0060205

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

JUL 11 2000

00-GWVZ-054

Ms. Jane Hedges
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336

Dear Ms. Hedges:

RESULTS OF ASSESSMENT AT THE 1325-N FACILITY

Please find attached the groundwater quality assessment report for the subject facility. The 1325-N Liquid Waste Disposal Facility is a Resource Conservation and Recovery Act facility in the 100-N Area, which has been monitored under an interim-status detection program (40 CFR 265.92). As discussed in the U.S. Department of Energy, Richland Operations Office (RL) letter to you from M. J. Furman, "Notification of Exceedance of Critical Mean Value for Specific Conductance at 1325-N Facility," dated January 13, 2000 (00-GWVZ-016), the average result of quadruplicate samples from downgradient wells 199-N-41 and 199-N-81 exceeded the critical mean value for specific conductance in September 1999.

Specific conductance is an indicator parameter under interim-status regulations. Because measurements in downgradient wells have been determined to be statistically different from background measurements, the following actions have been undertaken:

> "Within 15 days after the notification under paragraph (d)(1) of this section, the owner or operator must develop and submit to the Regional Administrator a specific plan . . . for a groundwater quality assessment program at the facility." [40 CFR 265.93(d)(2)]
>
> " . . . as soon as technically feasible . . . submit . . . a written report containing an assessment of the groundwater quality." [40 CFR 265.93)d)(5)] This information is belatedly submitted due to a breakdown in internal communication.

The groundwater-quality assessment indicates that the elevated downgradient measurements of specific conductance is caused by a nonhazardous constituent, sulfate, from an upgradient source as discussed in the attached report. Monitoring will continue at this site. The attached assessment report serves as the assessment plan and report.

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If you want to discuss this matter further, or require additional information, please contact M. J. Furman, Project Manager, at (509) 373-9630.

Sincerely,

K. Michael Thompson, Acting Program Manager
Groundwater/Vadose Zone Program

GWVZ:MJF

Attachment

cc w/attach:
J. V. Borghese, BHI
S. Leja, Ecology
M. J. Harman, PNNL
S. P. Luttrell, PNNL

Specific Conductance of Groundwater at 1325-N Liquid Waste Disposal Facility

Introduction

The 1325-N Liquid Waste Disposal Facility is regulated under the Resource Conservation and Recovery Act of 1976 (RCRA). Located east of the 100 N Area (Figure 1), the facility received cooling water and related liquid from N Reactor from 1983 through 1991.

Samples collected in September 1999 exceeded the revised critical mean value for specific conductance in two downgradient wells (199-N-41 and 199-N-81). As explained below, the exceedances do not indicate that the 1325-N facility is contaminating groundwater with hazardous constituents. The high specific conductance is caused by nonhazardous constituents (sulfate, calcium) from a source upgradient of the 1325-N facility.

Effluent Characteristics

Reactor cooling water and related liquids were discharged to the 1325-N Facility and contained radionuclides including tritium and strontium-90. Hazardous constituents included ammonium hydroxide, which was added to the reactor coolant system. A 1985 analysis of the effluent detected no ammonium or nitrate, however. Sulfate was detected at 12 mg/L and the specific conductance was 164 uS/cm (Diediker and Hall, 1987).

Specific Conductance

The low specific conductance of the effluent discharged to the 1325-N facility influenced groundwater near of the site. When the facility was in use, specific conductance of groundwater in nearby wells was less than 200 uS/cm. After discharges ceased in 1991, groundwater flowed in from upgradient of the site and specific conductance increased, as illustrated by the trend for well 199-N-27 (Figure 2).

The critical mean value for specific conductance formerly was based on data from quarterly samples from upgradient well 199-N-74 from March 1992 through March 1993. Specific conductance in the upgradient well was ~500 uS/cm at that time (see Figure 2), and the critical mean value was 689.9 uS/cm (Table B.6 in Hartman 1999). Specific conductance declined in well 199-N-74 from 1993 to 1995. In December 1999 the critical mean value was revised to reflect more recent conditions at the upgradient well, based on semiannual samples from September 1997 through September 1999. The new critical mean value is 470.9 uS/cm.

