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Grand Junction Projects Office Site Environmental Report for Calendar Year 1992

May 1993

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Grand Junction Projects Office

RUST Geotech Inc.

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Grand Junction Projects Office

Site Environmental Report

for Calendar Year 1992

May 1993

Prepared for

the U.S. Department of Energy

Grand Junction Projects Office

Albuquerque Field Office

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Abbreviations and Acronyms

Alky	Alkalinity
BOD	Biochemical oxygen demand
CDH	Colorado Department of Health
CDT	Specific conductance
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
Ci/yr	Curies per year
CFR	Code of Federal Regulations
COD	Chemical oxygen demand
COE	U.S. Army Corps of Engineers
CWIP	Commingled Waste Investigation Project
DCG	Derived Concentration Guide
DOE	U.S. Department of Energy
DOE-AL	DOE Albuquerque Field Office
DOE-HQ	DOE Headquarters
EA	Environmental Assessment
EDE	Effective dose equivalent
EML	Environmental Measurements Laboratory
EMSL	Environmental Measurement Systems Laboratory
EPA	U.S. Environmental Protection Agency
g/F	Grams per filter
gal/yr	Gallons per year
GJPO	Grand Junction Projects Office
GJPORAP	Grand Junction Projects Office Remedial Action Project
mg/L	Milligrams per liter
mrem	Millirems
mrem/yr	Millirems per year
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
ORNL	Oak Ridge National Laboratory
PCB	Polychlorinated biphenyl
pCi/F	Picocuries per filter
pCi/L	Picocuries per liter
pCi/μg	Picocuries per microgram
pg/mL	Picograms per milliliter
PM_{10}	Particulate matter less than or equal to 10 micrometers in diameter
ppm	Parts per million
QA	Quality assurance
QAPP	Quality Assurance Program Plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RRM	Residual radioactive material

SARA	Superfund Amendments and Reauthorization Act
scfm	Standard cubic feet per minute
SEN	Secretary of Energy Notice
TCL	Target Compound List
TDS	Total dissolved solids
TLD	Thermoluminescent dosimeter
TOC	Total organic carbon
tons/yr	Tons per year
TSCA	Toxic Substances Control Act
TSS	Total suspended solids
μCi/L	Microcuries per liter
μCi/mL	Microcuries per milliliter
μCi/yr	Microcuries per year
μg/F	Micrograms per filter
μg/L	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter
μm	Micrometers
μmhos/cm	Micromhos per centimeter
UMTRCA	Uranium Mill Tailings Radiation Control Act

Executive Summary

This report presents information pertaining to environmental activities conducted during calendar year 1992 at the U.S. Department of Energy Grand Junction Projects Office (DOE-GJPO) facility in Colorado. It has been prepared in accordance with the requirements of DOE Order 5400.1 and with supplemental guidance from the DOE Headquarters. Monitoring and report preparation were performed by RUST Geotech Inc. (Geotech), the prime contractor for the DOE-GJPO facility.

Environmental activities conducted at the GJPO facility during 1992 included those associated with environmental compliance, site remediation, off-site dose modeling, and radiological and nonradiological monitoring.

Three significant issues associated with environmental compliance emerged during 1992. The first issue emerged in February when the DOE-GJPO's waste generator status changed from that of a small quantity generator to a conditionally exempt small quantity generator (CESQG). By maintaining status as a CESQG, the GJPO will be exempt from the land disposal restrictions and associated restricted-waste storage prohibitions under the Resource Conservation and Recovery Act.

The second issue was concerned with the generation of mixed wastes on the facility, which was curtailed on May 8 because of the expiration of the Two-Year National Capacity Variance for Mixed Waste. Following approval of several hazardous waste compliance position documents, the *CESQG Management Plan* (Chem-Nuclear Geotech, Inc. 1992a) was prepared, and mixed-waste generation was resumed in on-site laboratories on November 30, 1992.

The third issue emerged on December 31 when the U. S. Environmental Protection Agency (EPA), Region VIII, served the DOE-GJPO with a Notice of Noncompliance, Compliance Schedule, and Notice of Opportunity for Conference and served Geotech with a Complaint and Notice of Opportunity for Hearing. Both servings identified two counts associated with the improper placement and storage of polychlorinated biphenyl-contaminated uranium mill tailings in an on-site stockpile. An informal settlement conference with EPA on March 16, 1993, resulted in the penalty associated with Count I being reduced and Count II and its associated penalty being dismissed. No terms or conditions for a consent agreement were reached in the informal settlement conference.

Four phases of the on-site Grand Junction Projects Office Remedial Action Project were completed in 1992. Remediation activities, which included the removal of 161,589 tons of uranium-mill-tailings-contaminated material from the facility, were conducted in compliance with all applicable permits.

Off-site dose modeling for the GJPO was conducted to determine compliance with current National Emission Standards for Hazardous Air Pollutants, Subpart H, and applicable DOE Orders (5400.1 and 5400.5). Results of the modeling indicated an

effective dose equivalent (EDE) from airborne radioparticulates of 5.710×10^{-2} millirems per year (mrem/yr). This dose was derived from summing the doses caused by all air emission sources on the facility. Air emission sources included three point sources and one area source. The EPA standard for such emissions is 10 mrem/yr. The collective effective dose (population dose), including the radon source term, was calculated as 9.508×10^{-3} person-rem per year. No standard is associated with this latter dose. The total off-site EDE to the public from all sources of radiation emanating from the facility (radon, air particulates, gamma) was calculated as 9 mrem/yr, which is well below the DOE dose limit of 100 mrem/yr above background.

The radiological and nonradiological monitoring program at the GJPO facility included monitoring of activities that generate potentially hazardous or toxic wastes and monitoring of ambient air, surface water, and ground water. Pathways of potential contaminant migration off site consist of atmospheric transport, wastewater discharge into the municipal sewer system, and ground-water discharge of the alluvial aquifer subjacent to the facility. Operational wastes include sanitary effluent that is discharged into the city of Grand Junction/Mesa County sewer system and hazardous wastes that are stored and disposed of in accordance with the Resource Conservation and Recovery Act. The total quantity of radioactivity released as airborne effluent from the GJPO during 1992 was estimated to be 3.61×10^{-5} curies; the quantity released as liquid (sewer) effluent was estimated to be 2.008×10^{-5} curies.

The ambient air monitoring program included measurements of atmospheric radon, particulate matter (radiological and nonradiological constituents), and gamma radiation. Atmospheric radon concentrations were measured at 13 site-boundary and off-site locations. No measured radon concentration exceeded the derived concentration guide for radon specified by DOE Order 5400.5 (3×10^{-9} microcuries per milliliter above background) during 1992.

Air particulate monitoring was conducted at three on-site locations with high-volume air particulate samplers. Maximum airborne concentrations of radium-226, thorium-230, and uranium were all several orders of magnitude below the regulatory guidelines specified by DOE Order 5400.5. EPA particulate matter (PM_{10}) standards of 50 micrograms per cubic meter ($\mu g/m^3$)(annual arithmetic mean) and 150 $\mu g/m^3$ (24-hour average) also were not exceeded at any location.

Gamma radiation was monitored at nine on-site and six off-site locations. All monitoring locations yielded gamma radiation levels well below the DOE standard of 100 mrem/yr (above background).

Radiological and nonradiological constituents were monitored in surface waters on the GJPO facility. Surface-water sources sampled in 1992 included the liquid effluent in the underground sewer system, the North and South Ponds on the facility, and the Gunnison River flowing adjacent to the facility. Samples were drawn from the sewer effluent to ensure compliance with the city of Grand Junction's Industrial Pretreatment Permit. Measured analyte concentrations were below threshold concentrations established by the permit, with the exception of those for biochemical oxygen demand and total suspended

solids, which exceeded threshold limits during the December sampling event. The cause of the excessive concentrations was investigated and corrected immediately.

Analysis of samples collected from the North and South Ponds indicated the presence of uranium, vanadium, arsenic, molybdenum, and sulfate in higher-than-background concentrations. These analytes are associated with leachate from uranium mill tailings.

Within the Gunnison River, which flows adjacent to the GJPO facility, state water quality standards for sulfate and manganese were exceeded during 1992. Because these excessive concentrations consistently occurred upstream as well as downstream of the GJPO facility in 1992 as well as in past years, they are not believed to be related to existing ground-water contamination or activities occurring at the GJPO facility.

Ground-water monitoring included sampling the shallow alluvial aquifer underlying the GJPO facility. Analytical results showed that arsenic, lead, total dissolved solids, selenium, molybdenum, nitrate, gross alpha, and uranium-234 and -238 are contaminating the ground water. All of these analyte concentrations exceeded standards established by the Uranium Mill Tailings Radiation Control Act and the Colorado Water Quality Control Commission in one or more wells during 1992. These excessive concentrations are consistent with previous years' monitoring results.

Introduction

The U.S. Department of Energy Grand Junction Projects Office (DOE-GJPO) facility is located in Mesa County, Colorado, immediately south and west of the Grand Junction city limits (Figure 1). Lying within an accretionary bend of the Gunnison River, the facility occupies an elongated, north-south-trending tract of 22.8 hectares (56.4 acres) that is bounded on the west and south by the river and on the north and east by county, city, and private property. An earthen dike runs between the facility and the river to the west. The Gunnison River, which converges with the Colorado River about 0.8 kilometer (0.5 mile) downstream of the facility, is used for seasonal recreational activities such as boating, fishing, and swimming. All domestic surface-water sources for the Grand Junction area are located upgradient of the GJPO facility.

In the immediate vicinity of the facility, the river canyon is 455 to 610 meters (1,500 to 2,000 feet) wide and 18 to 49 meters (60 to 160 feet) deep and is incised into the variegated siltstones, mudstones, and shales of the Brushy Basin Member of the Morrison Formation. Beneath the facility is a fine sandy soil, several inches to several feet thick, which is underlain by 6 to 12 meters (20 to 40 feet) of quaternary alluvium composed of silty sands and sandy gravels. The ground water contained within the alluvial aquifer has been contaminated by the leached products of uranium mill tailings. Water from the aquifer is not used for any purpose.

Although immediately surrounded by agricultural lands, the facility lies within 1 kilometer (0.6 mile) of more densely populated areas of Grand Junction. The 1990 population of the city of Grand Junction and surrounding areas was approximately 85,000.

Personnel at the facility develop, support, and administer a variety of programs. Historically, personnel were mainly involved in uranium procurement, evaluation of domestic uranium resources, development of uranium extractive processes, and advancement of geologic and geophysical exploration techniques. The current scope of activities includes provision of considerable support to the federal government's various remedial action programs. Housed on the facility are fully equipped laboratories for analytical chemistry, mineralogy/petrology, radon, and electronics. Research groups at the facility have received funding for specific projects from various entities, including the U.S. Environmental Protection Agency (EPA), U.S. Department of Defense, and DOE in conjunction with several universities.

Uranium milling, analyses, and storage were conducted on the facility for a period of approximately 30 years, but these activities ceased in the mid-1970s. All known contamination is believed to be the result of these past activities. According to historical records (those maintained by DOE and its predecessor agencies, the U.S. Atomic Energy Commission and the U.S. Energy Research and Development Administration), approximately 29,024 metric tons (32,000 short tons) of ore was processed between 1943 and 1958. The resulting tailings consisted of approximately 136,100 cubic meters (178,000 cubic yards) of material that was distributed throughout the site, as shown in

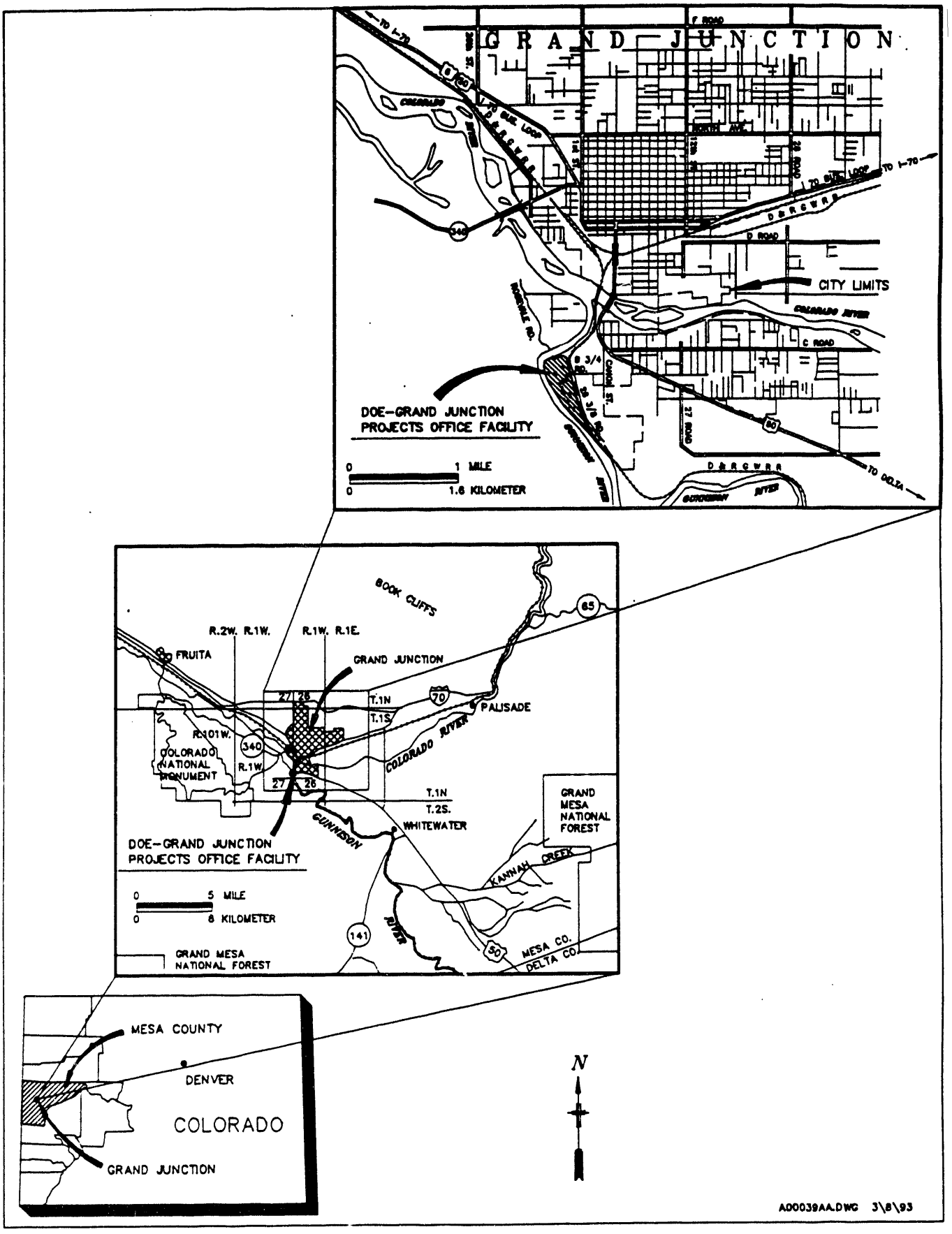


Figure 1. Site Location Map of the GJPO

Figure 2. Site investigations formally began in 1984 when the GJPO facility was accepted into the DOE Surplus Facilities Management Program. The facility was later transferred to the Defense Decontamination and Decommissioning Program. Under the guidelines set forth in the Uranium Mill Tailings Radiation Control Act (UMTRCA), site characterization and remedial action studies were initiated to assess the radiological hazards at the facility. The results of these studies are presented in a radiological characterization by Henwood and Ridolfi (1986). With the passage of the Superfund Amendments and Reauthorization Act (SARA) by Congress in October 1986, DOE-GJPO elected to comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process as well as the National Environmental Policy Act (NEPA) process. A Final Remedial Investigation/Feasibility Study—Environmental Assessment (RI/FS—EA) was completed in 1989 (UNC Geotech 1989).

This Site Environmental Report presents information pertaining to environmental activities conducted during calendar year 1992 at the DOE-GJPO facility. It has been prepared by RUST Geotech Inc. (Geotech), the prime contractor for the DOE-GJPO.

The report is organized into nine major sections: Compliance Summary—January 1, 1992, through April 1, 1993; Environmental Program Information; Environmental Radiological Program Information; Environmental Nonradiological Program Information; Ground-Water Protection Program; Quality Assurance; Appendix A, Monitoring Data; Appendix B, Time-Concentration Graphs; and Appendix C, Well Location Maps Showing Ground-Water Analytes that Exceed Federal/State Standards.

The Compliance Summary section summarizes the GJPO's compliance with federal, state, and local environmental requirements at the facility for the period January 1, 1992, through April 1, 1993. It also includes descriptions of the facility's Pollution Prevention and Waste Management programs and a list of environmental permits issued to the GJPO by federal, state, and local regulatory agencies.

The Environmental Program Information section includes (1) a description of the contamination present at the site, (2) a summary of air and surface-water monitoring performed on and near the site, including a discussion of how monitoring results compare with applicable standards, (3) a list of environmental documents completed in 1992 pertaining to site activities, and (4) a summary of significant environmental activities occurring at the site.

The third and fourth sections, Environmental Radiological and Environmental Nonradiological Program Information, summarize the monitoring results from the Environmental Program Information section in terms of radiological and nonradiological monitoring, respectively. The former section also includes calculations of off-site dose.

In the Ground-Water Protection Program section, the hydrogeology at the GJPO facility and the program conducted to monitor ground water are described. Analytical results of ground-water monitoring are compared with federal and state standards, and diagrams showing contaminant concentrations within ground water are presented.

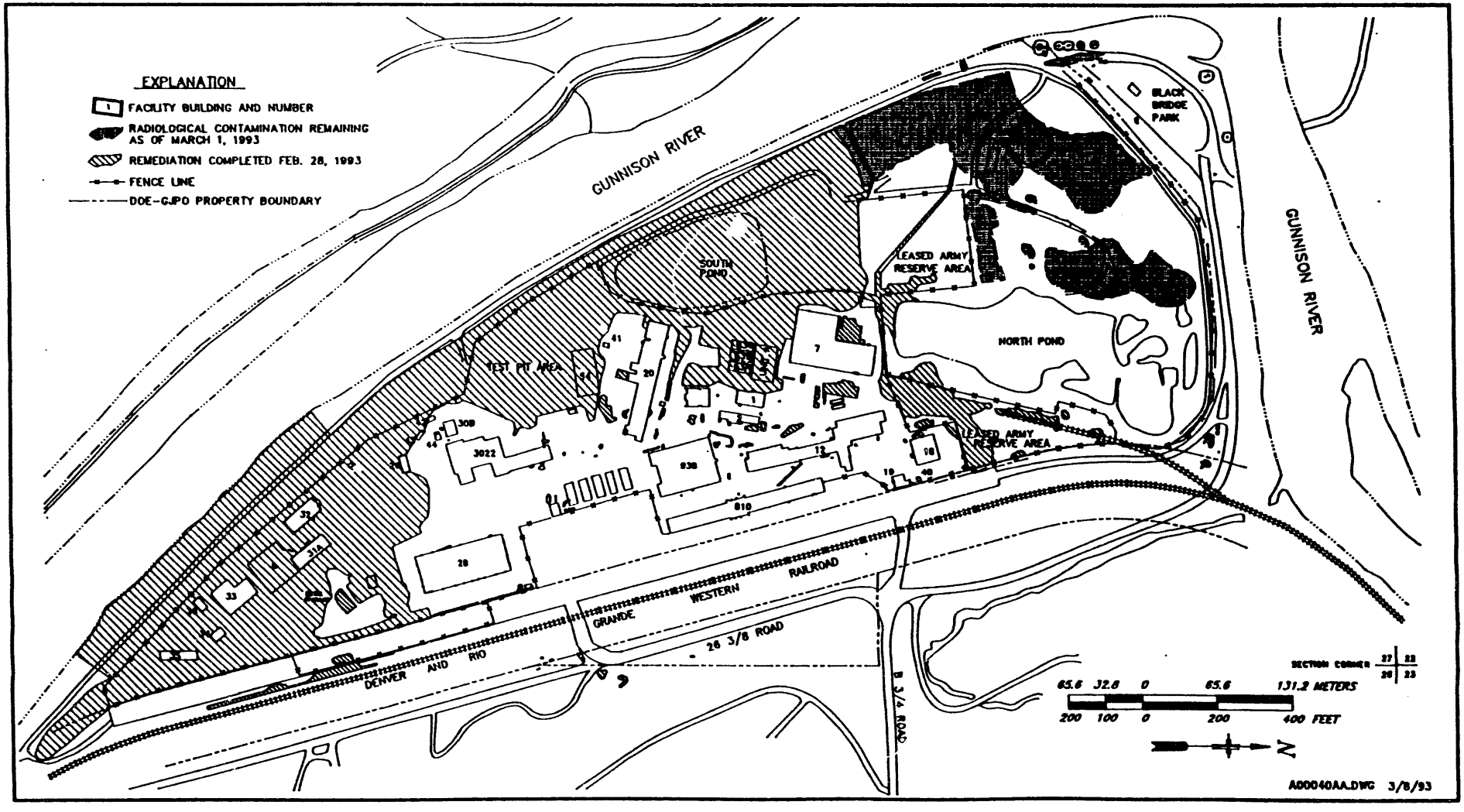


Figure 2. Map of the GJPO Facility Showing Areas of Tailings Contamination and Remediation

The Quality Assurance section summarizes the measures taken to ensure the quality of monitoring data collected at and near the GJPO facility. This section also includes results of the participation of the on-site Analytical Chemistry Laboratory in interlaboratory cross-check programs.

Appendix A comprises analytical data collected during 1992 and is organized according to medium (air, sewer, and water) and date sampled. Analytical data include radon, air particulates, direct gamma radiation, meteorology, sewer effluent, surface water, and ground water.

In Appendix B, data from selected media and locations are presented graphically to show changes in analyte concentrations over time. Also included in the graphs is a comparison between collected data and the applicable local, state, or federal standard.

In Appendix C, maps of alluvial well locations identify which ground-water analytes exceeded their respective federal/state standards at each well. Results of each of the 1992 quarterly sampling events are presented.

This report includes an Abbreviations and Acronyms section, which follows the Table of Contents; a References section, which follows the Quality Assurance section; and a Distribution List section, which lists persons and organizations who receive copies of this report.

Compliance Summary - January 1, 1992, Through April 1, 1993

Compliance Status

Compliance status for each of the major environmental statutes applicable to the DOE-GJPO facility is as follows:

Comprehensive Environmental Response, Compensation, and Liability Act

Although the DOE-GJPO facility was not listed on the National Priorities List by the EPA, DOE-GJPO elected to follow the CERCLA process for environmental cleanup of the facility. The Grand Junction Projects Office Remedial Action Project (GJPORAP) was begun to remove residual radioactive materials (RRM) remaining on site from early operations. An RI/FS—EA was completed in 1989, and a Record of Decision regarding the planned action was finalized and approved by the DOE Idaho Field Office in April 1990. Phase IV of the remedial action, which involved removal of RRM from the South Pond area, was completed in August 1992. Phases II, III, IC, ID, and V of the remedial action, which included demolition of Buildings 6 and 31 and removal of exterior RRM from areas west and southwest of the GJPO facility and adjacent to Building 7, were completed in November 1992. Ongoing remedial action (Phase IVA) includes removal of RRM from the northwest dike, the water line area by the North Parking Lot, Treasure Island, Black Bridge Park, and an area east of Building 7.

Updates to the GJPORAP Information Repository, a CERCLA-required project file that contains documentation of site activities, were prepared in October and December 1992.

A self-assessment of the DOE-GJPO's management of substances regulated by SARA, Title III, is being conducted and is anticipated to be completed in 1993.

Clean Air Act

In response to Air Pollution Emissions Notifications submitted to the state of Colorado during 1990, four emission permits were granted initial approval by the Air Pollution Control Division, Colorado Department of Health (CDH), on September 30, 1991, for air emission sources on the facility. The Analytical Chemistry Laboratory's emissions are permitted under Emission Permit No. 90ME402-1; the Sample Preparation Facility's emissions are permitted under Emission Permit No. 90ME402-2; the facility boilers emissions are permitted under Emission Permit No. 90ME402-3; and emissions from the Petrology Laboratory, the blueprint machine in Building 938, and the paint booth and degreasing unit in Building 28 are covered by Emission Permit No. 90ME402-4. The state of Colorado is expected to grant final approval for these emission permits in April 1993. Each permit will then require annual renewal.

Off-site dose modeling was conducted for the facility to determine compliance with current National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, and DOE Orders 5400.1 and 5400.5. The off-site dose resulting from 1992 emissions was 5.710×10^{-2} millirems per year (mrem/yr). The EPA standard for such emissions is 10 mrem/yr.

Monthly remediation progress reports were submitted to the EPA in compliance with an agreement (dated October 29, 1991) made with that agency concerning NESHAP, Subpart Q, Radon Emission Requirements.

During the week of August 3, 1992, the DOE Albuquerque Field Office (DOE-AL) conducted an appraisal of environmental, health, and quality compliance at the DOE-GJPO. One of the observations resulting from this appraisal pertained to Air Quality Permit No. 89ME080-2F, which had been issued to the DOE-GJPO by the CDH for mill tailings deposition at the state-owned repository. The observation noted that the DOE-GJPO had not requested the CDH to rescind this permit, even though the responsibilities for operating the state-owned repository had been transferred to another contractor in July 1991. A request for cancellation of the permit was submitted to the Air Pollution Control Division, CDH, on December 15, 1992. As of April 1, 1993, no response to this request had been received.

Clean Water Act

The DOE-GJPO does not discharge any wastewater or storm water via a point source to "waters of the United States." The facility, therefore, is exempt from the National Pollutant Discharge Elimination System (NPDES) permitting requirements, as specified in Section 402 of the Clean Water Act. In a letter dated July 28, 1992, the EPA, Region VIII, determined that the types of storm-water runoff existing at the facility (e.g., runoff from employee parking lots and administrative buildings, sheet flow, etc.) do not require an NPDES storm-water permit. No other NPDES-regulated wastewater discharges from the DOE-GJPO facility are known to exist.

Domestic sewage effluent from the facility is routed to the publicly owned treatment works operated by the city of Grand Junction. Sewage effluent was sampled monthly to ensure compliance with the Class II, Industrial Pretreatment Permit (No. 0023), which was issued in March 1989 and revised in April 1992. In accordance with the permit, monitoring reports were submitted to the city of Grand Junction in January and July 1992. Another revision to the permit (No. 23REV), which requires more frequent sampling of the effluent but for a fewer number of analytes, was received from the city's Industrial Pretreatment Program Coordinator in February 1993.

During 1992, all constituent concentrations measured within sewer effluent were below their respective threshold limits established by the permit, with the exception of those for biochemical oxygen demand (BOD) and total suspended solids (TSS). Concentrations of these constituents exceeded threshold limits during the December sampling. These results were reported immediately to the city of Grand Junction, and a resampling was begun. During resampling, the cause for the excessive levels was discovered (electrical

cables within the sampling area had dislodged and had trapped solid debris at the sampling site—see Sewer Effluent subsection of this report for details) and corrected.

On February 16, 1993, a sewer effluent grab sample was collected at the north lift station by the city of Grand Junction, as part of its permit oversight program. The pH of this sample was 4.29, which exceeded the maximum discharge range of 5.5 to 9.5 for pH. This was the first time, since issuance of the permit in March 1989, that pH was found to be outside the acceptable range by either the city or the GJPO. Upon learning of the low pH measurements, the on-site Analytical Chemistry Laboratory immediately initiated procedures to neutralize all acid solutions prior to their discharge to the sewer system. The sewer effluent at the site was resampled the next day, and measured pH levels (7.36, 7.27, 8.46, 8.28) were found to be well within discharge limits.

In accordance with Section 404 of the Clean Water Act, a 404 Permit (Permit No. 10040) was obtained from the U.S. Army Corps of Engineers (COE) in 1989 for excavation of RRM from the facility dike and adjacent areas along the Gunnison River. An extension of the 404 Permit was requested during 1991 and was received on February 25, 1992. The permit is valid through November 1993.

Executive Order 11988 "Floodplain Management"

The Mesa County Housing and Urban Design Flood Insurance Rate Map (July 1978) places the GJPO facility within the 1,000-year floodplain. In accordance with Executive Order 11988, "Floodplain Management," a Floodplain Management Plan was prepared and a Mesa County Floodplain Development Permit was obtained for the facility and GJPORAP operations.

Resource Conservation and Recovery Act

On March 29, 1991, the DOE-GJPO's waste generator status changed from a conditionally exempt small quantity generator (CESQG) of hazardous waste to a small quantity generator. This change resulted from the generation within a single month of approximately 408 kilograms of mixed waste that was discovered during on-site remedial action. Generation of this waste also resulted in the DOE-GJPO surpassing the amount of accumulated hazardous and mixed waste allowed under CESQG status (1,000 kilograms). In February 1992, status was returned to a CESQG after the following criteria were met: (1) a Part A permit application was submitted on January 22, 1992, to the CDH and EPA (submission of the application officially commenced operations within the hazardous and mixed waste storage unit [i.e., Building 42] as a Resource Conservation and Recovery Act [RCRA] interim-status storage facility); (2) less than 1,000 kilograms of hazardous and mixed waste was in on-site accumulation; and (3) less than 100 kilograms of hazardous and mixed waste was generated per month.

During 1992, approximately 595 kilograms of hazardous and mixed wastes was generated from routine facility operations. Points of generation included Laboratory Services, Maintenance, Information Services, Engineering, and Records Management. The

decrease in generation rates from the previous year resulted from the implementation of waste minimization efforts and a temporary curtailment of certain laboratory operations from May to December 1992. The temporary curtailment of laboratory operations, which included a complete cessation of mixed-waste generation, occurred because of the expiration on May 8, 1992, of the Two-Year National Capacity Variance for Mixed Waste. In response to that event, four hazardous waste compliance position documents were written, addressing

- Ignitability, flammability, and combustibility of solid waste samples;
- Management of analytical excess samples;
- Receipt of off-site hazardous waste at the DOE-GJPO interim status facility; and
- Management of land-disposal-restricted mixed waste generated at the DOE-GJPO.

Copies of the documents were provided to the EPA, Region VIII; the CDH; and the DOE-AL Environmental Protection Division. Following approval of the four position papers by each of these agencies, the DOE-GJPO prepared the *CESQG Management Plan* (Chem-Nuclear Geotech, Inc. 1992a), and on November 30, 1992, allowed the resumption of mixed-waste generation in on-site laboratories in accordance with the plan.

National Environmental Policy Act

In June 1992, the *Final Draft Environmental Assessment of Facility Operations at the Grand Junction Projects Office* (Chem-Nuclear Geotech, Inc. 1992b) was approved by the DOE-AL and, in July, was submitted to DOE-Headquarters (DOE-HQ) for review. In January 1993, the DOE-GJPO was requested by DOE-HQ (EM-40) to revise and update the EA to reflect conditions on the facility as of June 1993.

The DOE-GJPO met with DOE-AL NEPA staff in April 1992 as part of the DOE-GJPO's transition to the DOE-AL. At that time, DOE-AL's Supplemental Directive (5440.1D) was obtained for implementation at the DOE-GJPO. In August 1992, new policy and procedures referring to the Supplemental Directive and Secretary of Energy Notice (SEN) 15-90 were incorporated into the *Environmental Protection Manual* (Chem Nuclear-Geotech, Inc. 1992c).

As of April 1, 1993, 40 NEPA Categorical Exclusions and 12 NEPA Administrative Records were completed or initiated. An in-house central record-keeping system that documents and tracks NEPA determinations and the status of NEPA reviews and approvals was established in November 1992 and is updated monthly. Monthly reports listing active EAs and Environmental Impact Statements were prepared in accordance with SEN 15-90 and submitted to the DOE-AL.

Toxic Substance Control Act

Radioactive uranium mill tailings unknowingly mixed with polychlorinated biphenyls (PCBs) were placed in the on-site temporary tailings stockpile in summer 1989. The total volume of this commingled waste, before placement in the stockpile, was less than 1 cubic meter; the concentration of PCBs in the waste (before placement) ranged from 110 to 920 parts per million. Under EPA guidance, the PCB-contaminated tailings were excavated and stored at the facility in steel roll-off containers.

On December 31, 1992, the EPA, Region VIII, served the DOE-GJPO with a Notice of Noncompliance, Compliance Schedule, and Notice of Opportunity for Conference. The EPA also served Geotech with a Complaint and Notice of Opportunity for Hearing. Both servings identified two counts. Count I identified the placement of PCB-contaminated tailings in the stockpile as improper storage for disposal of PCBs in violation of 40 CFR 761.65(b). Count II identified storage of the PCB-contaminated tailings in the stockpile from summer 1989 to August 1991 as exceeding the 1-year limit established at 40 CFR 761.65(a).

On March 16, 1993, Geotech held an informal settlement conference with EPA. As a result of that conference, the penalty associated with Count I was reduced by 40 percent because of Geotech's voluntary notification of the incident and desire to comply with Toxic Substances Control Act (TSCA) regulations. Count II and its associated penalty were dismissed because of Geotech's inability to comply with the 1-year storage limit; i.e., no facility able to treat both components of the commingled waste (PCBs and uranium mill tailings) was available. No terms or conditions for a consent agreement were reached in the informal settlement conference.

