2.5 100 D Area

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The 100 D Area contains two former plutonium production reactors. D Reactor operated between 1944 and 1967 and DR Reactor between 1950 and 1964. Descriptions of operations and associated hazardous waste sites for the 100 D Area are presented in WHC-SD-EN-TI-181. Recent activities to characterize the vadose zone in the 100 D Area are summarized in Section 3.1.3.

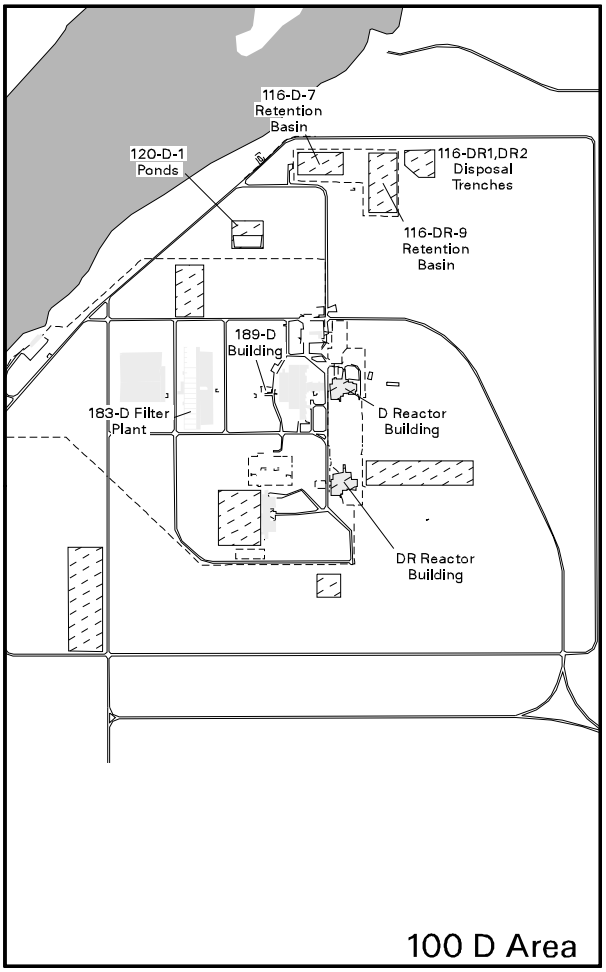
This section discusses groundwater in four general areas: the region around D and DR reactors and to the north, the 120-D-1 ponds RCRA unit, the southwestern 100 D Area, and the river shore.

2.5.1 D and DR Reactors

This section describes groundwater flow and contamination associated with waste sites in the central 100 D Area, near the D and DR reactors. The most prevalent contaminant is chromium. Nitrate and tritium are also elevated in broad plumes, while strontium-90 is above drinking water standards locally. Contamination associated with downgradient waste sites (116-DR-1 and 116-DR-2 disposal trenches; 116-D-7 and 116-DR-9 retention basins) is also discussed in this section. A pump-and-treat system near the retention basins removes chromium from groundwater.

2.5.1.1 Groundwater Flow

Groundwater flows to the north-northwest beneath the D and DR reactor buildings (see Plate 2). The distribution of contaminant plumes with sources near the reactor buildings confirms this direction of flow. During periods of high river stage in the spring and early summer, groundwater may flow toward the northeast (Section 3.5 in PNNL-12086). This effect, which is generally short-lived, is more pronounced in the north and northwest, closer to the Columbia River.



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Extraction wells 199-D8-53 and 199-D8-54A have created a depression in the water table north of the retention basins (see Plate 2). Section 2.5.1.6 describes the capture zone for these wells.

2.5.1.2 Chromium

The area around the D reactor building is a primary source area for a chromium plume that extends northward toward the Columbia River (Figure 2.5-1). The former retention basins and disposal trenches in the north also were contaminant sources. Previous interpretations (e.g., Section 5.6 of PNNL-12086) showed the entire 100 D Area underlain by a continuous area

of chromium contamination. In fiscal year 1999, data from new wells indicated that there are two separate plumes. The northeastern plume, originating near the reactor buildings, did not change significantly in fiscal year 1999. The center of this plume had annual average concentrations up to 630 µg/L in well 199-D5-14.

Chromium concentrations declined sharply in well 199-D5-15, north of the D reactor building, during the past year (Figure 2.5-2). The recent decrease, and a similar dip in the winter of 1996-97, were associated with lower specific conductance. Nitrate, a co-contaminant, also declined during these periods. These low chromium concentrations may be related to infiltration of fresh water from the surface. The 1996 low was linked to a leaking water line near the well. That line was blocked and is currently not in use. Well 199-D5-15 and two nearby wells were used to withdraw groundwater for a pilot-scale treatability test for removing chromium from 1994 to 1996 (DOE/RL-95-83). This pump-and-treat system may have caused declines in chromium during that time.

Monitoring Objectives in 100 D Area

Groundwater monitoring is conducted in the 100 D Area:

- triennially to annually to describe the nature and extent of contamination
- semiannually to detect the possible impact of one RCRA site, through March 1999
- semiannually to monitor trends in variable constituents/wells
- quarterly to characterize chromium and sulfate distribution
- quarterly to evaluate the performance of in situ remediation of chromium
- various time intervals to evaluate the performance of a pump-and treat system for chromium.

The northern chromium plume in the 100 D Area extends from the reactor buildings toward the Columbia River.

2.5.1.3 Nitrate

Nitrate is widely distributed in the 100 D Area at concentrations up to approximately twice the 45-mg/L maximum contaminant level (see Figure 2.1-4). The highest concentrations were measured in wells near the reactor buildings. Concentrations did not change significantly in fiscal year 1999.

2.5.1.4 Tritium

Tritium is above background levels in the 100 D Area, but exceeds the drinking water standard in only a few wells (see Plate 3). Two wells near the D reactor building had the highest average concentrations, 28,000 pCi/L. Many of the wells in the northwestern 100 D Area continued to have low tritium concentrations (less than 2,000 pCi/L) as a result of the influence of the Columbia River and, possibly, artificial recharge with fresh water.

2.5.1.5 Strontium-90

Strontium-90 exceeds the drinking water standard in one well near D Reactor and sporadically in one well near the retention basins. Well 199-D5-12 is the only well that consistently has elevated strontium-90 (~30 pCi/L). Well 199-D5-15 had an increase in gross beta levels in November 1999 (14.4 pCi/L), but the sample was not analyzed for strontium-90. The reason for this increase is not known. Groundwater in this area is presumably influenced by past disposal of radionuclide-bearing effluent from the D Reactor fuel storage basin, which is located nearby.

In the northern 100 D Area, strontium-90 is above background levels in several wells near the pump-and-treat system but is below the drinking water standard

with one exception. Well 199-D8-68 has shown widely variable strontium-90 concentrations during its 3-year history (Figure 2.5-3). Strontium-90 data are sparse in this well, so the possibility of a seasonal variation is difficult to assess. Some of the increases in strontium-90 (e.g., late 1997, late 1998) appear to follow mid-year increases in water level. Another possible explanation relates to the well's proximity to waste sites that were excavated and remediated in fiscal years 1997 through 1999 (see Section 2.5.4). It is possible that groundwater recharge increased because of the application of dust-control water or natural precipitation collecting in the excavations. The increased recharge may have mobilized or desorbed strontium-90 in the vadose zone and carried it to groundwater. If that is the case, levels are expected to decrease after remediation is completed.

2.5.1.6 Groundwater Remediation

A pump-and-treat system operates in the 100 D Area as part of an interim action for the 100-HR-3 Operable Unit. The system is located north of the former 116-D-7 and 116-DR-9 retention basins and began operating in July 1997. Groundwater is pumped from two extraction wells (199-D8-53 and 199-D8-54A) and treated and discharged in the 100 H Area.

Interim Remedial Action Objectives

The record of decision (ROD 1996b) contains the following specific remedial action objectives:

- protect aquatic receptors in the river bottom from contaminants in groundwater entering the Columbia River
- protect human health by preventing exposure to contaminants in the groundwater
- provide information that will lead to the final remedy.

Chromium-contaminated groundwater is pumped from two wells in the northern 100 D Area in an attempt to prevent the plume from reaching the Columbia River, where it could harm young salmon.

