566	
		Sulfate	129000	
		Fluoride	500	<
		Chloride	7000	
		Calcium, filtered	33700	
		Sodium, filtered	69100	
		Potassium, filtered	4300	
		Magnesium, filtered	6480	
	11/13/89	Tritium	13600	
		Gross beta	12	
		Strontium-90	3	
		Specific conductance	794	
		Specific conductance	795	
		Specific conductance	795	
		Specific conductance	797	
		Sulfate	213000	
		Fluoride	800	
		Chloride	10800	
		Calcium, filtered	66300	
		Sodium, filtered	88000	
		Potassium, filtered	5190	
		Magnesium, filtered	11100	

Table C-1. Selected Groundwater Chemistry Data. (sheet 18 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-21	2/01/90	Specific conductance	670	
		Specific conductance	678	
		Specific conductance	681	
		Specific conductance	687	
		Sulfate	221000	
		Fluoride	500	<
		Chloride	10600	
		Calcium, filtered	62900	
		Sodium, filtered	84800	
		Potassium, filtered	5600	
		Magnesium, filtered	12100	
	9/05/91	Specific conductance	1346	
		Sulfate	460000	
		Fluoride	940	
		Chloride	12000	
		Calcium, filtered	130000	
		Sodium, filtered	140000	
		Potassium, filtered	7800	
		Magnesium, filtered	24000	
	9/26/91	Tritium	4310	
	1/28/92	Specific conductance	1414	
		Sulfate	690000	
		Fluoride	1400	
		Chloride	14000	
		Calcium, filtered	140000	
		Sodium, filtered	160000	
		Potassium, filtered	8000	
		Magnesium, filtered	26000	
	2/14/92	Specific conductance	1455	
		Specific conductance	1455	
		Sulfate	610000	
		Fluoride	1400	
		Chloride	14000	
		Calcium, filtered	130000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 19 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-21	2/14/92	Sodium, filtered	150000	
		Potassium, filtered	7900	
		Magnesium, filtered	26000	
1-N-23	11/22/87	Tritium	7850	
		Tritium	7910	
		Tritium	8200	
		Strontium-90	0	<
		Strontium-90	0	
		Strontium-90	1	<
	3/22/88	Tritium	2550	
		Tritium	3060	
		Gross beta	15	
		Strontium-90	1	
		Strontium-90	2	
	6/07/88	Tritium	1940	
		Gross beta	8	
		Strontium-90	1	
	8/22/89	Specific conductance	831	
		Sulfate	231000	
		Fluoride	800	
		Chloride	15000	
	9/20/89	Specific conductance	894	
		Sulfate	221000	
		Fluoride	1000	<
		Chloride	14000	
	10/19/89	Tritium	15700	
		Gross beta	8	
		Strontium-90	1	

Table C-1. Selected Groundwater Chemistry Data. (sheet 20 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-23	12/11/89	Tritium	15000	
		Gross beta	12	
		Strontium-90	2	
		Specific conductance	1050	
		Sulfate	222000	
		Fluoride	500	<
		Chloride	17600	
1-N-24	11/22/87	Tritium	195	<
		Strontium-90	7	
	3/22/88	Tritium	404	
		Gross beta	29	
		Strontium-90	16	
	8/21/89	Specific conductance	1135	
		Sulfate	345000	
		Fluoride	900	
		Chloride	8300	
	9/20/89	Specific conductance	1051	
		Sulfate	180000	
		Fluoride	1000	<
		Chloride	15000	
	10/09/89	Tritium	174	<
		Gross beta	38	
		Strontium-90	12	
	12/06/89	Tritium	368	
		Gross beta	17	
		Strontium-90	5	
		Specific conductance	276	
		Sulfate	37200	
		Fluoride	500	<
		Chloride	5500	

Table C-1. Selected Groundwater Chemistry Data. (sheet 21 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-24	2/12/90	Specific conductance	338	
		Specific conductance	338	
		Specific conductance	341	
		Specific conductance	343	
		Sulfate	37500	
		Fluoride	500	<
		Chloride	6100	
1-N-3	11/22/87	Tritium	54200	
		Strontium-90	1460	
	12/16/87	Gross beta	4380	
		Specific conductance	480	
		Sulfate	136000	
		Fluoride	500	<
		Chloride	5990	
		Calcium, filtered	72800	
		Sodium, filtered	10900	
		Potassium, filtered	3090	
		Magnesium, filtered	12500	
	3/18/88	Tritium	41300	
		Gross beta	4270	
		Gross beta	5020	
		Strontium-90	2290	
		Specific conductance	668	
		Sulfate	248000	
		Fluoride	1610	
		Chloride	7020	
		Calcium, filtered	102000	
		Sodium, filtered	13000	
		Potassium, filtered	3190	
		Magnesium, filtered	16400	
	4/28/88	Tritium	41300	
		Gross beta	4460	

Table C-1. Selected Groundwater Chemistry Data. (sheet 22 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-3	4/28/88	Strontium-90	2580	
	6/29/88	Tritium	43200	
		Gross beta	3280	
		Strontium-90	2430	
		Specific conductance	494	
		Specific conductance	494	
		Specific conductance	495	
		Specific conductance	495	
		Sulfate	223000	
		Fluoride	500	<
		Chloride	7040	
		Calcium, filtered	103000	
		Sodium, filtered	15700	
		Potassium, filtered	3510	
		Magnesium, filtered	16700	
	12/19/88	Tritium	31900	
		Gross beta	6220	
		Strontium-90	2620	
		Specific conductance	732	
		Specific conductance	733	
		Specific conductance	734	
		Specific conductance	735	
		Sulfate	249000	
		Fluoride	500	<
		Chloride	6300	
		Calcium, filtered	115000	
		Sodium, filtered	15900	
		Potassium, filtered	3630	
		Magnesium, filtered	19500	
	3/09/89	Tritium	47100	
		Gross beta	2820	
		Strontium-90	2640	
		Specific conductance	606	
		Specific conductance	607	
		Specific conductance	607	
		Specific conductance	607	
		Sulfate	180000	
		Fluoride	500	<

Table C-1. Selected Groundwater Chemistry Data. (sheet 23 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-3	3/09/89	Chloride	5700	
		Calcium, filtered	87100	
		Sodium, filtered	16900	
		Potassium, filtered	3340	
		Magnesium, filtered	15100	
	3/14/89	Specific conductance	633	
		Specific conductance	638	
		Specific conductance	642	
		Specific conductance	647	
	7/26/89	Tritium	34100	
		Gross beta	1250	
		Strontium-90	1090	
		Specific conductance	161	
		Specific conductance	161	
		Specific conductance	161	
		Specific conductance	161	
		Sulfate	34900	
		Fluoride	500	<
		Chloride	5700	
		Calcium, filtered	35400	
		Sodium, filtered	8220	
		Potassium, filtered	2230	
		Magnesium, filtered	5850	
	8/15/89	Specific conductance	262	
		Specific conductance	262	
		Specific conductance	262	
		Specific conductance	263	
		Sulfate	31000	
		Fluoride	500	<
		Chloride	4800	
		Calcium, filtered	35400	
		Sodium, filtered	7650	
		Potassium, filtered	2180	
		Magnesium, filtered	5880	
	9/29/89	Tritium	23100	
		Gross beta	1010	

Table C-1. Selected Groundwater Chemistry Data. (sheet 24 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-3	9/29/89	Strontium-90	629	
		Specific conductance	241	
		Specific conductance	244	
		Specific conductance	269	
		Specific conductance	274	
		Sulfate	26000	
		Fluoride	500	<
		Chloride	3000	
		Calcium, filtered	27400	
		Sodium, filtered	6820	
		Potassium, filtered	1990	
		Magnesium, filtered	4750	
	11/08/89	Tritium	22600	
		Gross beta	1220	
		Strontium-90	541	
		Specific conductance	225	
		Specific conductance	226	
		Specific conductance	231	
		Specific conductance	268	
		Sulfate	24800	
		Fluoride	500	<
		Chloride	2500	
		Calcium, filtered	27900	
		Sodium, filtered	6720	
		Potassium, filtered	1940	
		Magnesium, filtered	4680	
	2/14/90	Tritium	25100	
		Gross beta	680	
		Strontium-90	607	
		Specific conductance	260	
		Specific conductance	262	
		Specific conductance	262	
		Specific conductance	263	
		Sulfate	29900	
		Fluoride	500	<
		Chloride	2600	
		Calcium, filtered	34000	
		Sodium, filtered	7670	
		Potassium, filtered	1960	
		Magnesium, filtered	5710	