PCB wastes generated by the Analytical Chemistry Laboratory during 1992 were managed and stored in accordance with applicable regulations, with the exception of the TSCA 1-year storage limitation. Liquid PCB wastes are awaiting off-site disposal pending approval of *The Application to Qualify Hazardous Wastes as Nonradioactive for Off-Site Shipment for Purposes of Regulatory Compliance and Safety* (i.e., the case-by-case exemption) and the *Performance Objective for Certification of Nonradioactive Hazardous Waste*, which address the DOE-HQ waste shipment moratorium (see Waste Management subsection under Current Issues and Actions). Solid PCB wastes generated by the Analytical Chemistry Laboratory, which include uranium mill tailings that have undergone analysis for PCBs/pesticides, are included in the DOE-GJPO's 180-day mixed waste inventory and treatment capacities report. Using information provided in this report, a site treatment plan will be developed and will delineate available options for treating these wastes.

Between the months of May 1992 and April 1993, asbestos abatement actions were completed in Buildings 12, 20, and 3022 in compliance with local, state, and federal regulations.

During the August 1992 appraisal of environmental, health, and quality compliance at the DOE-GJPO, the DOE-AL issued a finding that addressed the absence of an asbestos management plan. This finding was resolved in December 1992 when a policy

establishing minimum requirements (in accordance with TSCA, state, and local regulations) for conducting asbestos renovation or demolition at the facility was incorporated into the *Environmental Protection Manual* (Chem-Nuclear Geotech, Inc. 1992c).

Current Issues and Actions

DOE-HQ Baseline Environmental Audit

A baseline environmental audit conducted at the DOE-GJPO facility by the DOE-HQ in May and June 1991 resulted in the identification of 48 compliance and best-management-practice findings. The findings, which are summarized in the *Environmental Audit of the Grand Junction Projects Office* (DOE 1991a), were subdivided into 316 action items requiring completion or resolution to achieve compliance. A corrective action plan to address these deficiencies, the *Grand Junction Projects Office U.S. Department of Energy Baseline Environmental Audit Action Plan* (Chem-Nuclear Geotech, Inc. 1992d), was completed by the DOE-GJPO on January 21, 1992. As of April 1, 1993, approximately 95 percent of the action items had been completed.

The audit team recognized DOE-GJPO's system for ground-water well record organization and retention as a noteworthy practice. The entire history of each well on the facility, including records of the well permit, well construction details, and monitoring data, is contained in one file. This system allows quick and easy access to well information.

Pollution Prevention Awareness Program

In accordance with DOE Order 5400.1, the Pollution Prevention Awareness Program was implemented in March 1992 with the issuance of the *Waste Minimization and Pollution Prevention Awareness Plan* (Chem-Nuclear Geotech, Inc. 1992e). Discussed in the plan are the basic components of a pollution prevention awareness program, which include employee awareness, training, incentives, and awards.

Waste Management

Small quantities of low-level radioactive, mixed, and hazardous wastes were generated at the DOE-GJPO facility during 1992 in support of a variety of research and environmental restoration programs. These wastes were managed according to Colorado Hazardous Waste Regulations and DOE Orders 5400.3, *Hazardous and Radioactive Waste Program*, and 5820.2A, *Radioactive Waste Management*.

During 1992, hazardous wastes originated from a variety of on-site sources, including Information Services, Engineering, the Boiler Plant, and various maintenance and laboratory operations. Low-level and mixed wastes originated primarily from the Analytical Chemistry Laboratory as sample residue, sample extractant, and unused or

unusable radiochemicals. Because of the DOE-GJPO dependence upon off-site treatment and disposal facilities, a key element of the waste management program was the implementation of an aggressive waste minimization program. DOE-GJPO's *Waste Minimization and Pollution Prevention Awareness Plan* (Chem-Nuclear Geotech, Inc. 1992e) was updated and reissued in March 1992.

As a result of the DOE-HQ waste shipment moratorium, *The Application to Qualify Hazardous Wastes as Nonradioactive for Off-Site Shipment for Purposes of Regulatory Compliance and Safety* and the *Performance Objective for Certification of Nonradioactive Hazardous Waste* were prepared and submitted to the DOE-HQ in October 1992 and January 1993, respectively. These documents discuss the procedures by which hazardous wastes shipped off site will be verified as nonradioactive.

The *CESQG Management Plan* (Chem-Nuclear Geotech, Inc. 1992a) was completed in November 1992. This plan establishes the process by which hazardous and mixed waste generated at the facility will be managed to maintain the GJPO's status as a CESQG. By maintaining status as a CESQG, the GJPO will be exempt from the land disposal restrictions and associated restricted-waste storage prohibitions under RCRA. CESQG status also will allow the GJPO to generate mixed wastes, even though treatment technology and capacity have not been identified.

Summary of Facility Permits

DOE-GJPO facility permits that were active during the 1992 calendar year include

- Forty-seven well permits (Permit Nos. 039687 to 039733) issued by the Colorado Division of Water Resources for GJPO monitoring wells in September 1991 and one permit issued in September of 1992 (No. 166057). Well permits regulate the installation and abandonment of monitoring wells. Water-level measurements and water quality analyses are submitted to the Division of Water Resources upon request.

- A gravel pit permit (Permit No. 037845-F) issued in 1990 by the Colorado Division of Water Resources. Required if excavation activities expose ground water, this permit is valid until remedial work at the DOE-GJPO facility is complete.

- A State of Colorado Section 401 Water Quality Certification (No. 2030) issued to the DOE-GJPO facility in 1988 by the CDH to control erosion and sedimentation of the Gunnison River resulting from excavation activities associated with radioactive tailings removal and transportation. This certification is valid until remedial work at the facility is complete.

- A Mesa County floodplain development permit (Permit No. F-1-90) reissued in 1990 by the Mesa County Engineering Department. This permit allows for reconstruction of the flood control dike along the Gunnison River and is valid through completion of remedial work.

- An industrial pretreatment permit (No. 0023), issued by the city of Grand Junction for discharging sewer effluent to the city's wastewater treatment plant. The permit is valid through May 1996.

- A 404 permit obtained from the COE in 1989 for remedial excavation of the facility dike and adjacent areas along the Gunnison River. This permit is valid through November 1993.

- Six State of Colorado air emission permits for air emission sources on the facility and for GJPORAP activities. The permits are valid through 1993 and were issued as follows:

  — Permit No. 90ME402-1: Issued for the Analytical Chemistry Laboratory; acid consumption is limited to 900 gallons per year (gal/yr), volatile organic compound consumption is limited to 2,000 gal/yr. All permit conditions were met in 1992.

  — Permit No. 90ME402-2: Issued for the Sample Preparation Facility; processing of soil samples is limited to 66 tons per year (tons/yr). All permit conditions were met in 1992.

  — Permit No. 90ME402-3: Issued for the facility heating boiler; consumption of natural gas is limited to 30×10^6 cubic feet per year; consumption of #2 fuel oil is limited to 281×10^3 gal/yr. All permit conditions were met in 1992.

  — Permit No. 90ME402-4: Issued for the Petrology Laboratory, blueprint machine, degreasing unit in Building 28, and paint booth; consumption of solvent for degreaser is limited to 55 gal/yr, aqueous ammonium hydroxide for the blueprint machine is limited to 12 gal/yr, and paints and thinners are limited to 200 gal/yr. All permit conditions were met in 1992.

  — Permit No. 89ME080-1F: Issued for removal of GJPORAP material; removal of material is limited to 307,495 tons/yr. All permit conditions were met in 1992.

  — Permit No. 89ME080-2F: Issued for placement of GJPORAP material at state-owned repository; placement of material is limited to 307,495 tons/yr. All permit conditions were met in 1992.

Environmental Program Information

Sources of Contamination

A historical survey (McGinley 1987, 1988) and a radiological characterization (Henwood and Ridolfi 1986) were conducted to determine the nature and extent of contaminated materials at the GJPO facility. The historical survey indicated that the pilot-plant operations of the 1940s and 1950s were almost exclusively responsible for the contaminated materials at the facility. The radiological characterization summarized the findings of surface-soil surveys, soil borings, subsurface radiological logging, North and South Pond sediment sampling, and building surveys. From these studies and from information generated during initial phases of remedial action at the site, the total volume of uranium tailings and tailings-contaminated material was estimated at 191,000 cubic meters (250,000 cubic yards). The tailings and related materials occupied approximately 8 hectares (20 acres). Areas of contamination included the Tailings area, the North Pond area, the Leased Army Reserve area, the South Pond area, the dike area along the Gunnison River, and a number of smaller, scattered locations (see Figure 2). A critical pathway analysis, which identified sources of radiation and pathways of radiation exposure at the facility, was performed in 1987 and documented in the GJPO facility RI/FS—EA (UNC Geotech 1989).

Environmental Monitoring Summary

Air

Atmospheric Radon

An atmospheric radon monitoring program was established at the GJPO facility in 1984 and continues today. At the conclusion of the 1984 sampling period, the number of sampling locations was reduced from 25 to 8 but was increased to 13 in November 1990 in response to GJPORAP activities. Atmospheric radon concentration is measured with Landauer Radtrak® alpha-sensitive detectors. The detectors, placed in duplicate 1 meter above the ground surface (see Figure 3 for locations), are collected and analyzed on a quarterly (3-month exposure) basis.

Results of the 1992 radon monitoring program are summarized in Table 1 and listed by sampling period in Tables A-1 through A-4 in Appendix A. Table 1 also compares measured averages of 1992 data with the derived concentration guide (DCG) established for radon by DOE Order 5400.5, *Radiation Protection of the Public and the Environment.* Used as reference values for conducting radiological environmental protection programs, DCGs represent concentrations that would cause a member of the public, residing at the point of collection, to receive a dose of 100 mrem in a year from inhalation of radon gas or a specific radionuclide. The radon DCG established for DOE facilities is 3.0×10^{-9} microcuries per milliliter (μCi/mL) above natural background; background levels at the GJPO are 0.84×10^{-9} μCi/mL (UNC Geotech 1989). As indicated in

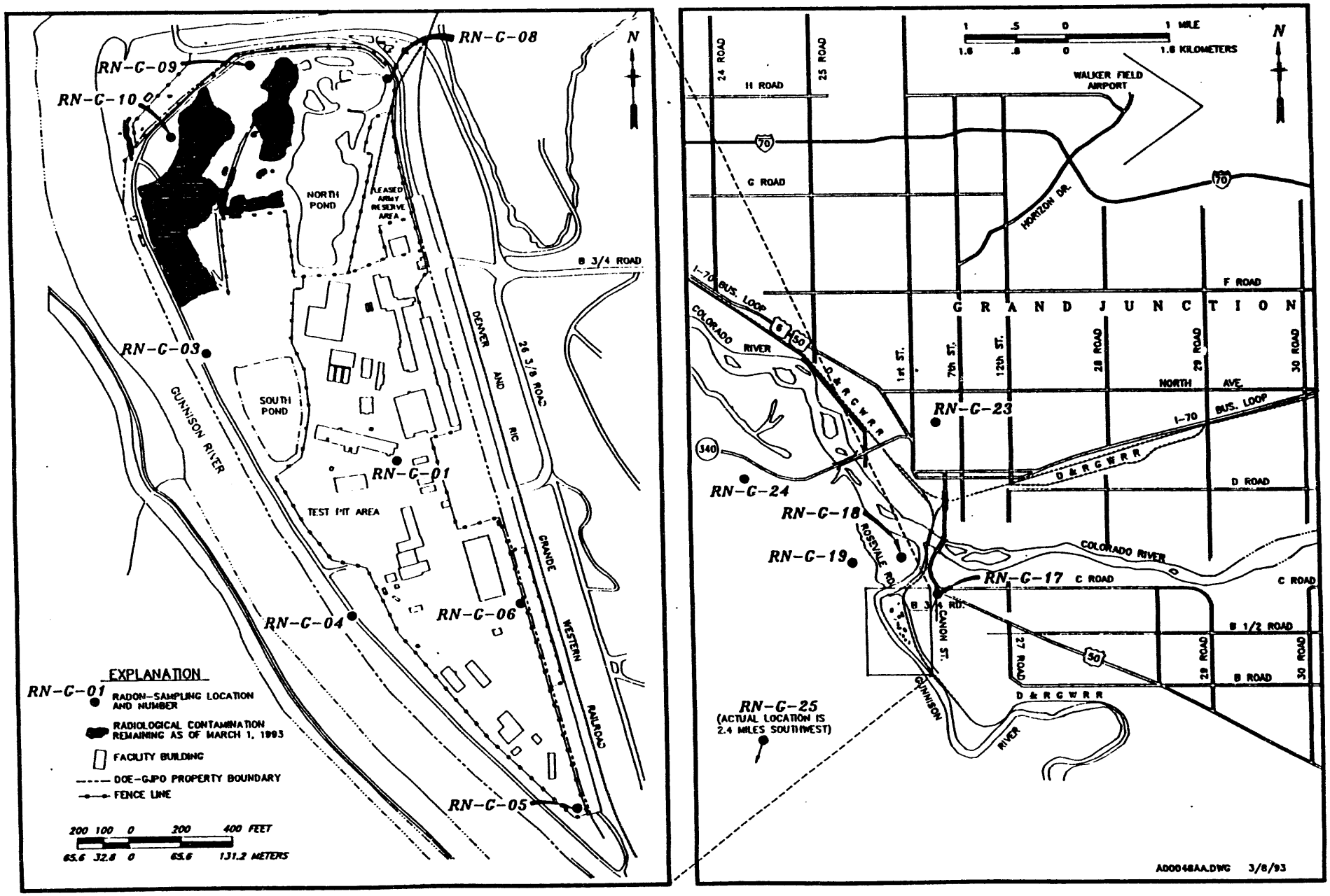


Figure 3. Atmospheric Radon Sample Locations at the GJPO Facility and Vicinity

Table 1. Comparison of Average Annual Radon Concentrations At and Near the GJPO Facility with the DCG

Sampling Location	Radon Concentration[a] Annual Average (μCi/mL)[b]	DCG (Including background) (μCi/mL)
On-Site		
RN-G-01	6.50E-10	3.84E-09
RN-G-03	6.38E-10	3.84E-09
RN-G-04	5.75E-10	3.84E-09
RN-G-05	5.13E-10	3.84E-09
RN-G-08	4.83E-10	3.84E-09
RN-G-09	9.13E-10	3.84E-09
RN-G-10	4.00E-10	3.84E-09
Off-Site		
RN-G-17	5.13E-10	3.84E-09
RN-G-18	6.63E-10	3.84E-09
RN-G-19	5.13E-10	3.84E-09
RN-G-23	4.25E-10	3.84E-09
RN-G-24	6.38E-10	3.84E-09
RN-G-25	5.38E-10	3.84E-09

[a]Scientific notation E = "x 10".
[b]1 μCi/mL = 3.7 x 10^4 becquerels/mL.

Table 1, average annual radon concentrations at all locations were below the DCG, which is consistent with previous years' results. On-site radon concentrations in 1992, however, generally were lower than those measured in 1991. This overall decrease in concentration probably occurred as a result of GJPORAP activities, which included removal of on-site radon sources (mill tailings and tailings-contaminated soil).

Air Particulates

Air particulate monitoring is conducted to comply with all applicable local, state, and federal regulatory requirements. DOE Order 5400.1, *General Environmental Protection Program,* specifies that effluent monitoring will be conducted to provide representative measurements of the quantities and concentrations of pollutants in airborne discharges. Demonstrations of compliance with the public dose limits of DOE Order 5400.5 and 40 CFR 61, Subpart H, *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities*, are based on calculations that use information obtained from environmental monitoring programs. In addition, DOE

Order 5400.5 lists DCGs for air that provide reference values for conducting radiological environmental protection programs. The DOE guidance document, *Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991b), recommends identifying and monitoring diffuse sources such as tailings piles. National primary and secondary ambient air quality standards (40 CFR 50), which have been deemed appropriate and applicable for this facility, define maximum acceptable levels of particulate matter.

The GJPO ambient air particulate sampling program was initiated in December 1985 to monitor GJPORAP activities and to monitor the impact of radionuclide point source emissions on the facility's air quality. The initial air particulate sampling network consisted of three high-volume air samplers that sampled ambient air at 40 standard cubic feet per minute (scfm) for 24 hours every sixth day. Metal towers were erected on concrete pads at the sampling sites, and samplers were mounted with filters 3 meters (10 feet) above ground level. In 1987, 10-micrometer (μm) size-selective inlets were installed in the intake of the sampler to separate particulate matter 10 μm or smaller (PM_{10}) from larger particles. The 10-μm or smaller particles are considered to be the biologically damaging component and are collected on the glass-fiber filter in the sampler. The heavier windblown particulates and fugitive dust are eliminated by the 10-μm size-selective inlet.

The sampling sites (see Figure 4) were selected on the basis of prevailing wind directions at the GJPO facility. Two principal wind vectors occur: north-northwest and south-southeast. The south station (AIR-G-1) is located in the south portion of the facility near Building 35; the west station (AIR-G-2) is located on the north edge of the Tailings Area; and the north station (AIR-G-3) is located in the north portion of the facility, northeast of the North Pond.

The 1992 air particulate sampling network consisted of three high-volume air particulate samplers. Radiological analytes, which included uranium (natural), radium-226, and thorium-230, were sampled continuously for a 5-day period each month. PM_{10}, the only nonradiological constituent measured, was sampled for a 24-hour period every sixth day. A summary of 1992 results are in Table 2, and results of individual sample analyses are in Tables A-5 through A-10 in Appendix A.

Table 2 compares uranium, radium-226, and thorium-230 DCGs (inclusive of background levels) with maximum and average concentrations measured at the GJPO facility during 1992. All measured concentrations are well below the respective DCGs. In Appendix B, Figures B-1 through B-3 show concentrations of uranium, thorium-230, and radium-226 as a percentage of their respective DCGs at station AIR-G-2 during 1992. Graphs for monitoring stations AIR-G-1 and AIR-G-3, although not included in this report, exhibit trends similar to AIR-G-2 graphs.

Acceptable levels of PM_{10} are defined by the EPA under the National Ambient Air Quality Standards; these levels have been adopted by the state of Colorado. The PM_{10} standard specifies a maximum annual average concentration of 50 micrograms per cubic meter ($\mu g/m^3$) and a maximum 24-hour concentration of 150 $\mu g/m^3$. Maximum measured values for this constituent in 1992 were below compliance levels (Table 2). In Appendix B, Figure B-4 shows PM_{10} concentrations as a percentage of the EPA/state

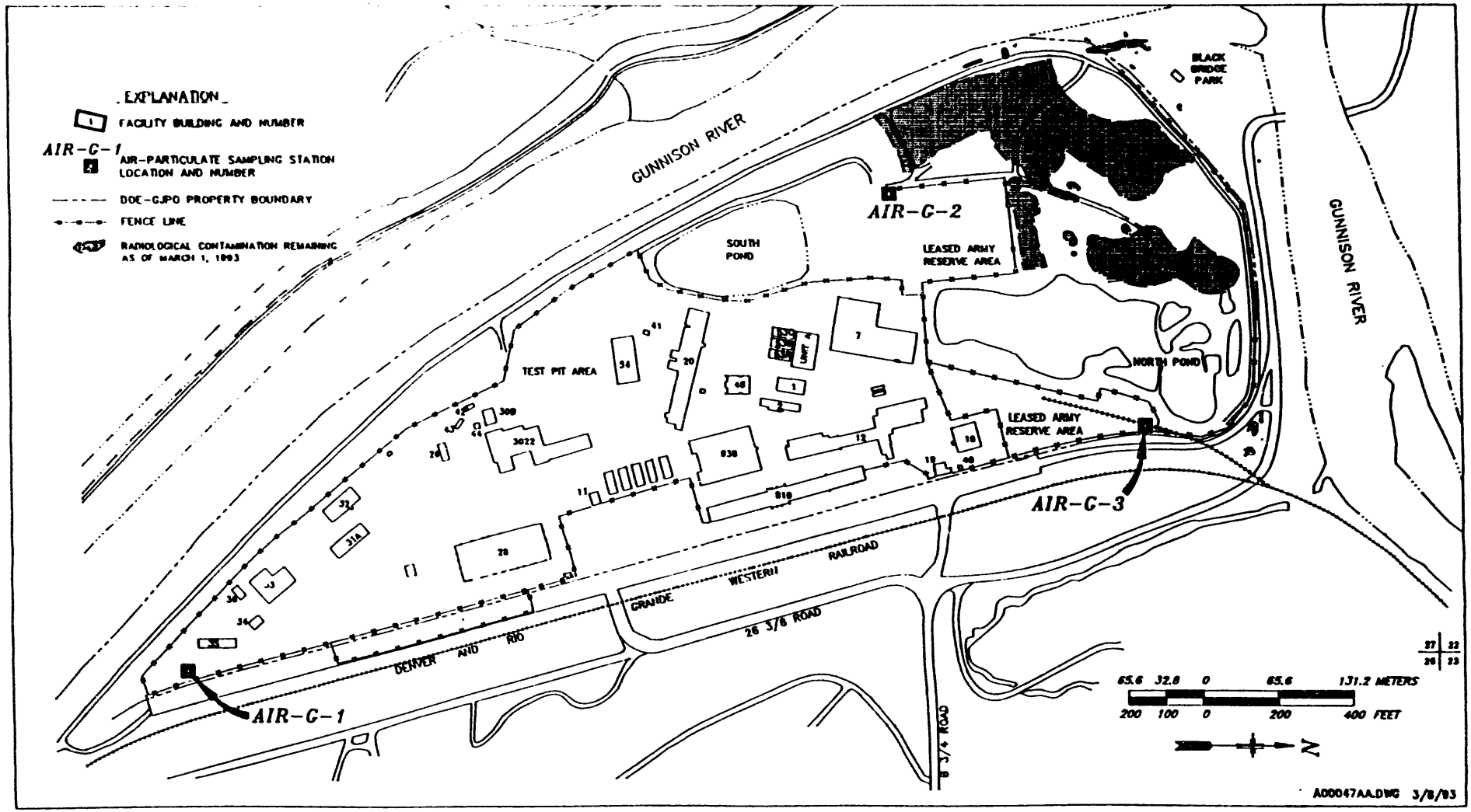


Figure 4. Air Particulate Sampling Locations at the GJPO Facility

Table 2. Results of the GJPO Air Particulate Monitoring Conducted during 1992[a,b]

		Radiological Elements					Suspended Particulates
		Radium-226 (μCi/mL)[c]	Thorium-230 (μCi/mL)	Thorium-230 (pg/mL)	Uranium (pg/mL)	Uranium (μCi/mL)	PM-10 (μg/m³)
DCG/Standard		1.0E-12	4.0E-14	No Standard	No Standard	2.0E-12	150 Maximum 50 Annual Ave.
Station							
	Maximum	7.8E-16	2.1E-16	1.1E-08	4.4E-04	2.9E-16	45.1
AIR-G-1	Average	2.9E-16	1.4E-16	7.2E-09	2.4E-04	1.6E-16	18.0
	Count	12 (4)	12 (7)	12 (7)	12 (12)	12 (12)	57 (57)
	Maximum	2.1E-15	1.9E-15	9.8E-08	1.2E-03	8.0E-16	48.8
AIR-G-2	Average	7.7E-16	4.5E-16	2.3E-08	4.6E-04	3.1E-16	18.0
	Count	11 (6)	11 (11)	11 (11)	11 (11)	11 (11)	47 (47)
	Maximum	6.4E-16	4.4E-16	2.3E-08	3.9E-04	2.6E-16	52.8
AIR-G-3	Average	4.1E-16	1.4E-16	7.2E-09	2.6E-04	1.7E-16	19.6
	Count	12 (3)	12 (10)	12 (10)	12 (12)	12 (12)	51 (51)

[a]The numbers given in this table are defined as follows:
Maximum — Maximum concentration.
Average — Average annual concentration. Only concentrations above the detection limit were used in this calculation.
Count — Number of samples collected (number of samples having concentrations above detection limits).
[b]Scientific notation E = "x 10."
[c]1 μCi/mL = 3.7×10^4 becquerels/mL.

standard for station AIR-G-2 during 1992. Although not included, graphs for the other two monitoring stations exhibit trends similar to AIR-G-2.

Radionuclide Point Source Emissions

Three point sources of radionuclide emissions occur on the GJPO facility: the Analytical Chemistry Laboratory, the Oak Ridge National Laboratory (ORNL) Sample Preparation Trailer, and the Sample Preparation facility (Baghouse). Because of the low emission rates from these sources, the EPA, Region VIII, Office in 1991 waived the sampling requirements indefinitely for the Analytical Chemistry Laboratory and the ORNL Trailer and granted a 1-year waiver for the Baghouse. However, emissions from these sources must be estimated using the method contained in 40 CFR 61, Appendix D. Estimated emissions were calculated and entered into the dose model AIRDOSPC™. Because of the extremely small quantities emitted from the Analytical Chemistry Laboratory and the ORNL Trailer, and because of the proximity of all three sources, the Analytical Chemistry Laboratory and ORNL Trailer source terms were combined with the Baghouse source term and treated as a single release point. Results of the modeling estimated an effective dose equivalent (EDE) to the maximally exposed individual (400 meters west-northwest of the facility) of 1.100×10^{-3} mrem/yr, well below the DOE and EPA limit of 10 mrem/yr.

Direct Gamma Radiation Monitoring

A direct environmental radiation monitoring program was begun at the GJPO facility in April 1991 to assess the potential gamma radiation dose to persons on and near the facility, in accordance with DOE Order 5400.5 and the DOE *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991b). Gamma radiation measurements are included, along with radiation measurements associated with radon and air particulates, in the calculation of total off-site dose to the public to determine compliance with the DOE standard of 100 mrem/yr above background (see Environmental Radiological Program Information section).

During 1992, radiation measurements were made with $CaSO_4$:Dy (calcium sulfate: dysprosium) thermoluminescent dosimeters (TLDs). Fifteen monitoring locations (Figure 5) on the GJPO facility and surrounding areas were monitored quarterly.

Results of the monitoring are presented in Tables A-11 through A-14 in Appendix A and are summarized in Table 3, which compares measured values with the DOE standard. The background level of gamma radiation, measured at TLD-G-15, was estimated at 91 mrem/yr. All on-site and off-site locations yielded annual average measurements well below the DOE standard.

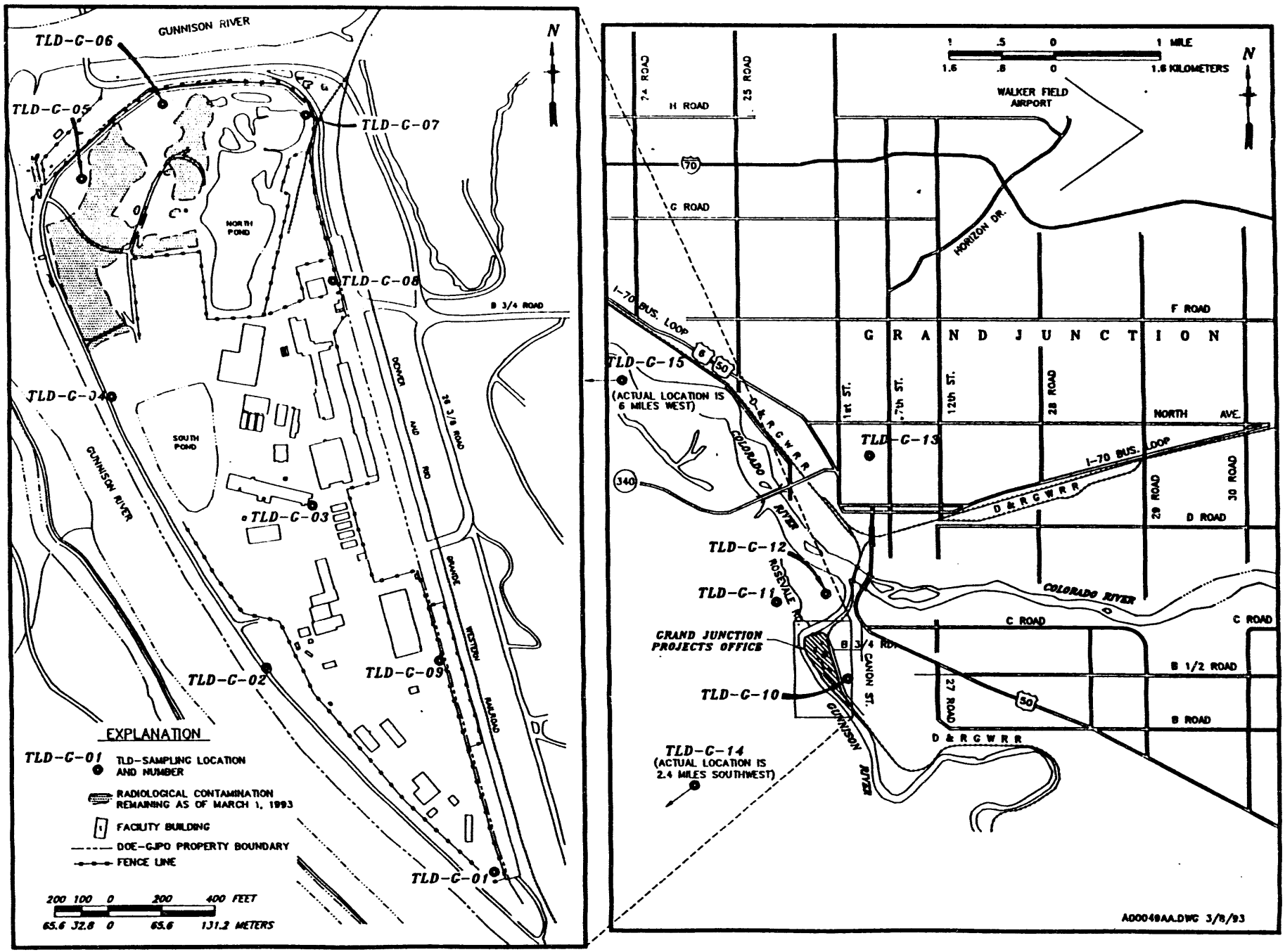


Figure 5. Direct Gamma Radiation Monitoring Stations at the GJPO Facility and Vicinity

Table 3. Average Annual Gamma Exposure Rates At and Near the GJPO Facility during 1992

Sampling Location	Gamma Exposure	
	Annual Average (mrem/yr)[a]	DOE Standard (mrem/yr)[b]
On-Site		
TLD-G-01	94	191
TLD-G-02	96	191
TLD-G-03	112	191
TLD-G-04	110	191
TLD-G-05	98	191
TLD-G-06	102	191
TLD-G-07	97	191
TLD-G-08	103	191
TLD-G-09	103	191
Off-Site		
TLD-G-10	86	191
TLD-G-11	89	191
TLD-G-12	100	191
TLD-G-13	94	191
TLD-G-14	89	191
TLD-G-15	91	191

[a]1 mrem/yr = .01 millisieverts/yr.
[b]Standard includes background of 91 mrem/yr.

Meteorology

Meteorological monitoring was not conducted at the GJPO during 1992. Because of problems associated with installation of a new system, valid data were not collected and are therefore not included in this report. Meteorological data representative of the GJPO were obtained from the National Weather Service Office in Grand Junction, Colorado, and used in the dose modeling. A copy of this data is in Table A-15, Appendix A.

Water

Sewer Effluent

In March 1989, an industrial pretreatment permit (No. 0023) was issued to the GJPO by the city of Grand Junction and Mesa County. This permit was issued in accordance with

provisions in Article 10 of Chapter 25, Code of Ordinance for the city of Grand Junction. Article 10 sets forth uniform requirements for users of city and county publicly owned wastewater treatment works and enables the city to comply with applicable state and federal laws. These laws include the Clean Water Act of 1977, the General Pretreatment Regulations (40 CFR 403), and the Colorado Water Quality Control Act, all as amended. In addition, Article 10 requires monitoring, enforcement activities, and user reporting.

Under provisions of the industrial pretreatment permit, the GJPO is required to sample its sewer effluent semiannually and report the results to the city by January 31 and July 31 each year. Table 4 lists the constituents required to be sampled and their respective threshold limits, as established by the permit.

During 1992, sewer effluent was sampled monthly, with the exception of September, October, and November, for the required constituents at the location labeled as Manhole #12 in Figure 6. Except for the December BOD and TSS concentrations, all constituent concentrations measured during the year were below or within their respective threshold limits. Table 4 summarizes the results of the sampling and provides a comparison of the results with threshold limits and with historical maximum concentrations. A complete list of sewer effluent sampling results is in Appendix A, Tables A-16 and A-17.

During the December 1992 sampling episode, the analytical results for BOD and TSS exceeded the permitted discharge limits. A resampling of the effluent was begun immediately. During resampling, it was discovered that the electrical cables that connected the flow sensor to the dedicated sampling line had become dislodged and had caused an accumulation of solid debris within the sewer line. The cables were moved, the sample site was flushed, and the cables were repositioned to avoid future accumulation of debris. Results obtained from the analysis of the sample collected after the sample site was cleaned were well below the permitted discharge limits for BOD and TSS.