Specific conductance in downgradient wells 199-N-81 and 199-N-41 exceeded the new critical mean value in September 1999, with average values of 490 and 492 uS/cm, respectively (see Figure 2). Note, however, that values were below the previous critical mean value.

The peak values of specific conductance in well 199-N-74 were in 1992 (these were the first data available; values could have been higher earlier). The peak in well 199-N-27 was in 1997. The distance between these wells is ~500 meters, so the flow rate is estimated to be up to 100 meters per year. Specific conductance is expected to peak in wells 199-N-41 and 199-N-81in 2000.

Sulfate

A plume of groundwater with relatively high sulfate concentrations passed upgradient well 199-N-74 in the early 1990s (Figure 3). In the mid-to-late 1990s, sulfate increased in the downgradient wells, including 199-N-41 and 199-N-81. Sulfate is one of the dominant ions contributing to the high specific conductance. One possible source of the high sulfate is the 1324-N/NA RCRA site, located southwest of the 1325-N Facility (see Figure 1). Effluent discharged to the 1324-N/NA site had very high levels of sulfate, and sulfate is elevated in downgradient wells. The 1324-N/NA site is not upgradient of the 1325-N facility under current flow conditions, but during its use from 1977 to 1990, the 1324-N/NA site created a recharge mound (Smith and Gorst, 1990) that may have pushed sulfate-laden water inland. Sulfate is a non-hazardous constituent with a secondary maximum contaminant level of 250 mg/L.

Nitrate

Nitrate concentrations in well 199-N-81 currently exceed the 45-mg/L maximum contaminant level. Nitrate increased simultaneously in a number of wells scattered across the 100 N Site in 1998 and 1999, and does not appear to have a single source (Section 5.5 of Hartman 1999) (Figure 4). It is below the maximum contaminant level in wells 199-N-41 and 199-N-74. Nitrate recently increased sharply in well 199-N-59, at the 1324-N/NA site, but nitrate was not present in the effluent discharged to that facility (DOE 1998). As explained above, no nitrate or ammonia was detected in samples of 1325-N effluent analyzed in 1985. Nitrate has always been low in 1325-N upgradient well 199-N-74. The source of the nitrate is unknown, but does not appear to be the 1325-N facility.

Conclusions and Recommendations

Specific conductance in two downgradient wells exceeded the critical mean value in September 1999. The source was not the 1325-N Facility, as evident from the following:

- Specific conductance exceeded the critical mean value only after the critical mean value was revised (lowered) based on 1997-99 concentrations in the upgradient well. The older critical mean value was not exceeded.

- Downgradient wells 199-N-41 and 199-N-81 are in a plume of high-sulfate groundwater that was observed in the upgradient well in 1991-1995. Based on the rate of groundwater flow in the area, the plume will pass the downgradient wells in 2-4 years.

No further assessment of the high specific conductance at 1325-N is needed. The site should remain in detection monitoring as described in the existing monitoring plan (Hartman 1996).

References:

DOE 1998, *100-NR-1 Treatment, Storage, and Disposal Units Corrective Measures Study/Closure Plan.* United State Department of Energy, Richland, Washington.

Diediker, L.A. and J.A. Hall, 1987, *Closure/Post-Closure Plan for the 1301-N and 1325-N Liquid Waste Disposal Facilities,* UNI-3533, UNC Nuclear Industries, Inc., Richland, Washington.

Hartman, M.J., 1996. *Groundwater Monitoring Plan for 1301-N, 1324-N/NA, and 1325-N Facilities.* WHC-SD-EN-AP-038, rev. 2.

Hartman, M.J., editor. 1999. *Hanford Site Groundwater Monitoring for Fiscal Year 1998.* PNNL-12086.

Smith, R.M. and W.R. Gorst, 1990. *RCRA Ground-Water Monitoring Projects for Hanford Facilities: Annual Progress Report for 1989.* PNL-7305.