Table C-1. Selected Groundwater Chemistry Data. (sheet 25 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-3	3/25/91	Tritium	23700	
		Strontium-90	548	
		Specific conductance	363	
	12/05/91	Tritium	21300	
		Gross beta	1170	
		Strontium-90	557	
		Specific conductance	365	
		Specific conductance	365	
		Sulfate	35000	
		Fluoride	600	
		Chloride	5500	
		Calcium, filtered	53000	
		Sodium, filtered	9600	
		Potassium, filtered	2700	
		Magnesium, filtered	8900	
1-N-4	11/22/87	Tritium	130000	
		Strontium-90	14	
	12/16/87	Gross beta	181	
		Specific conductance	216	
		Sulfate	13200	
		Fluoride	500	<
		Chloride	1250	
		Calcium, filtered	30500	
		Sodium, filtered	4420	
		Potassium, filtered	3080	
		Magnesium, filtered	5510	
	3/18/88	Tritium	86600	
		Gross beta	113	
		Gross beta	112	
		Strontium-90	12	
		Specific conductance	224	
		Sulfate	10800	

Table C-1. Selected Groundwater Chemistry Data. (sheet 26 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-4	3/18/88	Fluoride	500	<
		Chloride	1080	
		Calcium, filtered	26200	
		Sodium, filtered	3620	
		Potassium, filtered	2620	
		Magnesium, filtered	4480	
	4/13/88	Tritium	76600	
		Gross beta	98	
		Strontium-90	12	
	6/27/88	Tritium	85000	
		Gross beta	102	
		Strontium-90	13	
		Specific conductance	206	
		Specific conductance	206	
		Specific conductance	206	
		Specific conductance	208	
		Sulfate	14900	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	29400	
		Sodium, filtered	4650	
		Potassium, filtered	2920	
		Magnesium, filtered	5110	
	9/16/88	Tritium	73400	
		Gross beta	98	
		Strontium-90	15	
		Specific conductance	296	
		Specific conductance	297	
		Specific conductance	298	
		Specific conductance	298	
		Sulfate	28100	
		Fluoride	500	<
		Chloride	1770	
		Calcium, filtered	35200	
		Sodium, filtered	4750	
		Potassium, filtered	3290	
		Magnesium, filtered	5840	

Table C-1. Selected Groundwater Chemistry Data. (sheet 27 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-4	12/19/88	Tritium	80000	
		Gross beta	74	
		Strontium-90	12	
		Specific conductance	190	
		Specific conductance	190	
		Specific conductance	190	
		Specific conductance	191	
		Sulfate	18000	
		Fluoride	500	<
		Chloride	1200	
		Calcium, filtered	31400	
		Sodium, filtered	4220	
		Potassium, filtered	2960	
		Magnesium, filtered	5590	
	3/09/89	Tritium	88900	
		Gross beta	41	
		Strontium-90	9	
		Specific conductance	204	
		Specific conductance	204	
		Specific conductance	204	
		Specific conductance	204	
		Sulfate	12700	
		Fluoride	500	<
		Chloride	2600	
		Calcium, filtered	28000	
		Sodium, filtered	3820	
		Potassium, filtered	2790	
		Magnesium, filtered	5000	
	6/26/89	Tritium	35000	
		Gross beta	39	
		Strontium-90	8	
		Specific conductance	171	
		Specific conductance	171	
		Specific conductance	171	
		Specific conductance	172	
		Sulfate	18400	
		Fluoride	500	<
		Chloride	2200	
		Calcium, filtered	24300	
		Sodium, filtered	3380	

Table C-1. Selected Groundwater Chemistry Data. (sheet 28 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-4	6/26/89	Potassium, filtered	2480	
		Magnesium, filtered	4030	
	8/15/89	Specific conductance	182	
		Specific conductance	183	
		Specific conductance	183	
		Specific conductance	183	
		Sulfate	15300	
		Fluoride	500	<
		Chloride	1800	
		Calcium, filtered	24700	
		Sodium, filtered	3320	
		Potassium, filtered	2420	
		Magnesium, filtered	4090	
	9/29/89	Tritium	22100	
		Gross beta	34	
		Strontium-90	7	
		Specific conductance	165	
		Specific conductance	166	
		Specific conductance	167	
		Specific conductance	167	
		Sulfate	12700	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	21700	
		Sodium, filtered	3280	
		Potassium, filtered	2280	
		Magnesium, filtered	3640	
	11/08/89	Tritium	36000	
		Gross beta	30	
		Strontium-90	7	
		Specific conductance	161	
		Specific conductance	161	
		Specific conductance	161	
		Specific conductance	161	
		Sulfate	12400	
		Fluoride	500	<
		Chloride	1700	
		Calcium, filtered	21200	

Table C-1. Selected Groundwater Chemistry Data. (sheet 29 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-4	11/08/89	Sodium, filtered	3230	
		Potassium, filtered	2220	
		Magnesium, filtered	3530	
	2/02/90	Tritium	43100	
		Tritium	44000	
		Gross beta	31	
		Gross beta	32	
		Strontium-90	8	
		Strontium-90	8	
		Specific conductance	166	
		Specific conductance	168	
		Specific conductance	169	
		Specific conductance	170	
		Sulfate	12700	
		Sulfate	12700	
		Fluoride	500	<
		Fluoride	500	<
		Chloride	1400	
		Chloride	1500	
		Calcium, filtered	21800	
		Calcium, filtered	22500	
		Sodium, filtered	3600	
		Sodium, filtered	3730	
		Potassium, filtered	2280	
		Potassium, filtered	2300	
		Magnesium, filtered	3840	
		Magnesium, filtered	3900	
1-N-55	6/21/89	Specific conductance	459	
		Specific conductance	460	
		Specific conductance	461	
		Specific conductance	462	
		Sulfate	211000	
		Sulfate	212000	
		Fluoride	500	
		Fluoride	500	<
		Chloride	7400	
		Chloride	7600	
		Calcium, filtered	72300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 30 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-55	6/21/89	Calcium, filtered	78000	
		Sodium, filtered	32400	
		Sodium, filtered	35000	
		Potassium, filtered	4320	
		Potassium, filtered	4700	
		Magnesium, filtered	12400	
		Magnesium, filtered	13500	
	8/15/89	Specific conductance	355	
		Specific conductance	359	
		Specific conductance	359	
		Specific conductance	359	
		Sulfate	106000	
		Fluoride	500	<
		Chloride	5900	
		Calcium, filtered	49800	
		Sodium, filtered	19200	
		Potassium, filtered	3750	
		Magnesium, filtered	8870	
	10/02/89	Specific conductance	398	
		Specific conductance	405	
		Specific conductance	407	
		Specific conductance	412	
		Sulfate	114000	
		Fluoride	500	<
		Chloride	4200	
		Calcium, filtered	49800	
		Sodium, filtered	19200	
		Potassium, filtered	3710	
		Magnesium, filtered	9110	
	11/01/89	Tritium	19700	
		Gross beta	64	
		Strontium-90	44	
		Specific conductance	443	
		Specific conductance	443	
		Specific conductance	444	
		Specific conductance	444	
		Sulfate	122000	
		Fluoride	500	<