In addition to the required constituents, sewer effluent was sampled monthly (with the exception of September, October, and November) for gross alpha, gross beta, total dissolved solids, chemical oxygen demand, total organic halides, and total organic carbon. The purposes of this sampling were (1) to establish baseline concentrations of these constituents within the effluent and (2) to demonstrate compliance with DOE Order 5400.5, which establishes limits on the discharge of radionuclides into the sewer system. Gross alpha and gross beta analytical results indicated that monthly radionuclide concentrations were well below established DCG values (listed in Chapter III of DOE Order 5400.5). Results of these analyses are in Appendix A, Table A-16.

On February 24, 1992, a comprehensive characterization of sewer effluent was conducted to provide information to the city of Grand Junction/Mesa County for an update of the industrial pretreatment permit. The characterization included an analysis of organic compounds, semivolatile organic compounds, herbicides, pesticides, and inorganic metals. Data from this sampling are in Appendix A, Tables A-16 and A-17.

Table 4. Comparison of 1992 and Historical Sewer Effluent Maximum Concentrations with Permitted Threshold Limits[a,b]

Constituent	Threshold Limit[c]		1992 Maximum[d]	Historical Maximum[d]
Field Measurements				
pH	5.5 to 9.5		6.81 to 8.63	6.78 to 8.15
Inorganics				
Biochemical Oxygen Demand	200	mg/L	3120	273
Cyanide	1.2	mg/L	0.191	~0.0024
Oil and Grease	50	mg/L	48	49
Total Suspended Solids	250	mg/L	696	249
Metals				
Chromium	5	mg/L	0.0047	0.036
Copper	5	mg/L	0.0986	0.0716
Lead	0.69	mg/L	0.0203	0.0162
Mercury	0.08	mg/L	0.00076	0.0009
Nickel	3.98	mg/L	~0.0157	<0.04
Silver	0.43	mg/L	0.0395	0.0125
Zinc	5	mg/L	1.06	0.735
Pesticides and PCBs				
Polychlorinated biphenyls[e]	0.002	mg/L	<0.002	<0.001
Semivolatile Organics				
Phenol	10	mg/L	0.33	0.33

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]1992 industrial pretreatment permit No. 0023 issued by the city of Grand Junction.

[c]Maximum allowable contaminant levels.

[d]The listed values are in the units shown under the Threshold Limit column.

[e]Polychlorinated biphenyls include Aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

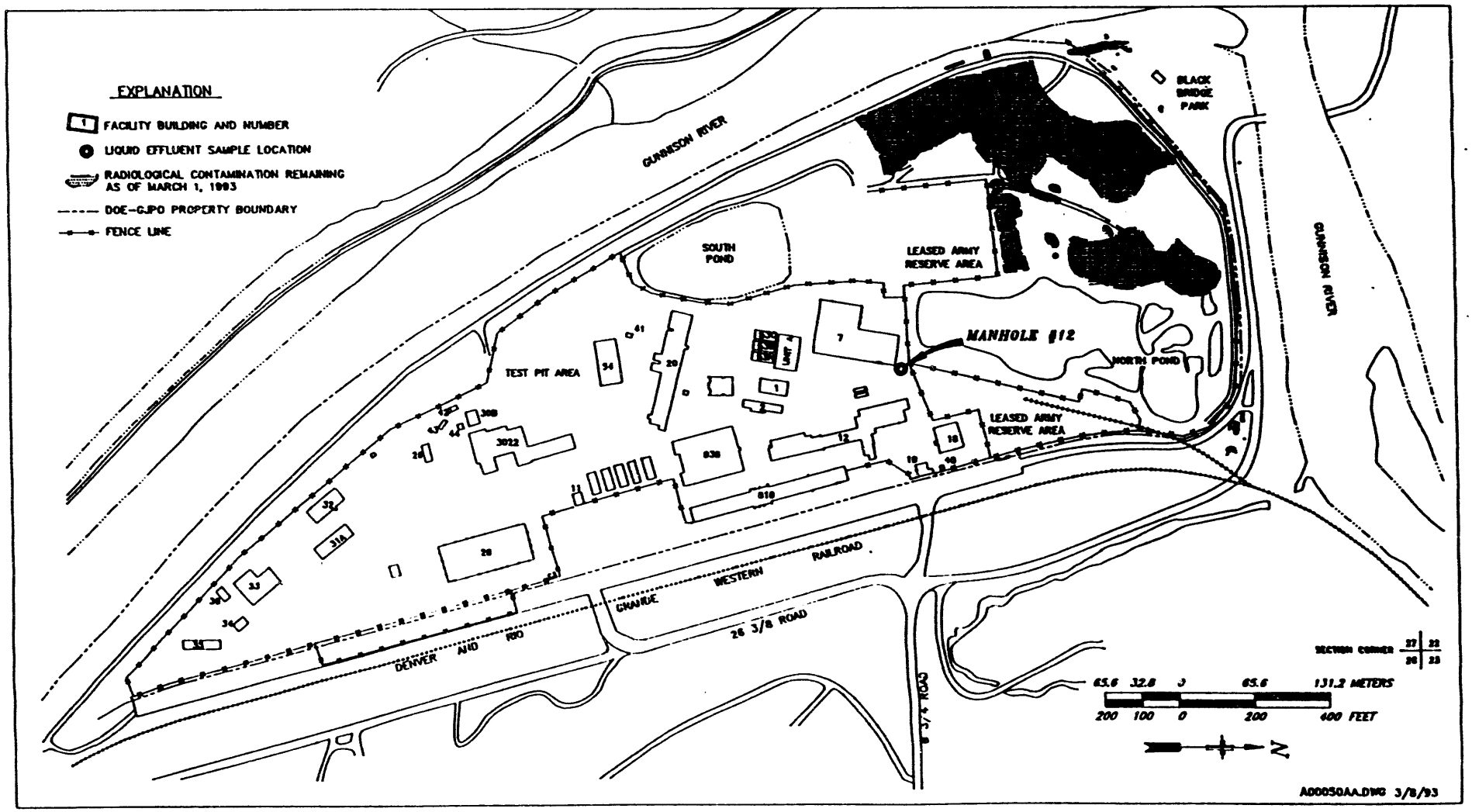


Figure 6. Sewer Effluent Sampling Location at the GJPO Facility

Surface Water

Surface-water sources at or near the GJPO facility include the Gunnison River, North Pond, and South Pond. The Gunnison River is adjacent to the facility, flowing along its west boundary, and the North and South Ponds are located on the facility property (Figure 7). All of these sources contain water perennially.

In accordance with the Colorado Water Quality Control Act, four state use classifications have been applied to the segment of the Gunnison River adjacent to the GJPO facility: (1) Recreation Class I, (2) Cold Water Aquatic Life Class I, (3) Domestic Water Supply, and (4) Agriculture. Table 5 lists the most stringent numeric water quality standards associated with these classifications. In the vicinity of the facility, the river is used for irrigation and for limited seasonal recreational activities such as boating, fishing, and swimming.

In 1990, surface-water sampling frequency was increased from a semiannual to a quarterly basis when remedial activities commenced at the GJPO facility. Quarterly sampling continued throughout 1991 and 1992. Grab samples were taken from six locations at or near the facility: four from the Gunnison River and one each from the North and South Ponds. Gunnison River samples were taken upstream of, adjacent to (two samples), and downstream of the facility near the shore of the river; the North and South Ponds were sampled near their west shores.

Surface waters were analyzed for specific conductance, pH, and alkalinity in the field and arsenic, barium, cadmium, calcium, chloride, chromium, iron, lead, magnesium, manganese, molybdenum, nitrate, potassium, selenium, sodium, sulfate, total organic carbon, vanadium, gross alpha, radium-226, radium-228, uranium-234, uranium-238, and thorium-230 in the laboratory. These analytes were chosen to characterize general water quality and to monitor the effects of contaminated alluvial ground water on surface-water quality. Maximum historical analyte concentrations and 1992 analyte concentrations within the Gunnison River are summarized and compared with state standards in Table 5. Several constituents listed in the table, such as copper, mercury, nickel, silver, zinc, nitrite, dissolved oxygen, and fecal coliform, were not analyzed for in 1992 because they were measured historically, and either no standards were exceeded or no relationship was found between alluvial ground-water contamination and Gunnison River concentrations for those analytes. A complete list of surface-water sampling results for 1992 is in Tables A-18 through A-21 in Appendix A.

Analyte concentrations observed in samples from the river, with the exception of sulfate and manganese, were below or within applicable state standards. Sulfate concentrations exceeded the standard at all sampling locations on the river in March, September, and December. Manganese concentrations exceeded state standards at upstream and downstream locations in March and at all locations in December. Maximum concentrations for manganese and sulfate in 1992 occurred at the on-site sampling locations. Currently, there is no evidence that discharges from the alluvial aquifer are contributing to these elevated concentrations in the Gunnison River. With the exception of uranium, no spatial or temporal patterns have been observed for any of the analyte concentrations.

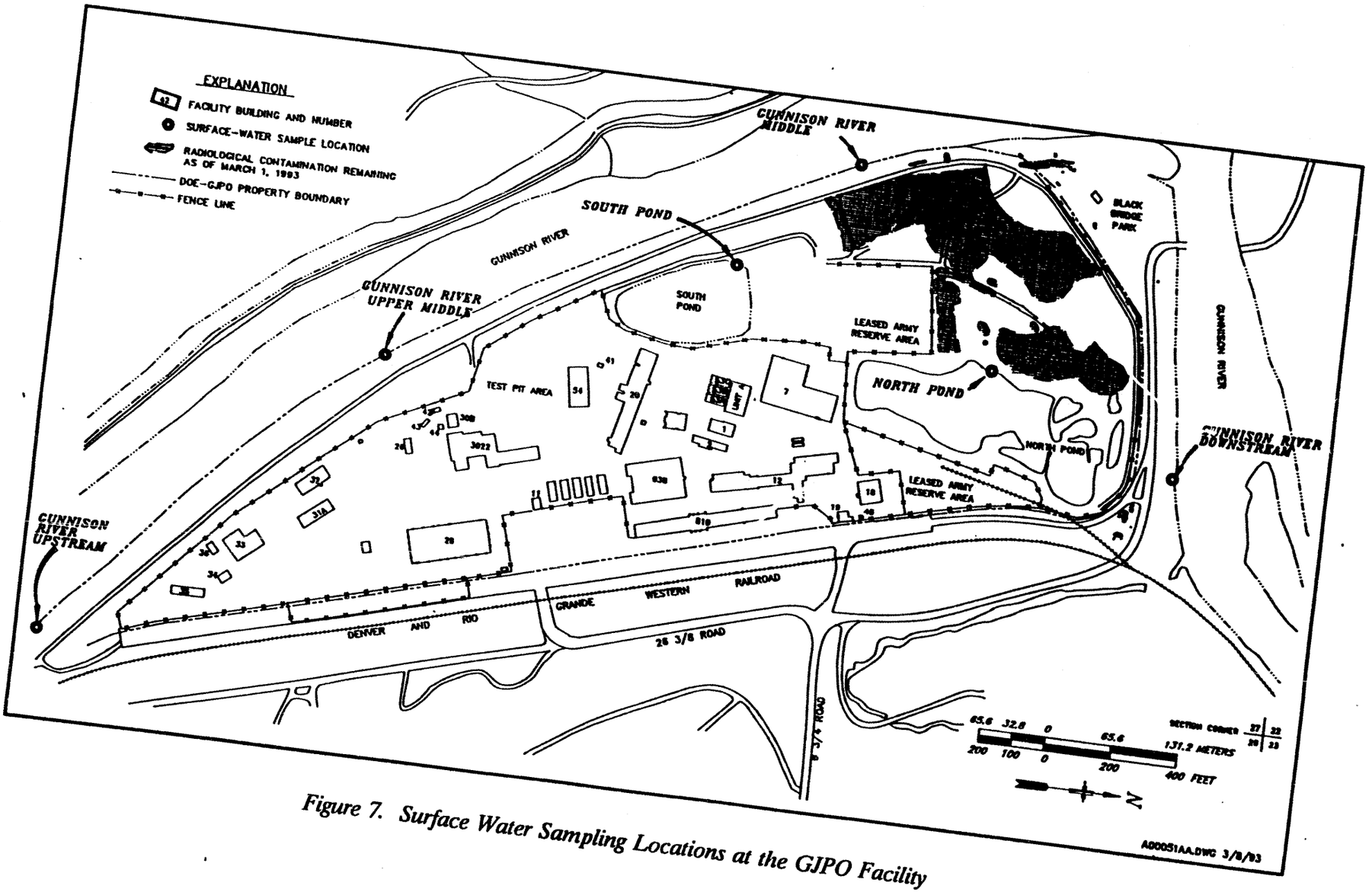


Figure 7. Surface Water Sampling Locations at the GJPO Facility

Table 5. Comparison of State of Colorado[a] Surface Water Quality Standards with 1992 and Historical Maximum Concentrations in the Gunnison River[b]

Constituent	State Standard		1992 Maximum[c]			Historical Maximum[c,d]		
			Up-Gradient	On-Site	Down-Gradient	Up-Gradient	On-Site	Down-Gradient
Field Measurements								
pH	6.5-9.0		7.5-8.22	7.65-8.74	8.31-8.65	7.2-9.04	7.29-9.19	7.33-9.01
Inorganics								
Chloride	250.0	mg/L	10.8	11	13.1	12.4	12.6	185
Dissolved Oxygen[e]	6.0	mg/L	---	---	---	9.5	9.3	9.5
Fecal Coliform	200	()[f]	---	---	---	1500	500	1300
Nitrate (as N)[g]	10.0	mg/L	1.197		1.19	1.717	1.604	2.711
Nitrite (as N)[h]	0.05	mg/L	---	---	---	<.304	---	<.304
Sulfate	250.0	mg/L	451	453	450	513	512	792
Metals								
Arsenic	0.360	mg/L	~0.0034	~0.0035	<0.003	0.007	<0.1	0.005
Cadmium	0.021	mg/L	<0.001	<0.001	<0.001	0.002	<0.002	<0.002
Copper	0.042	mg/L	---	---	---	0.056	0.013	0.015
Iron	0.300	mg/L	<0.01	<0.01	<0.01	0.43	<0.05	0.32
Lead	0.032	mg/L	0.0055	0.0035	<0.001	0.059	0.0118	0.001
Manganese	0.050	mg/L	0.0603	0.0643	0.085	0.137	0.066	0.109
Mercury	0.0001	mg/L	---	---	---	<0.002	<0.002	<0.002
Nickel	0.295	mg/L	---	---	---	0.005	0.003	0.007
Selenium	0.017	mg/L	0.0096	0.013	0.0062	0.009	0.014	0.008
Silver	0.001	mg/L	---	---	---	<0.0005	<0.0005	0.0005
Zinc	0.372	mg/L	---	---	---	19.2	0.38	0.97
Radiological								
Uranium[i]	40	pCi/L[j]	10.42	14.39	12	8.5	12.2	22.644

[a]Colorado Department of Health Water Quality Control Division, Standards for the Gunnison River segment, revised January 30, 1991.

[b]A "---" indicates no data available; a "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]The values are in units shown under the Standards column.

[d]Based on maximum concentrations observed from 1980 through 1991.

[e]Measured values represent the minimum measurement observed; compliance with the standard is indicated by a quantity larger than the standard.

[f]Colonies/100 mL

[g]Nitrate (as N) was derived for measured Nitrate using the conversion: Nitrate (as N) = $NO_3 \div 4.427$.

[h]Nitrite (as N) was derived for measured Nitrite using the conversion: Nitrite (as N) = $NO_2 \div 3.285$.

[i]Uranium concentrations which were measured in mg/L were converted to pCi/L for comparison purposes. The conversion assumes equilibrium and an activity of 0.666 pCi/L.

[j]1 pCi/L = 3.7×10^{-2} becquerels/L.

Uranium concentrations within the Gunnison River may have been affected by alluvial ground-water discharges but not to the extent that state water quality standards were exceeded. Figures B-5 through B-7 (Appendix B) show uranium concentrations over time at the upstream, on-site, and downstream sampling locations on the Gunnison River. Generally, concentrations of uranium are higher at the downstream location than at either the upstream or on-site locations, and increases and decreases in uranium concentrations at the three sampling locations occur at the same time. These trends may indicate a discharge of uranium-contaminated ground water into the Gunnison River. Uranium concentrations will continue to be monitored to detect further changes in surface-water quality that may occur in response to on-site mill tailings remediation.

The North and South Ponds are recharged by the shallow alluvial aquifer underlying the facility and express some of the same characteristics as the ground water (see Ground-Water Protection Program section of this report). Like the ground water, these surface water sources are contaminated by the leached products of uranium mill tailings. Although state surface water standards for the Gunnison River are not applicable to these water bodies, the standards provide a useful reference for contaminant evaluations. Concentrations of chloride, manganese, uranium-234 and -238, and sulfate in the North Pond exceeded state standards for these constituents during 1992. The maximum chloride concentration was 414 milligrams per liter (mg/L), the maximum manganese concentration was 0.287 mg/L, the maximum uranium-234 and -238 activity was 363.5 picocuries per liter (pCi/L), and the maximum sulfate concentration was 3,200 mg/L (see Tables A-18 through A-21, Appendix A). In the South Pond, concentrations of manganese, uranium-234 and -238, and sulfate exceeded state standards. The maximum manganese concentration was 1.8 mg/L, the maximum uranium-234 and -238 concentration was 474.94 pCi/L, and the maximum sulfate concentration was 1,900 mg/L (see Tables A-18 through A-21).

Remedial activities at the GJPO facility include removal of the source of ground- and surface-water contamination. When these sources have been removed, water quality should improve over time in the Gunnison River and North and South Ponds.

Environmental Permits and Document Preparation

Permits obtained in 1992 for the GJPO facility and GJPORAP operations are listed in the Compliance Summary section of this report.

Environmental documents completed in calendar year 1992 included

- Monthly remediation progress reports, submitted to the EPA in compliance with an agreement made with that agency concerning NESHAP, Subpart Q, Radon Emission Requirements.

- Annual NESHAP, Subpart H, report submitted to the EPA.

- *Grand Junction Projects Office Site Environmental Report for Calendar Year 1991* (Chem-Nuclear Geotech, Inc. 1992f).

- *Grand Junction Projects Office Facility, Grand Junction Projects Office Remedial Action Project, Monticello Mill Tailings Site Sampling and Analysis Plan for Environmental Monitoring* (Chem-Nuclear Geotech, Inc. 1992g).

- 1991 Radioactive Effluent and On-Site Discharge report for the GJPO.

Environmental Activities

Site Management Inspections

Inspections of the GJPO facility were conducted on a monthly basis during 1992. Site Management personnel were assisted by DOE and by Geotech representatives from Environmental Services, Quality Assurance, and Health, Safety, and Security. The inspections focused on waste management, pollution prevention, safety, and general housekeeping. The inspection team examined work areas, equipment storage areas, aboveground storage tanks, waste storage areas, and ongoing work. An important aspect of the inspections was the identification of potential environmental compliance issues related to the temporary storage of GJPO hazardous, radioactive, and mixed wastes.

Self-Assessments

The Self-Assessments Program was formally established in March 1991 at the GJPO facility to provide a comprehensive review process of activities associated with environmental protection, safety and health, management systems, and organizational structure. The objectives of the program are to achieve the highest level of safety for the public, environment, and employees at the facility and to provide feedback to management for the improvement of compliance and operations at the facility.

During 1992, 33 self-assessments were conducted for a variety of programs/procedures occurring on the GJPO facility. Topics of the self-assessments included management and organization, health and safety, and environmental concerns. To date, no conditions imminently hazardous to the environment or to health and safety have been found, although numerous corrective actions have been implemented, as a result of the self-assessments.

Environmental Training

A number of environmental training courses were conducted at the GJPO facility during 1992 in compliance with federal regulations and DOE orders. Following is a brief description of the courses:

- Environmental Awareness Training — developed by on-site personnel and offered quarterly to increase awareness of environmental regulations and requirements.

- Hazardous Waste Operations Refresher — provides an 8-hour SARA refresher course for all employees who may enter hazardous waste sites.

- General Employee Radiation Training — completed by employees who desire unescorted access to controlled areas on the facility.

- Radiation Worker Training — completed by all employees who work in radiologically controlled areas.

- Respirator Wearer Training/Respirator Supervisor Training — completed by all employees and supervisors of employees who work in areas containing potential respiratory hazards.

- Orientation for Health, Safety, and Security — developed for new employees; identifies potential hazards on the facility, discusses requirements of 29 CFR 1910, and familiarizes employees with facility security procedures.

- Health and Safety Update — provides an annual refresher of the Orientation for Health, Safety, and Security course.

- Hazardous Materials Transportation Training — this 8-hour course familiarizes employees involved with the shipment of hazardous wastes with the requirements of the U.S. Department of Transportation regulations and DOE Order 5480.3.

- Shipment of Radioactive and Other Hazardous Materials Training — this 36-hour class provides in-depth training in U.S. Department of Transportation regulations covered in 49 CFR 171-177; it emphasizes radioactive material packaging and transportation requirements.

- Emergency Response Cadre Training — provides training for personnel assigned to be first responders to emergencies (e.g., spills) on the facility.

- Asbestos Abatement Worker/Supervisor/Management Planner Training — familiarizes employees with the proper procedures for the remediation of facilities containing asbestos.

GJPORAP

A total of 161,589 tons of contaminated material was excavated from the GJPO facility in 1992 and transported to the state-owned temporary repository in Grand Junction. Phases II, III, IC, ID, V, and IV of the remedial action were completed, and Phase IVA was begun (see CERCLA subsection of the Compliance Summary section for details).

Commingled Waste Investigation Project

The Commingled Waste Investigation Project (CWIP) was developed to ensure that no radiologically contaminated materials commingled with hazardous wastes were transported to the state-owned temporary repository. Several commingled waste investigations were conducted in 1992 in conjunction with operational and remedial activities. In all cases,

analytical results indicated that hazardous wastes were not present and, therefore, that the material in question was not a commingled waste. However, stored wastes from three sites excavated in 1989 and 1990 remain on site, awaiting proper disposal.

One of the sites contained waste that was excavated from a sump located on the west side of Building 31 during 1989 GJPORAP activities. Analyses of the waste showed it to be a mixed waste, and it was stored in the DOE-GJPO's hazardous and mixed waste storage unit (Building 42). Although treatment options for this waste are being pursued, none have yet to be developed and approved.

Another site, a trench located in the hallway of Building 20, was excavated in 1990. Seven 55-gallon drums of liquid and sludge were collected during cleanup of the trench. Five of the drums contained trash produced during related asbestos abatement activities in the building, whereas two of the drums contained commingled wastes: one containing mercury as a component and the other containing acetone and methylene chloride as components. Like the mixed waste excavated from the sump, these wastes are awaiting the development of treatment options before they can be disposed.

A third commingled waste stored on the facility and awaiting disposal is the PCB-contaminated uranium mill tailings. This waste is discussed in the Compliance Summary section of this report.

Environmental Radiological Program Information

Radioactive Effluent Data

Radioactive effluent is released from the GJPO facility in four forms: liquid sewage discharged to the city of Grand Junction publicly owned treatment works, air particulate emissions, direct gamma radiation, and atmospheric radon. Effluent type and emitting sources are

- Liquid sewage — Analytical Chemistry Laboratory
- Point sources of air particulate emissions — Baghouse; ORNL Sample Preparation Trailer; Analytical Chemistry Laboratory
- Fugitive air particulate emissions — GJPORAP activities
- Direct gamma radiation — tailings pile
- Atmospheric radon — tailings pile, test pits, and radon calibration chambers

Radioactive liquid effluent is discharged from the Analytical Chemistry Laboratory to the city sewer system. Estimated total gross alpha and gross beta discharged during 1992 was 2.008×10^{-5} curies. Because of the numerous isotopes and elements discharged, and because of their small quantities, individual isotopes and elements were not measured in the effluent. Analysis for individual isotopes would have been conducted if the total gross alpha/gross beta concentration in any sample had been greater than five times the DCG reference value of the most stringent isotope released (plutonium-240; DCG reference value of 3×10^{-8} μCi/mL). This DCG reference value was not exceeded in any sample collected during 1992.

Radionuclide emissions from the three point sources were estimated according to 40 CFR 61, Appendix D. The source terms were combined and input into the dose model AIRDOSPC™. The resulting dose estimate was 1.100×10^{-3} mrem/yr EDE to the maximally exposed off-site individual (400 meters west-northwest of the GJPO facility).

Fugitive airborne emissions from the remedial action currently being performed at the GJPO also were estimated and modeled. Results of the modeling indicated an EDE of 5.600×10^{-2} mrem/yr, which, when combined with the dose resulting from point source emissions (1.100×10^{-3} mrem/yr), resulted in a total airborne radioparticulate dose of 5.710×10^{-2} mrem/yr (Table 6). Upon completion of the GJPO remediation, this air emission source will be eliminated.

Table 6. Effective Dose Equivalents Caused by Radiological Emissions from the GJPO Facility

	Standard	EDE
EDE from Airborne Radioparticulates	10 mrem/yr[a]	5.710×10^{-2} mrem/yr[b]
Collective Effective Dose (including Radon)	No Standard	9.508×10^{-3} person-rem/yr[c]
Total EDE to the Public[d]	.00 mrem/yr above background[e]	9 mrem/yr

[a]EPA standard (40 CFR 61.92), airborne emissions only (excludes radon).
[b]1 mrem/yr = 0.01 millisievert/yr.
[c]1 person-rem/yr = 0.01 person-sievert/yr.
[d]Sources of radiation included radon, air particulates, and gamma.
[e]DOE standard from DOE Order 5400.5; background dose rate for the Grand Junction area is 117 mrem/yr.

Gamma radiation was measured at 15 locations on and adjacent to the GJPO facility. All on-site and off-site locations yielded annual average measurements well below the DOE standard of 100 mrem/yr above background.

Concentrations of atmospheric radon were measured at 13 sampling locations on or near the GJPO facility during 1992. Annual average radon levels at all sampling locations were below the DCG established for DOE facilities. In addition, a radon source term derived from an earlier flux survey was input into the MICROAIRDOS™ model to determine the dose caused by radon emissions. The dose calculated by the model was 3.68×10^{-2} mrem/yr.

Total curies of each airborne radionuclide released during 1992 from the GJPO facility are listed in Table 7. As stated previously, total releases by radionuclide from the Analytical Chemistry Laboratory to the city sewer were not quantified. However, the estimated total release to the city sewer for all radionuclides was 2.008×10^{-5} curies. Because sewer releases were not considered a dose pathway, they were not included in the calculation of total EDE to the public.

Sampling programs and monitoring results for these effluent sources are discussed further in the Environmental Program Information section of this report.

Table 7. Airborne Source Terms Used in the MICROAIRDOS™ and AIRDOSPC™ Models for the GJPO

	Ci/yr[a]	g/yr	Half Life (yr)
All Point Sources Combined			
Americium-241	1.20×10^{-12}		458
Hydrogen-3	2.00×10^{-10}		12.5
Lead-210	3.00×10^{-7}		20
Plutonium-239	1.40×10^{-12}		2.4×10^{4}
Polonium-210	3.00×10^{-7}		3.2×10^{-1}
Radium-226	4.10×10^{-7}		1602
Strontium-90	3.60×10^{-11}		28
Thorium-230	4.00×10^{-7}		7.80×10^{4}
Thorium-232	4.90×10^{-8}		1.41×10^{10}
Uranium-238	7.00×10^{-7}		4.51×10^{9}
Uranium-235	4.80×10^{-9}		1.70×10^{8}
Uranium-234	3.80×10^{-11}		2.47×10^{5}
Uranium-Total		1.98	
Releases from 1992 Remedial Actions			
Lead-210	4.40×10^{-14}		
Radium-226	1.70×10^{-5}		
Thorium-230	1.70×10^{-5}		
Uranium-238	2.60×10^{-6}		
Uranium-235	1.80×10^{-8}		
Uranium-234	2.50×10^{-12}		
Uranium-Total		7.92	
Population Dose Source Terms			
Americium-241	1.20×10^{-12}		
Lead-210	3.00×10^{-7}		
Plutonium-239	1.40×10^{-12}		
Polonium-210	3.00×10^{-7}		
Radium-226	1.74×10^{-5}		
Radon-222	19.43		1.0×10^{-2}
Strontium-90	3.60×10^{-11}		
Thorium-230	1.74×10^{-5}		
Uranium-238	7.00×10^{-7}		
Uranium-235	4.80×10^{-9}		
Uranium-234	3.80×10^{-11}		
Uranium-Total		9.90	

[a] 1 Ci/yr = 3.7×10^{10} becquerels/yr.

Environmental Sampling for Radioactivity

Environmental sampling frequency, locations, and data tables for the GJPO radioactivity effluent sources are described fully in the Environmental Program Information section. Analytical methods and procedures are described in the Quality Assurance section.

Off-Site Dose Modeling

Off-site dose modeling was conducted at the GJPO during 1992 to determine compliance with NESHAP, Subpart H, and DOE Order 5400.5. Both DOE Order 5400.5 and NESHAP, Subpart H, limit airborne radioparticulate emissions (excluding radon) from DOE facilities so that no member of the public will receive an EDE of greater than 10 mrem/yr. DOE Order 5400.5 requires the calculation of a collective population dose. Results of the off-site dose modeling (Table 6) indicated an EDE to the maximally exposed off-site individual of 5.710×10^{-2} mrem/yr, well below the standard of 10 mrem/yr. The collective effective dose (population dose), including the radon source term, was 9.508×10^{-3} person-rem/yr (no standard established for this dose). Listed in Table 7 are the source terms used for these dose calculations.

Total off-site dose to the public was calculated by summing individual doses caused by radon, air-particulate, and gamma emissions. The resulting total EDE to the public was 9 mrem/yr, exclusive of background, well below the DOE dose limit of 100 mrem/yr above background. Background dose rate for the Grand Junction area is 117 mrem/yr.

Environmental Nonradiological Program Information

Nonradiological Effluent Data

Nonradiological effluent sources at the GJPO facility include the sewer system, Analytical Chemistry Laboratory, Boiler Plant, Petrology Laboratory, and uranium mill tailings piles. During 1992, sewer effluent constituent concentrations were below the threshold limits established by the city of Grand Junction's industrial pretreatment permit, with the exception of BOD and TSS concentrations. These threshold limit violations occurred during the December sampling event and are discussed in the Sewer Effluent subsection of this report.

Air emission permits from the Air Pollution Control Division, CDH, were obtained for the Analytical Chemistry Laboratory, Boiler Plant, and Petrology Laboratory. As a condition of the permits, emissions from these sources cannot exceed 20 percent opacity. During 1992, emissions from these sources met the opacity requirement.

In addition to the opacity requirement, the permit obtained for the Analytical Chemistry Laboratory established limits on the quantity of chemicals that could be used annually. The inventory of hazardous/radioactive chemicals maintained by the laboratory showed that no limits were exceeded in 1992.

The permit obtained for the Boiler Plant established limits on its annual gas consumption to ensure that individual pollutant emission rates would not exceed the limits established by Colorado Air Pollution Control Regulations. Gas consumption by the plant was within permitted limits in 1992.

Sampling during 1992 for PM_{10} from uranium mill tailings areas on the facility revealed that concentrations of this pollutant in the air were well below EPA-established limits. The Air Particulates subsection of this report contains a more detailed discussion of these sampling results.

Environmental Sampling for Nonradiological Pollution

In addition to effluent sampling, environmental sampling of surface water for nonradiological pollutants was conducted on and near the GJPO facility. The sampling program is described in the Environmental Program Information section of this document. Also contained in that section is a comparison of measured constituent levels with state surface water quality standards. During the 1992 sampling period, only the standards for manganese and sulfate were exceeded in the Gunnison River, and these excessive values were not a result of GJPO/GJPORAP activities.

SARA, Title III, Reporting

No SARA, Title III, reporting or notification occurred during 1992. A self-assessment of the DOE-GJPO's management of substances regulated by this act is currently being conducted.

Ground-Water Protection Program

Hydrogeology

Two hydrogeologic units are of importance at the GJPO facility: the unconsolidated alluvial aquifer along the Gunnison River and the underlying Morrison Formation aquitard. These two units and the Gunnison River are the controlling factors in ground-water flow and discharge into the river.

The alluvial aquifer underlying the GJPO facility occupies about 22.8 hectares (56.4 acres) of the Gunnison River floodplain; its thickness ranges from 6 to 21 meters (20 to 70 feet) but averages between 6 and 8 meters (20 and 25 feet). Bounded on the west and north by the river and on the east by the shales and sandstones of the Morrison Formation, the aquifer is open to the south where the alluvium continues along the east boundary of the river. Recharge is mainly from fluctuations in the river and, to a much lesser extent, precipitation. Ground water is discharged into the Gunnison River along the north and west boundaries of the facility. Aquifer pump tests show the hydraulic conductivity of the alluvium to be approximately 9 meters (30 feet) per day and the specific yield to be on the order of 0.05. Currently, the alluvial ground water is not used for any purpose.

The alluvial aquifer consists of two facies: a poorly sorted, unconsolidated basal gravel unit with a silt and sand matrix and an overlying unit of silty sand (Figure 8). Drill-hole logs from 1984 well installations indicate that both units are laterally continuous throughout the GJPO site.