Figure 1: Location of Wells and Facilities in 100 N Area [map w/ groundwater flow directions]
Figure 2: Specific Conductance in Wells Near 1325-N Facility.
Figure 3: Sulfate in Wells Near 1325-N Facility.
Figure 4: Average Nitrate Concentrations in 100 N Area Groundwater, Fiscal Year 1999.

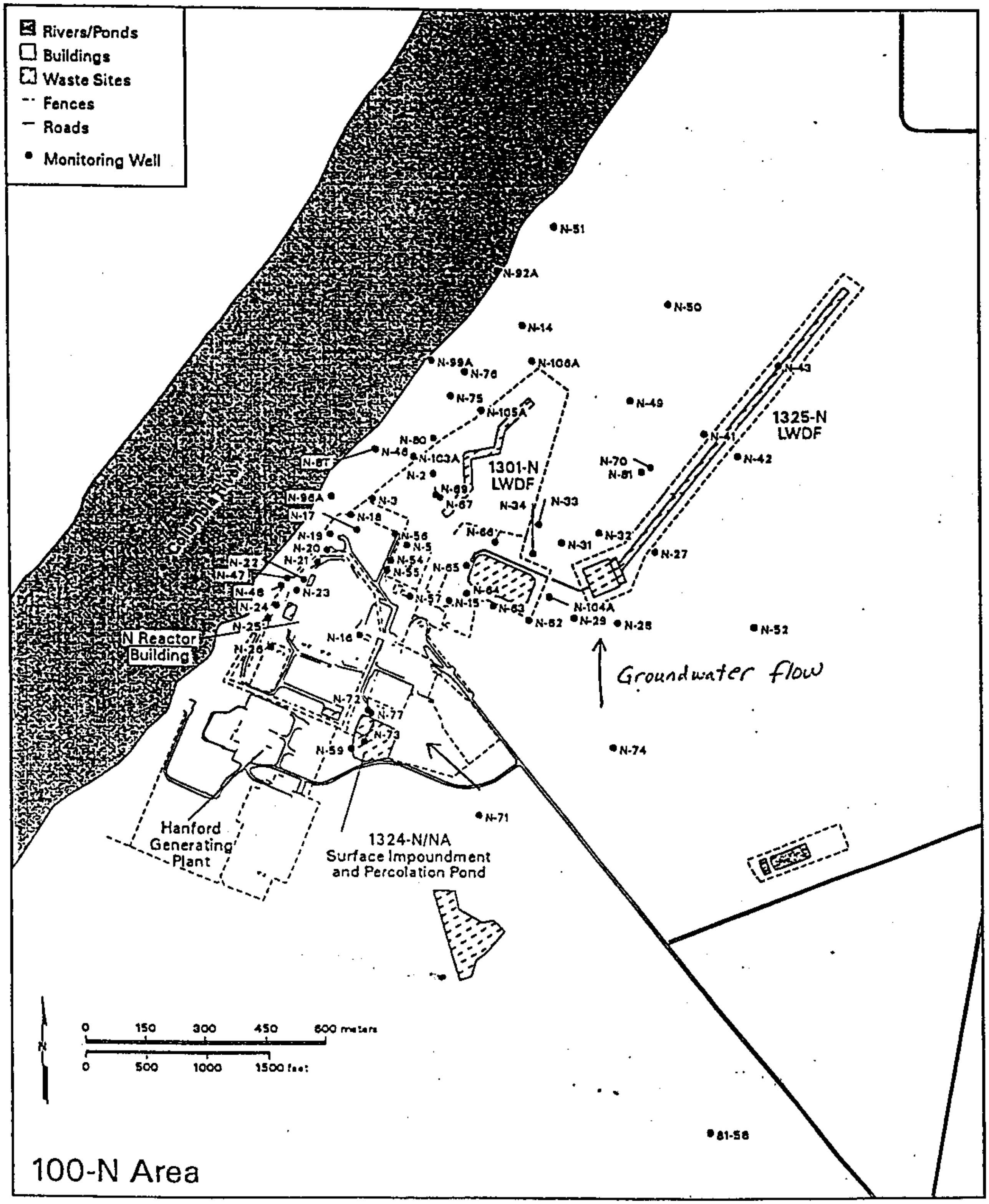

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Figure 1. Locations of RCRA Facilities and Monitoring Wells in 100 N Area.