Table C-1. Selected Groundwater Chemistry Data. (sheet 31 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-55	11/01/89	Chloride	4200	
		Calcium, filtered	51500	
		Sodium, filtered	20200	
		Potassium, filtered	3940	
		Magnesium, filtered	9600	
	2/01/90	Specific conductance	706	
		Specific conductance	706	
		Specific conductance	706	
		Specific conductance	706	
		Sulfate	264000	
		Fluoride	500	<
		Chloride	6200	
		Calcium, filtered	84000	
		Sodium, filtered	43100	
		Potassium, filtered	5250	
		Magnesium, filtered	16900	
	5/31/90	Sulfate	328000	
		Fluoride	500	<
		Chloride	7000	
	9/05/91	Specific conductance	1009	
		Sulfate	290000	
		Fluoride	680	
		Chloride	15000	
		Calcium, filtered	140000	
		Sodium, filtered	55000	
		Potassium, filtered	4800	
		Magnesium, filtered	23000	
	10/02/91	Tritium	14500	
		Strontium-90	44	
	10/11/91	Strontium-90	30	
	11/05/91	Specific conductance	907	
		Sulfate	310000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 32 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-55	11/05/91	Fluoride	1000	
		Chloride	14000	
		Calcium, filtered	120000	
		Sodium, filtered	48000	
		Potassium, filtered	4600	
		Magnesium, filtered	20000	
	2/10/92	Specific conductance	915	
		Specific conductance	915	
		Specific conductance	915	
		Sulfate	320000	
		Sulfate	330000	
		Fluoride	600	
		Fluoride	600	
		Chloride	14000	
		Chloride	14000	
		Calcium, filtered	110000	
		Calcium, filtered	120000	
		Sodium, filtered	47000	
		Sodium, filtered	49000	
		Potassium, filtered	4600	
		Potassium, filtered	4900	
		Magnesium, filtered	20000	
		Magnesium, filtered	21000	
1-N-56	6/21/89	Specific conductance	809	
		Specific conductance	810	
		Specific conductance	810	
		Specific conductance	810	
		Sulfate	227000	
		Fluoride	900	
		Chloride	14200	
		Calcium, filtered	175000	
		Sodium, filtered	54500	
		Potassium, filtered	4890	
		Magnesium, filtered	24900	
	8/15/89	Specific conductance	391	
		Specific conductance	393	

Table C-1. Selected Groundwater Chemistry Data. (sheet 33 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-56	8/15/89	Specific conductance	405	
		Specific conductance	420	
		Sulfate	47000	
		Fluoride	500	<
		Chloride	7800	
		Calcium, filtered	59300	
		Sodium, filtered	24000	
		Potassium, filtered	3130	
		Magnesium, filtered	8670	
	10/02/89	Specific conductance	490	
		Specific conductance	491	
		Specific conductance	493	
		Specific conductance	495	
		Sulfate	59000	
		Fluoride	500	<
		Chloride	6000	
		Calcium, filtered	70200	
		Sodium, filtered	21600	
		Potassium, filtered	3420	
		Magnesium, filtered	10400	
	11/01/89	Tritium	31100	
		Gross beta	691	
		Strontium-90	364	
		Specific conductance	516	
		Specific conductance	517	
		Specific conductance	517	
		Specific conductance	517	
		Sulfate	73000	
		Fluoride	500	<
		Chloride	6200	
		Calcium, filtered	72900	
		Sodium, filtered	25000	
		Potassium, filtered	3490	
		Magnesium, filtered	10400	
	2/01/90	Specific conductance	338	
		Specific conductance	338	
		Specific conductance	338	
		Specific conductance	340	

Table C-1. Selected Groundwater Chemistry Data. (sheet 34 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-56	2/01/90	Sulfate	49000	
		Fluoride	500	<
		Chloride	3200	
		Calcium, filtered	46100	
		Sodium, filtered	13700	
		Potassium, filtered	2520	
		Magnesium, filtered	7050	
	9/05/91	Specific conductance	850	
		Sulfate	180000	
		Fluoride	560	
		Chloride	6800	
		Calcium, filtered	140000	
		Sodium, filtered	19000	
		Potassium, filtered	2700	
		Magnesium, filtered	19000	
	10/02/91	Tritium	17800	
		Strontium-90	438	
	10/11/91	Strontium-90	289	
	11/05/91	Specific conductance	684	
		Sulfate	220000	
		Fluoride	800	
		Chloride	6000	
		Calcium, filtered	100000	
		Sodium, filtered	19000	
		Potassium, filtered	3300	
		Magnesium, filtered	16000	
	2/11/92	Specific conductance	731	
		Specific conductance	731	
		Sulfate	220000	
		Fluoride	200	
		Chloride	7000	
		Calcium, filtered	110000	
		Sodium, filtered	20000	
		Potassium, filtered	3300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 35 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-56	2/11/92	Magnesium, filtered	16000	
1-N-57	6/20/89	Specific conductance	446	
		Specific conductance	447	
		Specific conductance	447	
		Specific conductance	448	
		Sulfate	117000	
		Fluoride	500	<
		Chloride	7500	
		Calcium, filtered	55700	
		Sodium, filtered	26400	
		Potassium, filtered	4430	
		Magnesium, filtered	9130	
	8/16/89	Specific conductance	340	
		Specific conductance	341	
		Specific conductance	343	
		Specific conductance	348	
		Sulfate	57000	
		Fluoride	500	<
		Chloride	6600	
		Calcium, filtered	38700	
		Sodium, filtered	15100	
		Potassium, filtered	3650	
		Magnesium, filtered	6650	
	10/02/89	Specific conductance	271	
		Specific conductance	273	
		Specific conductance	274	
		Specific conductance	275	
		Sulfate	50000	
		Fluoride	500	<
		Chloride	3300	
		Calcium, filtered	30100	
		Sodium, filtered	13000	
		Potassium, filtered	3240	
		Magnesium, filtered	5690	

Table C-1. Selected Groundwater Chemistry Data. (sheet 36 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-57	11/02/89	Tritium	21800	
		Gross beta	39	
		Strontium-90	19	
		Specific conductance	317	
		Sulfate	56200	
		Fluoride	500	<
		Chloride	3200	
		Calcium, filtered	33300	
		Sodium, filtered	16400	
		Potassium, filtered	3530	
		Magnesium, filtered	6290	
	3/25/91	Tritium	14400	
		Strontium-90	35	
		Specific conductance	795	
	11/05/91	Tritium	11500	
		Gross beta	69	
		Strontium-90	46	
		Specific conductance	838	
		Sulfate	310000	
		Fluoride	1000	
		Chloride	13000	
		Calcium, filtered	91000	
		Sodium, filtered	62000	
		Potassium, filtered	6200	
		Magnesium, filtered	17000	
	2/14/92	Tritium	7080	
		Gross beta	109	
		Strontium-90	59	
		Specific conductance	910	
		Sulfate	320000	
		Fluoride	1000	
		Chloride	18000	
		Calcium, filtered	87000	
		Sodium, filtered	78000	
		Potassium, filtered	5300	
		Magnesium, filtered	17000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 37 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-57	5/21/92	Tritium	9930	
		Gross beta	100	
1-N-58	12/04/87	Gross beta	8	
		Specific conductance	1476	
		Sulfate	666000	
		Fluoride	1390	
		Chloride	5760	
		Calcium, filtered	43500	
		Sodium, filtered	301000	
		Potassium, filtered	3210	
		Magnesium, filtered	8050	
	1/14/88	Gross beta	5	
		Specific conductance	1529	
		Sulfate	608000	
		Fluoride	1280	
		Chloride	4700	
		Calcium, filtered	49500	
		Sodium, filtered	285000	
		Potassium, filtered	3760	
		Magnesium, filtered	9280	
	2/18/88	Gross beta	5	
		Gross beta	6	
		Sulfate	679000	
		Fluoride	500	<
		Chloride	4330	
		Calcium, filtered	47600	
		Calcium, filtered	48700	
		Sodium, filtered	250000	
		Sodium, filtered	251000	
		Potassium, filtered	3130	
		Potassium, filtered	3260	
		Magnesium, filtered	9180	
		Magnesium, filtered	9330	
	3/23/88	Gross beta	2	<