Field observations suggest that a simple depositional model is adequate to represent the alluvial unit. The basal unit was deposited as the river migrated from the east to its present position. During this migration, older alluvial sediments to the west were eroded, and a new layer of sediment was left behind. This resulted in a continuous layer of gravel, sand, and silt. Periodic flood events deposited sand and silt on top of the gravels to produce the alluvial stratigraphy shown in Figure 8. Such a depositional model is similar to the fluvial-floodplain facies model of Allen (1970), the primary difference between the two being that the alluvium at the GJPO facility was deposited in a laterally more restricted and much higher energy environment. The result is a thicker and more consistent basal gravel unit.

Generally, ground water enters the alluvial aquifer as recharge from the Gunnison River along the southern perimeter of the GJPO facility. The upgradient ground water tends to exhibit water quality characteristics similar to those of the river, although major ion concentrations increase slightly as the ground-water residence time increases. Before uranium mill tailings were removed from the facility, ground water flowing beneath the facility became contaminated with the leached products of uranium mill tailings — uranium, arsenic, selenium, and molybdenum— and major ion concentrations increased significantly. Only uranium and molybdenum, however, were mobile enough to migrate to the northern discharge boundary of the aquifer.

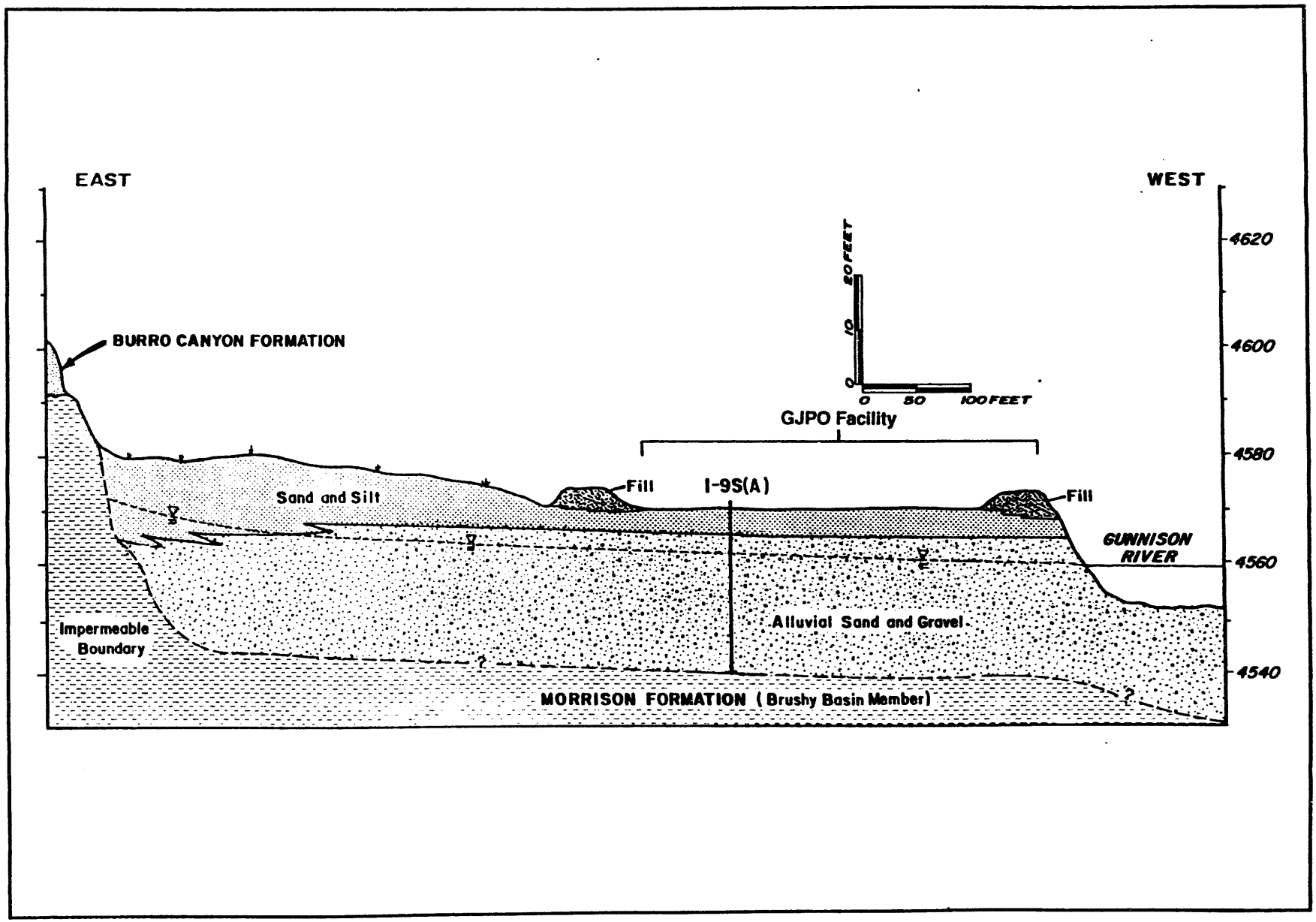


Figure 8. Geological Cross Section of the Alluvial Aquifer at the GJPO Facility

Underlying the alluvial aquifer at the GJPO facility is the Morrison Formation, which, in the Grand Junction area, comprises the Brushy Basin and Salt Wash Members. The formation is composed primarily of red, green, and gray shale, although minor lenticular sandstones are present in the upper Brushy Basin, and increasing sandstone facies occur in the Salt Wash. The Morrison serves as an aquitard beneath the facility, as it inhibits downward ground-water flow and prevents communication between the overlying alluvial aquifer and the underlying Entrada Sandstone aquifer.

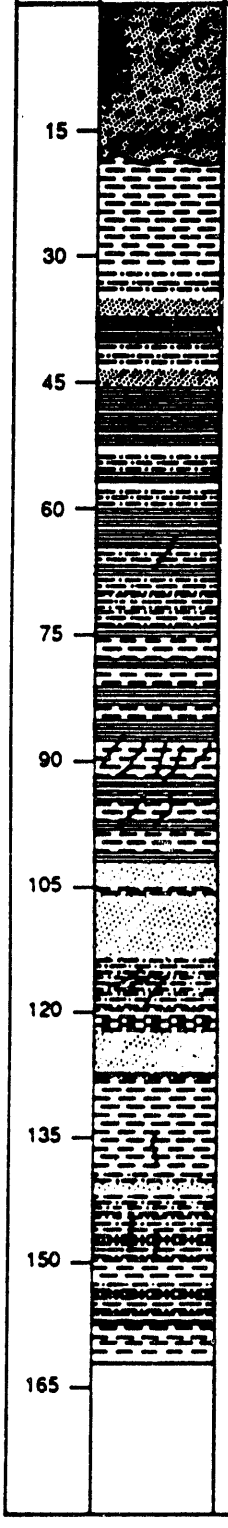
Regionally, the upper Brushy Basin Member is approximately 104 meters (340 feet) thick; however, about 12 meters (40 feet) of this unit has been removed from the GJPO facility site by the Gunnison River. Core samples from the facility show the Brushy Basin Member to contain mudstone (36 percent), siltstone (28 percent), shale (25 percent), and sandstone lenses (11 percent); a representative stratigraphic column is presented in Figure 9. Lohman (1965) reported that no known wells have been developed in the sandstones of the Brushy Basin, although some of the sandstone lenses bear small amounts of water.

At the base of the Brushy Basin is a conglomeratic sandstone which grades laterally into shale. The underlying Salt Wash Member is approximately 94 meters (310 feet) thick and contains lenticular sandstone units that produce minor amounts of water. Transmissivities measured in two producing wells in the Salt Wash ranged in value from 0.44 to 0.58 square meters (4.8 to 6.28 square feet) per day (Lohman 1965).

At the GJPO facility, the Gunnison River incises only the upper part of the Brushy Basin Member. Brushy Basin shales are exposed along the valley margins and underlie the alluvium. This framework results in free-flowing ground water in the alluvial aquifer because Brushy Basin shales act as a relatively impermeable boundary beneath the aquifer and along the valley margins.

Ground Water Monitoring Program

The objectives of the ground-water monitoring program at the GJPO are (1) to determine the baseline water quality and quantity conditions of the shallow alluvial aquifer underlying the site, (2) to characterize the type and extent of the contamination plume within the aquifer, (3) to verify compliance with federal and state ground water quality standards, and (4) to detect changes in water quality resulting from remedial action at the site. Although historical monitoring programs and characterization studies clearly defined baseline conditions with respect to inorganic constituents within the alluvial ground water, a characterization of organic constituents was not completed until 1992. Monitoring in 1992 focused on completing the organic characterization of the alluvial aquifer and pursuing the latter three monitoring objectives. Results of sample analyses were compared with federal standards promulgated by UMTRCA (40 CFR 192.12) and state standards promulgated by the Colorado Water Quality Control Act. The numeric standards applicable to the GJPO



Lithology and Fractures	Interval (feet)	Description
	0–19	Alluvium, sandy gravel, saturated below 3 ft. Sand, medium- to coarse-grained, subrounded, poorly sorted. Gravel, 10–250 mm, coarse pebble to cobble, well rounded.
	19–32	Mudstone, variegated, weak red (2.5 YR 4/2) and greenish gray (5 G 6/1), moist.
	32–38	Mudstone with intercalated siltstone and sandstone, variegated weak red (10 R 4/2) and light greenish gray (5 GY 7/1), fine-grained calcareous sandstone stringer at 37 ft., dark green gray (5 BG 4/1).
	38–42	Shale, variegated light greenish gray (5 GY 7/1) and dark reddish gray (10 R 4/1).
	42–44	Siltstone, greenish gray (5 GY 6/1), calcareous.
	44–47	Shale with intercalated, sandstone stringers at 44 ft. and 46 ft.
	47–54	Bentonitic shale with silt stringers, greenish gray (5 BG 6/1).
	54–59	Interbedded siltstone and shale.
	59–64	Bentonitic shales, variegated (5 GY 6/1 and 10 R 3/2).
	64–74	Siltstone with interbedded, bentonitic shale and some mudstone, variegated (5 GY 6/1 and 10 R 4/2), high-angle fracture at 67 ft.
	74–87	Interbedded mudstone and bentonitic shales, dominantly greenish gray (5 G 6/1).
	87–92	Mudstone, competent (5 G 6/1), zone of high-angle fractures, no alterations.
	92–102	Interbedded mudstone and shale, gray (5 G 6/1), two high-angle fractures at 97 ft.
	102–112	Sandstone, graded sequence, very fine silty sandstone, subangular, grades to medium grained, clean arenite with clear quartz and yellow (10 YR 8/6) grains. No apparent moisture.
	112–120	Siltstone, competent, variegated (5 G 6/1 and 10 R 4/2), two low-angle fractures at 115 ft with calcite infill, one high-angle fracture at 116 ft., no alterations.
	120–122	Mudstone, 0.4-ft.-thick bed of non-indurated, plastic clay.
	122–127	Sandstone, very fine to fine, calcareous, subangular (5 G 6/1 and 10 R 4/2). No apparent moisture.
	127–128	Siltstone, variegated (5 G 6/1 and 10 R 4/2).
	128–139	Mudstone, mottled but predominantly weak red (10 R 4/2), 90° fracture at 138 ft.
	139–150	Siltstone, variegated (5 G 6/1 and 10 R 4/2), sandstone stringer at 141 ft. and 145 ft.
	150–152	Mudstone, variegated (5 G 6/1 and 10 R 4/2), 0.3-ft.-thick bed of non-indurated clay at 151 ft.
	152–157	Siltstone, variegated (5 G 6/1 and 10 R 4/2), minor fault (3 ft. of visible displacement) at 157 ft.
	157–162	Mudstone, (5 G 6/2), greenish gray, with bentonitic shale at 159 ft. and 160 ft.

Figure 9. Representative Stratigraphic Column at the GJPO Facility (compiled from well log GJ87-19)

site are listed in Table 8 (Table 8 combines federal and state standards into one list for comparison purposes; the more stringent standard was listed if a difference existed).

From January to May 1992, water levels in 18 wells completed in the alluvial aquifer (see Figure 10 for locations) were measured monthly, and water quality samples were collected once in March. After this first sampling event, monitoring strategy and sampling methodology were revised. The revised strategy involved selecting a minimum number of wells located in strategic areas of the aquifer that would permit verification of ground-water restoration over time. Subsequently, the number of wells sampled during the June, September, and December sampling events was reduced from 18 to 13. The revision in sampling methodology involved the installation of dedicated bladder pumps, the use of which improved the sample quality and reduced the cost of the monitoring program. Well water levels continued to be measured monthly.

Two of the sampled wells, GJ84-9 and GJ84-10, are located upgradient from the mill tailings contamination plume and provide background water quality data. The remaining wells are located in or downgradient from contaminated/formerly contaminated areas of the facility and represent on-site and downgradient conditions.

Samples analyzed for radiological and inorganic constituents during the March sampling event were obtained with a peristaltic pump and filtered through a 0.45-μm filter in line with the collection vessel; samples analyzed for organic constituents were obtained with a Teflon bailer. During the June, September, and December sampling events, all samples were collected using dedicated bladder pumps. Sampling procedures are outlined in the *Environmental Procedures Catalog* (Chem-Nuclear Geotech, Inc. 1992h), which incorporates the standard procedures published by EPA (1985, 1987) and the DOE (1987). Radiological analytes included gross alpha, radium-226, radium-228, uranium-234, uranium-238, thorium-230, and thorium-232. Inorganic analytes included arsenic, barium, calcium, cadmium, chloride, chromium, iron, potassium, magnesium, manganese, molybdenum, sodium, nitrate, lead, selenium, sulfate, vanadium, and total dissolved solids. Organic analytes included Target Compound List (TCL) volatiles, semivolatiles, pesticides/PCBs, and herbicides (see Table A-22, Appendix A, for TCL constituents). Total organic carbon was added to the analyte list in December after organic characterization was completed. Total alkalinity, temperature, pH, and specific conductance were measured in the field to identify any change in general water quality. Analyses in 1992 did not include several constituents listed in Table 8, such as mercury and silver, because historically these constituents did not exceed standards.

Analytical results of samples collected from ground-water monitoring wells in 1992 are listed in Tables A-18 through A-21, A-23, and A-24 in Appendix A. Table 8 lists 1992 and historical maximum analyte concentrations and compares them with federal and state ground-water quality standards.

The highest uranium-234 and -238 activity recorded in 1992 (1,131.51 pCi/L) was measured in a sample from well 10-19N, located along the north boundary of the facility. Uranium activities above the UMTRCA standard of 30 pCi/L were recorded in samples from all the

Table 8. Comparison of Federal[a] and State of Colorado[b] Ground-Water Quality Standards with 1992 and Historical Maximum Concentrations in the Alluvial Aquifer[c]

Constituent	Federal/State Standard		1992 Maximum[d]			Historical Maximum[d,e]		
			Up-Gradient	On-Site	Down-Gradient	Up-Gradient	On-Site	Down-Gradient
Inorganics								
Nitrate (as N)[f]	10	mg/L	0.205	35.916	~0.042	1.581	69.573	2.711
Total Dissolved Solids[g]	2306	mg/L	2180	8840	6960	2040	10200	6270
Metals								
Arsenic	0.05	mg/L	~0.003	0.25	0.0161	0.01	0.68	0.011
Barium	1	mg/L	~0.0127	~0.0627	~0.0264	~0.0098	0.4	~0.0277
Cadmium	0.01	mg/L	<0.001	<0.001	<0.001	<0.002	0.055	<0.002
Chromium	0.05	mg/L	<0.006	<0.006	<0.006	0.01	0.112	0.048
Lead	0.05	mg/L	<0.001	0.0571	<0.001	<0.01	<0.01	<0.01
Mercury	0.002	mg/L	---	---	---	<0.001	<0.001	<0.001
Molybdenum	0.1	mg/L	~0.0133	0.434	0.304	0.023	19	0.413
Selenium	0.01	mg/L	~0.0025	0.0917	<0.02	<0.01	0.685	0.009
Silver	0.05	mg/L	---	---	---	<0.01	<0.01	<0.01
Radiological								
Gross Alpha (excluding Radon and Uranium)[h]	15	pCi/L[i]	<150	1073.14	504.4	71.02	800.8	234.2
Radium-226 and -228	5	pCi/L	0.1	0.3	0.1	1	36	0.3
Thorium-230 and -232[j]	60	pCi/L	<1	18	4.3	0.2	3.1	1.7
Uranium-234 and -238[k]	30	pCi/L	22.77	1131.51	995.6	199.8	5994	999
Herbicides								
2,4,5-TP (Silvex)	10	µg/L	<0.2	<0.2	<0.2	<0.17	<0.17	<0.17
2,4-D	100	µg/L	<0.25	<0.25	<0.25	<1.2	<1.2	<1.2
Pesticides and PCBs								
4,4'-DDT	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	0.1	µg/L	<0.05	<0.052	<0.05	<0.05	<0.05	<0.05
Dieldrin	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	0.2	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	0.1	µg/L	<0.05	<0.052	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	0.1	µg/L	<0.05	<0.052	<0.05	<0.05	<0.05	<0.05
Methoxychlor	100	µg/L	<0.5	<0.52	<0.5	<0.5	<0.5	<0.5
Polychlorinated biphenyls[l]	0.5	µg/L	<2	<2.1	<2	<1	<1	<1
Toxaphene	5	µg/L	<5	<5.2	<5	<1	<1	<1
gamma-BHC (Lindane)	4	µg/L	<0.05	<0.052	<0.05	<0.05	<0.05	<0.05

[a]Standards from the Uranium Mill Tailings Radiation Control Act, revised in 1986.

[b]Colorado Department of Health Water Quality Control Division, Basic Standards for Ground Water. "Potentially Usable Quality" classification, revised 10/17/91. Only the standards associated with constituents measured at the GJPO are listed in this table.

[c]A "---" indicates no data available; a "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[d]The values are in units shown under the Standards column.

[e]Based on maximum concentrations observed from 1984 through 1991.

[f]Nitrate (as N) was derived for measured nitrate using the conversion: Nitrate (as N) = NO_3÷4.427.

[g]This is a site-specific standard calculated as background x 1.25. The background value is based on two sampling events in 1992.

[h]Measured values represent total gross alpha minus uranium activity using assumptions in footnote j.

[i]1 pCi/L = 3.7 x 10^{-2} becquerels/L.

[j]Historical measurements are for thorium-230 only.

[k]Uranium concentrations measured in mg/L were converted to pCi/L for comparison purposes. The conversion assumes equilibrium and an activity of 0.666 pCi/µg.

[l]Polychlorinated biphenyls include Aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

Table 8 (continued). Comparison of Federal[a] and State of Colorado[b] Ground-Water Quality Standards with 1992 and Historical Maximum Concentrations in the Alluvial Aquifer[c]

Constituent	Federal/State Standard		1992 Maximum[d]			Historical Maximum[d,e]		
			Up-Gradient	On-Site	Down-Gradient	Up-Gradient	On-Site	Down-Gradient
Semivolatile Organics								
1,2-Dichlorobenzene	620	µg/L	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	620	µg/L	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	75	µg/L	<10	~1	<10	<10	<10	<10
2,4,5-Trichlorophenol	700	µg/L	<25	<25	<25	<50	<50	<50
2,4,6-Trichlorophenol	10	µg/L	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	21	µg/L	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	10	µg/L	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	14	µg/L	<10	<10	<10	<10	<10	<10
Hexachlorocyclo-pentadiene	49	µg/L	<10	<10	<10	<10	<10	<10
Isophorone	1050	µg/L	<10	<10	<10	<10	<10	<10
Nitrobenzene	10	µg/L	<10	<10	<10	<10	<10	<10
Pentachlorophenol	200	µg/L	<25	<25	<25	<50	<50	<50
bis(2-chloroethyl)ether	10	µg/L	<10	<10	<10	<10	<10	<10
Volatile Organics								
1,1,1-Trichloroethane	200	µg/L	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	28	µg/L	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	7	µg/L	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	5	µg/L	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	6	µg/L	<5	<5	<5	<5	<5	<5
Benzene	5	µg/L	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	5	µg/L	<5	<5	<5	<5	<5	<5
Chlorobenzene	300	µg/L	<5	<5	<5	<5	<5	<5
Ethyl benzene	680	µg/L	<5	<5	<5	<5	<5	<5
Tetrachloroethene	10	µg/L	<5	<5	<5	<5	<5	<5
Toluene	2420	µg/L	<5	<5	<5	<5	<5	<5
Trichloroethene	5	µg/L	<5	<5	<5	<5	<5	<5
Trihalomethanes	100	µg/L	<20	<20	<20	<20	<20	<20
Vinyl chloride	2	µg/L	<10	<10	<10	<10	<10	<10
cis-1,2-Dichloroethene	70	µg/L	<5	<5	<5	<5	<5	<5
trans-1,2-Dichloroethene	70	µg/L	<5	<5	<5	<5	<5	<5

[a]Standards from the Uranium Mill Tailings Radiation Control Act, revised in 1986.

[b]Colorado Department of Health Water Quality Control Division, Basic Standards for Ground Water. "Potentially Usable Quality" classification, revised 10/17/91. Only the standards associated with constituents measured at the GJPO are listed in this table.

[c]A "---" indicates no data available; a "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[d]The values are in units shown under the Standards column.

[e]Based on maximum concentrations observed from 1984 through 1991.

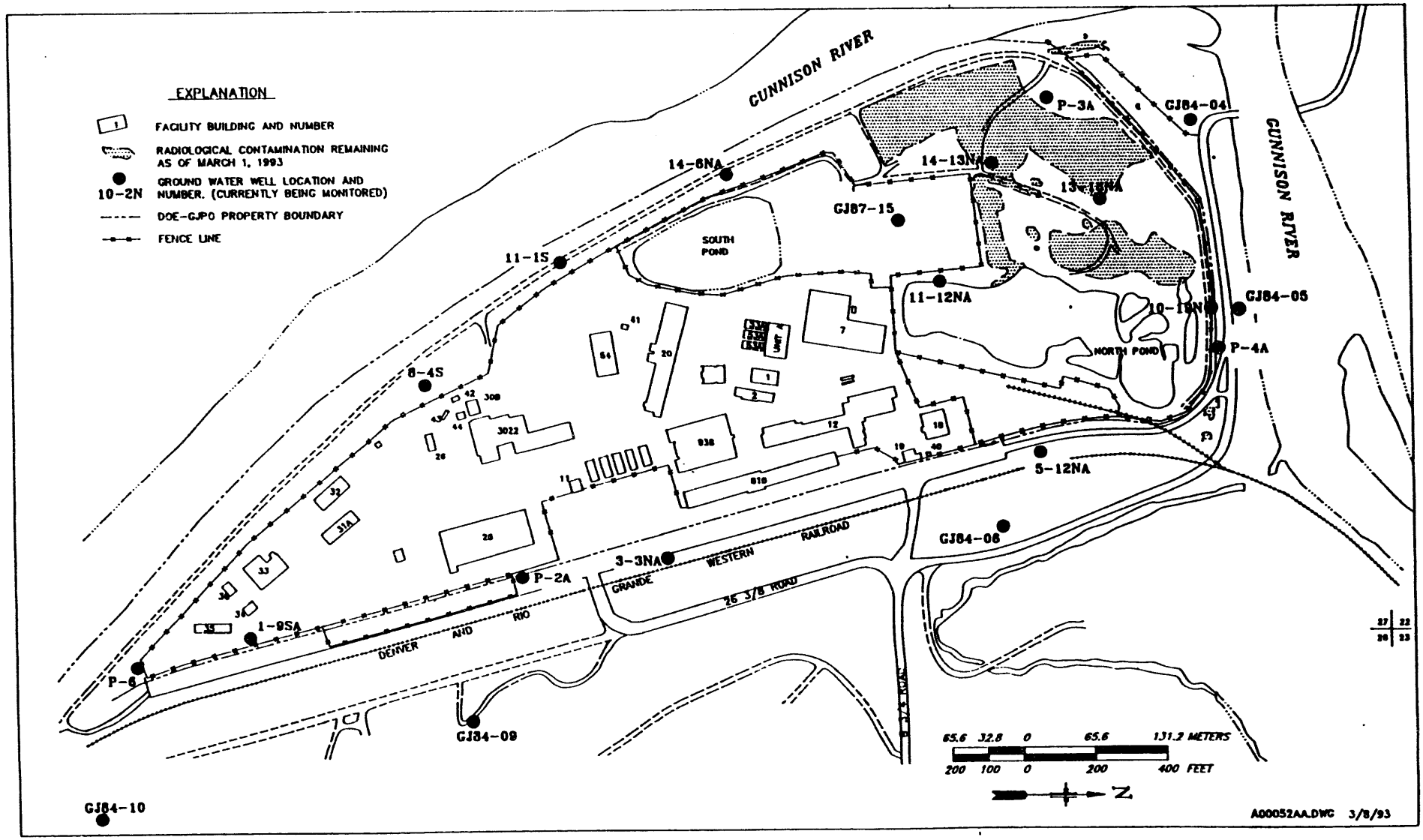


Figure 10. Ground-Water Sampling Locations at the GJPO Facility

alluvial wells at some time during the year, except for the two background wells (GJ84-9, GJ84-10) and wells 1-9SA, P-2A, and P-6, which are located in the southeast (nearest-to-upgradient) corner of the facility (Figure 11). A concentration contour map for uranium is shown in Figure 12 and illustrates the widespread uranium contamination.

Time-concentration graphs of uranium in samples collected from wells 10-19N and 14-6NA from December 1986 to December 1992 are in Appendix B, Figures B-8 and B-9. Well 10-19N consistently yielded samples containing the highest concentrations of uranium, whereas well 14-6NA yielded samples containing typical concentrations of uranium. For comparison, background uranium concentrations in well GJ84-10 for the same time period are illustrated in Figure B-10.

Molybdenum contamination also was widespread with the highest concentration in 1992 (0.434 mg/L) occurring in well 11-1S. Samples from eight other wells yielded molybdenum concentrations in excess of the UMTRCA ground-water standard of 0.1 mg/L (Figure 11). Concentrations of molybdenum in samples collected from well 10-19N over the last 6 years are illustrated in Figure B-11. Figure B-12 shows concentrations of molybdenum, which generally are below the UMTRCA standard but above background, in samples collected from well 14-6NA. Background molybdenum concentrations are illustrated in Figure B-13.

Arsenic contamination was localized in the vicinity of buried tailings in 1992. A sample from well 14-6NA yielded the highest concentration of 0.250 mg/L. The UMTRCA ground-water standard of 0.05 mg/L also was exceeded in samples from well GJ87-15 (Figure 11). As shown in Figure B-14, arsenic concentrations consistently exceed the UMTRCA standard over time in well 14-6NA. Background concentrations in well GJ84-10 are shown in Figure B-15 for comparison purposes.

Historically, radium-226 contamination appeared to be localized in the large buried tailings areas, which have now been remediated. In 1992, the state and UMTRCA radium-226 and -228 standard of 5 pCi/L was not exceeded in any well. Figure B-16 shows radium-226 concentrations over time in well 8-4S; background radium-226 concentrations are shown in Figure B-17.

Selenium contamination appeared in samples from wells P-2A, 13-16NA, 14-13NA, 8-4S, GJ87-15, 11-12NA, and 11-1S, which all yielded concentrations in excess of the UMTRCA ground-water standard of 0.01 mg/L (Figure 11). The highest selenium concentration, 0.0917 mg/L, was recorded in a sample from well 8-4S. Samples from well 8-4S consistently have contained selenium concentrations exceeding the UMTRCA standard (Figure B-18). In contrast, samples from background well GJ84-10 typically contain concentrations below the standard (Figure B-19).

Nitrate also occurred in elevated concentrations on the facility. Samples containing concentrations in excess of the UMTRCA ground-water standard of 10.0 mg/L (nitrate as N) were obtained from wells 11-1S and 8-4S (Figure 11).

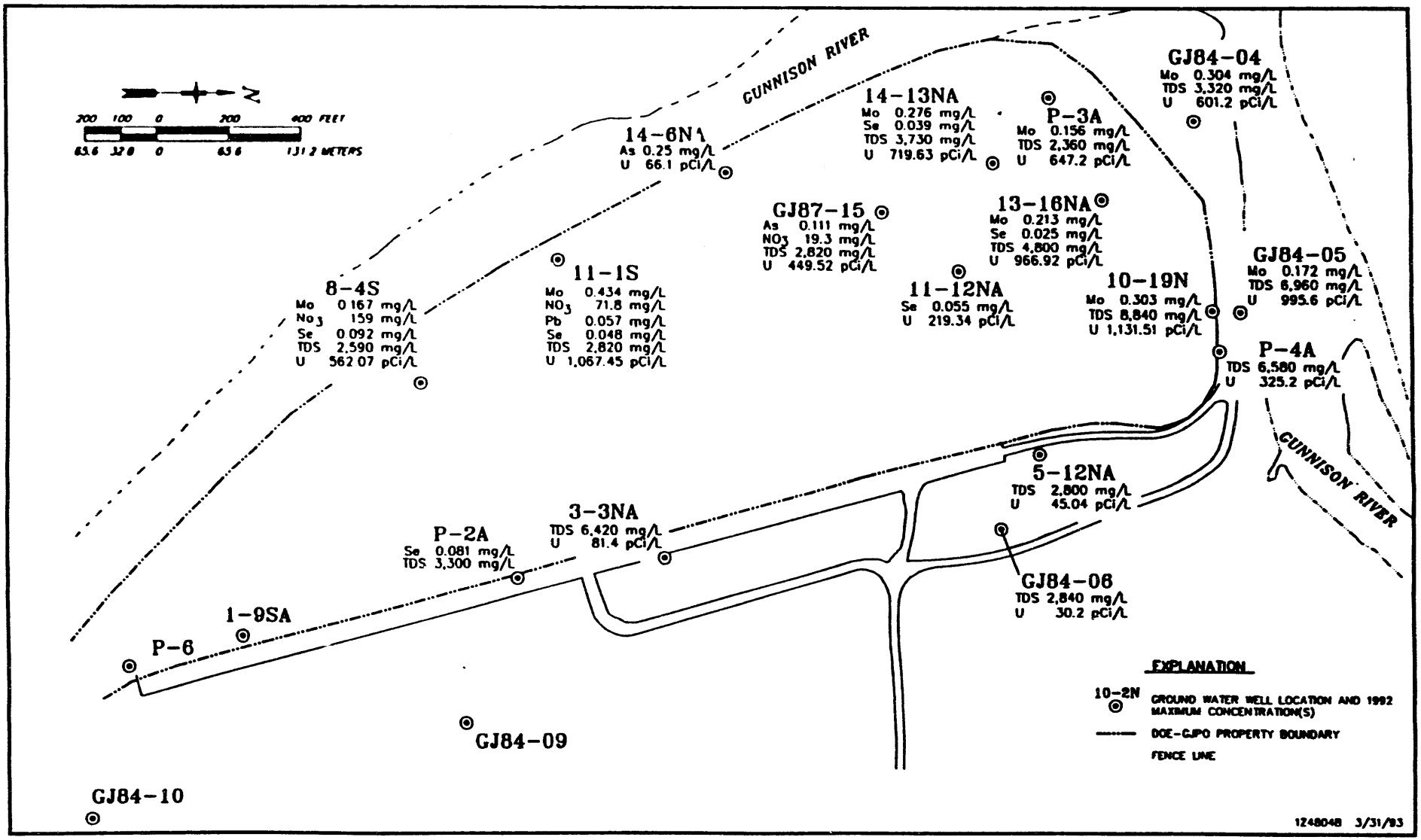


Figure 11. Concentrations of Ground-Water Analytes Exceeding Federal/State Standards in Alluvial Aquifer Well Samples at the GJPO

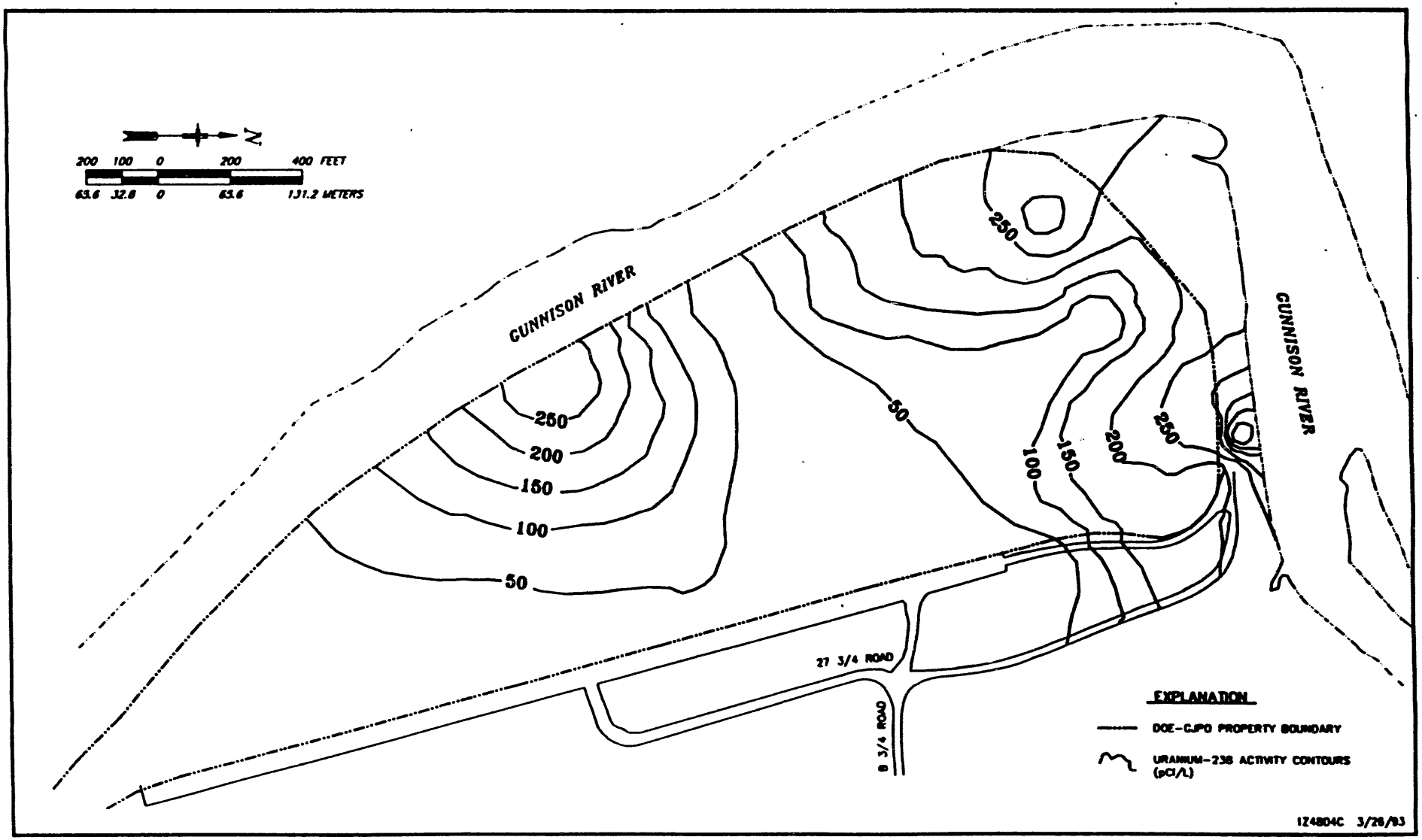


Figure 12. Uranium Activities in Ground Water at the GJPO in March 1992

Lead contamination (0.0571 mg/L) in excess of the UMTRCA standard of 0.05 mg/L appeared in one sample from well 11-1S. Samples from all other wells contained concentrations below the standard.