The record of decision stipulates that the pump-and-treat system continue operating until the selection of the final remedy, or when the U.S. Environmental Protection Agency and Washington State Department of Ecology are satisfied that termination (or intermittent operation) is appropriate. The system may be shut down when the concentration of hexavalent chromium is below 22 μg/L in the compliance wells (199-D8-68, 199-D8-69, and 199-D8-70), and the data indicate that the concentration will remain low. Other criteria for terminating pump-and-treat operations include the effectiveness of the treatment technology not justifying further operation, or the availability and feasibility of an alternative and superior treatment technique (ROD 1996b).

Remediation Progress During Fiscal Year 1999

The pump-and-treat system made progress toward achieving the remedial action objectives in 100 D Area during fiscal year 1999. Figure 2.5-4 shows the flow lines and hydraulic capture estimated to occur during a low-flow period in the Columbia River (November 1998), when groundwater flow to the Columbia River is greatest. The flow lines represent simulations of the paths that groundwater would follow. The flow paths curve toward the extraction wells, which capture the groundwater from beneath most of the high chromium area. In this simulation, groundwater that flows beneath the most significant waste sites in this area (retention basins, trenches and cribs) is prevented from reaching the Columbia River (DOE/RL-99-13).

Although designed primarily to prevent or reduce the amount of contaminated groundwater discharging into the Columbia River, the pump-and-treat system is also reducing overall contamination in the operable unit by the process of contaminant mass removal. The pump-and-treat program collects hydraulic monitoring data, contaminant monitoring data, and treatment system operation data to assess treatment system performance and to provide the basis for selecting the final remedy as part of the record of decision.

During fiscal year 1999, the pump-and-treat system in 100 D Area extracted ~128 million liters of groundwater (Table 2.5-1). The treatment system conveys the influent to the 100 H Area, where it was treated and injected into the aquifer. A total of ~51 kilograms of hexavalent chromium has been removed from the plume targeted for interim action since startup of the pump-and-treat system in July 1997. This is in addition to the ~30 kilograms removed earlier by the pilot-scale test conducted between August 1992 and August 1994 (DOE/RL-95-83). An estimate for the total amount of chromium in the plume suggests a mass of 590 kilograms (DOE/RL-94-95, Rev. 1). Uncertainty in this estimate is primarily associated with the lack of data on the vertical distribution of chromium in the aquifer, and the value should be viewed as an order-of-magnitude estimate. The rate at which chromium is discharging to the Columbia River via groundwater flow has also been estimated at ~0.07 kilograms per day (BHI-00469). This equates to a total mass flux of ~57 kilograms that would have entered the Columbia River via natural groundwater flow since July 1997. The actual flux is believed to be less because of the pump-and-treat system.

Influence on Aquifer Conditions

Chromium concentrations in the extraction wells and other monitoring wells vary seasonally (Figure 2.5-5). The highest concentrations are measured during the late fall and winter months, when the river stage is lowest. The lowest concentrations are measured in late spring and early summer months when runoff caused by snowmelt drains through the Columbia River and its tributaries. The concentrations of chromium measured in wells 199-D8-68, 199-D8-69, and 199-D8-70 around the beginning of fiscal year 1999 were the highest since the pump-and-treat system began in 1997. The cause of the increase is unclear, but probably is an artifact of the changes caused by the high river stages in 1996 and 1997. The concentrations returned to more typical values in the spring and summer of 1999.

The start of pump-and-treat operations coincided with the second of consecutive flood stage years in the Columbia River during 1996 and 1997. Seasonal variations mask long-term trends in chromium concentration. The maximum concentration in the extraction wells since 1997 is less than the average concentration in those wells before the first high river year (1996) (Figure 2.5-6). Wells 199-D8-53 and 199-D8-54A were originally installed as *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) monitoring wells in 1991 and converted to pump-and-treat extraction wells in 1997.

Because the concentration of chromium in the extraction and compliance wells shows a cyclical pattern, an overall trend in concentration over the last 2 years is difficult to identify. The concentration has declined below 22 μg/L in the extraction and compliance wells twice, during the summer 1997 (all five wells) and the summer 1999 (all except compliance well 199-D8-70), but both times the concentration rebounded above the action level by the following September. Because of the recurring elevated concentration of chromium in the compliance wells, the annual summary report (DOE/RL-99-13) recommended continued operation of the pump-and-treat system. Contaminant data indicate that many years of pumping may be required before the remedial action objectives have been entirely satisfied.

2.5.2 120-D-1 Ponds

The 120-D-1 ponds (commonly known as D ponds) received effluent from a water treatment plant and related facilities from 1977 until 1994. The site was clean closed in fiscal year 1999. This means that all dangerous waste constituents or residues have been removed and no *Resource Conservation and Recovery Act of 1976* (RCRA) groundwater monitoring is required in the future. The following discussion finalizes RCRA interpretation for this site.

2.5.2.1 Groundwater Flow

Groundwater generally flows toward the north beneath D Ponds (see Plate 2). When the stage of the Columbia River is high, flow direction is inferred to be toward the northeast. The rate of flow was estimated to be between 0.002 and 0.2 meter per day in March 1999 (see Table A.2).

2.5.2.2 RCRA Parameters

None of the indicator parameters exceeded critical mean values in fiscal year 1999, indicating the ponds have not contaminated groundwater.

Specific conductance has increased beneath the ponds since dilution effects dissipated (Figure 2.5-7). Groundwater chemistry in the vicinity of the ponds was affected by dilution while the ponds were in use. The dilution effect influenced groundwater chemistry even in upgradient well 199-D5-13. After discharges to the ponds ceased in 1994, groundwater from upgradient sources with high specific conductance flowed past the well and specific conductance increased. This parameter continued to increase in downgradient wells during fiscal year 1999.

Groundwater beneath the ponds has relatively high pH because of the influence of underlying ash (Figure 2.5-8). The elevated pH is caused by pond discharge reacting with materials in the ash that underlies the ponds to within 10 meters of the water table (WHC-EP-0666, WHC-SD-EN-EV-033).

The only regulated dangerous waste that may have been discharged to D ponds was mercury. No mercury has ever been detected in groundwater downgradient of the ponds.

2.5.3 Southwestern 100 D Area

This section describes groundwater flow and contamination in the southwestern 100 D Area, which contains the highest concentrations of chromium measured in groundwater on the Hanford Site. Twelve new wells were installed in fiscal year 1999, which helped define the boundaries of the chromium plume. An innovative technique for groundwater remediation, using chemical redox principles, was tested in fiscal years 1997 through 1999. Test results indicate that the technique is effective at transforming hexavalent chromium to a less toxic, less mobile form (trivalent chromium).

2.5.3.1 Groundwater Flow

The direction of groundwater flow in the southwestern 100 D Area varies with river stage. Estimates range from 0.1 to 0.3 meter per day toward the northwest during normal river stage. Flow was toward the northeast when the river stage was high. These estimates were based on water-level measurements near the redox site in 1997, 1998, and 1999, an estimated hydraulic conductivity of 16.5 meters per day, and an average porosity of 0.14. The latter terms were obtained from hydraulic tests of site wells and laboratory analyses of site sediment.

2.5.3.2 Chromium

The chromium plume in the southwestern 100 D Area is long and thin, oriented perpendicular to the Columbia River (see Figure 2.5-1). The highest average concentrations in fiscal year 1999 were over 1,000 μg/L in wells 199-D4-15 and 199-D5-43. Twelve new wells that were drilled in fiscal year 1999 provided data that helped define plume boundaries and concentrations. The suspected source of contamination is sodium dichromate stock solution that was used in the 190-DR building or nearby waste sites.

Estimates for the total volume of contaminated groundwater and total mass of chromium in the chromium plume in the southwestern corner of the 100 D Area suggest values that exceed 536 million liters and 233 kilograms, respectively (BHI-01309, Rev. 0). This plume has been the target for a remediation test using a reduction/oxidation (redox) manipulation method (PNNL-12153), which converts the hexavalent chromium in situ to a less soluble form (trivalent chromium). The record of decision for the 100-HR-3

Operable Unit has been amended to include use of the redox method for interim remedial action (ROD 1999b).