Table C-1. Selected Groundwater Chemistry Data. (sheet 38 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-58	3/23/88	Gross beta	3	<
		Specific conductance	1051	
		Specific conductance	1052	
		Specific conductance	1054	
		Specific conductance	1056	
		Sulfate	382000	
		Sulfate	412000	
		Fluoride	1050	
		Fluoride	1090	
		Chloride	3340	
		Chloride	3360	
		Calcium, filtered	29100	
		Calcium, filtered	32100	
		Sodium, filtered	190000	
		Sodium, filtered	213000	
		Potassium, filtered	2410	
		Potassium, filtered	2590	
		Magnesium, filtered	5650	
		Magnesium, filtered	6110	
	7/06/88	Tritium	56	<
		Gross beta	3	<
		Gross beta	7	
		Strontium-90	0	<
		Specific conductance	1144	
		Specific conductance	1144	
		Specific conductance	1146	
		Specific conductance	1146	
		Sulfate	483000	
		Sulfate	485000	
		Fluoride	1510	
		Fluoride	1530	
		Chloride	6550	
		Chloride	6560	
		Calcium, filtered	35800	
		Calcium, filtered	37600	
		Sodium, filtered	187000	
		Sodium, filtered	189000	
		Potassium, filtered	2560	
		Potassium, filtered	2680	
		Magnesium, filtered	6660	
		Magnesium, filtered	6970	

Table C-1. Selected Groundwater Chemistry Data. (sheet 39 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-58	9/14/88	Tritium	74	<
		Gross beta	9	
		Gross beta	15	
		Strontium-90	1	
		Specific conductance	1711	
		Specific conductance	1713	
		Specific conductance	1713	
		Specific conductance	1715	
		Sulfate	1010000	
		Sulfate	1020000	
		Fluoride	500	<
		Fluoride	500	<
		Chloride	10300	
		Chloride	10300	
		Calcium, filtered	144000	
		Calcium, filtered	146000	
		Sodium, filtered	382000	
		Sodium, filtered	396000	
		Potassium, filtered	6310	
		Potassium, filtered	6710	
		Magnesium, filtered	24600	
		Magnesium, filtered	25000	
	3/02/89	Tritium	-147	<
		Gross beta	4	
		Strontium-90	1	<
		Specific conductance	2090	
		Specific conductance	2100	
		Specific conductance	2100	
		Specific conductance	2150	
		Sulfate	1180000	
		Fluoride	500	<
		Chloride	4800	
		Calcium, filtered	119000	
		Sodium, filtered	341000	
		Potassium, filtered	5720	
		Magnesium, filtered	24700	
	7/25/89	Tritium	118	<
		Gross beta	7	
		Strontium-90	1	
		Specific conductance	2400	

Table C-1. Selected Groundwater Chemistry Data. (sheet 40 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-58	7/25/89	Specific conductance	2400	
		Specific conductance	2410	
		Specific conductance	2410	
		Sulfate	1350000	
		Fluoride	2390	
		Chloride	6460	
		Calcium, filtered	139000	
		Sodium, filtered	479000	
		Potassium, filtered	5380	
		Magnesium, filtered	29000	
	8/14/89	Specific conductance	2250	
		Specific conductance	2250	
		Specific conductance	2260	
		Specific conductance	2260	
		Sulfate	1140000	
		Fluoride	2200	
		Chloride	4800	
		Calcium, filtered	134000	
		Sodium, filtered	479000	
		Potassium, filtered	5060	
		Magnesium, filtered	25600	
	9/18/89	Tritium	39	<
		Gross beta	3	
		Strontium-90	0	<
		Specific conductance	2570	
		Specific conductance	2590	
		Specific conductance	2600	
		Specific conductance	2610	
		Sulfate	1180000	
		Fluoride	2900	
		Chloride	6200	
		Calcium, filtered	130000	
		Sodium, filtered	427000	
		Potassium, filtered	4220	
		Magnesium, filtered	20000	
	11/15/89	Tritium	27	<
		Gross beta	3	
		Strontium-90	1	

Table C-1. Selected Groundwater Chemistry Data. (sheet 41 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-58	11/15/89	Specific conductance	3350	
		Specific conductance	3360	
		Specific conductance	3390	
		Specific conductance	3390	
		Sulfate	1560000	
		Fluoride	3300	
		Chloride	10500	
		Calcium, filtered	205000	
		Sodium, filtered	583000	
		Potassium, filtered	5380	
		Magnesium, filtered	37800	
	2/05/90	Tritium	239	<
		Gross beta	3	
		Strontium-90	0	<
		Specific conductance	1539	
		Specific conductance	1539	
		Specific conductance	1541	
		Specific conductance	1542	
		Sulfate	690000	
		Fluoride	1000	
		Chloride	4200	
		Calcium, filtered	48600	
		Sodium, filtered	279000	
		Potassium, filtered	2850	
		Magnesium, filtered	8400	
1-N-59	12/04/87	Gross beta	4	<
		Specific conductance	1623	
		Sulfate	789000	
		Fluoride	1520	
		Chloride	5650	
		Calcium, filtered	48100	
		Sodium, filtered	296000	
		Potassium, filtered	3580	
		Magnesium, filtered	10900	
	1/13/88	Gross beta	10	
		Specific conductance	1539	

Table C-1. Selected Groundwater Chemistry Data. (sheet 42 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-59	1/13/88	Sulfate	833000	
		Fluoride	1460	
		Chloride	5220	
		Calcium, filtered	58100	
		Sodium, filtered	315000	
		Potassium, filtered	4010	
		Magnesium, filtered	13300	
	2/18/88	Gross beta	9	
		Specific conductance	1369	
		Sulfate	904000	
		Fluoride	590	
		Chloride	4200	
		Calcium, filtered	72400	
		Sodium, filtered	361000	
		Potassium, filtered	4080	
		Magnesium, filtered	13600	
	3/23/88	Gross beta	4	
		Specific conductance	1259	
		Specific conductance	1266	
		Specific conductance	1269	
		Specific conductance	1270	
		Sulfate	534000	
		Fluoride	1030	
		Chloride	4090	
		Calcium, filtered	35100	
		Sodium, filtered	237000	
		Potassium, filtered	3340	
		Magnesium, filtered	7370	
	7/06/88	Tritium	149	<
		Gross beta	2	<
		Strontium-90	0	<
		Specific conductance	1087	
		Specific conductance	1088	
		Specific conductance	1088	
		Specific conductance	1089	
		Sulfate	465000	
		Fluoride	1050	
		Chloride	6130	

Table C-1. Selected Groundwater Chemistry Data. (sheet 43 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-59	7/06/88	Calcium, filtered	24500	
		Sodium, filtered	187000	
		Potassium, filtered	2560	
		Magnesium, filtered	4950	
	9/14/88	Tritium	210	<
		Gross beta	16	
		Strontium-90	0	<
		Specific conductance	1032	
		Specific conductance	1034	
		Specific conductance	1035	
		Specific conductance	1036	
		Sulfate	564000	
		Sulfate	581000	
		Fluoride	670	
		Fluoride	703	
		Chloride	6310	
		Chloride	6350	
		Calcium, filtered	47800	
		Sodium, filtered	251000	
		Potassium, filtered	5020	
		Magnesium, filtered	8810	
	3/01/89	Tritium	-26	<
		Gross beta	2	<
		Gross beta	3	
		Strontium-90	-0	<
		Specific conductance	1815	
		Specific conductance	1825	
		Specific conductance	1829	
		Specific conductance	1838	
		Sulfate	742000	
		Sulfate	754000	
		Fluoride	500	<
		Fluoride	500	<
		Chloride	3900	
		Chloride	3900	
		Calcium, filtered	45800	
		Calcium, filtered	47500	
		Sodium, filtered	312000	
		Sodium, filtered	324000	
		Potassium, filtered	3180	