Total dissolved solid (TDS) concentrations exceeded the aquifer-specific state standard of 2,306 mg/L (1.25 x background) in 15 wells (Figure 11). The highest TDS concentration in 1992, 8,840 mg/L, occurred in well 10-19N.

During 1992, concentrations of arsenic, lead, molybdenum, nitrate, selenium, TDS, uranium-234 and -238, and gross alpha in samples from the alluvial aquifer exceeded ground-water quality standards (Figure 11). Figures C-1 through C-4 in Appendix C identify which analytes exceeded their respective standards at each well during the 1992 quarterly sampling events. The objective of future monitoring is to verify improvement in ground-water quality when remedial action is completed. Ground-water modeling of the alluvial aquifer predicts that the ground water will be cleaned to below applicable standards within 50 to 80 years after the uranium mill tailings source is removed. Uranium mill tailings removal began on the facility in 1990 and will continue through 1994.

Sampling for TCL semivolatiles, volatiles, pesticides/PCBs, and herbicides in the alluvial aquifer was conducted in March, June, and September 1992. All measured concentrations were below reporting limits in all samples, with the exception of that for chloromethane, which was detected in a sample from well 11-1S in March (Table A-23). Because the low concentration of chloromethane (10 μg/L) from this sample was equal to the reporting limit, and chloromethane was detected in higher concentrations in the trip blanks (61 μg/L and 30 μg/L), it is likely the compound was introduced during the sampling and analysis process. Thus, it is not considered an actual ground-water contaminant.

Semivolatile compounds that were not TCL constituents, but were detected, were labeled as tentatively identified compounds and are listed in Tables A-23 and A-24 (note: no tentatively identified compounds were detected in the June sampling event). Tentatively identified compounds were labeled as such because the laboratory instrument was not calibrated for that specific compound, which resulted in an estimated concentration. Because the estimated concentrations were less than 48 μg/L, these compounds are not considered potential contaminants in the ground water.

Quality Assurance

DOE-GJPO has a Quality Assurance (QA) Program that is consistent with and responsive to DOE Order 5700.6C, *Quality Assurance*, and that addresses the requirements of the American Society of Mechanical Engineers NQA-1 (1989), *Quality Assurance Program Requirements for Nuclear Facilities*. This program provides a structured approach for the application of quality assurance (QA) principles for work performed by the DOE and is implemented through the *Quality Assurance Manual* (Chem-Nuclear Geotech, Inc. 1992i).

The Quality Assurance Program Plan (QAPP) was developed for specific environmental monitoring and surveillance needs at the GJPO and is appended to the *Environmental Monitoring Plan* (Chem-Nuclear Geotech, Inc. 1992j). The primary purposes of the QAPP are to ensure that all data and documentation are valid, traceable, and meet requirements and that all environmental monitoring results are valid. In addition, the QAPP addresses organizational responsibility, design, procedures, records, and audits. Field and laboratory quality control (QC), human factors, chain-of-custody, performance reporting, and independent data verification are addressed by the organizations responsible for the work.

Sampling

Sampling methodologies used for environmental monitoring at the GJPO are described in the *Environmental Procedures Catalog* (Chem-Nuclear Geotech, Inc. 1992h) and follow EPA guidance given in *Test Methods for Evaluating Solid Waste* (EPA 1986). QA and QC measures are integrated into all sampling activities and ensure sample representativeness, sample accuracy, sample precision, data comparability, and data completeness.

Laboratory Analysis

The Analytical Chemistry Laboratory performs analyses in support of the environmental monitoring programs and implements QA requirements through the *Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures* (Chem-Nuclear Geotech, Inc. 1992k). The Analytical Chemistry Laboratory's objective is to provide high-quality analytical data that adequately meet the environmental monitoring program requirements. This objective is met by implementing laboratory protocol that ensures that a sample will retain its proper identity, that analytical results will be obtained and reported correctly, and that a well-documented sample history will be maintained. QA and QC measures addressed include organizational responsibility, training/qualification of personnel, laboratory records, records control, laboratory quality control, data acceptance, sample analysis, data recording and calculation, data deficiencies, chain-of-custody, procurement of services, and quality assessment. Sampling and analytical

methodologies are in the *Analytical Chemistry Laboratory Handbook of Analytical and Sample-Preparation Procedures* (Chem-Nuclear Geotech, Inc. 1992l).

The Analytical Chemistry Laboratory maintains an internal QC organization to provide independent data review and evaluation of QA data. The QA section staff includes in its audit program the evaluation of the effectiveness of the Analytical Chemistry Laboratory QC program. Subcontracted analytical laboratories are under the supervision of the Analytical Chemistry Laboratory. It is the responsibility of the Analytical Chemistry Laboratory to monitor a subcontracted laboratory's methodologies and sample results and ensure that proper QC is practiced.

Interlaboratory Quality Assurance Programs

The Analytical Chemistry Laboratory participates in the DOE interlaboratory QA program coordinated by the DOE Environmental Measurements Laboratory (EML) for radioactive materials, as mandated by DOE Order 5400.1. This interlaboratory program is designed to test the quality of the environmental measurements being reported to the DOE by its contractors. Real or synthetic environmental samples that have been prepared and thoroughly analyzed at the program laboratory are distributed to the contractors for analysis, and the results are compiled for comparison. The Analytical Chemistry Laboratory also participates in two non-DOE interlaboratory QA programs: (1) EPA's Environmental Measurement Systems Laboratory (EMSL) for radioactive materials and (2) the National Institute for Occupational Safety and Health Proficiency Analytical Testing Program for airborne metal, silica, and asbestos. A summary of the 1992 Analytical Chemistry Laboratory's results for the EML and EMSL interlaboratory QA programs is in Table 9. The precision of the Laboratory's results can be determined by comparing the reported laboratory values with the reference values listed in Table 9.

Data Management

Data management objectives for environmental monitoring activities are to maximize the usefulness and protection of important program information and to minimize the record-keeping burden and cost. These objectives were achieved in 1992 through establishment and implementation of continuous, systematic, and effective controls for each phase of a record's life cycle. Records were stored and kept in an identifiable, legible, and retrievable state and were protected against deterioration, damage, and loss.

Data management activities included receipt of laboratory results via network transfer, data entry of information, and formatting of data for report preparation. All environmental monitoring data were stored in an ORACLE data base on a MicroVAX computer system that is maintained by Geotech.

Records generated in support of environmental monitoring activities were subject to the requirements for maximum-level records, as specified in the *Environmental Monitoring Plan* (Chem-Nuclear Geotech, Inc. 1992j) and in Section 13 of Geotech's *Management Policies Manual* (Chem-Nuclear Geotech, Inc. 1992m).

Table 9. Summary of Analytical Results for the Interlaboratory Quality Assurance Programs

Analysis Date	Matrix Type	Isotope Analyzed	Reported Laboratory Value[a]	Reference Value[a]	Ratio Reported/ Reference
DOE Environmental Measurements Laboratory					
09/92	Air	Be-7	0.340	0.308	1.10
09/92	Air	Mn-54	0.270	0.259	1.04
09/92	Air	Co-57	0.580	0.640	0.91
09/92	Air	Co-60	0.360	0.306	1.18
09/92	Air	Sr-90	0.163	0.137	1.19
09/92	Air	Cs-134	0.410	0.372	1.10
09/92	Air	Cs-137	0.640	0.582	1.10
09/92	Air	Ce-144	0.390	0.433	0.90
09/92	Air	Pu-238	0.366	0.420	0.87
09/92	Air	Pu-239	0.400	0.450	0.89
09/92	Air	Am-241	0.285	0.320	0.89
09/92	Air	U	0.150	0.128	1.17
09/92	Soil	K-40	0.327	0.384	0.85
09/92	Soil	Sr-90	0.908	0.957	0.95
09/92	Soil	Cs-137	0.292	0.285	1.02
09/92	Soil	Pu-238	0.207	0.219	0.95
09/92	Soil	Pu-239	0.710	0.776	0.91
09/92	Soil	Am-241	0.212	0.183	1.16
09/92	Soil	U-234	0.312	0.292	1.07
09/92	Soil	U-238	0.318	0.296	1.07
09/92	Soil	U	0.110	0.232	0.47
09/92	Vegetn	K-40	0.090	0.101	0.89
09/92	Vegetn	Sr-90	0.284	0.489	0.58
09/92	Vegetn	Cs-137	0.250	0.292	0.86
09/92	Vegetn	Pu-238	0.104	0.125	0.83
09/92	Vegetn	Pu-239	0.310	0.379	0.82
09/92	Vegetn	Am-241	0.219	0.242	0.90
09/92	Water	H-3	0.141	0.118	1.19
09/92	Water	Mn-54	0.380	0.333	1.14
09/92	Water	Co-60	0.270	0.278	0.97
09/92	Water	Sr-90	0.202	0.220	0.92
09/92	Water	Cs-134	0.560	0.441	1.27
09/92	Water	Cs-137	0.370	0.290	1.28
09/92	Water	Ce-144	0.610	0.512	1.19
09/92	Water	Pu-238	0.192	0.197	0.97
09/92	Water	Pu-239	0.220	0.238	0.92
09/92	Water	Am-241	0.223	0.205	1.09
09/92	Water	U	0.940	0.906	1.04
Environmental Monitoring Systems Laboratory					
01/17/92	Water	Sr-90	19.00	20.00	.95
01/24/92	Water	Pu-239	16.40	16.80	.98
03/13/92	Water	U (nat)	25.27	25.31	.00
03/27/92	Air	Alpha	7.00	7.01	.00
03/27/92	Air	Beta	42.00	41.01	.02
03/27/92	Air	Sr-90	15.00	15.01	.00
03/27/92	Air	Cs-137	9.00	10.00	.90
05/15/92	Water	Gross Alpha	18.00	15.01	.20
05/15/92	Water	Gross Beta	43.67	44.00	.99
07/24/92	Water	U (nat)	3.87	4.00	.97
08/21/92	Water	Pu	8.73	9.00	.97
08/28/92	Air	Alpha	25.00	30.00	.83
08/28/92	Air	Beta	72.33	69.01	.05
08/28/92	Air	Sr-90	24.33	25.00	.97
08/28/92	Air	Cs-137	19.67	18.01	.09
09/18/92	Water	Gross Alpha	24.67	45.00	.55
09/18/92	Water	Gross Beta	47.33	50.00	.95
10/09/92	Water	C0-60	9.00	10.00	.90
10/09/92	Water	Zn-65	138.67	148.00	.94
10/09/92	Water	Ru-106	165.67	175.00	.95
10/09/92	Water	Cs-134	6.67	8.00	.83
10/09/92	Water	Cs-137	9.00	8.01	.12
10/09/92	Water	Ba-133	79.67	74.01	.08
10/23/92	Water	H-3	5946.33	5962.01	.00
11/06/92	Water	Ra-226	7.37	7.50	.98
11/06/92	Water	Ra-228	5.43	5.01	.09

[a]All values are relative. Exponents are not included; therefore, values do not indicate actual concentrations.

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Appendix A

Monitoring Data

Table A-1. Radon Data for Grand Junction, First Quarter 1992
(Date Installed: 12/27/1991; Date Removed: 04/03/1992)

Sample Location	Detector Number	Reported Radon[a] Concentration (pCi/L)	Corrected Radon[b] Concentration (pCi/L)	Radon Concentration (μCi/mL)
RN-G-01	3176826	0.3	0.4	4.0E-10
RN-G-01	3176841	0.3	0.4	4.0E-10
RN-G-03	3176823	0.8	1.0	1.0E-09
RN-G-03	3176836	0.4	0.4	4.0E-10
RN-G-04	3176824	1.1	1.3	1.3E-09
RN-G-04	3176829	0.4	0.4	4.0E-10
RN-G-05	3176832	0.3	0.3	3.0E-10
RN-G-05	3176835	0.3	0.4	4.0E-10
RN-G-08	3176830	<0.1	<0.1	<1.0E-10
RN-G-08	3176834	1.0	1.2	1.2E-09
RN-G-09	3176818	0.8	1.0	1.0E-09
RN-G-09	3176838	0.6	0.7	7.0E-10
RN-G-10	3176820	0.3	0.3	3.0E-10
RN-G-10	3176831	0.5	0.6	6.0E-10
RN-G-17	3176851	0.4	0.5	5.0E-10
RN-G-17	3176854	0.6	0.7	7.0E-10
RN-G-18	3176846	0.1	0.1	1.0E-10
RN-G-18	3176863	0.5	0.6	6.0E-10
RN-G-19	3176843	0.4	0.5	5.0E-10
RN-G-19	3176868	0.3	0.3	3.0E-10
RN-G-23	3176845	0.7	0.8	8.0E-10
RN-G-23	3176856	0.2	0.2	2.0E-10
RN-G-24	3176848	0.5	0.6	6.0E-10
RN-G-24	3176857	0.6	0.7	7.0E-10
RN-G-25	3176865	0.4	0.5	5.0E-10
RN-G-25	3176866	0.2	0.3	3.0E-10

[a]The reported radon concentration value is the result received from the subcontracted laboratory. A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).

[b]The corrected radon concentration value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-2. Radon Data for Grand Junction, Second Quarter 1992
(Date Installed: 04/03/1992; Date Removed: 06/29/1992)

Sample Location	Detector Number	Reported Radon[a] Concentration (pCi/L)	Corrected Radon[b] Concentration (pCi/L)	Radon Concentration (μCi/mL)
RN-G-01	3176905	0.9	0.9	9.0E-10
RN-G-01	3176916	1.4	1.4	1.4E-09
RN-G-03	3176910	0.6	0.6	6.0E-10
RN-G-03	3176931	0.6	0.6	6.0E-10
RN-G-04	3176902	0.3	0.3	3.0E-10
RN-G-04	3176913	0.9	0.9	9.0E-10
RN-G-05	3176896	1.0	1.0	1.0E-09
RN-G-05	3176906	0.3	0.3	3.0E-10
RN-G-08	3176919	0.2	0.2	2.0E-10
RN-G-08	3176922	0.8	0.8	8.0E-10
RN-G-09	3176927	1.3	1.3	1.3E-09
RN-G-09	3176943	1.7	1.6	1.6E-09
RN-G-10	3176898	0.3	0.3	3.0E-10
RN-G-10	3176917	<0.1	<0.1	<1.0E-10
RN-G-17	3176912	0.8	0.8	8.0E-10
RN-G-17	3176925	0.5	0.5	5.0E-10
RN-G-18	3176932	0.3	0.3	3.0E-10
RN-G-18	3176938	1.1	1.1	1.1E-09
RN-G-19	3176915	0.9	0.9	9.0E-10
RN-G-19	3176933	0.6	0.6	6.0E-10
RN-G-23	3176907	0.3	0.3	3.0E-10
RN-G-23	3176935	0.4	0.4	4.0E-10
RN-G-24	3176895	1.1	1.1	1.1E-09
RN-G-24	3176911	0.4	0.4	4.0E-10
RN-G-25	3176918	0.4	0.4	4.0E-10
RN-G-25	3176937	0.9	0.9	9.0E-10

[a]The reported radon concentration value is the result received from the subcontracted laboratory. A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).

[b]The corrected radon concentration value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-3. Radon Data for Grand Junction, Third Quarter 1992
(Date Installed: 06/29/1992; Date Removed: 09/28/1992)

Sample Location	Detector Number	Reported Radon[a] Concentration (pCi/L)	Corrected Radon[b] Concentration (pCi/L)	Radon Concentration (μCi/mL)
RN-G-01	3557715	0.3	0.3	3.0E-10
RN-G-01	3557731	0.5	0.5	5.0E-10
RN-G-03	3553210	0.8	0.9	9.0E-10
RN-G-03	3557719	0.5	0.5	5.0E-10
RN-G-04	3553231	0.5	0.5	5.0E-10
RN-G-04	3557722	0.4	0.4	4.0E-10
RN-G-05	3557718	0.7	0.8	8.0E-10
RN-G-05	3557730	0.3	0.3	3.0E-10
RN-G-08	3553215	0.3	0.4	4.0E-10
RN-G-08	3553219	0.2	0.2	2.0E-10
RN-G-09	3553217	0.6	0.6	6.0E-10
RN-G-09	3557714	0.6	0.6	6.0E-10
RN-G-10	3553227	0.6	0.6	6.0E-10
RN-G-10	3557728	0.4	0.4	4.0E-10
RN-G-17	3553222	0.5	0.5	5.0E-10
RN-G-17	3557725	0.4	0.4	4.0E-10
RN-G-18	3553206	0.7	0.8	8.0E-10
RN-G-18	3557727	0.7	0.8	8.0E-10
RN-G-19	3553202	0.4	0.4	4.0E-10
RN-G-19	3553211	0.4	0.4	4.0E-10
RN-G-23	3557716	0.3	0.4	4.0E-10
RN-G-23	3557729	0.5	0.5	5.0E-10
RN-G-24	3553212	0.6	0.6	6.0E-10
RN-G-24	3557732	0.8	0.9	9.0E-10
RN-G-25	3553204	0.8	0.9	9.0E-10
RN-G-25	3553225	0.6	0.6	6.0E-10

[a]The reported radon concentration value is the result received from the subcontracted laboratory.

[b]The corrected radon concentration value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-4. Radon Data for Grand Junction, Fourth Quarter 1992
(Date Installed: 09/28/1992; Date Removed: 12/28/1992)

Sample Location	Detector Number	Reported Radon[a] Concentration (pCi/L)	Corrected Radon[b] Concentration (pCi/L)	Radon Concentration (μCi/mL)
RN-G-03	3557758	0.6	0.6	6.0E-10
RN-G-03	3557773	0.5	0.5	5.0E-10
RN-G-04	3557759	0.4	0.4	4.0E-10
RN-G-04	3557799	0.4	0.4	4.0E-10
RN-G-05	3557760	0.5	0.5	5.0E-10
RN-G-05	3557766	0.5	0.5	5.0E-10
RN-G-09	3557764	0.7	0.7	7.0E-10
RN-G-09	3557777	0.8	0.8	8.0E-10
RN-G-10	3557761	1.0	1.0	1.0E-09
RN-G-10	3557765	<0.1	<0.1	<1.0E-10
RN-G-17	3557779	0.2	0.2	2.0E-10
RN-G-17	3557791	0.5	0.5	5.0E-10
RN-G-18	3557786	0.8	0.8	8.0E-10
RN-G-18	3557796	0.8	0.8	8.0E-10
RN-G-19	3557793	0.6	0.6	6.0E-10
RN-G-19	3557795	0.4	0.4	4.0E-10
RN-G-23	3557783	0.6	0.6	6.0E-10
RN-G-23	3557787	0.2	0.2	2.0E-10
RN-G-24	3557778	0.3	0.3	3.0E-10
RN-G-24	3557792	0.5	0.5	5.0E-10
RN-G-25	3557784	0.3	0.3	3.0E-10
RN-G-25	3557798	0.4	0.4	4.0E-10

[a]The reported radon concentration value is the result received from the subcontracted laboratory. A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).

[b]The corrected radon concentration value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-5. Analytical Air Sample Results for Station AIR-G-1 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226		Thorium-230			Uranium		
						(pCi/F)[b]	(μCi/mL)	(pCi/F)	(μCi/mL)	(pg/mL)	(μg/F)[c]	(μg/m³)	(μCi/mL)
AIR-G-1	01/31/1992	MLY-673	5916046	37	96.67	<1.5	<2.5E-16	0.6	9.9E-17	5.1E-09	2.7	4.4E-04	3.0E-16
AIR-G-1	02/29/1992	MLY-913	5916027	36.6	98.22	1.1	1.8E-16	<0.6	<9.8E-17	<5.1E-09	1.1	1.8E-04	1.2E-16
AIR-G-1	03/12/1992	MLY-922	5916018	36	99.92	<2.2	<3.6E-16	<0.6	<9.8E-17	<5.1E-09	1.0	1.6E-04	1.1E-16
AIR-G-1	04/17/1992	MLY-768	5918856	35	100.04	<2.9	<4.9E-16	1.0	1.7E-16	8.7E-09	1.0	1.7E-04	1.1E-16
AIR-G-1	05/29/1992	MLY-867	5918832	34.5	78.21	<2.4	<5.2E-16	<0.5	<1.1E-16	<5.6E-09	1.2	2.6E-04	1.7E-16
AIR-G-1	06/26/1992	MLY-707	5918817	33.7	100.42	<2.2	<3.8E-16	1.2	2.1E-16	1.1E-08	2.1	3.7E-04	2.4E-16
AIR-G-1	07/09/1992	MLY-716	5916387	33.6	100.11	<1.8	<3.1E-16	<0.5	<8.7E-17	<4.5E-09	1.1	1.9E-04	1.3E-16
AIR-G-1	08/21/1992	MLY-888	5916343	33.8	74.85	<2.9	<6.7E-16	0.7	1.6E-16	8.4E-09	1.3	3.0E-04	2.0E-16
AIR-G-1	09/25/1992	09221992-01	5916299	34	77.30	3.5	7.8E-16	0.7	1.6E-16	8.1E-09	1.4	3.1E-04	2.1E-16
AIR-G-1	10/30/1992	10261992-01	5916260	35	101.31	<3.7	<6.1E-16	0.8	1.3E-16	6.8E-09	1.1	1.8E-04	1.2E-16
AIR-G-1	11/09/1992	11091992-01	5916251	36	177.37	0.7	6.5E-17	0.5	4.6E-17	2.4E-09	1.2	1.1E-04	7.4E-17
AIR-G-1	12/28/1992	12281992-01	5916206	37	76.63	0.6	1.2E-16	<0.3	<6.2E-17	<3.2E-09	0.9	2.0E-04	1.3E-16

[a] A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).
[b] Picocuries per filter.
[c] Micrograms per filter.

Table A-6. Analytical Air Sample Results for Station AIR-G-2 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226 (pCi/F)[b]	Radium-226 (μCi/mL)	Thorium-230 (pCi/F)	Thorium-230 (μCi/mL)	Thorium-230 (pg/mL)	Uranium (μg/F)[c]	Uranium (μg/m^3)	Uranium (μCi/mL)
AIR-G-2	01/31/1992	MLY-674	5916045	37	95.37	1.6	2.7E-16	1.1	1.8E-16	9.5E-09	1.2	2.0E-04	1.3E-16
AIR-G-2	02/29/1992	MLY-914	5916026	36.6	98.40	12.9	2.1E-15	11.6	1.9E-15	9.8E-08	5.2	8.5E-04	5.7E-16
AIR-G-2	03/12/1992	MLY-923	5916017	36	99.23	10.1	1.7E-15	7.1	1.2E-15	6.0E-08	7.4	1.2E-03	8.1E-16
AIR-G-2	05/29/1992	MLY-868	5918831	34.5	77.77	<4.7	<1.0E-15	1.2	2.6E-16	1.4E-08	1.8	3.9E-04	2.6E-16
AIR-G-2	06/26/1992	MLY-708	5918816	33.7	100.43	2.0	3.5E-16	1.1	1.9E-16	9.9E-09	2.3	4.0E-04	2.7E-16
AIR-G-2	07/10/1992	MLY-717	5916386	33.6	99.84	<2.9	<5.1E-16	1.8	3.2E-16	1.6E-08	3.1	5.4E-04	3.6E-16
AIR-G-2	08/21/1992	MLY-889	5916342	33.8	74.80	<2.7	<6.3E-16	1.5	3.5E-16	1.8E-08	1.8	4.2E-04	2.8E-16
AIR-G-2	09/25/1992	09221992-02	5916298	34	76.98	<1.9	<4.3E-16	1.2	2.7E-16	1.4E-08	2.2	4.9E-04	3.3E-16
AIR-G-2	10/30/1992	10261992-02	5916259	35	100.56	<2.1	<3.5E-16	0.6	1.0E-16	5.2E-09	1.1	1.8E-04	1.2E-16
AIR-G-2	11/09/1992	11091992-02	5916250	36	177.05	1.0	9.2E-17	1.0	9.2E-17	4.8E-09	1.3	1.2E-04	8.0E-17
AIR-G-2	12/28/1992	12281992-02	5916205	37	76.10	0.7	1.5E-16	0.5	1.0E-16	5.4E-09	0.9	2.0E-04	1.3E-16

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).
[b]Picocuries per filter.
[c]Micrograms per filter.

Table A-7. Analytical Air Sample Results for Station AIR-G-3 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226		Thorium-230			Uranium		
						(pCi/F)[b]	(μCi/mL)	(pCi/F)	(μCi/mL)	(pg/mL)	(μg/F)[c]	(μg/m^3)	(μCi/mL)
AIR-G-3	01/31/1992	MLY-675	5916044	37	95.91	<1.2	<2.0E-16	0.8	1.3E-16	6.8E-09	1.2	2.0E-04	1.3E-16
AIR-G-3	02/29/1992	MLY-915	5916025	36.6	99.00	<1.2	<1.9E-16	<0.5	<8.1E-17	<4.2E-09	1.2	1.9E-04	1.3E-16
AIR-G-3	03/12/1992	MLY-924	5916016	36	99.40	2.5	4.1E-16	0.5	8.2E-17	4.2E-09	1.2	2.0E-04	1.3E-16
AIR-G-3	04/17/1992	MLY-770	5918854	35	56.28	<2.9	<8.7E-16	<0.5	<1.5E-16	<7.7E-09	1.2	3.6E-04	2.4E-16
AIR-G-3	05/29/1992	MLY-869	5918830	34.5	78.12	<1.6	<3.5E-16	0.8	1.7E-16	9.0E-09	1.2	2.6E-04	1.7E-16
AIR-G-3	06/26/1992	MLY-709	5918815	33.7	101.14	3.7	6.4E-16	0.8	1.4E-16	7.1E-09	1.8	3.1E-04	2.1E-16
AIR-G-3	07/08/1992	MLY-718	5916385	33.6	123.59	<2.5	<3.5E-16	0.5	7.1E-17	3.7E-09	2.0	2.8E-04	1.9E-16
AIR-G-3	08/21/1992	MLY-890	5916341	33.8	74.80	<2.0	<4.7E-16	0.7	1.6E-16	8.4E-09	1.3	3.0E-04	2.0E-16
AIR-G-3	09/25/1992	09221992-03	5916297	34	75.04	<1.3	<3.0E-16	1.9	4.4E-16	2.3E-08	1.7	3.9E-04	2.6E-16
AIR-G-3	10/30/1992	10261992-03	5916258	35	100.71	<2.5	<4.2E-16	0.5	8.3E-17	4.3E-09	1.2	2.0E-04	1.3E-16
AIR-G-3	11/09/1992	11091992-03	5916249	36	103.00	<0.6	<9.5E-17	0.4	7.5E-17	3.8E-09	1.1	1.7E-04	1.2E-16
AIR-G-3	12/28/1992	12281992-03	5916204	37	77.00	0.9	1.9E-16	0.3	7.2E-17	3.7E-09	0.9	1.9E-04	1.2E-16

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).
[b]Picocuries per filter.
[c]Micrograms per filter.

Table A-8. Suspended Particulates (PM_{10}) Data for Station AIR-G-1 during 1992

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[a]	Conc. ($\mu g/m^3$)
AIR-G-1	01/03/1992	MLY-658	5916061	37	24.31	0.0287	19
AIR-G-1	01/09/1992	MLY-661	5916059	37	24.30	0.0164	11
AIR-G-1	01/15/1992	MLY-664	5916055	37	24.31	0.0272	18
AIR-G-1	01/21/1992	MLY-667	5916052	37	24.32	0.0640	42
AIR-G-1	01/26/1992	MLY-670	5916049	37	24.31	0.0689	45
AIR-G-1	02/01/1992	MLY-620	5916042	37	24.01	0.0560	37
AIR-G-1	02/06/1992	MLY-901	5916039	36.6	24.02	0.0171	11
AIR-G-1	02/12/1992	MLY-904	5906036	36.6	23.96	0.0147	10
AIR-G-1	02/18/1992	MLY-907	5916033	36.6	23.97	0.0211	14
AIR-G-1	02/24/1992	MLY-910	5916030	36.6	23.88	0.0146	10
AIR-G-1	03/03/1992	MLY-916	5916024	36.6	24.05	0.0213	14
AIR-G-1	03/07/1992	MLY-919	5916021	36	24.06	0.0095	6
AIR-G-1	03/13/1992	MLY-925	5916015	36	23.94	0.0280	19
AIR-G-1	03/19/1992	MLY-753	5916012	36	23.94	0.0216	15
AIR-G-1	03/25/1992	MLY-756	5916009	36	23.98	0.0122	8
AIR-G-1	03/31/1992	MLY-759	5916006	35	23.96	0.0148	10
AIR-G-1	04/06/1992	MLY-762	5916003	35	23.95	0.0218	15
AIR-G-1	04/12/1992	MLY-765	5918859	35	23.96	0.0255	18
AIR-G-1	04/18/1992	MLY-771	5918853	35	24.42	0.0046	3
AIR-G-1	04/24/1992	MLY-774	5918850	35	24.43	0.0203	14
AIR-G-1	04/30/1992	MLY-[illegible]	5918847	35	24.41	0.0403	28
AIR-G-1	05/06/1992	M[illegible]	5918844	35	24.44	0.0382	26
AIR-G-1	05/12/1992	M[illegible]	5918841	35	24.48	0.0188	13
AIR-G-1	05/18/1992	MLY-[illegible]	5918838	34.5	24.44	0.0242	17
AIR-G-1	05/24/1992	MLY-864	5918835	34.5	24.42	0.0057	4
AIR-G-1	05/30/1992	MLY-870	5918829	34.5	24.28	0.0082	6
AIR-G-1	06/05/1992	MLY-873	5918826	33.7	24.28	0.0162	12
AIR-G-1	06/11/1992	MLY-701	5918823	33.7	24.32	0.0183	13
AIR-G-1	06/17/1992	MLY-704	5918820	33.7	24.28	0.0282	20
AIR-G-1	06/29/1992	MLY-710	5916393	33.7	23.74	0.0267	20
AIR-G-1	07/05/1992	MLY-713	5916390	33.6	23.69	0.0275	20
AIR-G-1	07/11/1992	MLY-719	5916384	33.6	23.98	0.0179	13
AIR-G-1	07/17/1992	MLY-721	5916381	33.6	23.92	0.0307	22
AIR-G-1	07/23/1992	MLY-723	5916379	33.6	23.93	0.0157	11
AIR-G-1	07/29/1992	MLY-725	5916377	33.6	23.93	0.0303	22
AIR-G-1	08/04/1992	MLY-878	5916353	33.6	23.94	0.0266	19
AIR-G-1	08/10/1992	MLY-881	5916350	33.8	23.91	0.0309	23
AIR-G-1	08/16/1992	MLY-884	5916347	33.8	23.91	0.0211	15
AIR-G-1	08/22/1992	MLY-891	5916340	33.8	24.23	0.0099	7
AIR-G-1	08/28/1992	MLY-894	5916337	33.8	24.24	0.0309	22
AIR-G-1	09/03/1992	MLY-897	5916334	34	24.34	0.0218	16
AIR-G-1	09/09/1992	09091992-01	5916307	34	24.25	0.0214	15
AIR-G-1	09/15/1992	09151992-01	5916304	34	24.24	0.0128	9
AIR-G-1	09/21/1992	09211992-01	5916301	34	24.25	0.0201	14
AIR-G-1	09/27/1992	09271992-01	5916296	34	23.77	0.0352	26

[a]Grams per filter.