The redox technique appears to be successful in chemically reducing hexavalent chromium to a less toxic, less mobile form (trivalent chromium) and will be expanded in fiscal year 2000. Results of a treatability study in 1997 through 1999 show that chromium concentrations have declined in downgradient wells.

Testing of an innovative technique for cleaning groundwater in the 100 D Area was completed in fiscal year 1999. The technique appears to be successful in chemically reducing chromium to a less toxic form. The system will be expanded in fiscal year 2000.

The method created a permeable treatment zone in the aquifer to remediate contaminants that are sensitive to chemical reduction. The treatment zone was created by reducing the ferric iron to ferrous iron within the minerals of the aquifer sediment. This reduction was accomplished by injecting a chemical-reducing agent, sodium dithionate, into closely spaced wells. After the aquifer sediment was reduced, reagent and reaction products were pumped out of the wells. The reducing conditions remain in the aquifer because of the change in iron chemistry, and the barrier should remain effective for 23 ±6 years. Hexavalent chromium is immobilized by reduction of the soluble chromate ion (hexavalent chromium) to insoluble chromium hydroxide or iron chromium hydroxide (trivalent chromium). This transformation is particularly advantageous because chromium is not easily reoxidized under ambient environmental conditions, and will thus remain immobile.

Concentrations of hexavalent chromium are below the detection limit (less than 7 µg/L) in the treatment zone (e.g., 199-D4-1 and 199-D4-7), and have declined in downgradient wells (e.g., 199-D4-4, 199-D4-5, and 199-D4-6; Figure 2.5-9). Dithionite was injected into a single well, 199-D4-7, in October 1997, creating a narrow treatment zone estimated at ~15 meters in diameter. Chromium concentrations dropped sharply in downgradient wells, and have remained below the detection limit in the injection well and other wells in the treatment zone. Chromium concentrations in the downgradient wells rebounded somewhat in the first half of 1998, possibly because of changes in the direction of groundwater flow. Chromium concentrations in the downgradient wells dropped again following the second series of injections during May to July 1998. This series of injections included wells 199-D4-9, 199-D4-10, 199-D4-11, and 199-D4-12, and created a longer treatment zone. Chromium concentrations continued to be low until spring and summary 1999. At that time, high river stage reversed the flow direction, causing chromium to increase in wells 199-D4-5 and 199-D4-6. This revised gradient can also be seen by the decrease in chromium concentrations in well 199-D4-2, which is upgradient of the site during normal conditions. Residual effects of redox treatment cause the groundwater to have high specific conductance, while ambient groundwater and river water have lower specific conductance. Thus specific conductance varies inversely with chromium (see Figure 2.5-9). The changes in specific conductance are evidence of changes in flow direction.

Dithionite was injected into well 199-D4-21 in September 1999, lengthening the treatment zone. Effects of that injection will be monitored in fiscal year 2000.

Although chromium concentrations have declined significantly, it is too early to tell how the redox method will perform at this site in the long term. Not enough time has elapsed since the July 1998 injection for groundwater migrating through the treatment zone to fully influence the aquifer downgradient.

Other effects of the redox method include decreases in dissolved oxygen and nitrate and increases in aluminum, iron, manganese, and nitrite. Although iron and manganese are elevated in the treatment zone, they are not expected to be mobile downgradient from the zone because they will reoxidize, and become

immobile, once they contact untreated sediment. Chromium, however, cannot be reoxidized to its hexavalent state in the natural oxidizing conditions at the 100 D Area.

Wells in and downgradient of the treatment zone also show residual effects of the injected reagent. Although much of the reacted reagent (sodium dithionite with potassium carbonate/bicarbonate as a buffer) was pumped from the test wells, some of it remained in the aquifer. Residual effects included elevated carbonate/bicarbonate, potassium, sodium, and sulfate. These constituents cause elevated specific conductance. High gross beta activity that was observed in well 199-D4-1 was caused by potassium-40, a natural component of potassium. Gross beta levels will decline as the residual reagent dissipates. Another potential source of potassium was from tracer tests conducted before the initial injection and in 1999.

Sulfate increased in well 199-D4-13 in most of fiscal year 1999 (Figure 2.5-10). The increase is probably caused by disposal of withdrawn water containing spent reagent and reaction products, which was dripped to the ground near this well. The increase in sulfate probably does not reflect an influx of residual reagent, because well 199-D4-13 is not in the flow path of the redox test site and increases in sulfate were not observed in nearby wells 199-D4-14 and 199-D4-15.

In addition to the monitoring wells, five sets of sampling tubes, each with multiple depths, are used to monitor water in the substrate of the Columbia River downgradient of the site (Section 2.5.5). These data will be used to help assess the performance and side effects of the redox method. However, it is too soon to see effects at the Columbia River.

The redox demonstration will be expanded to a full-scale remediation system beginning in fiscal year 2000. Fourteen new injection/withdrawal wells are planned for fiscal year 2000 to expand the redox barrier. Expansion will continue until the barrier is long enough to prevent groundwater exceeding 20 μg/L chromium from reaching compliance wells near the Columbia River (ROD 1999b).

2.5.3.3 Tritium

Tritium in the southwestern 100 D Area may have migrated from the 100 N Area (Figure 2.5-11). Concentrations in well 699-87-55, located upgradient of 100 D Area, were much higher in the 1970s and 1980s than they are now and have declined for the last 10 years. Well 199-D2-6, in the southwestern 100 Area, showed increases in tritium in 1996 and 1997. This well is downgradient of well 699-87-55, so it is likely that the peaks in well 199-D2-6 are related to previous high values in well 699-87-55. Tritium levels declined in well 199-D2-6 in fiscal year 1999, but remained at 4,600 pCi/L, slightly above pre-1996 levels. Well 199-D3-2, west of the 100 D Area, appears to be linked to the 100 N tritium plume and had concentrations of 35,000 pCi/L in fiscal year 1999.

2.5.4 Waste Site Remediation

Remedial action of waste sites in the northern 100 D Area continued in fiscal year 1999. These activities consisted of removing and stockpiling clean overburden soil and excavating contaminated soil and debris for disposal. Water (obtained from fire hydrants) was applied as necessary to control dust. Application of water was held to a minimum to reduce the potential for mobilizing contaminants from the vadose zone to the groundwater. The sites have not yet been backfilled with clean soil, so the excavations remain open, and water will be applied as needed to control dust until they are stabilized. Groundwater in the 100 D Area is 16 to 20 meters below the ground surface. The waste sites that were excavated in fiscal year 1999 include the following:

- 116-D-7 and 116-DR-9 retention basins (and associated sludge pits) — Excavation began in fiscal year 1998 and was completed during the first quarter of fiscal year 1999 (October 1998 for 116-D-7 and December 1998 for 116-DR-9). The maximum depths of the excavations were 4.6 to 4.7 meters. In the 116-D-7 basin, results of soil analyses for hexavalent chromium ranged from below the detection limit up to 18 mg/kg on the floor of the excavation.

- 116-DR-1 and 116-DR-2 trenches — Excavation continued from fiscal year 1998. Limited areas of contamination were excavated in fiscal year 1999. The remaining contamination will be excavated in fiscal year 2000. The maximum depth was ~4.6 meters.

- 1607-D2 septic tank — Excavation began in fiscal year 1998 and was completed in October 1998. The maximum depth was 4.7 meters.

- North process effluent pipelines — These pipelines, located north of D Reactor, were removed in fiscal year 1999. The depths of the resulting trenches ranged from 2 to 6 meters.

2.5.5 Water Quality at Shoreline Monitoring Locations

Groundwater near the Columbia River is sampled annually in the late fall via aquifer sampling tubes and riverbank seeps. The sampling tubes are polyethylene tubes that were installed in the aquifer at locations near the low water shoreline. Spacing between tubes installed in 1996 and 1997 ranges from 70 to 350 meters. Tube sites completed in 1996 included only one sampling tube; sites completed in 1997 includes up to three tubes installed at different depths to a maximum of 8.8 meters. Seeps are locations where groundwater discharges above the river level.

2.5.5.1 Aquifer Sampling Tube Results

Analyses of samples collected in fall 1998 had concentrations of hexavalent chromium ranging from undetected in tubes from the downstream end of the 100 D Area to 783 µg/L within the chromium plume in the southwestern 100 D Area. The highest nitrate concentrations (49 mg/L) also were detected in samples collected from a tube in the southwestern chromium plume. Results were consistent with earlier sampling rounds and with analytical results from nearby groundwater monitoring wells.