Table C-1. Selected Groundwater Chemistry Data. (sheet 44 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-59	3/01/89	Potassium, filtered	3270	
		Magnesium, filtered	11800	
		Magnesium, filtered	12100	
	7/17/89	Tritium	247	<
		Gross beta	5	
		Strontium-90	0	<
		Specific conductance	2300	
		Specific conductance	2310	
		Specific conductance	2320	
		Specific conductance	2340	
		Sulfate	1170000	
		Fluoride	2110	
		Chloride	5540	
		Calcium, filtered	119000	
		Sodium, filtered	397000	
		Potassium, filtered	5340	
		Magnesium, filtered	24200	
	8/14/89	Specific conductance	2800	
		Specific conductance	2830	
		Specific conductance	2840	
		Specific conductance	2870	
		Sulfate	1550000	
		Fluoride	2600	
		Chloride	8400	
		Calcium, filtered	169000	
		Sodium, filtered	565000	
		Potassium, filtered	6570	
		Magnesium, filtered	36600	
	9/18/89	Tritium	124	<
		Gross beta	5	
		Strontium-90	1	<
		Specific conductance	3450	
		Specific conductance	3460	
		Specific conductance	3460	
		Specific conductance	3460	
		Sulfate	1760000	
		Fluoride	3500	
		Chloride	8000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 45 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-59	9/18/89	Calcium, filtered	292000	
		Sodium, filtered	513000	
		Potassium, filtered	9510	
		Magnesium, filtered	53200	
	11/16/89	Tritium	153	<
		Gross beta	4	
		Strontium-90	0	<
		Specific conductance	2130	
		Specific conductance	2150	
		Specific conductance	2150	
		Specific conductance	2160	
		Sulfate	1010000	
		Fluoride	2100	
		Chloride	7700	
		Calcium, filtered	105000	
		Sodium, filtered	331000	
		Potassium, filtered	4100	
		Magnesium, filtered	18100	
	2/02/90	Tritium	-41	<
		Tritium	90	<
		Gross beta	3	
		Gross beta	4	
		Strontium-90	-0	<
		Strontium-90	-0	<
		Specific conductance	1175	
		Specific conductance	1178	
		Specific conductance	1178	
		Specific conductance	1181	
		Sulfate	532000	
		Sulfate	538000	
		Fluoride	600	
		Fluoride	600	
		Chloride	3500	
		Chloride	3600	
		Calcium, filtered	31400	
		Calcium, filtered	31700	
		Sodium, filtered	270000	
		Sodium, filtered	281000	
		Potassium, filtered	3710	
		Potassium, filtered	3950	

Table C-1. Selected Groundwater Chemistry Data. (sheet 46 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-59	2/02/90	Magnesium, filtered	6260	
		Magnesium, filtered	6500	
	3/27/91	Specific conductance	748	
	9/03/91	Tritium	357	
		Gross beta	2	U
		Strontium-90	-0	U
		Specific conductance	872	
		Sulfate	210000	
		Fluoride	1500	
		Chloride	2500	
		Calcium, filtered	16000	
		Sodium, filtered	170000	
		Potassium, filtered	3000	
		Magnesium, filtered	2800	
1-N-60	12/04/87	Gross beta	4	<
		Specific conductance	1552	
		Sulfate	819000	
		Fluoride	1610	
		Chloride	5720	
		Calcium, filtered	55000	
		Sodium, filtered	283000	
		Potassium, filtered	3640	
		Magnesium, filtered	12600	
	1/14/88	Gross beta	8	
		Specific conductance	1512	
		Sulfate	681000	
		Fluoride	1300	
		Chloride	3530	
		Calcium, filtered	50700	
		Sodium, filtered	272000	
		Potassium, filtered	3450	
		Magnesium, filtered	12300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 47 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-60	2/18/88	Gross beta	4	<
		Sulfate	736000	
		Fluoride	500	<
		Chloride	2920	
		Calcium, filtered	39200	
		Sodium, filtered	253000	
		Potassium, filtered	2840	
		Magnesium, filtered	8680	
	3/23/88	Gross beta	6	
		Specific conductance	1378	
		Specific conductance	1379	
		Specific conductance	1382	
		Sulfate	519000	
		Fluoride	1110	
		Chloride	3720	
		Calcium, filtered	47500	
		Sodium, filtered	256000	
		Potassium, filtered	4360	
		Magnesium, filtered	9080	
	7/06/88	Tritium	227	<
		Gross beta	6	
		Strontium-90	0	<
		Specific conductance	761	
		Specific conductance	763	
		Specific conductance	764	
		Specific conductance	766	
		Sulfate	257000	
		Fluoride	1050	
		Chloride	4780	
		Calcium, filtered	17700	
		Sodium, filtered	129000	
		Potassium, filtered	2690	
		Magnesium, filtered	3410	
	9/14/88	Tritium	207	<
		Gross beta	13	
		Strontium-90	-0	<
		Specific conductance	1218	
		Specific conductance	1218	

Table C-1. Selected Groundwater Chemistry Data. (sheet 48 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-60	9/14/88	Specific conductance	1219	
		Specific conductance	1221	
		Sulfate	641000	
		Sulfate	643000	
		Fluoride	835	
		Fluoride	856	
		Chloride	6180	
		Chloride	6340	
		Calcium, filtered	79200	
		Sodium, filtered	248000	
		Potassium, filtered	5550	
		Magnesium, filtered	12700	
	3/02/89	Tritium	31	<
		Gross beta	3	
		Strontium-90	0	<
		Specific conductance	1619	
		Specific conductance	1622	
		Specific conductance	1628	
		Specific conductance	1629	
		Sulfate	833000	
		Fluoride	500	<
		Chloride	5000	
		Calcium, filtered	86600	
		Sodium, filtered	298000	
		Potassium, filtered	5110	
		Magnesium, filtered	16700	
	8/01/89	Tritium	51	<
		Tritium	64	<
		Gross beta	3	<
		Gross beta	12	
		Strontium-90	0	<
		Strontium-90	0	<
		Specific conductance	1771	
		Specific conductance	1779	
		Specific conductance	1791	
		Specific conductance	1830	
		Sulfate	1170000	
		Sulfate	1180000	
		Fluoride	2100	
		Fluoride	2100	

Table C-1. Selected Groundwater Chemistry Data. (sheet 49 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-60	8/01/89	Chloride	5300	
		Chloride	5300	
		Calcium, filtered	145000	
		Calcium, filtered	152000	
		Sodium, filtered	418000	
		Sodium, filtered	430000	
		Potassium, filtered	7480	
		Potassium, filtered	7900	
		Magnesium, filtered	27600	
		Magnesium, filtered	28900	
	8/14/89	Specific conductance	1290	
		Specific conductance	1315	
		Specific conductance	1340	
		Specific conductance	1394	
		Sulfate	1150000	
		Fluoride	2100	
		Chloride	4800	
		Calcium, filtered	145000	
		Sodium, filtered	428000	
		Potassium, filtered	7580	
		Magnesium, filtered	27500	
	9/18/89	Tritium	100	<
		Gross beta	6	
		Strontium-90	0	<
		Specific conductance	2430	
		Specific conductance	2450	
		Specific conductance	2450	
		Specific conductance	2450	
		Sulfate	1100000	
		Fluoride	2700	
		Chloride	6500	
		Calcium, filtered	123000	
		Sodium, filtered	362000	
		Potassium, filtered	6550	
		Magnesium, filtered	22600	
	11/16/89	Tritium	39	<
		Gross beta	12	
		Strontium-90	0	<