Table A-8 (continued). Suspended Particulates (PM_{10}) Data for Station AIR-G-1 during 1992

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[a]	Conc. ($\mu g/m^3$)
AIR-G-1	10/03/1992	10031992-01	5916293	35	23.82	0.0270	19
AIR-G-1	10/09/1992	10091992-01	5916290	35	23.76	0.0569	40
AIR-G-1	10/15/1992	10151992-01	5916287	35	23.77	0.0367	26
AIR-G-1	10/21/1992	10211992-01	5916263	35	23.77	0.0347	25
AIR-G-1	11/02/1992	11021992-01	5916257	35	24.13	0.0067	5
AIR-G-1	11/08/1992	11081992-01	5916254	36	24.19	0.0192	13
AIR-G-1	11/26/1992	11261992-01	5916245	36	24.28	0.0069	.5
AIR-G-1	12/02/1992	12021992-01	5916221	36	24.27	0.0463	31
AIR-G-1	12/08/1992	12081992-01	5916218	37	24.32	0.0485	32
AIR-G-1	12/15/1992	12151992-01	5916215	37	24.27	0.0256	17
AIR-G-1	12/15/1992	12151992-01	5916215	37	24.27	0.0256	17
AIR-G-1	12/26/1992	12261992-01	5916209	37	24.27	0.0643	42

[a]Grams per filter.

Table A-9. Suspended Particulates (PM_{10}) Data for Station AIR-G-2 during 1992

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[a]	Conc. ($\mu g/m^3$)
AIR-G-2	01/03/1992	MLY-659	5916060	37	23.90	0.0296	20
AIR-G-2	01/09/1992	MLY-662	5916057	37	23.88	0.0224	15
AIR-G-2	01/15/1992	MLY-665	5916054	37	23.89	0.0287	19
AIR-G-2	01/21/1992	MLY-668	5916051	37	23.90	0.0733	49
AIR-G-2	01/26/1992	MLY-671	5916048	37	23.90	0.0700	47
AIR-G-2	02/01/1992	MLY-621	5916041	37	23.71	0.0539	36
AIR-G-2	02/06/1992	MLY-902	5916038	36.6	23.76	0.0201	14
AIR-G-2	02/12/1992	MLY-905	5916035	36.6	23.66	0.0194	13
AIR-G-2	02/18/1992	MLY-908	5916032	36.6	23.67	0.0297	20
AIR-G-2	02/24/1992	MLY-911	5916029	36.6	23.66	0.0193	13
AIR-G-2	03/03/1992	MLY-917	5916023	36.6	24.54	0.0215	14
AIR-G-2	03/07/1992	MLY-920	5916020	36	23.79	0.0083	6
AIR-G-2	03/13/1992	MLY-751	5916014	36	23.52	0.0247	17
AIR-G-2	03/19/1992	MLY-754	5916011	36	23.52	0.0242	17
AIR-G-2	03/25/1992	MLY-757	5916008	36	23.53	0.0194	13
AIR-G-2	03/31/1992	MLY-760	5916005	35	23.55	0.0122	9
AIR-G-2	04/06/1992	MLY-763	5916002	35	23.51	0.0187	13
AIR-G-2	04/12/1992	MLY-766	5918858	35	23.50	0.0212	15
AIR-G-2	04/24/1992	MLY-775	5918849	35	23.25	0.0193	14
AIR-G-2	04/30/1992	MLY-853	5918846	35	23.15	0.0408	30
AIR-G-2	05/06/1992	MLY-857	5918843	35	23.26	0.0322	23
AIR-G-2	05/30/1992	MLY-871	5918828	34.5	23.93	0.0052	4
AIR-G-2	06/05/1992	MLY-874	5918825	33.7	23.89	0.0238	17
AIR-G-2	06/11/1992	MLY-702	5918822	33.7	23.89	0.0155	11
AIR-G-2	06/17/1992	MLY-705	5918819	33.7	23.72	0.0157	12
AIR-G-2	06/29/1992	MLY-711	5916392	33.7	23.56	0.0212	16
AIR-G-2	07/05/1992	MLY-714	5916389	33.6	23.57	0.0192	14
AIR-G-2	07/29/1992	MLY-876	5916376	33.6	24.12	0.0290	21
AIR-G-2	08/16/1992	MLY-885	5916346	33.8	24.06	0.0197	14
AIR-G-2	08/22/1992	MLY-892	5916339	33.8	23.43	0.0076	6
AIR-G-2	08/28/1992	MLY-895	5916336	33.8	23.64	0.0227	17
AIR-G-2	09/03/1992	MLY-898	5916333	34	23.61	0.0192	14
AIR-G-2	09/09/1992	09091992-02	5916306	34	23.59	0.0231	17
AIR-G-2	09/15/1992	09151992-02	5916303	34	23.58	0.0190	14
AIR-G-2	09/21/1992	09211992-02	5916300	34	23.59	0.0181	13
AIR-G-2	09/27/1992	09271992-02	5916295	34	23.36	0.0267	20
AIR-G-2	10/03/1992	10031992-02	5916292	35	24.46	0.0282	19
AIR-G-2	10/09/1992	10091992-02	5916289	35	23.43	0.0465	33
AIR-G-2	10/15/1992	10151992-02	5916286	35	23.46	0.0400	29
AIR-G-2	10/21/1992	10211992-02	5916263	35	23.45	0.0335	24
AIR-G-2	11/02/1992	11021992-02	5916256	35	23.48	0.0062	4
AIR-G-2	11/08/1992	11801992-02	5916253	36	23.54	0.0184	13
AIR-G-2	11/20/1992	11201992-02	5916246	36	23.84	0.0034	2
AIR-G-2	11/26/1992	11261992-02	5916244	36	23.87	0.0071	5
AIR-G-2	12/02/1992	12021992-02	5916220	36	23.85	0.0453	31
AIR-G-2	12/15/1992	12151992-02	5916214	37	23.87	0.0223	15
AIR-G-2	12/26/1992	12261992-02	5916208	37	23.80	0.0679	45

[a]Grams per filter.

Table A-10. Suspended Particulates (PM_{10}) Data for Station AIR-G-3 during 1992

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[a]	Conc. ($\mu g/m^3$)
AIR-G-3	01/03/1992	MLY-660	5916059	37	24.15	0.0305	20
AIR-G-3	01/09/1992	MLY-663	5916056	37	24.12	0.0274	18
AIR-G-3	01/15/1992	MLY-666	5916053	37	24.11	0.0321	21
AIR-G-3	01/21/1992	MLY-669	5916050	37	24.10	0.0800	53
AIR-G-3	02/01/1992	MLY-622	5916040	37	24.33	0.0623	41
AIR-G-3	02/06/1992	MLY-903	5916037	36.6	24.30	0.0284	19
AIR-G-3	02/12/1992	MLY-906	5916034	36.6	24.27	0.0172	11
AIR-G-3	02/18/1992	MLY-909	5916031	36.6	24.30	0.0337	22
AIR-G-3	02/24/1992	MLY-912	5916028	36.6	24.25	0.0177	12
AIR-G-3	03/03/1992	MLY-918	5916022	36.6	24.11	0.0199	13
AIR-G-3	03/07/1992	MLY-921	5916019	36	24.38	0.0112	8
AIR-G-3	03/13/1992	MLY-752	5916013	36	24.00	0.0303	21
AIR-G-3	03/19/1992	MLY-755	5916010	36	23.98	0.0261	18
AIR-G-3	03/25/1992	MLY-758	5916007	36	24.00	0.0167	11
AIR-G-3	03/31/1992	MLY-761	5916004	35	23.99	0.0144	10
AIR-G-3	04/06/1992	MLY-764	5916001	35	23.97	0.0249	17
AIR-G-3	04/12/1992	MLY-767	5918857	35	23.95	0.0269	19
AIR-G-3	04/18/1992	MLY-773	5918851	35	24.39	0.0028	2
AIR-G-3	04/24/1992	MLY-851	591[illegible]8	35	24.39	0.0257	18
AIR-G-3	04/30/1992	MLY-854	591[illegible]5	35	24.37	0.0426	29
AIR-G-3	05/06/1992	MLY-858	5918842	35	24.37	0.0483	33
AIR-G-3	05/12/1992	MLY-861	5918839	35	24.41	0.0185	13
AIR-G-3	05/18/1992	MYL-863	5918836	34.5	24.38	0.0287	20
AIR-G-3	05/24/1992	MLY-866	5918833	34.5	24.38	0.0064	4
AIR-G-3	05/30/1992	MLY-872	5918827	34.5	24.40	0.0075	5
AIR-G-3	06/05/1992	MLY-875	5918824	33.7	24.40	0.0165	12
AIR-G-3	06/11/1992	MLY-703	5918821	33.7	24.42	0.0164	12
AIR-G-3	06/17/1992	MLY-706	5918818	33.7	24.41	0.0262	19
AIR-G-3	06/29/1992	MLY-712	5916391	33.7	23.97	0.0274	20
AIR-G-3	07/05/1992	MLY-715	5916388	33.6	23.97	0.0240	18
AIR-G-3	07/17/1992	MLY-722	5916382	33.6	23.66	0.0232	17
AIR-G-3	07/23/1992	MLY-724	5916378	33.6	23.64	0.0187	14
AIR-G-3	07/29/1992	MLY-877	5916375	33.6	23.66	0.0294	22
AIR-G-3	08/04/1992	MLY-880	5916351	33.6	23.68	0.0289	21
AIR-G-3	08/10/1992	MLY-883	5916348	33.8	23.62	0.0259	19
AIR-G-3	08/16/1992	MLY-886	5916345	33.8	23.64	0.0306	23
AIR-G-3	08/22/1992	MLY-893	5916338	33.8	23.84	0.0090	7
AIR-G-3	08/28/1992	MLY-896	5916335	33.8	23.89	0.0262	19
AIR-G-3	09/03/1992	MLY-899	5916332	34	23.94	0.0281	20
AIR-G-3	09/21/1992	09211992-03	5916302	34	23.91	0.0244	18
AIR-G-3	09/27/1992	09271992-03	5916294	34	23.92	0.0336	24

[a]Grams per filter.

Table A-10 (continued). Suspended Particulates (PM_{10}) Data for Station AIR-G-3 during 1992

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[a]	Conc, ($\mu g/m^3$)
AIR-G-3	10/03/1992	10031992-03	5916291	35	23.93	0.0368	26
AIR-G-3	10/09/1992	10091992-03	5916288	35	23.89	0.0533	38
AIR-G-3	10/15/1992	10151992-03	5916285	35	23.46	0.0484	35
AIR-G-3	10/21/1992	10211992-03	5916261	35	23.92	0.0466	33
AIR-G-3	11/02/1992	11021992-03	5916255	35	24.47	0.0064	4
AIR-G-3	11/08/1992	11081992-03	5916252	36	24.53	0.0247	16
AIR-G-3	11/26/1992	11261992-03	5916243	36	15.17	0.0120	13
AIR-G-3	12/08/1992	12081992-03	5916216	37	24.00	0.0456	30
AIR-G-3	12/15/1992	12151992-03	5916213	37	24.00	0.0247	16
AIR-G-3	12/20/1992	12201992-03	5916210	37	24.00	0.0654	43

[a]Grams per filter.

Table A-11. Environmental Radiation Exposure Data for Grand Junction, First Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-4	05/13/1992	12/31/1991	03/31/1992	91

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approximate Annual Exposure (mrem)
1992-1	GJ-19	TLD-G-01	25.5	0.3	102.3
1992-1	GJ-29	TLD-G-02	23.5	0.3	94.3
1992-1	GJ-25	TLD-G-03	25.1	0.3	100.7
1992-1	GJ-21	TLD-G-04	28.3	0.3	113.5
1992-1	GJ-22	TLD-G-04-D[c]	28.5	0.3	114.3
1992-1	GJ-24	TLD-G-05	22.8	0.3	91.5
1992-1	GJ-17	TLD-G-06	22.5	0.2	90.2
1992-1	GJ-23	TLD-G-07	23.1	0.3	92.7
1992-1	GJ-15	TLD-G-08	26.7	0.3	107.1
1992-1	GJ-20	TLD-G-09	27.2	0.3	109.1
1992-1	GJ-18	TLD-G-10	20.8	0.2	83.4
1992-1	GJ-26	TLD-G-11	21.7	0.2	87.0
1992-1	GJ-16	TLD-G-12	24.5	0.3	98.3
1992-1	GJ-28	TLD-G-13	21.7	0.2	87.0
1992-1	GJ-30	TLD-G-14	20.0	0.2	80.2
1992-1	GJ-27	TLD-G-15	20.5	0.2	82.2

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample

Table A-12. Environmental Radiation Exposure Data for Grand Junction, Second Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-5	08/04/1992	03/31/1992	06/30/1992	91

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approximate Annual Exposure (mrem)
1992-2	GJ-1	TLD-G-01	14.7	0.2	59.0
1992-2	GJ-2	TLD-G-02	23.9	0.3	95.9
1992-2	GJ-3	TLD-G-03	26.9	0.3	107.9
1992-2	GJ-4	TLD-G-04	22.5	0.2	90.2
1992-2	GJ-15	TLD-G-04-D[c]	23.7	0.3	95.1
1992-2	GJ-5	TLD-G-05	25.3	0.3	101.5
1992-2	GJ-6	TLD-G-06	26.3	0.3	105.5
1992-2	GJ-7	TLD-G-07	23.8	0.3	95.5
1992-2	GJ-8	TLD-G-08	26.1	0.3	104.7
1992-2	GJ-9	TLD-G-09	25.1	0.3	100.7
1992-2	GJ-10	TLD-G-10	21.5	0.2	86.2
1992-2	GJ-11	TLD-G-11	21.7	0.2	87.0
1992-2	GJ-12	TLD-G-12	23.7	0.3	95.1
1992-2	GJ-13	TLD-G-13	22.8	0.3	91.5
1992-2	GJ-14	TLD-G-14	23.1	0.3	92.7
1992-2	GJ-16	TLD-G-15	22.8	0.3	91.5

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-13. Environmental Radiation Exposure Data for Grand Junction, Third Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-6	10/10/1992	06/30/1992	10/01/1992	92

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approximate Annual Exposure (mrem)
1992-3	GJ-16	TLD-G-01	26.3	0.3	104.3
1992-3	GJ-12	TLD-G-02	21.7	0.2	86.1
1992-3	GJ-7	TLD-G-03	28.6	0.3	113.5
1992-3	GJ-1	TLD-G-04	34.1	0.4	135.3
1992-3	GJ-2	TLD-G-04-D[c]	36.0	0.4	142.8
1992-3	GJ-15	TLD-G-05	24.0	0.3	95.2
1992-3	GJ-5	TLD-G-06	26.8	0.3	106.3
1992-3	GJ-10	TLD-G-07	22.1	0.2	87.7
1992-3	GJ-11	TLD-G-08	23.0	0.3	91.3
1992-3	GJ-4	TLD-G-09	24.5	0.3	97.2
1992-3	GJ-14	TLD-G-10	20.3	0.2	80.5
1992-3	GJ-13	TLD-G-11	22.0	0.2	87.3
1992-3	GJ-9	TLD-G-12	24.0	0.3	95.2
1992-3	GJ-3	TLD-G-13	22.3	0.2	88.5
1992-3	GJ-8	TLD-G-14	22.0	0.2	87.3
1992-3	GJ-6	TLD-G-15	22.1	0.2	87.7

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample

Table A-14. Environmental Radiation Exposure Data for Grand Junction, Fourth Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-7	01/20/1993	10/01/1992	12/30/1992	90

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approximate Annual Exposure (mrem)
1992-4	GJ-20	TLD-G-01	27.3	0.3	110.7
1992-4	GJ-32	TLD-G-02	26.4	0.3	107.1
1992-4	GJ-27	TLD-G-03	31.2	0.3	126.5
1992-4	GJ-15	TLD-G-04	22.9	0.3	92.9
1992-4	GJ-30	TLD-G-04-D[c]	24.6	0.3	99.8
1992-4	GJ-22	TLD-G-05	25.3	0.3	102.6
1992-4	GJ-29	TLD-G-06	26.1	0.3	105.9
1992-4	GJ-28	TLD-G-07	27.8	0.3	112.7
1992-4	GJ-31	TLD-G-08	27.0	0.3	109.5
1992-4	GJ-17	TLD-G-09	26.0	0.3	105.4
1992-4	GJ-23	TLD-G-10	22.7	0.3	92.1
1992-4	GJ-24	TLD-G-11	23.3	0.3	94.5
1992-4	GJ-18	TLD-G-12	27.7	0.3	112.3
1992-4	GJ-21	TLD-G-13	26.5	0.3	107.5
1992-4	GJ-26	TLD-G-14	23.3	0.3	94.5
1992-4	GJ-34	TLD-G-15	25.0	0.3	101.4

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-15. Meteorological Data for Grand Junction

Frequency of Wind Directions[a]

Wind Toward	Frequency
N	0.052
NNW	0.073
NW	0.140
WNW	0.199
W	0.054
WSW	0.051
SW	0.031
SSW	0.023
S	0.040
SSE	0.045
SE	0.075
ESE	0.098
E	0.042
ENE	0.025
NE	0.027
NNE	0.025

Frequency of Each Stability Class for Each Direction

Wind Toward	Fraction of Time in Each Stability Class[b]					
	A	B	C	D	E	F
N	0.0418	0.2162	0.2074	0.3218	0.0615	0.1513
NNW	0.0282	0.1580	0.2393	0.3084	0.0923	0.1738
NW	0.0087	0.0685	0.1520	0.3159	0.1921	0.2628
WNW	0.0045	0.0333	0.0608	0.3729	0.2641	0.2644
W	0.0085	0.0452	0.0459	0.1993	0.1790	0.5220
WSW	0.0103	0.0348	0.0363	0.1736	0.1623	0.5827
SW	0.0205	0.0668	0.0587	0.2515	0.1838	0.4187
SSW	0.0141	0.0872	0.0872	0.2945	0.1805	0.3364
S	0.0181	0.0915	0.0912	0.3417	0.1800	0.2774
SSE	0.0128	0.1119	0.1468	0.4019	0.1477	0.1790
SE	0.0202	0.1270	0.1914	0.4042	0.1128	0.1444
ESE	0.0314	0.1662	0.2315	0.3691	0.0719	0.1298
E	0.0449	0.2164	0.2214	0.3198	0.0582	0.1392
ENE	0.0852	0.2738	0.1688	0.2631	0.0654	0.1438
NE	0.0697	0.2387	0.1531	0.3384	0.0550	0.1450
NNE	0.0675	0.2300	0.1764	0.3329	0.0494	0.1439

[a]Average atmospheric lid for the area is 538 meters.

[b]Stability classes A,B, and C refer to daytime, unstable conditions, with class A having the most unstable conditions. Class D refers to overcast or neutral conditions at night or during the day. Classes E and F refer to nightime, stable conditions and are based on the amount of cloud cover, with F having greater or thicker cloud cover.

Table A-15 (continued). Meteorological Data for Grand Junction

Reciprocal-Averaged Wind Speeds

Wind Toward	Wind Speed (meters/second) in Each Stability Class					
	A	B	C	D	E	F
N	1.03	1.27	2.19	3.32	3.11	0.97
NNW	1.12	1.36	2.55	3.51	3.30	1.37
NW	1.02	1.40	2.60	3.94	3.71	1.29
WNW	0.96	1.20	2.28	4.33	3.72	1.28
W	0.93	1.01	1.28	2.33	3.12	1.07
WSW	0.98	0.94	1.29	2.43	2.93	1.13
SW	0.91	1.00	1.49	2.62	3.13	1.03
SSW	1.10	0.96	1.50	2.91	3.21	1.06
S	0.99	1.06	1.65	3.12	3.27	1.11
SSE	1.04	1.16	2.10	3.27	3.28	1.17
SE	1.06	1.31	2.38	3.34	3.26	1.12
ESE	1.08	1.37	2.43	3.20	3.08	1.02
E	1.11	1.36	2.29	2.82	2.96	0.97
ENE	1.06	1.23	2.10	2.67	2.85	0.91
NE	1.10	1.17	2.18	3.24	2.95	0.94
NNE	1.11	1.14	2.34	3.36	2.98	0.92

Average Wind Speeds

Wind Toward	Wind Speed (meters/second) in Each Stability Class					
	A	B	C	D	E	F
N	1.41	1.99	3.41	5.52	3.11	1.29
NNW	1.57	2.16	3.50	5.20	3.53	1.60
NW	1.41	2.21	3.59	5.30	3.92	1.81
WNW	1.28	1.91	3.32	5.65	3.92	1.79
W	1.20	1.44	2.19	4.13	3.34	1.49
WSW	1.32	1.32	2.38	4.[illegible]	3.11	1.52
SW	1.17	1.46	2.59	4.[illegible]	3.55	1.41
SSW	1.54	1.39	2.57	4.86	3.45	1.47
S	1.34	1.58	2.77	4.68	3.51	1.56
SSE	1.43	1.82	3.32	4.97	3.51	1.65
SE	1.47	2.15	3.60	5.07	3.50	1.57
ESE	1.51	2.29	3.67	5.02	3.30	1.41
E	1.55	2.26	3.53	5.15	3.14	1.31
ENE	1.48	1.99	3.30	5.09	3.00	1.16
NE	1.53	1.88	4.04	5.91	3.13	1.23
NNE	1.55	1.79	4.12	6.05	3.17	1.19

Table A-16. Sewer Effluent Chemistry Data for Grand Junction during 1992[a,b]

Ticket Number	Sample Date	Ag (µg/L)	Alpha (pCi/L)[c]	As (µg/L)	Be (µg/L)	Beta (pCi/L)[b]	BOD (mg/L)	Cd (µg/L)	CN (µg/L)	COD[d] (mg/L)	Cr (µg/L)	Cu (µg/L)
MLY-465	01/09/1992	<5.0	<8.8	No Data	No Data	<10.7	130	No Data	<10.0	227	<6.0	30.9
MLY-466	01/09/1992	No Data	<9.3	No Data	No Data	<13.2	No Data	No Data	No Data	No Data	No Data	No Data
MLY-477	02/13/1992	<5.0	<9.1	No Data	No Data	<9.0	90	No Data	<10.0	112	<6.0	35.8
MLY-478	02/13/1992	No Data	<9.3	No Data	No Data	<9.0	No Data	No Data	No Data	No Data	No Data	No Data
MLY-480	02/24/1992	No Data	No Data	3.5	<1.0	No Data	No Data	<4.0	No Data	No Data	No Data	No Data
MLY-481	03/11/1992	5.9	<11	No Data	No Data	<11	125	No Data	<10.0	208	4.7	62.7
MLY-482	03/11/1992	No Data	<17	No Data	No Data	<22	No Data	No Data	No Data	No Data	No Data	No Data
MLY-483	04/08/1992	<3.5	<5.3	No Data	No Data	27.0	190	No Data	<10.0	327	<4.0	54.7
MLY-484	04/08/1992	No Data	<5.4	No Data	No Data	26.2	No Data	No Data	No Data	No Data	No Data	No Data
MLY-485	04/08/1992	No Data	<7.0	No Data	No Data	10.8	No Data	No Data	No Data	No Data	No Data	No Data
MLY-490	05/07/1992	<3.5	<4.7	No Data	No Data	<6.9	No Data	No Data	<10.0	No Data	<4.0	31.6
MLY-491	05/07/1992	No Data	<4.8	No Data	No Data	<6.9	No Data	No Data	No Data	No Data	No Data	No Data
MLY-492	05/07/1992	No Data	<9.9	No Data	No Data	16.1	No Data	No Data	No Data	No Data	No Data	No Data
MLY-493	05/07/1992	No Data	36.4	No Data	No Data	40.6	No Data	No Data	No Data	No Data	No Data	No Data
MLY-494	05/14/1992	<3.5	No Data	No Data	No Data	No Data	133	No Data	16.5	184	<4.0	29.5
MLY-495	06/04/1992	<5.7	<4.8	No Data	No Data	<7.2	No Data	No Data	<10.0	No Data	<3.9	32.4
MLY-496	06/04/1992	<5.7	<4.8	No Data	No Data	<7.2	80.0	No Data	<10.0	125	<3.9	37.7
MLY-497	06/04/1992	No Data	39.7	No Data	No Data	41.6	No Data	No Data	No Data	No Data	No Data	No Data
MLY-498	06/04/1992	No Data	<4.8	No Data	No Data	<7.2	No Data	No Data	No Data	No Data	No Data	No Data
MLY-499	07/07/1992	~9.1	<12	No Data	No Data	<10	270	No Data	191	316	<3.9	98.6
MLY-500	07/07/1992	No Data	<14	No Data	No Data	14	No Data	No Data	No Data	No Data	No Data	No Data
MLY-951	08/06/1992	<5.7	<7	No Data	No Data	<11	35	No Data	<10.0	73.6	<3.9	~10.1
MLY-952	08/06/1992	No Data	<7	No Data	No Data	<11	No Data	No Data	No Data	No Data	No Data	No Data
MLY-953	10/19/1992[d]	<6.0	<30	No Data	No Data	<50	84	No Data	<10.0	No Data	<6.0	60.0
MLY-954	12/17/1992	38.9	<20	No Data	No Data	40	3120	No Data	<10.0	3320	~9.4	94.7
MLY-955	12/17/1992	No Data	40	No Data	No Data	<40	No Data	No Data	No Data	No Data	No Data	No Data
MLY-956	12/17/1992	39.5	<20	No Data	No Data	34	No Data	No Data	<10.0	No Data	~8.4	96.5
MLY-957	12/17/1992	No Data	<30	No Data	No Data	<40	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" symbol indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated)

[b]All sewer effluent samples were collected from manhole #12 by Geotech, with the exception of sample MLY-953, which was collected at the North Lift Station by the city of Grand Junction.

[c]The values listed multiplied by 10^{-9} will result in µCi/mL.

[d]Chemical oxygen demand.

Table A 16 (continued) Sewer Effluent Chemistry Data for Grand Junction during 1992[a,b]

Ticket Number	Sample Date	Herbicide (µg/l)	Hg (µg/l)	Ni (µg/l)	Oil (mg/L)	Pb (µg/L)	Pesticide (µg/L)	pH	Phenol (µg/L)	Sb (µg/L)	Se (µg/L)
MLY-465	01/09/1992	No Data	<0.20	<12.0	40	1.9	No Detect	8.63	330	No Data	No Data
MLY-466	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-477	02/13/1992	No Data	<0.20	<12.0	22	8.1	No Detect	7.24	95	No Data	No Data
MLY-478	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-480	02/24/1992	No Detect	No Data	No Data	No Data	No Data	No Detect	No Data	<100	<40.0	<2.0
MLY-481	03/11/1992	No Data	<0.20	<16.0	36	10.8	No Detect	7.96	97	No Data	No Data
MLY-482	03/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	7.96	No Data	No Data	No Data
MLY-483	04/08/1992	No Data	0.13	<15.6	26	14.3	No Detect	7.38	80	No Data	No Data
MLY-484	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-485	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-490	05/07/1992	No Data	0.06	<15.6	26	14.3	No Detect	8.39	83	No Data	No Data
MLY-491	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-492	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-493	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-494	05/14/1992	No Data	0.05	<15.6	14	8.7	No Detect	6.58	125	No Data	No Data
MLY-495	06/04/1992	No Data	0.09	<13.0	48	3.7	No Detect	7.26	125	No Data	No Data
MLY-496	06/04/1992	No Data	0.39	<13.0	46	6.1	No Detect	No Data	125	No Data	No Data
MLY-497	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-498	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-499	07/07/1992	No Data	0.37	<13.0	14	20.3	No Detect	6.81	54	No Data	No Data
MLY-500	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-951	08/06/1992	No Data	~0.12	<13.0	29	~2.9	No Detect	7.77	97	No Data	No Data
MLY-952	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-953	10/19/1992	No Data	<0.10	~13.6	12	14.0	No Data	No Data	97	No Data	No Data
MLY-954	12/17/1992	No Data	0.63	~14.7	32	8.1	No Detect	8.0	54	No Data	No Data
MLY-955	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-956	12/17/1992	No Data	0.76	~15.7	35	8.9	No Data	No Data	108	No Data	No Data
MLY-957	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" symbol indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated)

[b]All sewer effluent samples were collected from manhole #12 by Geotech, with the exception of sample MLY-953, which was collected at the North Lift Station by the city of Grand Junction.

Table A-16 (continued). Sewer Effluent Chemistry Data for Grand Junction during 1992[a,b]

Ticket Number	Sample Date	Semivolatile (µg/L)	TDS (mg/L)	Temp (Deg C)	Tl (µg/L)	TOC[c] (mg/L)	TOX (mg/L)	TSS (mg/L)	Volatile (µg/L)	Zn (µg/L)
MLY-465	01/09/1992	No Data	390	12.2	No Data	75.7	0.14	58	No Data	457
MLY-466	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-477	02/13/1992	No Data	280	12.2	No Data	42.5	0.05	14	No Data	413
MLY-478	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-480	02/24/1992	See Table	No Data	No Data	<4.0	No Data	No Data	No Data	See Table	540
MLY-481	03/11/1992	No Data	460	13.0	No Data	74.4	0.10	38	No Data	422
MLY-482	03/11/1992	No Data	No Data	13.0	No Data	No Data	No Data	No Data	No Data	No Data
MLY-483	04/08/1992	No Data	490	15.9	No Data	109	0.06	83	No Data	572
MLY-484	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-485	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-490	05/07/1992	No Data	310	18.8	No Data	56.7	No Data	53	No Data	462
MLY-491	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-492	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-493	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-494	05/14/1992	No Data	No Data	21.7	No Data	No Data	No Data	64	No Data	522
MLY-495	06/04/1992	No Data	280	20.5	No Data	52.5	No Data	50	No Data	606
MLY-496	06/04/1992	No Data	280	No Data	No Data	51.2	0.13	50	No Data	653
MLY-497	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-498	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-499	07/07/1992	No Data	290	23.0	No Data	98.7	0.20	250	No Data	1060
MLY-500	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-951	08/06/1992	No Data	236	23.7	No Data	24.4	0.02	20	No Data	302
MLY-952	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-953	10/19/1992	No Data	380	No Data	No Data	No Data	No Data	167	No Data	639
MLY-954	12/17/1992	No Data	1080	21.5	No Data	677	0.04	696	No Data	842
MLY-955	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-956	12/17/1992	No Data	1080	No Data	No Data	704	No Data	674	No Data	919
MLY-957	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" symbol indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]All sewer effluent samples were collected from manhole #12 by Geotech, with the exception of sample MLY-953, which was collected at the North Lift Station by the city of Grand Junction.

[c]Total organic carbon.