The highest tritium concentrations (2,600 and 3,200 pCi/L) were detected in samples collected from two sampling tubes along the downstream end of the 100 D Area. The same locations were characterized by the highest gross beta concentrations, at 8.6 and 23 pCi/L. These tubes are downgradient of the 116-DR-9 retention basins and 116-DR-1 and 116-DR-2 liquid waste disposal trenches.

2.5.5.2 Riverbank Seepage Results

Three riverbank seep sites were sampled during fall 1998. Specific conductance ranged from 160 to 245 µS/cm. These relatively low levels suggest that the samples contained substantial river water draining from bank storage.

Chromium concentrations of seep samples ranged from 111 µg/L near the upstream limit of the chromium plume in the southwestern 100 D Area to 21 µg/L downstream near the 100 D pump-and-treat compliance wells. Nitrate concentrations ranged from 7 mg/L at the upstream location to 16 mg/L near the 100 D Area pump-and-treat compliance wells.

Tritium concentrations ranged from 4,100 pCi/L in the upstream seep, nearest 100 N Area, to undetected in the downstream seep. Gross beta concentrations were near the method detection limit at all sites.

Table 2.5-1. Summary of 100 D Area Pump-and-Treat Performance for Fiscal Year 1999

Well or Sample Location	Annual Average Flow Rate (L/min)	Maximum Sustained Flow Rate (L/min)	Total Volume Pumped (x 10^6 L)	Average Chromium Concentration (µg/L)	Chromium Mass Removed (kg)
199-D8-53	132.6	153.2	58.4	137	8.0
199-D8-54A	156.8	172.3	69.2	162	11.2
D-Influent	288.1	312.1	127.6	150.4[(a)]	19.2

Data source: Project specific database for the 100-HR-3 Operable Unit.

(a) Influent was not sampled. This number was calculated from concentrations and volumes in individual wells.

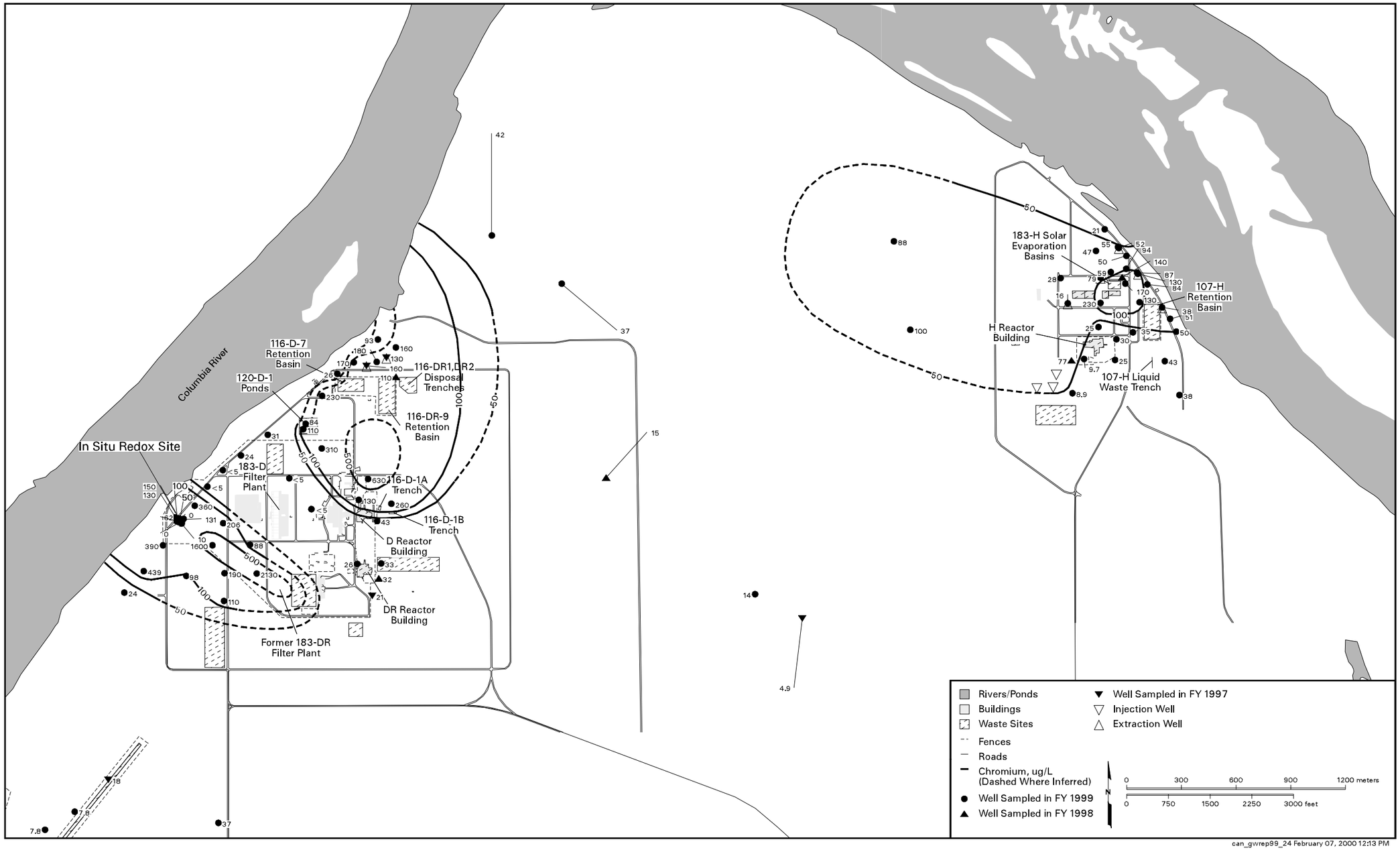

Figure 2.5-1. Average Chromium Concentrations in 100 D and 100 H Areas, Top of Unconfined Aquifer

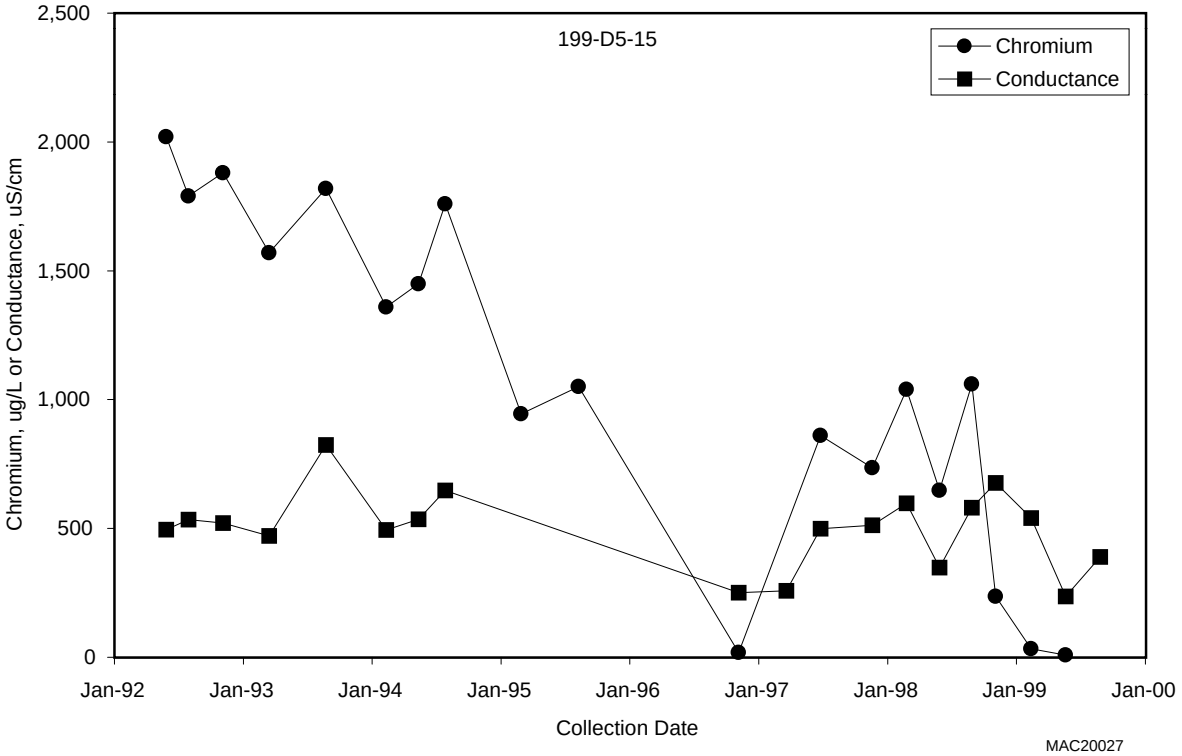

Figure 2.5-2. Chromium and Specific Conductance in Well 199-D5-15, North of D Reactor