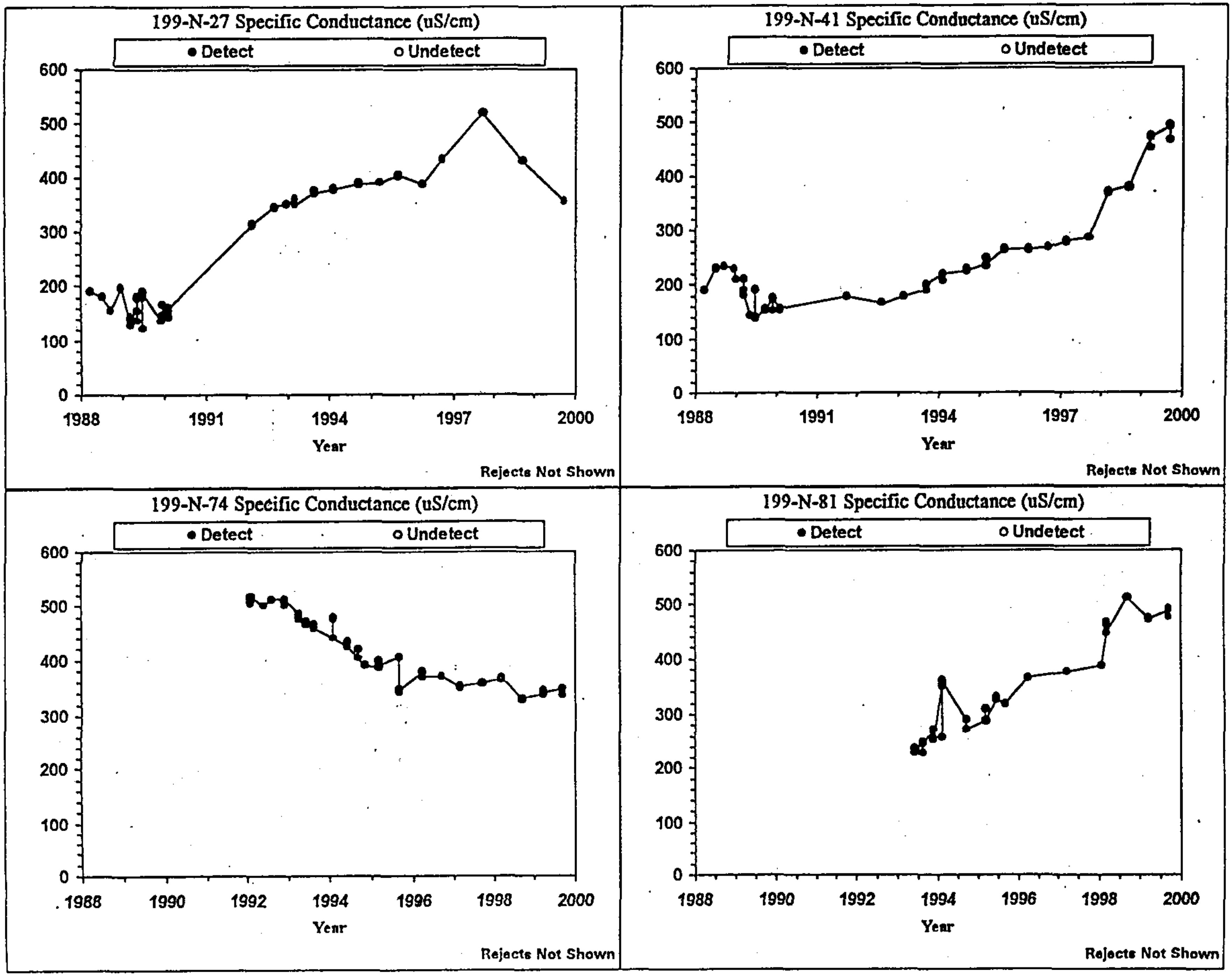

Figure 2. Specific Conductance in 1325-N Monitoring Wells.