Table C-1. Selected Groundwater Chemistry Data. (sheet 50 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-60	11/16/89	Specific conductance	2700	
		Specific conductance	2740	
		Specific conductance	2740	
		Specific conductance	3070	
		Sulfate	1430000	
		Sulfate	1440000	
		Fluoride	2700	
		Fluoride	2800	
		Chloride	9200	
		Chloride	9300	
		Calcium, filtered	166000	
		Calcium, filtered	178000	
		Sodium, filtered	459000	
		Sodium, filtered	467000	
		Potassium, filtered	6360	
		Potassium, filtered	6380	
		Magnesium, filtered	30300	
		Magnesium, filtered	32000	
	2/05/90	Tritium	144	<
		Gross beta	3	
		Strontium-90	-0	<
		Specific conductance	1440	
		Specific conductance	1442	
		Specific conductance	1449	
		Specific conductance	1451	
		Sulfate	589000	
		Fluoride	800	
		Chloride	3800	
		Calcium, filtered	42900	
		Sodium, filtered	269000	
		Potassium, filtered	3800	
		Magnesium, filtered	7380	
1-N-61	12/04/87	Gross beta	9	
		Specific conductance	1502	
		Sulfate	816000	
		Fluoride	1470	
		Chloride	3660	
		Calcium, filtered	95300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 51 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-61	12/04/87	Sodium, filtered	292000	
		Potassium, filtered	2970	
		Magnesium, filtered	18200	
	1/13/88	Gross beta	6	
		Specific conductance	1493	
		Sulfate	792000	
		Fluoride	1480	
		Chloride	3810	
		Calcium, filtered	53500	
		Sodium, filtered	280000	
		Potassium, filtered	2510	
		Magnesium, filtered	13200	
	2/18/88	Gross beta	4	<
		Sulfate	669000	
		Fluoride	500	<
		Chloride	5670	
		Calcium, filtered	21900	
		Sodium, filtered	273000	
		Potassium, filtered	1590	
		Magnesium, filtered	5250	
	3/23/88	Gross beta	3	<
		Specific conductance	1862	
		Specific conductance	1865	
		Specific conductance	1868	
		Specific conductance	1873	
		Sulfate	910000	
		Fluoride	1560	
		Chloride	6050	
		Calcium, filtered	75800	
		Sodium, filtered	322000	
		Potassium, filtered	2400	
		Magnesium, filtered	15700	
	7/06/88	Tritium	15	<
		Gross beta	5	<
		Strontium-90	0	<
		Specific conductance	1202	

Table C-1. Selected Groundwater Chemistry Data. (sheet 52 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-61	7/06/88	Specific conductance	1202	
		Specific conductance	1204	
		Specific conductance	1206	
		Sulfate	516000	
		Fluoride	1400	
		Chloride	6680	
		Calcium, filtered	29300	
		Sodium, filtered	200000	
		Potassium, filtered	2340	
		Magnesium, filtered	6910	
	9/14/88	Tritium	356	<
		Gross beta	4	<
		Strontium-90	0	<
		Specific conductance	1534	
		Specific conductance	1535	
		Specific conductance	1535	
		Specific conductance	1536	
		Sulfate	794000	
		Sulfate	799000	
		Fluoride	898	
		Fluoride	942	
		Chloride	7810	
		Chloride	7990	
		Calcium, filtered	45800	
		Sodium, filtered	342000	
		Potassium, filtered	2610	
		Magnesium, filtered	9760	
	3/02/89	Tritium	34	<
		Gross beta	2	<
		Strontium-90	-0	<
		Specific conductance	1037	
		Specific conductance	1039	
		Specific conductance	1040	
		Specific conductance	1042	
		Sulfate	495000	
		Fluoride	800	
		Chloride	2500	
		Calcium, filtered	25600	
		Sodium, filtered	236000	
		Potassium, filtered	1650	

Table C-1. Selected Groundwater Chemistry Data. (sheet 53 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-61	3/02/89	Magnesium, filtered	7100	
	7/28/89	Tritium	73	<
		Gross beta	5	<
		Strontium-90	0	<
		Specific conductance	3850	
		Specific conductance	3900	
		Specific conductance	3900	
		Specific conductance	3910	
		Sulfate	2030000	
		Fluoride	3400	
		Chloride	13400	
		Calcium, filtered	156000	
		Sodium, filtered	972000	
		Potassium, filtered	5000	
		Magnesium, filtered	37100	
	8/14/89	Specific conductance	1646	
		Specific conductance	1650	
		Specific conductance	1654	
		Specific conductance	1660	
		Sulfate	2180000	
		Fluoride	3500	
		Chloride	12000	
		Calcium, filtered	162000	
		Sodium, filtered	886000	
		Potassium, filtered	5260	
		Magnesium, filtered	38400	
	9/19/89	Tritium	56	<
		Tritium	157	<
		Gross beta	2	<
		Gross beta	6	
		Strontium-90	0	<
		Strontium-90	0	
		Specific conductance	3690	
		Specific conductance	3740	
		Specific conductance	3740	
		Specific conductance	3740	
		Sulfate	1840000	
		Sulfate	1850000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 54 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-61	9/19/89	Fluoride	3800	
		Fluoride	3900	
		Chloride	14000	
		Chloride	14000	
		Calcium, filtered	136000	
		Calcium, filtered	150000	
		Sodium, filtered	707000	
		Sodium, filtered	774000	
		Potassium, filtered	4600	
		Potassium, filtered	4630	
		Magnesium, filtered	33000	
		Magnesium, filtered	36000	
	11/16/89	Tritium	27	<
		Gross beta	5	
		Strontium-90	1	<
		Specific conductance	2060	
		Specific conductance	2060	
		Specific conductance	2070	
		Specific conductance	2070	
		Sulfate	991000	
		Fluoride	2400	
		Chloride	5200	
		Calcium, filtered	52900	
		Sodium, filtered	365000	
		Potassium, filtered	2680	
		Magnesium, filtered	12400	
	2/07/90	Tritium	234	<
		Gross beta	1	<
		Strontium-90	-0	<
		Specific conductance	1519	
		Specific conductance	1522	
		Specific conductance	1527	
		Specific conductance	1543	
		Sulfate	605000	
		Fluoride	900	
		Chloride	5000	
		Calcium, filtered	40100	
		Sodium, filtered	254000	
		Potassium, filtered	2110	
		Magnesium, filtered	10600	

Table C-1. Selected Groundwater Chemistry Data. (sheet 55 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-66	3/08/89	Tritium	52400	
		Gross beta	36	
		Strontium-90	1	<
		Specific conductance	160	
		Specific conductance	160	
		Specific conductance	161	
		Specific conductance	161	
		Sulfate	12400	
		Fluoride	500	<
		Chloride	900	
		Calcium, filtered	21800	
		Sodium, filtered	2820	
		Potassium, filtered	2220	
		Magnesium, filtered	3690	
	8/02/89	Tritium	12200	
		Gross beta	17	
		Strontium-90	1	<
		Specific conductance	189	
		Specific conductance	190	
		Specific conductance	190	
		Specific conductance	190	
		Sulfate	15900	
		Fluoride	500	<
		Chloride	2500	
		Calcium, filtered	27600	
		Sodium, filtered	4170	
		Potassium, filtered	2720	
		Magnesium, filtered	4530	
	8/16/89	Specific conductance	162	
		Specific conductance	164	
		Specific conductance	164	
		Specific conductance	164	
		Sulfate	12200	
		Fluoride	500	<
		Chloride	1500	
		Calcium, filtered	23300	

Table C-1. Selected Groundwater Chemistry Data. (sheet 56 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-66	8/16/89	Sodium, filtered	2870	
		Potassium, filtered	2250	
		Magnesium, filtered	3750	
	9/29/89	Tritium	27700	
		Gross beta	31	
		Strontium-90	2	
		Specific conductance	1735	
		Specific conductance	1740	
		Specific conductance	1741	
		Specific conductance	1764	
		Sulfate	12100	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	21500	
		Sodium, filtered	2040	
		Potassium, filtered	1830	
		Magnesium, filtered	3470	
	11/08/89	Tritium	52400	
		Gross beta	29	
		Strontium-90	2	
		Specific conductance	157	
		Specific conductance	159	
		Specific conductance	159	
		Specific conductance	160	
		Sulfate	11300	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	23300	
		Sodium, filtered	2300	
		Potassium, filtered	2010	
		Magnesium, filtered	3640	
	2/02/90	Tritium	43400	
		Gross beta	68	
		Strontium-90	3	
		Specific conductance	155	
		Specific conductance	155	
		Specific conductance	155	
		Specific conductance	156	