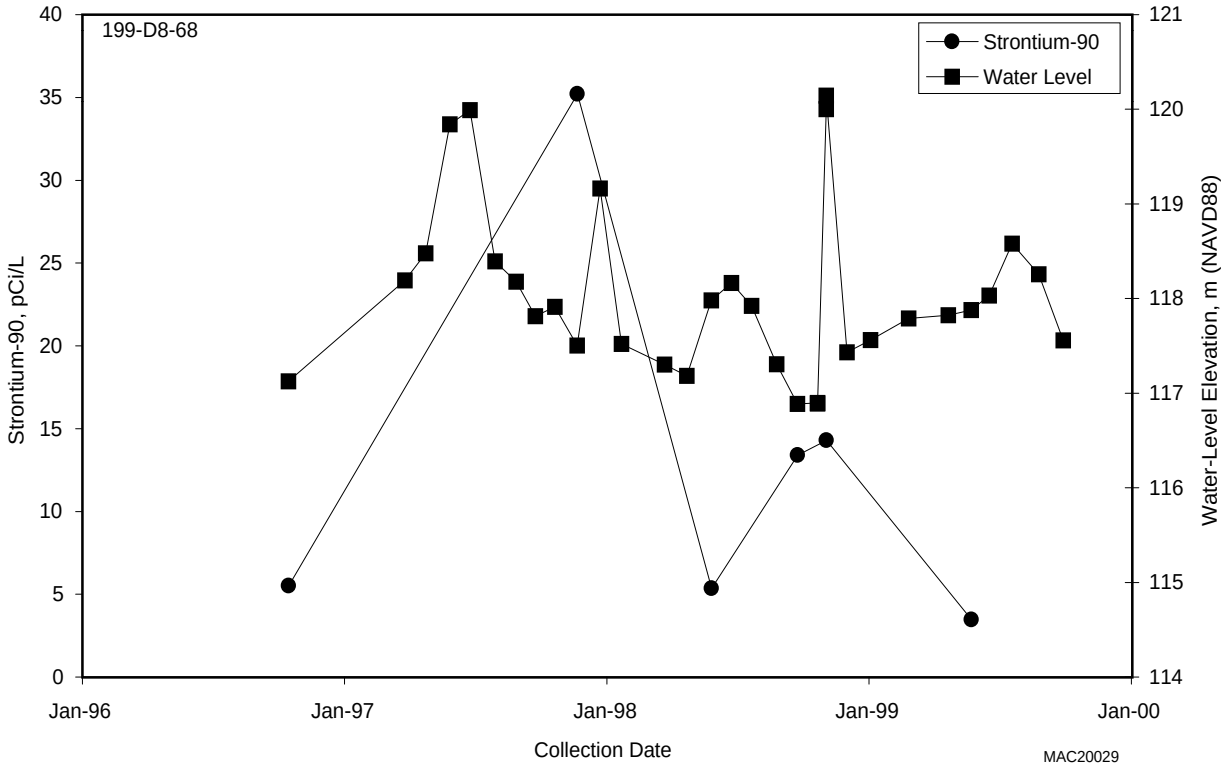

Figure 2.5-3. Strontium-90 and Water Levels in Well 199-D8-68, Northern 100 D Area

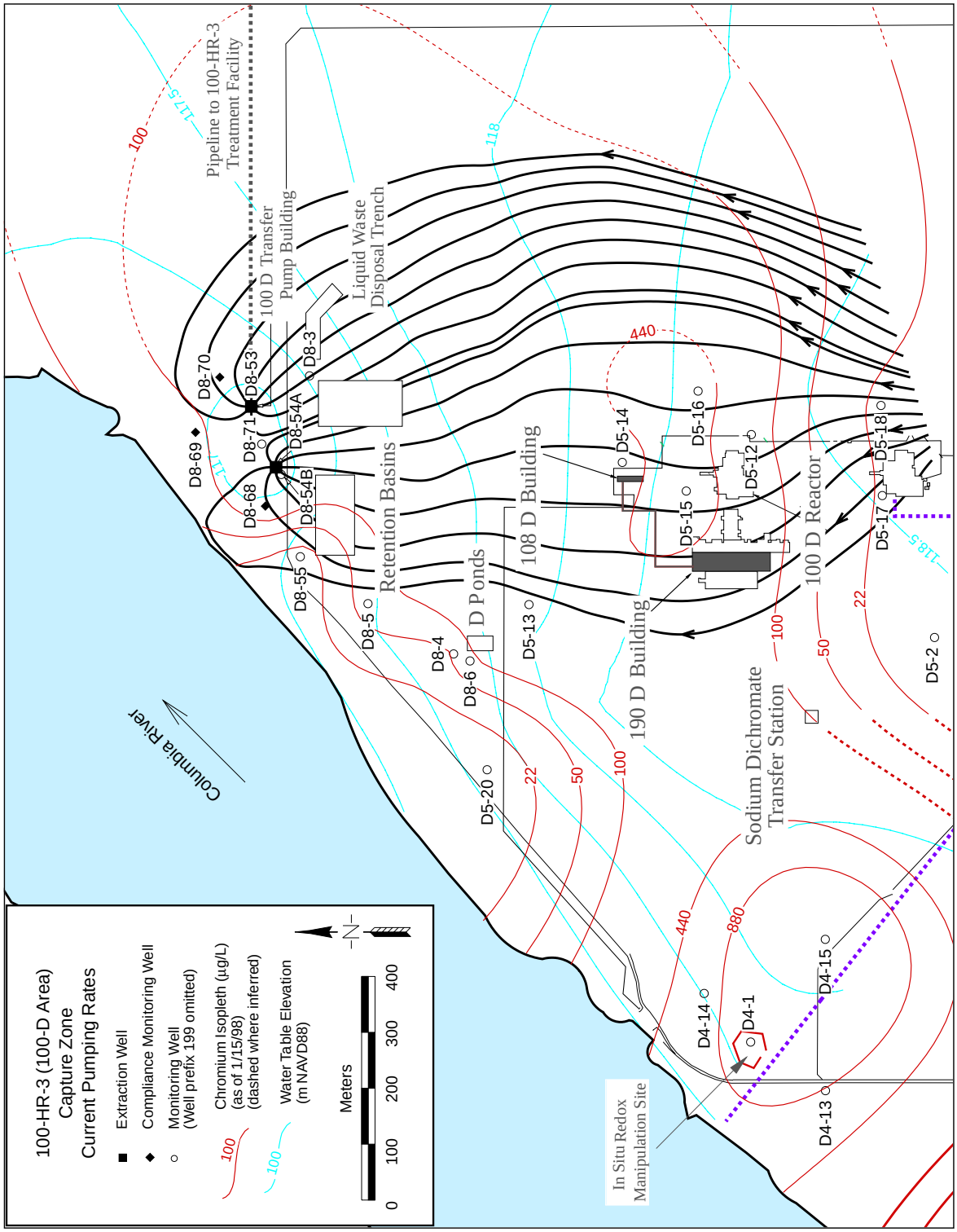

Figure 2.5-4. Capture Zone from 100-HR-3 (100 D Area) Pump-and-Treat System (DOE/RL-99-13)