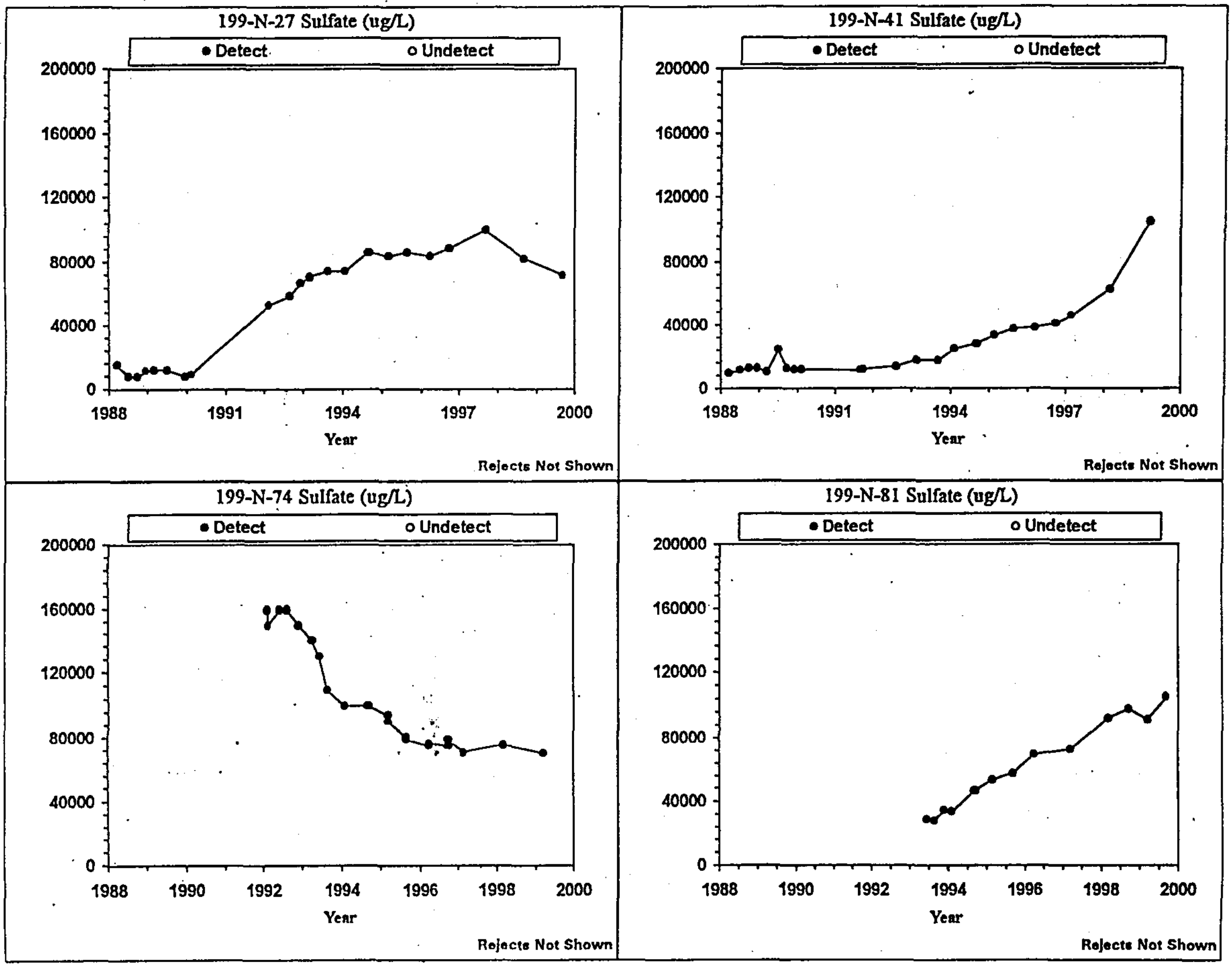

Figure 3. Sulfate in 1325-N Monitoring Wells.