Table C-1. Selected Groundwater Chemistry Data. (sheet 57 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-66	2/02/90	Sulfate	12400	
		Fluoride	500	<
		Chloride	1400	
		Calcium, filtered	21700	
		Sodium, filtered	2630	
		Potassium, filtered	2100	
		Magnesium, filtered	3700	
	11/05/91	Tritium	29300	
		Gross beta	11	
		Strontium-90	1	
		Specific conductance	209	
		Sulfate	26000	
		Fluoride	600	
		Chloride	2100	
		Calcium, filtered	29000	
		Sodium, filtered	3300	
		Potassium, filtered	2400	
		Magnesium, filtered	4600	
1-N-67	12/19/88	Tritium	84900	
		Gross beta	40800	
		Strontium-90	13800	
		Specific conductance	213	
		Specific conductance	214	
		Specific conductance	214	
		Specific conductance	214	
		Sulfate	11200	
		Fluoride	500	<
		Chloride	1100	
		Calcium, filtered	32800	
		Sodium, filtered	3080	
		Potassium, filtered	1600	
		Magnesium, filtered	5230	
	3/08/89	Tritium	77300	
		Gross beta	39000	
		Strontium-90	23400	
		Specific conductance	308	

Table C-1. Selected Groundwater Chemistry Data. (sheet 58 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-67	3/08/89	Specific conductance	309	
		Specific conductance	310	
		Specific conductance	312	
		Sulfate	11900	
		Fluoride	500	<
		Chloride	1100	
		Calcium, filtered	43800	
		Sodium, filtered	3360	
		Potassium, filtered	1690	
		Magnesium, filtered	7140	
	8/02/89	Tritium	71800	
		Gross beta	25500	
		Strontium-90	14100	
		Specific conductance	191	
		Specific conductance	191	
		Specific conductance	191	
		Specific conductance	192	
		Sulfate	13600	
		Fluoride	500	<
		Chloride	1900	
		Calcium, filtered	30200	
		Sodium, filtered	3050	
		Potassium, filtered	1540	
		Magnesium, filtered	4290	
	8/16/89	Sulfate	16000	
		Fluoride	500	<
		Chloride	3800	
		Calcium, filtered	31300	
		Sodium, filtered	3150	
		Potassium, filtered	1580	
		Magnesium, filtered	4570	
	10/02/89	Tritium	45300	
		Gross beta	25700	
		Strontium-90	13000	
		Specific conductance	218	
		Specific conductance	218	
		Specific conductance	219	
		Specific conductance	219	

Table C-1. Selected Groundwater Chemistry Data. (sheet 59 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-67	10/02/89	Sulfate	19900	
		Fluoride	500	<
		Chloride	5700	
		Calcium, filtered	27100	
		Sodium, filtered	2760	
		Potassium, filtered	1500	
		Magnesium, filtered	4330	
	11/08/89	Tritium	42600	
		Gross beta	24100	
		Strontium-90	11600	
		Specific conductance	199	
		Specific conductance	199	
		Specific conductance	200	
		Specific conductance	200	
		Sulfate	19500	
		Fluoride	500	<
		Chloride	6200	
		Calcium, filtered	28100	
		Sodium, filtered	2890	
		Potassium, filtered	1460	
		Magnesium, filtered	4340	
	2/05/90	Tritium	47400	
		Gross beta	16500	
		Strontium-90	8980	
		Specific conductance	175	
		Specific conductance	176	
		Specific conductance	177	
		Specific conductance	178	
		Sulfate	14700	
		Fluoride	500	<
		Chloride	2500	
		Calcium, filtered	26700	
		Sodium, filtered	2670	
		Potassium, filtered	1390	
		Magnesium, filtered	3920	
	3/25/91	Tritium	37400	
		Strontium-90	6060	
		Specific conductance	178	

Table C-1. Selected Groundwater Chemistry Data. (sheet 60 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-67	11/22/91	Tritium	26100	
		Gross beta	7850	
		Strontium-90	4340	
		Specific conductance	194	
		Sulfate	12000	
		Fluoride	300	
		Chloride	1600	
		Calcium, filtered	29000	
		Sodium, filtered	3000	
		Potassium, filtered	1200	
		Magnesium, filtered	4400	
1-N-69	12/19/88	Tritium	90700	
		Gross beta	43	
		Strontium-90	0	<
		Specific conductance	197	
		Specific conductance	200	
		Specific conductance	200	
		Specific conductance	200	
		Sulfate	10600	
		Fluoride	500	<
		Chloride	900	
		Calcium, filtered	28400	
		Sodium, filtered	2760	
		Potassium, filtered	2030	
		Magnesium, filtered	5570	
	3/08/89	Tritium	85100	
		Gross beta	18	
		Strontium-90	1	<
		Specific conductance	195	
		Specific conductance	195	
		Specific conductance	196	
		Specific conductance	196	
		Sulfate	9900	
		Fluoride	500	<
		Chloride	900	
		Calcium, filtered	26100	

Table C-1. Selected Groundwater Chemistry Data. (sheet 61 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-69	3/08/89	Sodium, filtered	2890	
		Potassium, filtered	2110	
		Magnesium, filtered	5590	
	8/02/89	Tritium	92700	
		Gross beta	19	
		Strontium-90	0	<
		Specific conductance	202	
		Specific conductance	202	
		Specific conductance	202	
		Specific conductance	202	
		Sulfate	11400	
		Fluoride	500	<
		Chloride	1000	
		Calcium, filtered	28400	
		Sodium, filtered	3480	
		Potassium, filtered	2300	
		Magnesium, filtered	5890	
	8/16/89	Specific conductance	201	
		Specific conductance	206	
		Specific conductance	207	
		Specific conductance	208	
		Sulfate	11300	
		Fluoride	500	<
		Chloride	1000	
		Calcium, filtered	24000	
		Sodium, filtered	2910	
		Potassium, filtered	1990	
		Magnesium, filtered	4830	
	10/02/89	Tritium	75100	
		Gross beta	22	
		Strontium-90	1	
		Specific conductance	197	
		Specific conductance	197	
		Specific conductance	197	
		Specific conductance	197	
		Sulfate	11500	
		Fluoride	500	<
		Chloride	1200	

Table C-1. Selected Groundwater Chemistry Data. (sheet 62 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-69	10/02/89	Calcium, filtered	23900	
		Sodium, filtered	2930	
		Potassium, filtered	2090	
		Magnesium, filtered	5080	
	11/08/89	Tritium	78400	
		Gross beta	19	
		Strontium-90	0	<
		Specific conductance	185	
		Specific conductance	185	
		Specific conductance	186	
		Specific conductance	186	
		Sulfate	11000	
		Fluoride	500	<
		Chloride	1100	
		Calcium, filtered	24300	
		Sodium, filtered	2820	
		Potassium, filtered	1950	
		Magnesium, filtered	4970	
	2/02/90	Tritium	90100	
		Gross beta	15	
		Strontium-90	-0	<
		Specific conductance	179	
		Specific conductance	179	
		Specific conductance	179	
		Specific conductance	180	
		Sulfate	10900	
		Fluoride	500	<
		Chloride	1100	
		Calcium, filtered	23700	
		Sodium, filtered	3080	
		Potassium, filtered	1890	
		Magnesium, filtered	4930	
	11/22/91	Tritium	31400	
		Gross beta	5	
		Strontium-90	-0	U
		Specific conductance	156	
		Sulfate	11000	
		Fluoride	400	

Table C-1. Selected Groundwater Chemistry Data. (sheet 63 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-69	11/22/91	Chloride	1500	
		Calcium, filtered	21000	
		Sodium, filtered	2800	
		Potassium, filtered	2000	
		Magnesium, filtered	4100	
1-N-71	1/28/92	Specific conductance	293	
		Sulfate	38000	
		Fluoride	600	
		Chloride	4200	
		Calcium, filtered	18000	
		Sodium, filtered	41000	
		Potassium, filtered	3800	
		Magnesium, filtered	4900	
	2/13/92	Specific conductance	316	
		Specific conductance	316	
		Sulfate	38000	
		Fluoride	500	
		Chloride	4100	
		Calcium, filtered	19000	
		Sodium, filtered	40000	
		Potassium, filtered	3800	
		Magnesium, filtered	5100	
1-N-72	1/28/92	Specific conductance	300	
		Sulfate	81000	
		Fluoride	700	
		Chloride	5600	
		Calcium, filtered	30000	
		Sodium, filtered	27000	
		Potassium, filtered	2500	
		Magnesium, filtered	5500	
	2/13/92	Specific conductance	298	
		Specific conductance	298	