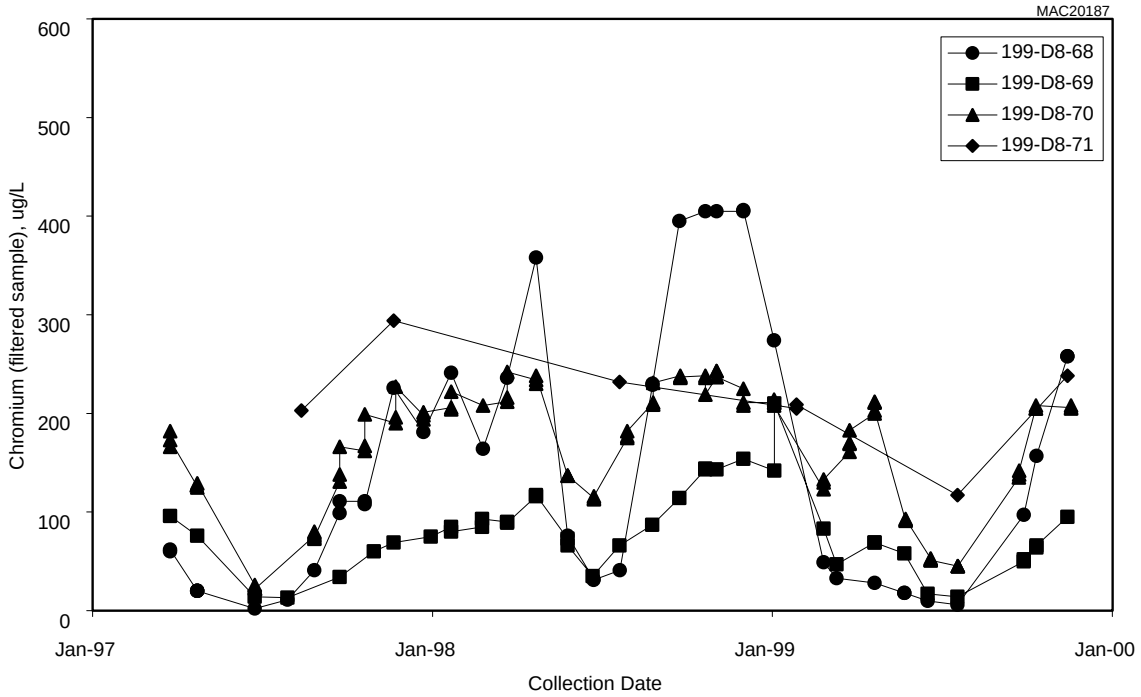

Figure 2.5-5. Chromium in Compliance Wells for the 100-HR-3 (100 D Area) Pump-and-Treat System

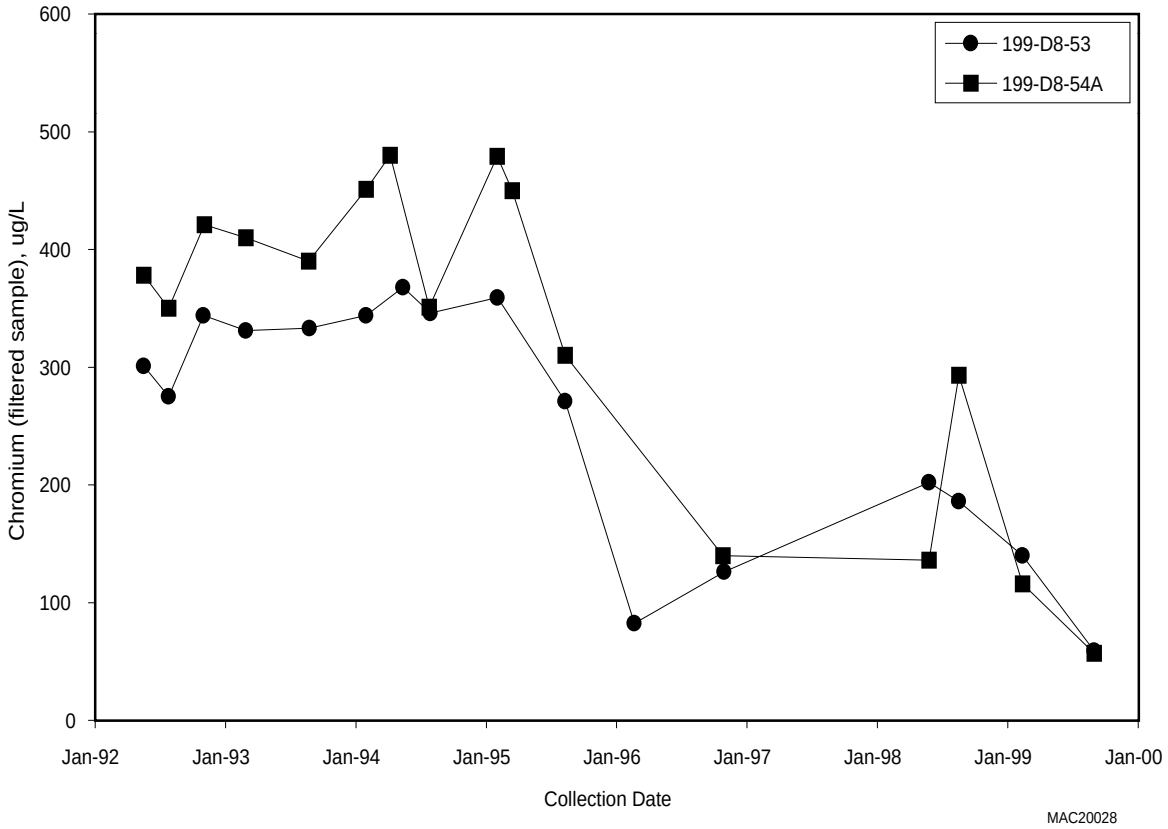

Figure 2.5-6. Chromium in Extraction Wells for 100-HR-3 (100 D Area) Pump-and-Treat System