Table A-17. Sewer Effluent Chemistry Data for Grand Junction during 1992, Organics[a]

Ticket Number	Sample Date	103-82-2 (µg/L)	106-44-5 (µg/L)	117-81-7 (µg/L)	143-07-7 (µg/L)	26265-99-6 (µg/L)	544-63-8 (µg/L)	57-10-3 (µg/L)	57-11-4 (µg/L)	57-88-5 (µg/L)
MLY-465	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-466	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-477	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-478	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-479	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-480	02/24/1992	22	29	86	34	22	50	900	1600	40
MLY-481	03/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-482	03/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-483	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-484	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-485	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-490	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-491	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-492	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-493	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-494	05/14/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-495	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-496	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-497	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-498	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-499	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-500	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-951	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-952	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-953	10/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-954	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-955	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-956	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-957	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]CAS Number 103-82-2 Benzeneacetic acid
CAS Number 106-44-5 4-Methylphenol
CAS Number 117-81-7 Bis(2-ethylhexyl)phthalate
CAS Number 143-07-7 Dodecanoic acid
CAS Number 26265-99-6 Heptadecenoic acid
CAS Number 544-63-8 Tetradecanoic acid
CAS Number 57-10-3 Hexadecanoic acid
CAS Number 57-11-4 Octadecanoic acid
CAS Number 57-88-5 Cholesterol

Table A-17 (continued). Sewer Effluent Chemistry Data for Grand Junction during 1992, Organics[a]

Ticket Number	Sample Date	58-08-2 (µg/L)	59-02-9 (µg/L)	65-85-0 (µg/L)	67-64-1 (µg/L)	75-09-2 (µg/L)	UNK-17.02 (µg/L)	UNK-20.77 (µg/L)	UNK-22.59 (µg/L)	UNK-26.19 (µg/L)
MLY-465	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-466	01/09/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-477	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-478	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-479	02/13/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-480	02/24/1992	74	10	76	69	8700	10	13	40	1100
MLY-481	03/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-482	03/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-483	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-484	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-485	04/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-490	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-491	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-492	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-493	05/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-494	05/14/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-495	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-496	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-497	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-498	06/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-499	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-500	07/07/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-951	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-952	08/06/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-953	10/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-954	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-955	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-956	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
MLY-957	12/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]CAS Number 58-08-2 Caffeine
CAS Number 59-02-9 Vitamin E
CAS Number 65-85-0 Benzoic acid
CAS Number 67-64-1 Acetone
CAS Number 75-09-2 Methylene chloride
CAS Number UNK-17.02 Unknown organic acid
CAS Number UNK-20.77 Unknown
CAS Number UNK-22.59 Unknown
CAS Number UNK-26.19 Unknown organic acid

Table A-17 (continued). Sewer Effluent Chemistry Data for Grand Junction during 1992, Organics

Ticket Number	Sample Date	UNK-30.19 (μg/L)
MLY-465	01/09/1992	No Data
MLY-466	01/09/1992	No Data
MLY-477	02/13/1992	No Data
MLY-478	02/13/1992	No Data
MLY-479	02/13/1992	No Data
MLY-480	02/24/1992	17
MLY-481	03/11/1992	No Data
MLY-482	03/11/1992	No Data
MLY-483	04/08/1992	No Data
MLY-484	04/08/1992	No Data
MLY-485	04/08/1992	No Data
MLY-490	05/07/1992	No Data
MLY-491	05/07/1992	No Data
MLY-492	05/07/1992	No Data
MLY-493	05/07/1992	No Data
MLY-494	05/14/1992	No Data
MLY-495	06/04/1992	No Data
MLY-496	06/04/1992	No Data
MLY-497	06/04/1992	No Data
MLY-498	06/04/1992	No Data
MLY-499	07/07/1992	No Data
MLY-500	07/07/1992	No Data
MLY-951	08/06/1992	No Data
MLY-952	08/06/1992	No Data
MLY-953	10/19/1992	No Data
MLY-954	12/17/1992	No Data
MLY-955	12/17/1992	No Data
MLY-956	12/17/1992	No Data
MLY-957	12/17/1992	No Data

[a]CAS Number UNK-30.19 Unknown

Table A-18. Water Chemistry Data for Grand Junction, March 16 through March 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Alky[b] (ppm) (as $CaCO_3$)	Alpha (pCi/L)[c]	As (µg/L)	Ba (µg/L)	Ca (µg/L)	Cd (µg/L)	CDT[d] (µmhos/cm)[e]	Cl (µg/L)	Cr (µg/L)
Ground Water											
1-9SA	MLY-734	03/18/1992	257	<140	<2.0	~17.1	107000	<1.0	1980	19500	<4.0
10-19N	MLY-684	03/17/1992	405	800	<20.0	~12.2	464000	<1.0	8000	608000	<4.0
11-1S	MLY-682	03/17/1992	312	600	<2.0	~31.3	228000	<1.0	3140	114000	<4.0
13-16NA	MLY-728	03/17/1992	501	470	~2.9	~13.8	354000	<1.0	4350	191000	<4.0
13-16NA (Dup)	MLY-729	03/17/1992	No Data	440	<2.0	~14.3	357000	<1.0	No Data	190000	<4.0
14-13NA	MLY-730	03/17/1992	No Data	510	11.3	~12.8	262000	<1.0	2951	139000	<4.0
14-6NA	MLY-683	03/17/1992	257	220	250	~62.7	130000	<1.0	1311	19600	<4.0
3-3NA	MLY-736	03/18/1992	336	<200	<2.0	~15.6	795000	<1.0	7320	1050000	<4.0
5-12NA	MLY-737	03/18/1992	319	<150	<2.0	~15.2	298000	<1.0	3220	160000	<4.0
GJ84-04	MLY-731	03/17/1992	388	<160	12.3	~23.1	223000	<1.0	3987	141000	<4.0
GJ84-05	MLY-733	03/17/1992	452	1500	<2.0	~26.4	546000	<1.0	7680	487000	<4.0
GJ84-06	MLY-690	03/18/1992	278	<150	<2.0	~24.6	369000	<1.0	2780	188000	<4.0
GJ84-09	MLY-735	03/18/1992	260	<150	<2.0	~12.1	126000	<1.0	2380	49100	<4.0
GJ84-10	MLY-727	03/16/1992	146	<150	<2.0	~5.4	128000	<1.0	2660	105000	<4.0
P-2A	MLY-688	03/18/1992	226	<160	<2.0	~17.9	294000	<1.0	3480	230000	<4.0
P-3A	MLY-685	03/17/1992	318	570	<2.0	~35.5	287000	<1.0	2450	65300	<4.0
P-4A	MLY-689	03/18/1992	352	500	<2.0	~14.8	395000	<1.0	6170	454000	<4.0
P-6	MLY-686	03/18/1992	246	<140	<2.0	~17.0	79700	<1.0	1767	20400	<4.0
Surface Water											
Lower Gunnison	MLY-726	03/16/1992	136	<50	<2.0	~41.3	91500	<1.0	1008	13100	<4.0
Middle Gunnison	MLY-677	03/16/1992	136	<50	~2.9	~41.4	87700	<1.0	888	8700	<4.0
North Pond	MLY-679	03/16/1992	273	440	~2.7	~13.7	282000	<1.0	3670	275000	<4.0
South Pond	MLY-680	03/16/1992	154	210	14.7	~13.8	316000	<1.0	3050	177000	<4.0
Upper Gunnison	MLY-678	03/16/1992	162	70	~2.1	~40.0	88000	<1.0	887	8590	<4.0
Upper Mid Gunnison	MLY-681	03/16/1992	143	<50	<2.0	~45.2	89200	<1.0	864	9100	<4.0
QA/QC											
Equipment Blank	MLY-732	03/17/1992	No Data	<30	<2.0	<5.0	<14.0	<1.0	No Data	~59.5	<4.0
Trip Blank	MLY-676	03/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-687	03/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Alkalinity

[c]The values listed multiplied by 10^{-9} will result in µCi/mL.

[d]Conductivity

[e]Micromhos per centimeter

Table A 18 (continued) Water Chemistry Data for Grand Junction, March 16 through March 18, 1992[a]

Sample location	Ticket Number	Sample Date	Fe (µg/L)	H_2O Depth (Feet)	Herbicide (µg/L)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NO_3 (µg/L)
Ground Water											
1-9SA	MLY 734	03/18/1992	-24.8	13.45	No Detect	6010	17400	652	<21.0	323000	~90.6
10-19N	MLY-684	03/17/1992	427	12.91	No Detect	20900	301000	4880	206	1720000	~60.4
11-1S	MLY-682	03/17/1992	<10.0	16.22	No Detect	9860	95700	92.7	270	655000	71800
13-16NA	MLY-728	03/17/1992	<10.0	4.48	No Detect	16100	94800	6660	155	611000	1600
13-16NA (Dup)	MLY-729	03/17/1992	<10.0	No Data	No Detect	15100	93100	6620	149	616000	1600
14-13NA	MLY-730	03/17/1992	<10.0	6.25	No Detect	14800	58800	3000	155	377000	5850
14-6NA	MLY-683	03/17/1992	1930	17.47	No Detect	18900	28500	4630	<21.0	135000	204
3-3NA	MLY-736	03/18/1992	632	12.31	No Detect	17400	142000	4710	<21.0	974000	~169
5-12NA	MLY-737	03/18/1992	<10.0	9.88	No Detect	5670	114000	482	<21.0	327000	1280
GJ84 04	MLY 731	03/17/1992	-11.2	9.08	No Detect	11900	61100	2800	304	730000	~140
GJ84 05	MLY-733	03/17/1992	-40.9	11.31	No Detect	17800	192000	4570	172	1430000	~99.1
GJ84-06	MLY-690	03/18/1992	<10.0	13.89	No Detect	5110	122000	77.5	<21.0	232000	1510
GJ84-09	MLY-735	03/18/1992	-28.3	20.90	No Detect	7710	20600	178	<21.0	370000	907
GJ84-10	MLY-727	03/16/1992	<10.0	32.03	No Detect	5530	31100	542	<21.0	507000	~128
P-2A	MLY-688	03/18/1992	<10.0	15.71	No Detect	11700	88300	2550	<21.0	555000	23600
P-3A	MLY-685	03/17/1992	<10.0	4.21	No Detect	10100	60900	5540	156	335000	~62.6
P-4A	MLY-689	03/18/1992	246	9.77	No Detect	23900	276000	3170	89.9	1160000	543
P-6	MLY-686	03/18/1992	<10.0	12.10	No Detect	6040	16300	575	<21.0	339000	2610
Surface Water											
Lower Gunnison	MLY-726	03/16/1992	<10.0	No Data	No Data	~2320	37800	85.0	<21.0	71300	2510
Middle Gunnison	MLY-677	03/16/1992	<10.0	No Data	No Data	~2570	35500	49.4	<21.0	59900	2500
North Pond	MLY-679	03/16/1992	<10.0	No Data	No Data	16600	142000	287	~39.9	674000	~246
South Pond	MLY-680	03/16/1992	<10.0	No Data	No Data	16700	78400	500	207	371000	10800
Upper Gunnison	MLY-678	03/16/1992	<10.0	No Data	No Data	~2250	35600	60.3	<21.0	59800	2640
Upper Mid Gunnison	MLY-681	03/16/1992	<10.0	No Data	No Data	~2430	36500	46.7	<21.0	60100	2410
QA/QC											
Equipment Blank	MLY-732	03/17/1992	<10.0	No Data	No Detect	<1300	<86.0	<1.0	<21.0	~115	~23.9
Trip Blank	MLY-676	03/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-687	03/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). "No Detect" indicates that the maximum concentration was below detection limits (detection limits are listed in Table A-21).

Table A-18 (continued). Water Chemistry Data for Grand Junction, March 16 through March 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Pb (µg/L)	Pesticide (µg/L)	pH	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Se (µg/L)	Semivolatile (µg/L)	SO_4 (µg/L)	TDS (mg/L)
Ground Water											
1-9SA	MLY-734	03/18/1992	<1.0	No Detect	7.91	<0.4	<1	<2.0	See Table	733000	1440
10-19N	MLY-684	03/17/1992	<1.0	No Detect	7.18	<0.4	<1	<20.0	See Table	4510000	8380
11-1S	MLY-682	03/17/1992	<1.0	No Detect	7.10	<0.4	<1	48.5	See Table	1420000	2820
13-16NA	MLY-728	03/17/1992	<1.0	No Detect	6.87	<0.4	<1	25.4	No Detect	1750000	3540
13-16NA (Dup)	MLY-729	03/17/1992	<1.0	No Detect	No Data	<0.4	<1	14.8	See Table	1750000	3540
14-13NA	MLY-730	03/17/1992	<1.0	No Detect	7.23	<0.4	<1	38.9	See Table	1140000	2380
14-6NA	MLY-683	03/17/1992	<1.0	No Detect	7.20	<0.4	<1	<2.0	See Table	468000	1040
3-3NA	MLY-736	03/18/1992	<1.0	No Detect	7.47	<0.4	<1	<20.0	See Table	2790000	6420
5-12NA	MLY-737	03/18/1992	<1.0	No Detect	7.36	<0.4	<1	<20.0	See Table	1360000	2800
GJ84-04	MLY-731	03/17/1992	<1.0	No Detect	7.41	<0.4	<1	<2.0	No Detect	1760000	3320
GJ84-05	MLY-733	03/17/1992	<1.0	No Detect	7.25	<0.4	<1	<20.0	No Detect	3750000	6960
GJ84-06	MLY-690	03/18/1992	~1.5	No Detect	7.10	<0.4	<1	~2.4	No Detect	1430000	2840
GJ84-09	MLY-735	03/18/1992	<1.0	No Detect	7.50	<0.4	<1	<2.0	No Detect	941000	1840
GJ84-10	MLY-727	03/16/1992	<1.0	No Detect	7.45	<0.4	<1	<2.0	See Table	1150000	2180
P-2A	MLY-688	03/18/1992	<1.0	No Detect	7.19	<0.4	<1	80.5	No Detect	1690000	3300
P-3A	MLY-685	03/17/1992	<1.0	No Detect	6.75	<0.4	<1	<20.0	No Detect	1210000	2360
P-4A	MLY-689	03/18/1992	<1.0	No Detect	6.96	<0.4	<1	<20.0	See Table	3520000	6580
P-6	MLY-686	03/18/1992	<1.0	No Detect	7.29	<0.4	<1	~4.0	No Detect	671000	1380
Surface Water											
Lower Gunnison	MLY-726	03/16/1992	<1.0	No Data	8.31	<0.4	<1	~3.8	No Data	343000	760
Middle Gunnison	MLY-677	03/16/1992	<1.0	No Data	8.34	<0.4	<1	7.0	No Data	311000	700
North Pond	MLY-679	03/16/1992	<1.0	No Data	8.11	<0.4	<1	<2.0	No Data	1980000	3940
South Pond	MLY-680	03/16/1992	<1.0	No Data	8.87	<0.4	<1	16.4	No Data	1410000	2520
Upper Gunnison	MLY-678	03/16/1992	<1.0	No Data	8.22	<0.4	<1	~2.5	No Data	310000	700
Upper Mid Gunnison	MLY-681	03/16/1992	<1.0	No Data	8.55	<0.4	<1	~3.8	No Data	314000	640
QA/QC											
Equipment Blank	MLY-732	03/17/1992	<1.0	No Detect	No Data	<0.4	<1	<2.0	See Table	~95.4	<20
Trip Blank	MLY-676	03/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-687	03/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). "No Detect" indicates that the maximum concentration was below detection limits (detection limits are listed in Table A-21); "See Table" indicates that the reader should refer to Table A-23 in this report for a list of detected constituents.

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-18 (continued). Water Chemistry Data for Grand Junction, March 16 through March 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Temp (Deg C)	Th-230 (pCi/L)[b]	TOC (mg/L)	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)	Volatile (µg/L)
Ground Water									
1-9SA	MLY-734	03/18/1992	14.3	<0.3	3.7	11.2	7.2	<7.0	No Detect
10-19N	MLY-684	03/17/1992	9.7	<0.3	19.3	243.8	246.0	<7.0	See Table
11-1S	MLY-682	03/17/1992	13.4	<0.3	7.3	288.4	285.7	<7.0	See Table
13-16NA	MLY-728	03/17/1992	11.2	<0.3	11.1	46.0	58.1	~17.1	No Detect
13-16NA (Dup)	MLY-729	03/17/1992	No Data	<0.3	12.1	89.4	109.4	~19.4	See Table
14-13NA	MLY-730	03/17/1992	12.2	<0.3	5.5	207.7	197.7	~18.7	See Table
14-6NA	MLY-683	03/17/1992	12.3	<0.3	6.2	32.6	33.5	<7.0	See Table
3-3NA	MLY-736	03/18/1992	15.7	<0.3	3.1	51.0	30.4	<7.0	No Detect
5-12NA	MLY-737	03/18/1992	13.5	<0.3	5.0	25.5	16.3	<7.0	See Table
GJ84-04	MLY-731	03/17/1992	12.3	<0.3	7.0	178.0	205.8	~29.6	No Detect
GJ84-05	MLY-733	03/17/1992	11.2	<0.3	13.9	498.8	496.8	<7.0	See Table
GJ84-06	MLY-690	03/18/1992	14.8	<0.3	6.3	18.5	11.7	<7.0	See Table
GJ84-09	MLY-735	03/18/1992	14.9	<0.3	2.0	8.1	4.7	<7.0	No Detect
GJ84-10	MLY-727	03/16/1992	16.3	<0.3	3.9	8.8	5.7	<7.0	No Detect
P-2A	MLY-688	03/18/1992	15.9	<0.3	8.3	16.3	12.7	<7.0	See Table
P-3A	MLY-685	03/17/1992	11.3	<0.3	8.6	329.4	317.8	<7.0	See Table
P-4A	MLY-689	03/18/1992	12.7	<0.3	31.9	168.9	156.3	<7.0	See Table
P-6	MLY-686	03/18/1992	12.9	<0.3	5.1	14.5	10.1	<7.0	No Detect
Surface Water									
Lower Gunnison	MLY-726	03/16/1992	10.2	<0.3	6.2	6.8	5.2	<7.0	No Data
Middle Gunnison	MLY-677	03/16/1992	9.7	<0.3	4.9	4.4	2.6	<7.0	No Data
North Pond	MLY-679	03/16/1992	16.3	<0.3	18.3	194.0	169.5	<7.0	No Data
South Pond	MLY-680	03/16/1992	16.1	<0.3	77.2	210.1	208.3	~40.6	No Data
Upper Gunnison	MLY-678	03/16/1992	11.1	<0.3	6.8	4.7	2.6	<7.0	No Data
Upper Mid Gunnison	MLY-681	03/16/1992	13.7	<0.3	11.8	4.1	2.9	<7.0	No Data
QA/QC									
Equipment Blank	MLY-732	03/17/1992	No Data	<0.3	0.7	0.6	0.6	<7.0	No Detect
Trip Blank	MLY-676	03/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	See Table
Trip Blank	MLY-687	03/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	See Table

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is the detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-23 in this report for a list of detected constituents.

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-19. Water Chemistry Data for Grand Junction, June 15 through June 19, 1992[a]

Sample Location	Ticket Number	Sample Date	Alky (ppm) (as $CaCO_3$)	Alpha (pCi/L)[b]	As (µg/L)	Ba (µg/L)	Ca (µg/L)	Cd (µg/L)	CDT (µmhos/cm)	Cl (µg/L)	Cr (µg/L)
Ground Water											
1-9SA	MLY-846	06/19/1992	232	<60	<3.0	~9.6	99100	<1.0	1950	10700	<4.0
10-19N	MLY-844	06/18/1992	702	1200	<3.0	~10.6	465000	<1.0	8130	521000	<4.0
11-12NA	MLY-843	06/18/1992	370	290	36.0	~15.0	285000	<1.0	3350	160000	<4.0
13-16NA	MLY-840	06/18/1992	480	1300	~3.3	~16.7	477000	<1.0	5460	300000	<4.0
14-13NA	MLY-841	06/18/1992	306	720	~8.1	~14.0	290000	<1.0	3450	150000	<4.0
14-6NA	MLY-845	06/19/1992	199	60	203	~38.5	92900	<1.0	1070	20200	<4.0
5-12NA	MLY-837	06/17/1992	329	100	<3.0	~10.1	290000	<1.0	3140	152000	<4.0
GJ84-04	MLY-842	06/18/1992	287	570	16.1	~12.7	149000	<1.0	3580	102000	<4.0
GJ84-09	MLY-836	06/17/1992	247	<70	~3.0	~10.1	124000	<1.0	2390	45100	<4.0
GJ84-10	MLY-834	06/16/1992	248	<75	<3.0	~7.0	133000	<1.0	2690	97500	<4.0
GJ87-15	MLY-838	06/17/1992	326	440	100	~17.3	248000	<1.0	2900	139000	<4.0
GJ87-15 (Dup)	MLY-839	06/17/1992	No Data	400	111	~15.3	249000	<1.0	No Data	140000	<4.0
Surface Water											
Lower Gunnison	MLY-829	06/15/1992	99	<20	<3.0	~32.0	79000	<1.0	699	5000	<4.0
Middle Gunnison	MLY-828	06/15/1992	103	<20	~3.5	~33.9	81100	<1.0	699	5110	<4.0
North Pond	MLY-831	06/16/1992	130	399	~5.1	~17.6	283000	<1.0	4630	303000	<4.0
South Pond	MLY-833	06/16/1992	80	324	22.1	~25.9	321000	<1.0	3290	168000	<4.0
Upper Gunnison	MLY-826	06/15/1992	102	<30	~3.4	~34.4	83000	<1.0	730	5370	<4.0
Upper Mid Gunnison	MLY-827	06/15/1992	94	<30	<3.0	~36.5	80900	<1.0	711	5320	<4.0
QA/QC											
Equipment Blank	MLY-832	06/16/1992	No Data	<7	<3.0	<4.0	319000	<1.0	No Data	~114	<4.0
Trip Blank	MLY-830	06/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-835	06/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-19 (continued). Water Chemistry Data for Grand Junction, June 15 through June 19, 1992[a]

Sample Location	Ticket Number	Sample Date	Fe (µg/L)	H_2O Depth (feet)	Herb (µg/L)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NO_3 (µg/L)
Ground Water											
1-9SA	MLY-846	06/19/1992	<9.0	11.18	No Detect	5770	17400	736	<22.0	324000	~189
10-19N	MLY-844	06/18/1992	216	11.70	No Detect	18800	265000	5010	182	1430000	~415
11-12NA	MLY-843	06/18/1992	<9.0	4.78	No Detect	8730	92800	998	<22.0	394000	14200
13-16NA	MLY-840	06/18/1992	249	3.37	No Detect	18300	133000	9270	148	708000	1110
14-13NA	MLY-841	06/18/1992	<9.0	4.70	No Detect	15800	66600	3690	248	448000	1770
14-6NA	MLY-845	06/19/1992	1030	16.70	No Detect	13600	23200	2720	<22.0	88600	~36.0
5-12NA	MLY-837	06/17/1992	<9.0	8.77	No Detect	5720	113000	645	<22.0	316000	1170
GJ84-04	MLY-842	06/18/1992	<9.0	7.90	No Detect	10200	41900	1900	265	637000	~184
GJ84-09	MLY-836	06/17/1992	121	16.33	No Detect	6970	19800	239	<22.0	410000	~22.8
GJ84-10	MLY-834	06/16/1992	<9.0	32.56	No Detect	5280	31900	421	<22.0	454000	~326
GJ87-15	MLY-838	06/17/1992	<9.0	7.06	No Detect	13200	60800	2760	95.4	353000	10800
GJ87-15 (Dup)	MLY-839	06/17/1992	<9.0	No Data	No Detect	12700	60600	2760	94.6	354000	10900
Surface Water											
Lower Gunnison	MLY-829	06/15/1992	<9.0	No Data	No Data	~1680	24800	~6.0	<22.0	37000	2730
Middle Gunnison	MLY-828	06/15/1992	<9.0	No Data	No Data	~1320	25200	~10.5	<22.0	37900	2780
North Pond	MLY-831	06/16/1992	<9.0	No Data	No Data	19700	154000	121	50.9	709000	~116
South Pond	MLY-833	06/16/1992	<9.0	No Data	No Data	20500	76800	1820	106	390000	6110
Upper Gunnison	MLY-826	06/15/1992	<9.0	No Data	No Data	~1700	25600	~6.3	<22.0	38700	4370
Upper Mid Gunnison	MLY-827	06/15/1992	<9.0	No Data	No Data	~1500	25200	~8.7	<22.0	38000	2720
QA/QC											
Equipment Blank	MLY-832	06/16/1992	<9.0	No Data	No Data	<1100	<53.0	<1.0	<22.0	~97.4	~54.0
Trip Blank	MLY-830	06/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-835	06/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

Table A-19 (continued). Water Chemistry Data for Grand Junction, June 15 through June 19, 1992[a]

Sample Location	Ticket Number	Sample Date	Pb (µg/L)	Pesticide (µg/L)	pH	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Se (µg/L)	Semivolatile (µg/L)	SO_4 (µg/L)	TDS (mg/L)
Ground Water											
1-9SA	MLY-846	06/19/1992	<1.0	No Detect	7.97	<0.1	<1	<2.0	No Detect	327000	1400
10-19N	MLY-844	06/18/1992	<1.0	No Detect	7.38	0.1	<1	~2.5	No Detect	3980000	7500
11-12NA	MLY-843	06/19/1992	<1.0	No Detect	7.30	0.1	<1	29.4	No Detect	1400000	2780
13-16NA	MLY-840	06/18/1992	<1.0	No Detect	6.98	0.1	<1	~31.0	No Detect	2350000	4800
14-13NA	MLY-341	06/18/1992	<1.0	No Detect	7.13	0.1	<1	16.7	No Detect	1470000	2900
14-6NA	MLY-845	06/19/1992	<1.0	No Detect	7.41	0.1	<1	<2.0	No Detect	737000	780
5-12NA	MLY-837	06/17/1992	<1.0	No Detect	7.29	0.2	<1	11.1	No Detect	1290000	2720
GJ84-04	MLY-842	06/18/1992	<1.0	No Detect	7.39	0.1	<1	<2.0	No Detect	1460000	2780
GJ84-09	MLY-836	06/17/1992	<1.0	No Detect	7.48	0.1	<1	<2.0	No Detect	929000	1800
GJ84-10	MLY-834	06/16/1992	<1.0	No Detect	7.57	0.1	<1	~2.5	No Detect	1100000	2080
GJ87-15	MLY-838	06/17/1992	<1.0	No Detect	7.28	0.1	<1	57.7	No Detect	<210	2360
GJ87-15 (Dup)	MLY-839	06/17/1992	<1.0	No Detect	No Data	0.1	<1	41.8	No Detect	<210	2320
Surface Water											
Lower Gunnison	MLY-829	06/15/1992	<1.0	No Data	8.49	0.1	<1	5.5	No Data	228000	560
Middle Gunnison	MLY-828	06/15/1992	<1.0	No Data	8.08	0.1	<1	7.2	No Data	236000	580
North Pond	MLY-831	06/16/1992	<1.0	No Data	8.50	0.2	<1	6.5	No Data	2290000	4140
South Pond	MLY-833	06/16/1992	<1.0	No Data	7.03	0.4	<1	~5.2	No Data	1540000	2940
Upper Gunnison	MLY-826	06/15/1992	<1.0	No Data	7.50	0.1	<1	~4.8	No Data	244000	560
Upper Mid Gunnison	MLY-827	06/15/1992	<1.0	No Data	8.18	0.1	<1	~4.5	No Data	220000	560
QA/QC											
Equipment Blank	MLY-832	06/16/1992	<1.0	No Data	No Data	<0.1	<1	<2.0	No Data	209	220
Trip Blank	MLY-830	06/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	MLY-835	06/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A 19 (continued) Water Chemistry Data for Grand Junction, June 15 through June 19, 1992[a]

Sample location	Ticket Number	Sample Date	Temperature (degrees C)	Th-230 (pCi/L)[b]	TOC (mg/L)	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)	Volatile (µg/L)
Ground Water									
1-9SA	MLY 846	06/19/1992	14 8	<0.3	1.1	10.99	8.02	<7.0	No Detect
10-19N	MLY 844	06/18/1992	11.0	<0.5	13.8	289.74	295.69	<7.0	No Detect
11-12NA	MLY-843	06/18/1992	13.3	<0.3	4.1	108.91	93.39	138	No Detect
13-16NA	MLY-840	06/18/1992	13.1	<0.3	15.7	112.04	114.82	~19.5	No Detect
14-13NA	MLY-841	06/18/1992	14.1	<0.5	5.3	289.96	282.41	~17.4	No Detect
14-6NA	MLY-845	06/19/1992	11.8	<0.3	1.2	24.19	24.49	~12.2	No Detect
5-12NA	MLY-837	06/17/1992	14.1	<0.3	3.7	21.48	15.14	<7.0	No Detect
GJ84 04	MLY-842	06/18/1992	13.2	<0.5	5.5	223.09	198.97	~14.5	No Detect
GJ84 09	MLY 836	06/17/1992	14.4	<0.3	0.6	6.84	4.17	<7.0	No Detect
GJ84 10	MLY-834	06/16/1992	15.3	<0.3	1.0	13.42	9.35	<7.0	No Detect
GJ87-15	MLY-838	06/17/1992	15.6	<0.3	4.4	157.79	136.10	223	No Detect
GJ87-15 (Dup)	MLY-839	06/17/1992	No Data	<0.3	4.5	149.35	141.42	219	No Detect
Surface Water									
Lower Gunnison	MLY-829	06/15/1992	18.5	<0.3	5.0	4.22	3.10	<7.0	No Data
Middle Gunnison	MLY-828	06/15/1992	18.3	<0.3	3.8	3.14	2.60	<7.0	No Data
North Pond	MLY-831	06/16/1992	21.2	<0.6	25.9	151.56	143.01	<7.0	No Data
South Pond	MLY-833	06/16/1992	19.8	<0.6	25.2	148.27	150.19	~33.1	No Data
Upper Gunnison	MLY-826	06/15/1992	15.8	<0.3	5.3	2.27	2.08	<7.0	No Data
Upper Mid Gunnison	MLY-827	06/15/1992	16.5	<0.3	5.6	2.78	2.05	<7.0	No Data
QA/QC									
Equipment Blank	MLY-832	06/16/1992	No Data	<0.3	0.6	0.48	0.62	<7.0	No Data
Trip Blank	MLY-830	06/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Detect
Trip Blank	MLY-835	06/17/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Detect

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-20. Water Chemistry Data for Grand Junction, September 8 through September 14, 1992[a]

Sample Location	Ticket Number	Sample Date	Alky (ppm) (CaCO3)	Alpha (pCi/L)[b]	As (µg/L)	Ba (µg/L)	Ca (µg/L)	Cd (µg/L)	CDT (µmhos/cm)	Cl (µg/L)	Cr (µg/L)
Ground Water											
1-9SA	MLY-749	09/09/1992	236	<40	<3.0	~14.3	106000	<1.0	1894	19100	<6.0
10-19N	NAW-293	09/10/1992	594	1200	<30.0	~15.9	562000	<1.0	9100	713000	<6.0
11-12NA	NAW-292	09/10/1992	331	220	33.6	~24.6	329000	<1.0	3560	187000	<6.0
11-1S	MLY-900	09/09/1992	281	1100	<3.0	~12.3	158000	<1.0	2586	71300	<6.0
13-16NA	NAW-294	09/11/1992	530	1000	<30.0	~19.2	482000	<1.0	5370	287000	<6.0
14-13NA	NAW-295	09/11/1992	391	900	14.7	~18.0	136000	<1.0	3720	158000	<6.0
14-6NA	NAW-290	09/10/1992	161	<30	225	~43.9	102000	<1.0	1128	15400	<6.0
5-12NA	MLY-750	09/09/1992	403	<80	<3.0	~20.2	338000	<1.0	3300	166000	<6.0
GJ84-04	MLY-747	09/08/1992	324	510	~3.6	~16.5	170000	<1.0	3630	51000	<6.0
GJ84-04 (Dup)	MLY-748	09/08/1992	324	480	<3.0	~19.4	172000	<1.0	3630	54200	<6.0
GJ84-09	NAW-289	09/09/1992	273	<50	<30.0	~12.7	119000	<1.0	2330	45000	<6.0
GJ84-10	MLY-746	09/08/1992	164	<60	<30.0	<7.0	140000	<1.0	2620	94500	<6.0
GJ87-15	NAW-291	09/10/1992	294	240	87.8	~23.6	286000	<1.0	3110	164000	<6.0
Surface Water											
Lower Gunnison	NAW-299	09/14/1992	133	<30	<3.0	~36.5	121000	<1.0	1184	9810	<6.0
Middle Gunnison	NAW-298	09/14/1992	148	30	<3.0	~37.1	127000	<1.0	1085	9510	<6.0
North Pond	NAW-300	09/14/1992	52	420	<30.0	~17.3	352000	<1.0	4850	414000	<6.0
South Pond	NAW-302	09/14/1992	152	490	15.3	~26.5	408000	<1.0	3890	204000	<6.0
Upper Gunnison	NAW-296	09/14/1992	131	<30	<3.0	~35.5	128000	<1.0	1125	9580	<6.0
Upper Mid Gunnison	NAW-297	09/14/1992	151	<20	<3.0	~37.7	134000	<1.0	1163	9680	<6.0
QA/QC											
Equipment Blank	NAW-301	09/14/1992	No Data	<5	<3.0	<7.0	<24.0	<1.0	No Data	~62.7	<6.0
Trip Blank	MLY-525	09/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-20 (continued). Water Chemistry Data for Grand Junction, September 8 through September 14, 1992[a]

Sample Location	Ticket Number	Sample Date	Fe (µg/L)	H_2O Depth (Feet)	Herbicide (µg/L)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NO_3 (µg/L)
Ground Water											
1-9SA	MLY-749	09/09/1992	<10.0	12.74	No Detect	5700	16500	822	~12.1	327000	~74.6
10-19N	NAW-293	09/10/1992	493	12.56	No Detect	25800	340000	5630	303	1910000	~61.5
11-12NA	NAW-292	09/10/1992	<10.0	5.77	No Detect	10300	97200	1140	~28.9	432000	15900
11-1S	MLY-900	09/09/1992	<10.0	16.65	No Detect	7040	58300	149	434	382000	1700
13-16NA	NAW-294	09/11/1992	506	4.31	No Detect	21000	123000	8800	213	761000	~110
14-13NA	NAW-295	09/11/1992	<10.0	5.53	No Detect	19600	74800	4570	276	71600	~665
14-6NA	NAW-290	09/10/1992	1350	20.14	No Detect	14900	21500	3230	~13.8	96500	~23.2
5-12NA	MLY-750	09/09/1992	<10.0	7.65	No Detect	5940	122000	699	~16.1	335000	744
GJ84-04	MLY-747	09/08/1992	~19.0	8.61	No Detect	10500	42200	2140	290	683000	~106
GJ84-04 (Dup)	MLY-748	09/08/1992	~15.2	8.61	No Detect	11200	42300	2160	288	674000	~103
GJ84-09	NAW-289	09/09/1992	~69.0	20.57	No Detect	7600	19400	160	~8.4	396000	~45.9
GJ84-10	MLY-746	09/08/1992	<10.0	33.7	No Detect	~4600	32500	493	~13.3	447000	~260
GJ87-15	NAW-291	09/10/1992	<10.0	8.24	No Detect	15600	66200	3280	97.3	375000	19300
Surface Water											
Lower Gunnison	NAW-299	09/14/1992	<10.0	No Data	No Data	~3340	41600	16.2	~4.7	67100	5270
Middle Gunnison	NAW-298	09/14/1992	<10.0	No Data	No Data	~3360	43700	19.0	~4.5	70800	5200
North Pond	NAW-300	09/14/1992	<10.0	No Data	No Data	26800	230000	26.7	50.6	1030000	~99.4
South Pond	NAW-302	09/14/1992	<10.0	No Data	No Data	25800	87400	412	148	461000	6600
Upper Gunnison	NAW-296	09/14/1992	<10.0	No Data	No Data	~3080	43700	21.2	~4.9	70800	5250
Upper Mid Gunnison	NAW-297	09/14/1992	<10.0	No Data	No Data	~3490	45700	26.7	~4.6	74100	5400
QA/QC											
Equipment Blank	NAW-301	09/14/1992	<10.0	No Data	No Data	<1700	<95.0	<1.0	<1.0	~167	~44.4
Trip Blank	MLY-525	09/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

Table A-20 (continued). Water Chemistry Data for Grand Junction, September 8 through September 14, 1992[a]

Sample Location	Ticket Number	Sample Date	Pb (µg/L)	Pesticide (µg/L)	pH	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Se (µg/L)	Semivolatile (µg/L)	SO_4 (µg/L)	TDS (mg/L)
Ground Water											
1-9SA	MLY-749	09/09/1992	<1.0	No Detect	7.82	<0.1	<2	<3.0	See Table	707000	1360
10-19N	NAW-293	09/10/1992	<1.0	No Detect	6.97	0.2	<2	<30.0	See Table	4980000	8840
11-12NA	NAW-292	09/10/1992	<1.0	No Detect	6.95	0.1	<3	46.8	See Table	1480000	2740
11-1S	MLY-900	09/09/1992	<1.0	No Detect	7.30	<0.1	<1	<3.0	See Table	1030000	1880
13-16NA	NAW-294	09/11/1992	<1.0	No Detect	6.77	0.1	<2	5.7	See Table	2330000	4300
14-13NA	NAW-295	09/11/1992	<1.0	No Detect	6.82	0.1	<2	11.5	See Table	1590000	3000
14-6NA	NAW-290	09/10/1992	<1.0	No Detect	7.05	<0.1	<4	<3.0	See Table	387000	740
5-12NA	MLY-750	09/09/1992	<1.0	No Detect	7.12	0.0	<2	9.8	See Table	1440000	2680
GJ84-04	MLY-747	09/08/1992	<1.0	No Detect	7.23	0.1	<2	<3.0	See Table	706000	2680
GJ84-04 (Dup)	MLY-748	09/08/1992	<1.0	No Detect	7.23	<0.1	<2	<3.0	See Table	750000	2700
GJ84-09	NAW-289	09/09/1992	<1.0	No Detect	7.30	<0.1	<2	<3.0	See Table	909000	1440
GJ84-10	MLY-746	09/08/1992	<1.0	No Detect	7.52	0.1	<2	<3.3	See Table	1060000	1720
GJ87-15	NAW-291	09/10/1992	<1.0	No Detect	6.79	0.1	<2	36.3	See Table	1210000	2360
Surface Water											
Lower Gunnison	NAW-299	09/14/1992	<1.0	No Data	8.52	<0.1	<3	6.2	No Data	450000	820
Middle Gunnison	NAW-298	09/14/1992	3.5	No Data	7.84	0.1	<2	13.0	No Data	449000	820
North Pond	NAW-300	09/14/1992	<1.0	No Data	9.97	<0.2	<2	<3.0	No Data	3200000	5300
South Pond	NAW-302	09/14/1992	<1.0	No Data	7.50	0.1	<2	<3.0	No Data	1900000	2900
Upper Gunnison	NAW-296	09/14/1992	<1.0	No Data	7.59	0.2	<2	7.4	No Data	451000	800
Upper Mid Gunnison	NAW-297	09/14/1992	<1.0	No Data	8.20	0.1	<2	8.3	No Data	453000	600
QA/QC											
Equipment Blank	NAW-301	09/14/1992	<1.0	No Data	No Data	0.1	<2	<3.0	No Data	~57.0	400
Trip Blank	MLY-525	09/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-23 in this report for a list of detected constituents.