Table C-1. Selected Groundwater Chemistry Data. (sheet 64 of 69)

Well	Date	Constituent	Result (a)	LT (b)
1-N-72	2/13/92	Sulfate	72000	
		Fluoride	600	
		Chloride	5200	
		Calcium, filtered	29000	
		Sodium, filtered	23000	
		Potassium, filtered	3000	
		Magnesium, filtered	5500	
1-N-73	1/28/92	Specific conductance	533	
		Sulfate	130000	
		Fluoride	900	
		Chloride	4800	
		Calcium, filtered	5300	
		Sodium, filtered	120000	
		Potassium, filtered	2000	
		Magnesium, filtered	970	
	2/13/92	Specific conductance	588	
		Specific conductance	588	
		Sulfate	130000	
		Fluoride	800	
		Chloride	4700	
		Calcium, filtered	5500	
		Sodium, filtered	110000	
		Potassium, filtered	1300	
		Magnesium, filtered	1000	
6-81-58	12/13/87	Tritium	303	<
		Gross beta	1	<
		Specific conductance	173	
		Sulfate	15300	
		Fluoride	500	<
		Chloride	1270	
		Calcium, filtered	30400	
		Sodium, filtered	4460	
		Potassium, filtered	2360	
		Magnesium, filtered	8030	

Table C-1. Selected Groundwater Chemistry Data. (sheet 65 of 69)

Well	Date	Constituent	Result (a)	LT (b)
6-81-58	3/02/88	Tritium	246	<
		Gross beta	2	
		Gross beta	0	<
		Specific conductance	112	
		Sulfate	16100	
		Fluoride	500	<
		Chloride	1320	
		Calcium, filtered	27000	
		Sodium, filtered	4580	
		Potassium, filtered	2650	
		Magnesium, filtered	7660	
	5/22/88	Tritium	321	<
		Gross beta	1	
	6/30/88	Tritium	156	<
		Gross beta	2	<
		Strontium-90	-0	<
		Specific conductance	208	
		Specific conductance	208	
		Specific conductance	209	
		Specific conductance	209	
		Sulfate	14600	
		Fluoride	500	<
		Chloride	1390	
		Calcium, filtered	25500	
		Sodium, filtered	4610	
		Potassium, filtered	2600	
		Magnesium, filtered	7230	
	8/31/88	Tritium	560	
		Gross beta	2	
	9/19/88	Tritium	535	
		Gross beta	4	
		Strontium-90	-0	<
		Specific conductance	179	
		Specific conductance	179	

Table C-1. Selected Groundwater Chemistry Data. (sheet 66 of 69)

Well	Date	Constituent	Result (a)	LT (b)
6-81-58	9/19/88	Specific conductance	180	
		Specific conductance	180	
		Sulfate	14900	
		Fluoride	500	<
		Chloride	1150	
		Calcium, filtered	28400	
		Sodium, filtered	5110	
		Potassium, filtered	2950	
		Magnesium, filtered	7900	
	11/28/88	Tritium	39	<
		Gross beta	4	
	12/19/88	Tritium	161	<
		Gross beta	4	
		Strontium-90	-0	<
		Specific conductance	226	
		Specific conductance	227	
		Specific conductance	227	
		Specific conductance	228	
		Sulfate	14800	
		Fluoride	500	<
		Chloride	1300	
		Calcium, filtered	26300	
		Sodium, filtered	4390	
		Potassium, filtered	2670	
		Magnesium, filtered	7660	
	1/16/89	Specific conductance	166	
		Sulfate	15900	
		Fluoride	500	<
		Chloride	1500	
		Calcium, filtered	27900	
		Sodium, filtered	4370	
		Potassium, filtered	2560	
		Magnesium, filtered	7200	
	3/03/89	Tritium	270	<
		Gross beta	1	<
		Strontium-90	1	<

Table C-1. Selected Groundwater Chemistry Data. (sheet 67 of 69)

Well	Date	Constituent	Result (a)	LT (b)
6-81-58	3/03/89	Specific conductance	153	
		Specific conductance	154	
		Specific conductance	155	
		Specific conductance	156	
		Sulfate	16000	
		Fluoride	500	<
		Chloride	1400	
		Calcium, filtered	31400	
		Sodium, filtered	5210	
		Potassium, filtered	3070	
		Magnesium, filtered	9280	
	9/18/89	Tritium	88	<
		Gross beta	4	
		Strontium-90	-0	<
		Specific conductance	212	
		Specific conductance	214	
		Specific conductance	216	
		Specific conductance	216	
		Sulfate	15400	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	27600	
		Sodium, filtered	4010	
		Potassium, filtered	2520	
		Magnesium, filtered	7280	
	11/28/89	Tritium	158	<
		Gross beta	3	
		Strontium-90	0	<
		Specific conductance	254	
		Specific conductance	255	
		Specific conductance	255	
		Specific conductance	255	
		Sulfate	17300	
		Fluoride	500	<
		Chloride	1500	
		Calcium, filtered	26800	
		Sodium, filtered	3740	
		Potassium, filtered	2360	
		Magnesium, filtered	7080	

Table C-1. Selected Groundwater Chemistry Data. (sheet 68 of 69)

Well	Date	Constituent	Result (a)	LT (b)
6-81-58	2/07/90	Tritium	353	
		Gross beta	3	
		Strontium-90	-0	<
		Specific conductance	200	
		Specific conductance	203	
		Specific conductance	204	
		Specific conductance	204	
		Sulfate	16400	
		Fluoride	500	<
		Chloride	1600	
		Calcium, filtered	25000	
		Sodium, filtered	4050	
		Potassium, filtered	2380	
		Magnesium, filtered	6930	
	9/04/91	Tritium	950	
		Tritium	1400	
		Gross beta	1	U
		Gross beta	4	
		Strontium-90	-0	U
		Strontium-90	1	
		Specific conductance	236	
		Sulfate	17000	
		Sulfate	17000	
		Fluoride	320	
		Fluoride	330	
		Chloride	3200	
		Chloride	3200	
		Calcium, filtered	31000	
		Calcium, filtered	31000	
		Sodium, filtered	5000	
		Sodium, filtered	5100	
		Potassium, filtered	2900	
		Potassium, filtered	3000	
		Magnesium, filtered	8300	
		Magnesium, filtered	8300	
	1/23/92	Tritium	373	
		Gross beta	5	
		Strontium-90	-0	U
		Specific conductance	249	
		Sulfate	19000	

Table C-1. Selected Groundwater Chemistry Data. (sheet 69 of 69)

Well	Date	Constituent	Result (a)	LT (b)
6-81-58	1/23/92	Fluoride	100	U
		Chloride	3300	
		Calcium, filtered	30000	
		Sodium, filtered	4800	
		Potassium, filtered	1700	
		Magnesium, filtered	8700	
	2/14/92	Specific conductance	236	
		Specific conductance	237	
		Specific conductance	237	
		Specific conductance	237	
		Sulfate	21000	
		Fluoride	200	
		Chloride	3600	
		Calcium, filtered	29000	
		Sodium, filtered	4400	
		Potassium, filtered	2300	
		Magnesium, filtered	8100	

(a) Units for ions are ppb; for radionuclides are pCi/L; for specific conductance are umho/cm.
(b) "U" and "<" both signify constituent was not detected above the contractual quantitation limit.

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Author/Requestor (Printed/Signature): M.J. Hartman — Date: 11/24/92

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Name	MSIN	With Attachment	EDT/ECN & Comment	EDT/ECN Only
K.R. Fecht	H6-06	X		
R.L. Jackson	H6-06	X		
M.J. Hartman (5)	H6-06	X		
G.S. Hunacek	X0-41	X		
R.E. Peterson	H6-06	X		
S.E. Vukelich	H6-02	X		
R.R. Thompson	L4-88	X		
D.J. Watson (2)	X0-41	X		
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