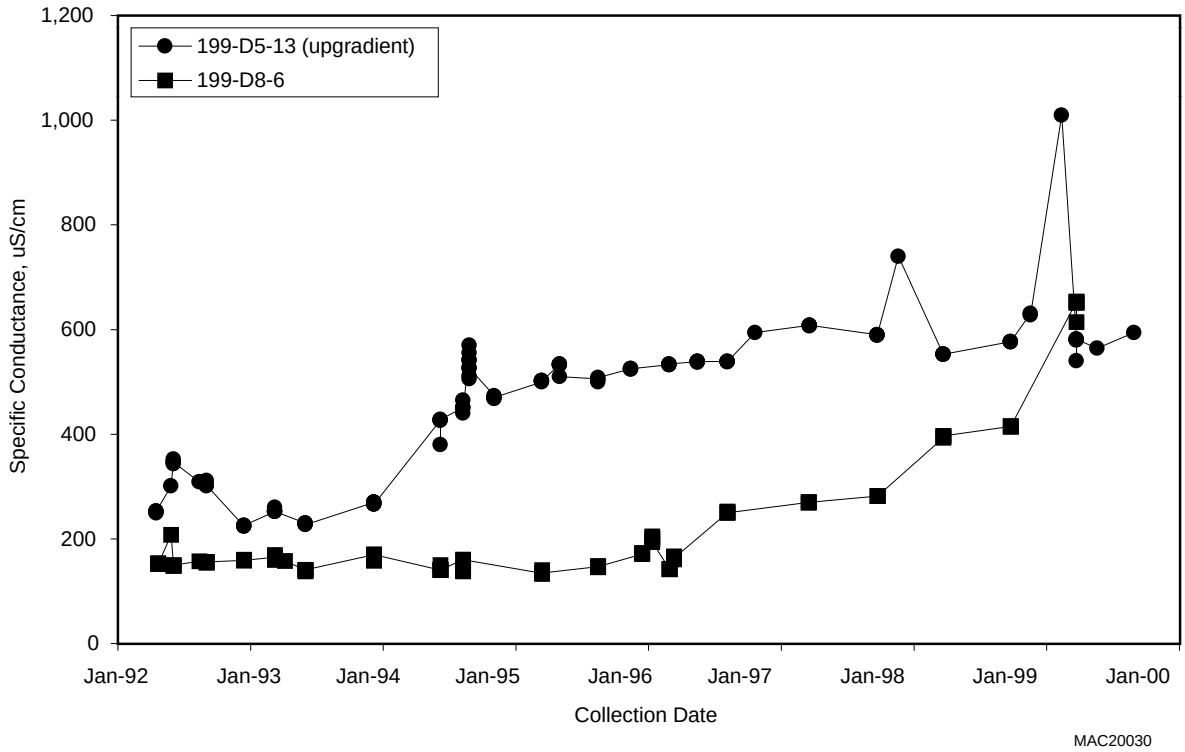

Figure 2.5-7. Specific Conductance in Wells Monitoring D Ponds

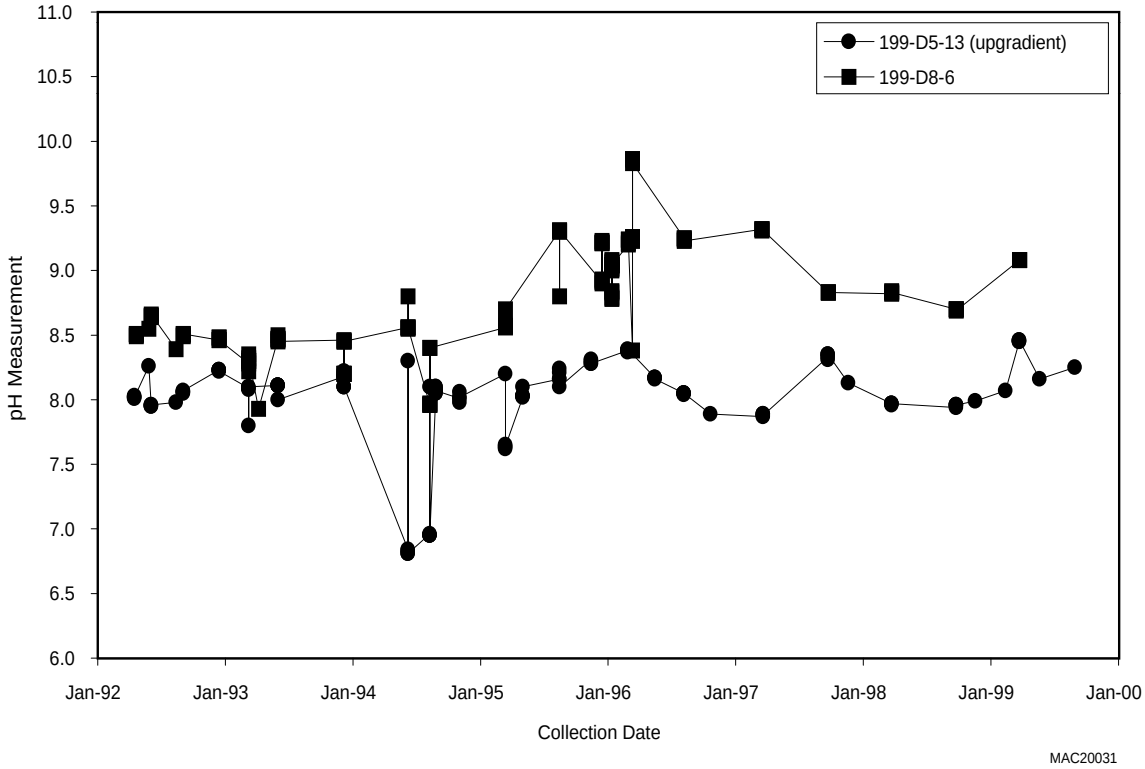

Figure 2.5-8. pH in Wells Monitoring D Ponds

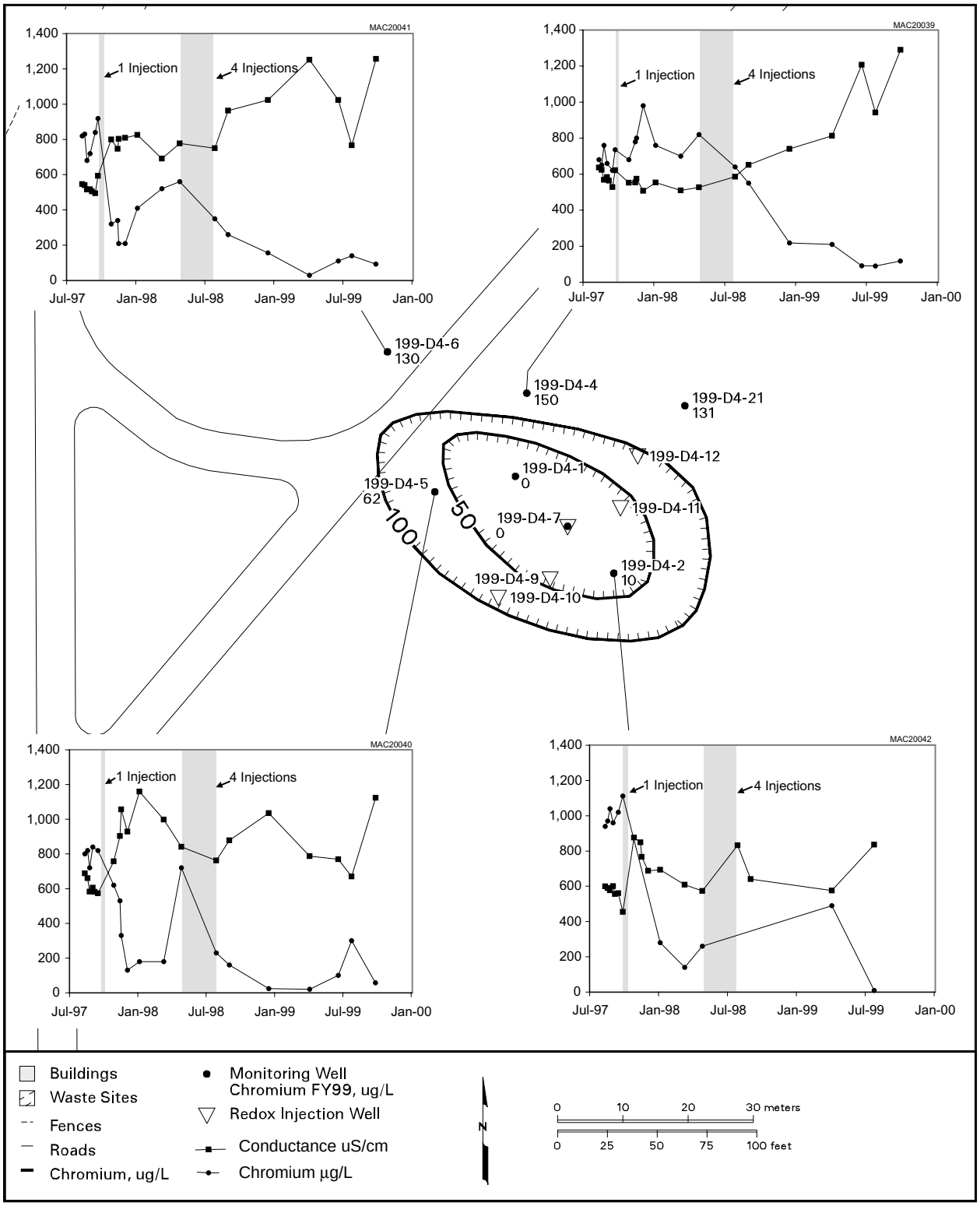

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Figure 2.5-9. Chromium in Wells Monitoring Redox Demonstration