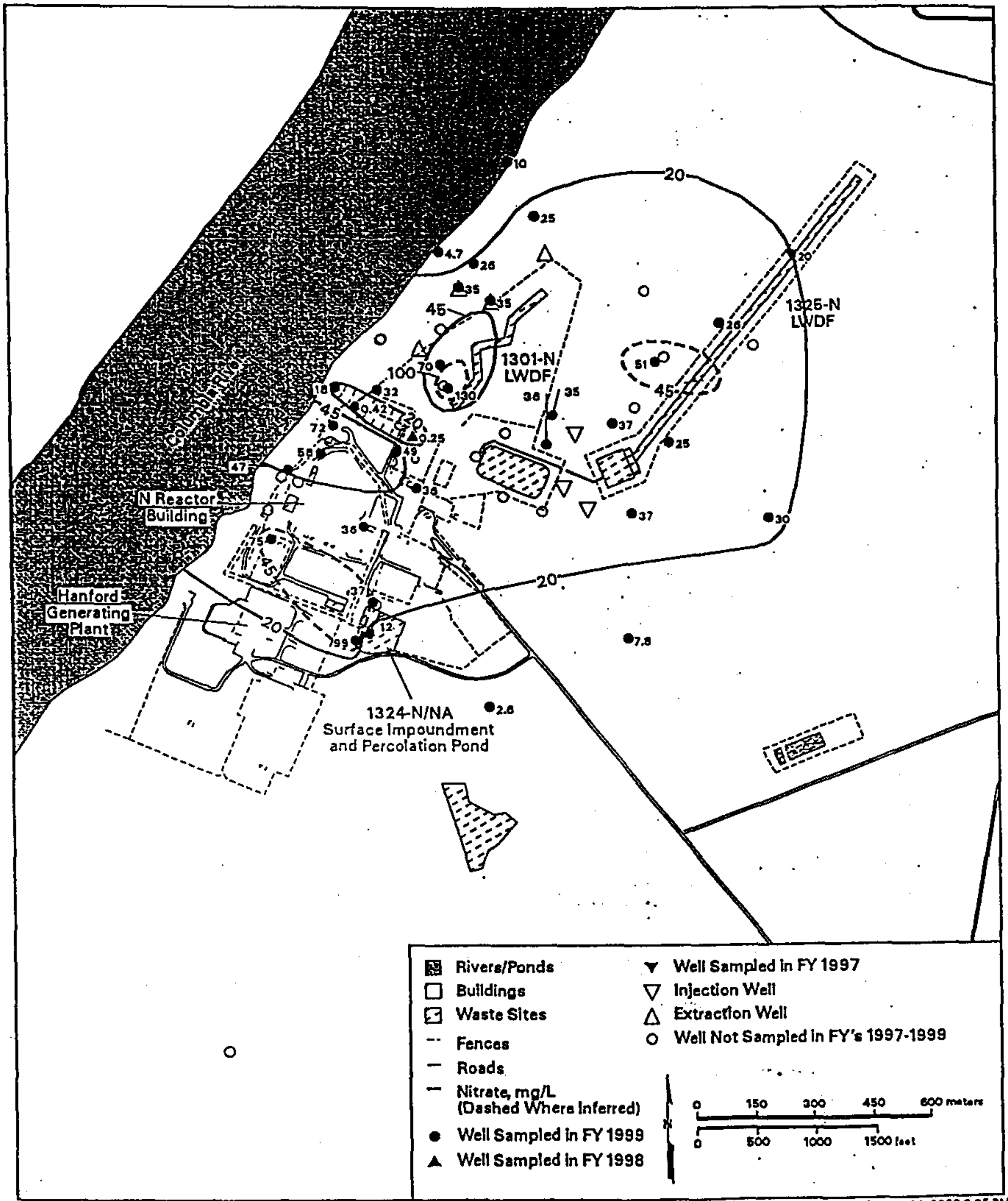

Figure 4. Nitrate Distribution in 100 N Area, Fiscal Year 1999.