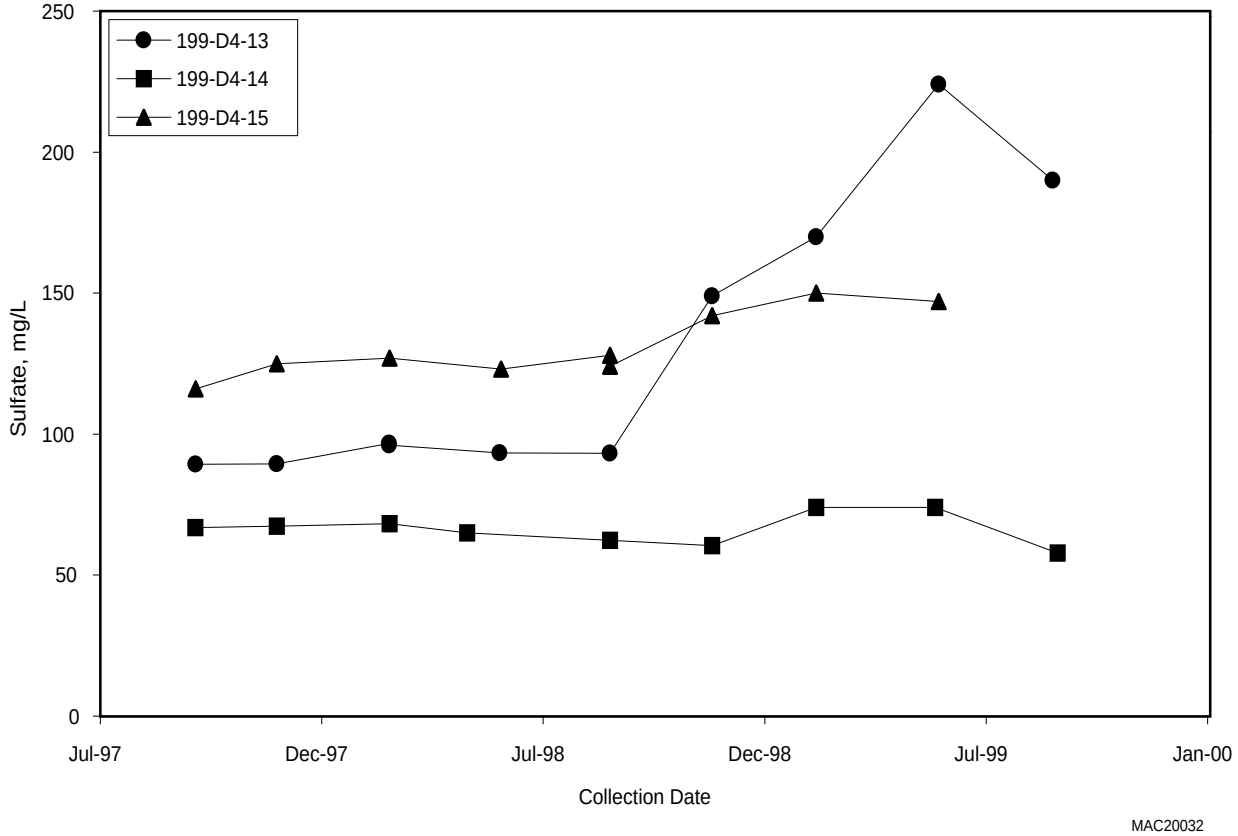
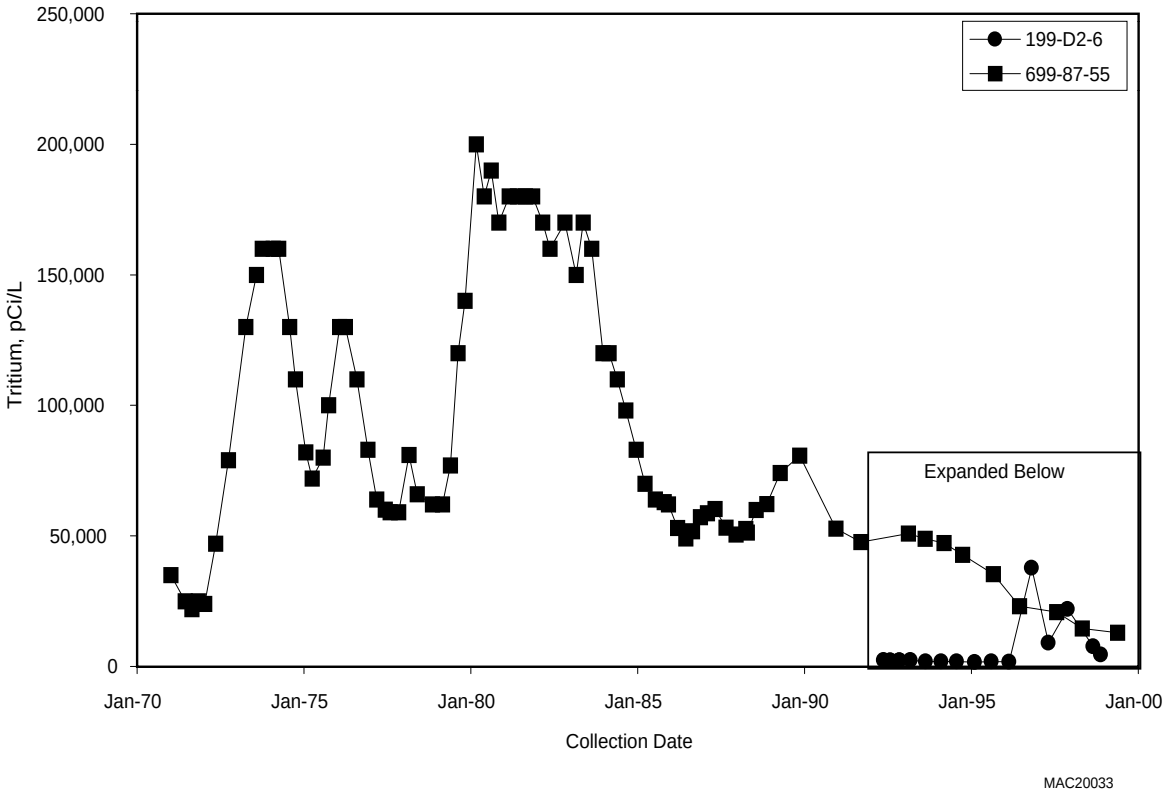


Figure 2.5-10. Sulfate in Wells 199-D4-13, 199-D4-14, and 199-D4-15 Near Redox Demonstration



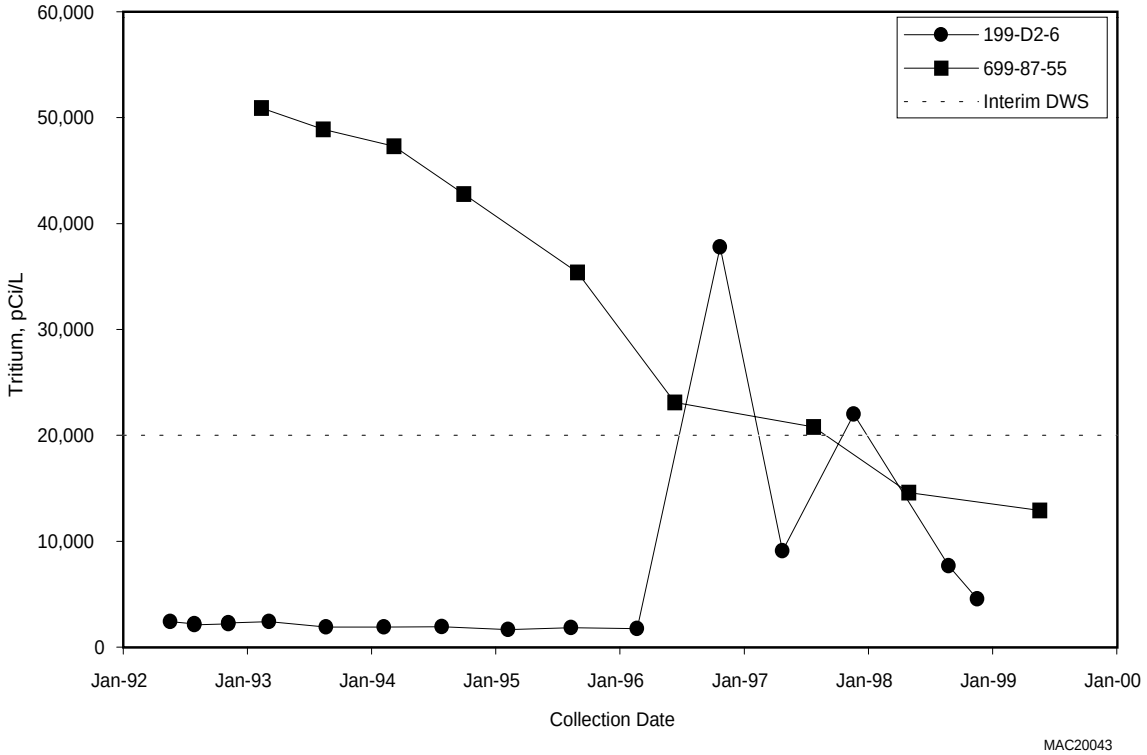


Figure 2.5-11. Tritium in Wells 199-D2-6 and 699-87-55 at 100 D Area, South of 100 D Area