[b]The values listed multiplied by $1U^{-9}$ will result in µCi/mL.

Table A-20 (continued). Water Chemistry Data for Grand Junction, September 8 through September 14, 1992[a]

Sample Location	Ticket Number	Sample Date	Temperature (degrees C)	Th-230 (pCi/L)[b]	Th-232 (pCi/L)[b]	TOC (mg/L)	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)	Volatile (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	15.5	<1.0	<1.0	0.9	12.07	7.90	<7.0	No Detect
10-19N	NAW-293	09/10/1992	13.9	<3	<1.7	18.7	575.13	556.38	<7.0	No Detect
11-12NA	NAW-292	09/10/1992	15.8	<1.0	<1.0	3.2	106.62	99.68	153	No Detect
11-1S	MLY-900	09/09/1992	14.9	<1.0	<1.0	3.5	532.46	534.99	<7.0	No Detect
13-16NA	NAW-294	09/11/1992	16.3	<3	<1.9	14.6	504.25	462.67	~20.6	No Detect
14-13NA	NAW-295	09/11/1992	17.4	9	9	6.9	352.31	367.32	~21.3	No Detect
14-6NA	NAW-290	09/10/1992	13.9	<1.0	<1.0	3.6	10.55	9.56	<7.0	No Detect
5-12NA	MLY-750	09/09/1992	14.9	<1.0	<1.0	4.2	27.63	17.41	<7.0	No Detect
GJ84-04	MLY-747	09/08/1992	15.0	<4	<2	5.2	240.27	241.81	~16.0	No Detect
GJ84-04 (Dup)	MLY-748	09/08/1992	15.0	<4	<2	5.2	259.37	245.89	~16.3	No Detect
GJ84-09	NAW-289	09/09/1992	14.9	<1.0	<1.0	0.6	7.27	4.04	<7.0	No Detect
GJ84-10	MLY-746	09/08/1992	15.4	<1.0	<1.0	2.8	8.20	3.49	<7.0	No Detect
GJ87-15	NAW-291	09/10/1992	19.7	<1.0	<1.0	4.1	171.61	161.05	245	No Detect
Surface Water										
Lower Gunnison	NAW-299	09/14/1992	18.5	<1.0	<1.0	4.8	5.38	3.20	<7.0	No Data
Middle Gunnison	NAW-298	09/14/1992	17.9	<1.0	<1.0	5.3	5.61	3.17	<7.0	No Data
North Pond	NAW-300	09/14/1992	29.9	<7	<7	43.7	149.76	136.87	~15.0	No Data
South Pond	NAW-302	09/14/1992	22.1	<4	<4	15.2	227.85	246.97	~7.7	No Data
Upper Gunnison	NAW-296	09/14/1992	17.4	<1.0	<1.0	5.8	5.50	3.26	<7.0	No Data
Upper Mid Gunnison	NAW-297	09/14/1992	17.4	<1.0	<1.0	4.8	5.48	3.14	<7.0	No Data
QA/QC										
Equipment Blank	NAW-301	09/14/1992	No Data	<1.0	<1.0	No Data	0.03	<0.15	<7.0	No Data
Trip Blank	MLY-525	09/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-21. Water Chemistry Data for Grand Junction, December 14 through December 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Alky (ppm)	Alpha (pCi/L)[b]	As (µg/L)	Ba (µg/L)	Beta (pCi/L)[b]	Ca (µg/L)	Cd (µg/L)	CDT (µmhos/cm)	Cl (µg/L)
Ground Water											
1-9SA	NBA-379	12/15/1992	249	<40	<2.0	~13.0	90	104000	<1.0	1915	18700
10-19N	NBA-394	12/18/1992	493	900	<20.0	~12.6	400	523000	<1.0	5170	613000
11-12NA	NBA-385	12/16/1992	343	240	43.5	~21.0	80	339000	<1.0	3741	198000
11-1S	NBA-382	12/15/1992	248	480	<2.0	~12.7	240	68500	<1.0	1628	23700
13-16NA	NBA-395	12/18/1992	575	600	~3.4	~16.2	320	415000	<1.0	9200	218000
14-13NA	NBA-393	12/18/1992	435	1000	11.7	~16.3	480	443000	<1.0	4440	178000
5-12NA	NBA-378	12/15/1992	327	<70	<2.0	~13.3	<70	292000	<1.0	3100	172000
8-4S	NBA-381	12/15/1992	279	780	<2.0	~19.0	320	330000	<1.0	3240	126000
GJ84-04	NBA-390	12/17/1992	315	630	<20.0	~18.0	220	187000	<1.0	3880	105000
GJ84-09	NBA-376	12/14/1992	247	<50	<2.0	~12.2	<50	128000	<1.0	2390	46200
GJ84-09 (Dup)	NBA-377	12/14/1992	247	<50	<2.0	~12.0	<50	126000	<1.0	2390	46700
GJ84-10	NBA-451	12/14/1992	170	<60	<2.0	~6.7	<50	140000	<1.0	2600	96100
GJ87-15	NBA-380	12/15/1992	374	560	81.3	~21.9	180	339000	<1.0	3390	156000
Surface Water											
Lower Gunnison	NBA-392	12/17/1992	175	<30	<2.0	~36.8	<20	121000	<1.0	1358	10600
Middle Gunnison	NBA-391	12/17/1992	166	<20	<2.0	~36.7	<20	117000	<1.0	948	10600
North Pond	NBA-386	12/16/1992	240	250	<2.0	~10.6	<110	347000	<1.0	5250	371000
South Pond	NBA-387	12/17/1992	95	420	13.8	~13.8	140	337000	<1.0	3410	167000
South Pond (Dup)	NBA-388	12/17/1992	95	490	11.6	~14.4	160	355000	<1.0	3410	167000
Upper Gunnison	NBA-383	12/16/1992	150	<20	<2.0	~38.5	<20	123000	<1.0	1281	10800
Upper Mid Gunnison	NBA-384	12/16/1992	161	20	<2.0	~38.1	<20	123000	<1.0	1278	11000
QA/QC											
Equipment Blank	NBA-389	12/17/1992	No Data	<6	<2.0	<5.0	<10	~297	<1.0	No Data	~21.7

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A 21 (continued) Water Chemistry Data for Grand Junction, December 14 through December 18, 1992[a]

Sample location	Ticket Number	Sample Date	Cr (µg/L)	Fe (µg/L)	H_2O Depth (feet)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NO_3 (µg/L)
Ground Water											
1-9SA	NBA-379	12/15/1992	<4.0	~13.1	13.31	6040	16600	971	<27.0	318000	~62.1
10-19N	NBA-394	12/18/1992	<4.0	387	4.67	23100	310000	5370	194	1580000	~288
11-12NA	NBA-385	12/16/1992	<4.0	<5.0	5.69	11600	101000	1160	<27.0	449000	14700
11-1S	NBA-382	12/15/1992	<4.0	<5.0	17.04	6350	27400	36.9	210	247000	~205
13-16NA	NBA-395	12/18/1992	<4.0	1620	13.22	20000	112000	7140	204	743000	~303
14-13NA	NBA-393	12/18/1992	<4.0	<5.0	6.06	22100	88500	5630	250	561000	~499
5-12NA	NBA-378	12/15/1992	<4.0	<5.0	10.00	6210	112000	577	<27.0	315000	~298
8-4S	NBA-381	12/15/1992	<4.0	~6.2	9.12	10300	102000	1290	167	301000	159000
GJ84-04	NBA-390	12/17/1992	<4.0	~18.3	9.34	13300	52400	2460	270	665000	~155
GJ84-09	NBA-376	12/14/1992	<4.0	128	20.95	7970	20300	223	<27.0	408000	~124
GJ84-09 (Dup)	NBA-377	12/14/1992	<4.0	120	20.95	8040	19900	209	<27.0	406000	~83.1
GJ84-10	NBA-451	12/14/1992	<4.0	<5.0	33.46	5280	32400	465	<27.0	442000	~247
GJ87-15	NBA-380	12/15/1992	<4.0	<5.0	7.98	16800	78100	3940	127	405000	1410
Surface Water											
Lower Gunnison	NBA-392	12/17/1992	<4.0	<5.0	No Data	~3010	48500	53.9	<27.0	78500	5120
Middle Gunnison	NBA-391	12/17/1992	<4.0	<5.0	No Data	~3420	47200	54.2	<27.0	77900	5180
North Pond	NBA-386	12/16/1992	<4.0	~8.6	No Data	23100	212000	45.1	~32.2	927000	1140
South Pond	NBA-387	12/17/1992	<4.0	<5.0	No Data	No Data	73300	165	108	382000	17200
South Pond (Dup)	NBA-388	12/17/1992	<4.0	<5.0	No Data	16000	74000	166	122	394000	17100
Upper Gunnison	NBA-383	12/16/1992	<4.0	<5.0	No Data	~3330	47900	56.7	<27.0	78100	5300
Upper Mid Gunnison	NBA-384	12/16/1992	<4.0	<5.0	No Data	~3250	47300	64.3	<27.0	79800	5340
QA/QC											
Equipment Blank	NBA-389	12/17/1992	<4.0	<5.0	No Data	<1090	~89.4	~1.1	<27.0	<52.0	~26.7

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

Table A-21 (continued). Water Chemistry Data for Grand Junction, December 14 through December 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Pb (µg/L)	pH	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Se (µg/L)	SO_4 (µg/L)	TDS (mg/L)	Temp (Deg C)	Th-230 (pCi/L)[b]
Ground Water											
1-9SA	NBA-379	12/15/1992	<1.0	7.62	<0.1	<2	<2.0	711000	1410	16.3	<0.3
10-[illegible]N	NBA-394	12/18/1992	<1.0	6.87	0.1	<2	<20.0	4300000	8100	15.5	1.1
11-[illegible]NA	NBA-385	12/16/1992	<1.0	7.08	<0.3	<2	54.5	1520000	2770	15.7	<0.3
11-1S	NBA-382	12/15/1992	57.1	7.36	<0.1	<2	<2.0	507000	1010	15.5	<0.4
13-16NA	NBA-395	12/18/1992	<1.0	7.12	<0.1	<2	~2.1	2220000	4300	13.5	<0.3
14-13NA	NBA-393	12/18/1992	<1.0	6.85	0.1	<2	~2.8	1910000	3730	15.5	<0.8
5-12NA	NBA-378	12/15/1992	<1.0	6.87	<0.1	<1	~3.0	1290000	2590	14.9	<0.3
8-4S	NBA-381	12/15/1992	<1.0	7.15	0.3	<3	91.7	1220000	2590	14.7	<0.3
GJ84-04	NBA-390	12/17/1992	<1.0	6.89	<0.1	<2	<2.0	1550000	2920	14.9	3.2
GJ84-09	NBA-376	12/14/1992	<1.0	7.17	<0.1	<2	<2.0	908000	1750	14.9	<0.3
GJ84-09 (Dup)	NBA-377	12/14/1992	<1.0	7.17	<0.1	<2	<2.0	917000	1730	14.9	<0.3
GJ84-10	NBA-451	12/14/1992	<1.0	7.39	<0.1	<3	~2.2	1050000	1950	14.7	<0.3
GJ87-15	NBA-380	12/15/1992	<1.0	6.79	<0.1	<2	10.1	1420000	2820	16.3	<0.3
Surface Water											
Lower Gunnison	NBA-392	12/17/1992	<1.0	8.65	0.1	<2	6.0	435000	919	0.2	<0.3
Middle Gunnison	NBA-391	12/17/1992	<1.0	8.74	<0.1	<2	5.7	434000	892	0.4	<0.3
North Pond	NBA-386	12/16/1992	<1.0	6.86	12.3	<4	~3.8	2790000	5120	3.4	5.0
South Pond	NBA-387	12/17/1992	<1.0	7.69	<0.1	<2	~3.7	1560000	2870	2.0	<0.6
South Pond (Dup)	NBA-388	12/17/1992	<1.0	7.69	<0.1	<3	~3.5	1560000	2860	2.0	<0.5
Upper Gunnison	NBA-383	12/16/1992	5.5	8.22	<0.2	<4	9.6	444000	902	1.0	0.70
Upper Mid Gunnison	NBA-384	12/16/1992	<1.0	7.65	0.1	<2	7.8	447000	914	2.0	<0.3
QA/QC											
Equipment Blank	NBA-389	12/17/1992	<1.0	No Data	<0.1	<2	<2.0	<85.0	214	No Data	<0.3

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-21 (continued). Water Chemistry Data for Grand Junction, December 14 through December 18, 1992[a]

Sample Location	Ticket Number	Sample Date	Th-232 (pCi/L)[b]	TOC (mg/L)	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)
Ground Water							
1-9SA	NBA-379	12/15/1992	<0.3	1.2	11.22	7.35	<9.0
10-19N	NBA-394	12/18/1992	0.8	15.2	434.56	410.15	<9.0
11-12NA	NBA-385	12/16/1992	<0.3	6.2	115.05	104.29	160
11-1S	NBA-382	12/15/1992	0.5	5.9	253.78	255.35	<9.0
13-16NA	NBA-395	12/18/1992	<0.3	11.2	323.40	320.13	~21.7
14-13NA	NBA-393	12/18/1992	<0.7	8.5	470.48	462.38	~22.2
5-12NA	NBA-378	12/15/1992	<0.3	3.7	22.75	14.60	<9.0
8-4S	NBA-381	12/15/1992	<0.3	5.3	281.01	281.06	<9.0
GJ84-04	NBA-390	12/17/1992	1.1	5.6	303.78	297.42	~28.8
GJ84-09	NBA-376	12/14/1992	<0.3	2.0	7.84	4.06	<9.0
GJ84-09 (Dup)	NBA-377	12/14/1992	<0.3	2.0	7.68	3.95	<9.0
GJ84-10	NBA-451	12/14/1992	<0.3	1.4	8.60	3.72	<9.0
GJ87-15	NBA-380	12/15/1992	<0.3	6.4	223.83	225.69	227
Surface Water							
Lower Gunnison	NBA-392	12/17/1992	<0.3	5.1	5.79	4.12	<9.0
Middle Gunnison	NBA-391	12/17/1992	<0.3	4.8	6.30	4.19	<9.0
North Pond	NBA-386	12/16/1992	4.6	21.8	164.79	149.48	<9.0
South Pond	NBA-387	12/17/1992	<0.5	8.7	199.17	201.57	50.5
South Pond (Dup)	NBA-388	12/17/1992	<0.3	8.3	203.47	198.91	53.4
Upper Gunnison	NBA-383	12/16/1992	0.50	5.1	6.34	4.08	<9.0
Upper Mid Gunnison	NBA-384	12/16/1992	<0.3	4.6	8.30	6.09	<9.0
QA/QC							
Equipment Blank	NBA-389	12/17/1992	<0.3	No Data	0.54	0.45	<9.0

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-22. Target Compound List of Organic Constituents Included in Analysis of Ground Water at the GJPO

CAS Number	Constituent	Reporting Limit (μg/L)
Volatile Organics		
71-55-6	1,1,1-Trichloroethane	5
79-34-5	1,1,2,2-Tetrachloroethane	5
79-00-5	1,1,2-Trichloroethane	5
75-34-3	1,1-Dichloroethane	5
75-35-4	1,1-Dichloroethene	5
107-06-2	1,2-Dichloroethane	5
540-59-0	1,2-Dichloroethene (total)	5
78-87-5	1,2-Dichloropropane	5
78-93-3	2-Butanone	10
591-78-6	2-Hexanone	10
108-10-1	4-Methyl-2-pentanone	10
67-64-1	Acetone	10
71-43-2	Benzene	5
75-27-4	Bromodichloromethane	5
75-25-2	Bromoform	5
74-83-9	Bromomethane	10
75-15-0	Carbon disulfide	5
56-23-5	Carbon tetrachloride	5
108-90-7	Chlorobenzene	5
75-00-3	Chloroethane	10
67-66-3	Chloroform	5
74-87-3	Chloromethane	10
156-59-2	*cis*-1,2-Dichloroethene	5
10061-01-5	*cis*-1,3-Dichloropropene	5
124-48-1	Dibromochloromethane	5
100-41-4	Ethyl benzene	5
108-38-3	*m*-Xylene	5
75-09-2	Methylene chloride	5
95-47-6	*o*-Xylene	5
100-42-5	Styrene	5
127-18-4	Tetrachloroethene	5
108-88-3	Toluene	5
156-60-5	*trans*-1,2-Dichloroethene	5
10061-02-6	*trans*-1,3-Dichloropropene	5
79-01-6	Trichloroethene	5
108-05-4	Vinyl acetate	10
75-01-4	Vinyl chloride	10
1330-20-7	Xylenes (total)	5

Table A-22 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the GJPO

CAS Number	Const tuent	Reporting Limit (μg/L)
Herbicides		
93-76-5	2,4,5-T	0.20
93-72-1	2,4,5-TP (Silvex)	0.17
94-75-7	2,4-D	1.2
94-82-6	2,4-DB	0.91
75-99-0	Dalapon	5.8
120-36-5	Dichloroprop	0.65
94-74-6	MCPA	249
7085-19-0	MCPP	192
Pesticides		
72-54-8	4,4'-DDD	0.10
72-55-9	4,4'-DDE	0.10
50-29-3	4,4'-DDT	0.10
309-00-2	Aldrin	0.05
319-84-6	alpha-BHC	0.05
5103-71-9	alpha-Chlordane	0.05
12674-11-2	Aroclor-1016	0.5
11104-28-2	Aroclor-1221	0.5
11141-16-5	Aroclor-1232	0.5
53469-21-9	Aroclor-1242	0.5
12672-29-6	Aroclor-1248	0.5
11097-69-1	Aroclor-1254	1.0
11096-82-5	Aroclor-1260	1.0
319-85-7	beta-BHC	0.05
319-86-8	delta-BHC	0.05
60-57-1	Dieldrin	0.10
959-98-8	Endosulfan I	0.05
33213-65-9	Endosulfan II	0.10
1031-07-8	Endosulfan sulfate	0.10
72-20-8	Endrin	0.10
7421-93-4	Endrin aldehyde	0.10
53494-70-5	Endrin ketone	0.10
58-89-9	gamma-BHC (Lindane)	0.05
5103-74-2	gamma-Chlordane	0.05
76-44-8	Heptachlor	0.05
1024-57-3	Heptachlor epoxide	0.05
72-43-5	Methoxychlor	0.5
8001-35-2	Toxaphene	1.0

Table A-22 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the GJPO

CAS Number	Constituent	Reporting Limit (μg/L)
Semivolatile Organics		
120-82-1	1,2,4-Trichlorobenzene	10
95-50-1	1,2-Dichlorobenzene	10
541-73-1	1,3-Dichlorobenzene	10
106-46-7	1,4-Dichlorobenzene	10
108-60-1	2,2-Oxybis(1-chloropropane)	10
95-95-4	2,4,5-Trichlorophenol	50
88-06-2	2,4,6-Trichlorophenol	10
120-83-2	2,4-Dichlorophenol	10
105-67-9	2,4-Dimethylphenol	10
51-28-5	2,4-Dinitrophenol	50
121-14-2	2,4-Dinitrotoluene	10
606-20-2	2,6-Dinitrotoluene	10
91-58-7	2-Chloronaphthalene	10
95-57-8	2-Chlorophenol	10
91-57-6	2-Methylnaphthalene	10
95-48-7	2-Methylphenol	10
88-74-4	2-Nitroaniline	50
88-75-5	2-Nitrophenol	10
91-94-1	3,3'-Dichlorobenzidine	20
99-09-2	3-Nitroaniline	50
534-52-1	4,6-Dinitro-2-methylphenol	50
101-55-3	4-Bromophenyl-phenylether	10
59-50-7	4-Chloro-3-methylphenol	10
106-47-8	4-Chloroaniline	10
7005-72-3	4-Chlorophenyl phenyl ether	10
106-44-5	4-Methylphenol	10
100-01-6	4-Nitroaniline	50
100-02-7	4-Nitrophenol	50
83-32-9	Acenaphthene	10
208-96-8	Acenaphthylene	10
120-12-7	Anthracene	10
56-55-3	Benzo(a)anthracene	10
50-32-8	Benzo(a)pyrene	10
205-99-2	Benzo(b)fluoranthene	10
191-24-2	Benzo(g,h,i)perylene	10
207-08-9	Benzo(k)fluoranthene	10
65-85-0	Benzoic acid	50
100-51-6	Benzyl alcohol	10
111-91-1	Bis(2-chloroethoxy)methane	10
111-44-4	Bis(2-chloroethyl)ether	10
117-81-7	Bis(2-ethylhexyl)phthalate	10
85-68-7	Butyl benzyl phthalate	10
218-01-9	Chrysene	10

Table A-22 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the GJPO

CAS Number	Constituent	Reporting Limit (µg/L)
Semivolatile Organics		
84-74-2	Di-n-butylphthalate	10
117-84-0	Di-n-octylphthalate	10
53-70-3	Dibenzo(a,h)anthracene	10
132-64-9	Dibenzofuran	10
84-66-2	Diethylphthalate	10
131-11-3	Dimethylphthalate	10
206-44-0	Fluoranthene	10
86-73-7	Fluorene	10
118-74-1	Hexachlorobenzene	10
87-68-3	Hexachlorobutadiene	10
77-47-4	Hexachlorocyclopentadiene	10
67-72-1	Hexachloroethane	10
193-39-5	Indeno(1,2,3-cd)pyrene	10
78-59-1	Isophorone	10
621-64-7	N-Nitroso-di-n-dipropylamine	10
86-30-6	N-Nitrosodiphenylamine	10
91-20-3	Naphthalene	10
98-95-3	Nitrobenzene	10
87-86-5	Pentachlorophenol	50
85-01-8	Phenanthrene	10
108-95-2	Phenol	10
129-00-0	Pyrene	10

Table A-23. Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, March 16 through March 18, 1992[a,b]

Sample Location	Ticket Number	Sample Date	112-95-8[c,d] (µg/L)	117-81-7[c,e] (µg/L)	17302-32-8[c,d] (µg/L)	544-76-3[c,d] (µg/L)	62016-18-6[c,d] (µg/L)	629-99-2[c,d] (µg/L)	630-02-4[c,d] (µg/L)	74-83-9[e,f] (µg/L)
Ground Water										
1-9SA	MLY-734	03/18/1992	N[g]	<10	N	N	N	N	N	<10
10-19N	MLY-684	03/17/1992	N	<10	N	N	N	N	N	<10
11-1S	MLY-682	03/17/1992	N	<10	N	N	N	N	N	<10
13-16NA	MLY-728	03/17/1992	N	<10	N	N	N	N	N	<10
13-16NA (Dup)	MLY-729	03/17/1992	N	<10	N	N	N	N	N	<10
14-13NA	MLY-730	03/17/1992	N	<10	N	N	N	N	N	<10
14-6NA	MLY-683	03/17/1992	N	~6	N	N	N	N	N	<10
3-3NA	MLY-736	03/18/1992	~15	<10	~12	~9	~5	~7	~14	<10
5-12NA	MLY-737	03/18/1992	N	<10	N	N	N	N	N	<10
GJ84-04	MLY-731	03/17/1992	N	<10	N	N	N	N	N	<10
GJ84-05	MLY-733	03/17/1992	N	<10	N	N	N	N	N	<10
GJ84-06	MLY-690	03/18/1992	N	<10	N	N	N	N	N	<10
GJ84-09	MLY-735	03/18/1992	N	<10	N	N	N	N	N	<10
GJ84-10	MLY-727	03/16/1992	N	<10	N	N	N	N	N	<10
P-2A	MLY-688	03/18/1992	N	<10	N	N	N	N	N	<10
P-3A	MLY-685	03/17/1992	N	<10	N	N	N	N	N	<10
P-4A	MLY-689	03/18/1992	N	<10	N	N	N	N	N	<10
P-6	MLY-686	03/18/1992	N	<10	N	N	N	N	N	<10
QA/QC										
Equipment Blank	MLY-732	03/17/1992	N	<10	N	N	N	N	N	<10
Trip Blank	MLY-676	03/16/1992	N	N	N	N	N	N	N	~2.3
Trip Blank	MLY-687	03/18/1992	N	N	N	N	N	N	N	~3.1

[a]CAS Number 112-95-8 Eicosane
CAS Number 117-81-7 Bis(2-ethylhexyl)phthalate
CAS Number 17302-32-8 Nonane, 3,7-dimethyl-
CAS Number 544-76-3 Hexadecane
CAS Number 62016-18-6 Octane, 5-ethyl-2-methyl-
CAS Number 629-99-2 Pentacosane
CAS Number 630-02-4 Octacosane
CAS Number 74-83-9 Bromomethane

[b]A "<" indicates that the maximum concentration was below reporting limits (number shown is reporting limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

[f]Volatile compound.

[g]Not observed.

Table A-23 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, March 16 through March 18, 1992[a,b]

Sample Location	Ticket Number	Sample Date	74-87-3[e,f] (µg/L)	75-09-2[e,f] (µg/L)	84-74-2[c,e] (µg/L)	UNK-10.34[c,d] (µg/L)	UNK-10.37[c,d] (µg/L)	UNK-10.39[c,d] (µg/L)	UNK-19.87[c,d] (µg/L)	UNK-19.89[c,d] (µg/L)
Ground Water										
1-9SA	MLY-734	03/18/1992	<10	<5	<10	N[g]	N	N	N	~2
10-19N	MLY-684	03/17/1992	<10	~1.9	<10	N	N	N	~3	N
11-1S	MLY-682	03/17/1992	10	<5	<10	N	N	~2	N	N
13-16NA	MLY-728	03/17/1992	<10	<5	<10	N	N	N	N	N
13-16NA (Dup)	MLY-729	03/17/1992	<10	~1.2	<10	N	N	N	N	~2
14-13NA	MLY-730	03/17/1992	~1.7	~1.2	<10	N	~3	N	N	N
14-6NA	MLY-683	03/17/1992	~5.5	<5	~5	N	N	N	N	N
3-3NA	MLY-736	03/18/1992	<10	<5	<10	N	N	N	N	N
5-12NA	MLY-737	03/18/1992	~3.3	<5	<10	~15	N	N	N	N
GJ84-04	MLY-731	03/17/1992	<10	<5	<10	N	N	N	N	N
GJ84-05	MLY-733	03/17/1992	<10	~1.0	<10	N	N	N	N	N
GJ84-06	MLY-690	03/18/1992	~1.0	<5	<10	N	N	N	N	N
GJ84-09	MLY-735	03/18/1992	<10	<5	<10	N	N	N	N	N
GJ84-10	MLY-727	03/16/1992	<10	<5	<10	N	~6	N	N	N
P-2A	MLY-688	03/18/1992	~3.1	<5	<10	N	N	N	N	N
P-3A	MLY-685	03/17/1992	<10	~0.92	<10	N	N	N	N	N
P-4A	MLY-689	03/18/1992	~1.7	<5	<10	N	N	N	N	N
P-6	MLY-686	03/18/1992	<10	<5	<10	N	N	N	N	N
QA/QC										
Equipment Blank	MLY-732	03/17/1992	<10	<5	<10	N	N	N	N	N
Trip Blank	MLY-676	03/16/1992	61	<5	N	N	N	N	N	N
Trip Blank	MLY-687	03/18/1992	30	<5	N	N	N	N	N	N

[a]CAS Number 84-74-2 Di-n-butylphthalate
CAS Number UNK-10.34 Unknown
CAS Number UNK-10.37 Unknown
CAS Number UNK-10.39 Unknown
CAS Number UNK-19.87 Unknown
CAS Number UNK-19.89 Unknown
CAS Number 74-87-3 Chloromethane
CAS Number 75-09-2 Methylene chloride

[b]A "<" indicates that the maximum concentration was below reporting limits (number shown is reporting limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

[f]Volatile compound.

[g]Not observed.

Table A-23 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, March 16 through March 18, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-19.92[c,d] (µg/L)	UNK-20.57[c,d] (µg/L)	UNK-32.57[c,d] (µg/L)	UNK-33.41[c,d] (µg/L)	UNK-34.54[c,d] (µg/L)	UNK-37.02[c,d] (µg/L)	UNK-37.04[c,d] (µg/L)	UNK-39.09[c,d] (µg/L)
Ground Water										
1-9SA	MLY-734	03/18/1992	N[e]	N	N	N	N	N	N	N
10-19N	MLY-684	03/17/1992	N	N	N	N	N	N	N	N
11-1S	MLY-682	03/17/1992	N	N	N	N	N	N	N	N
13-16NA	MLY-728	03/17/1992	N	N	N	N	N	N	N	N
13-16NA (Dup)	MLY-729	03/17/1992	N	N	N	N	N	N	N	N
14-13NA	MLY-730	03/17/1992	N	N	N	N	N	N	N	N
14-6NA	MLY-683	03/17/1992	N	~3	N	N	N	N	N	N
3-3NA	MLY-736	03/18/1992	N	N	N	~3	N	~2	N	N
5-12NA	MLY-737	03/18/1992	N	N	~3	N	~3	N	~3	~3
GJ84-04	MLY-731	03/17/1992	N	N	N	N	N	N	N	N
GJ84-05	MLY-733	03/17/1992	N	N	N	N	N	N	N	N
GJ84-06	MLY-690	03/18/1992	N	N	N	N	N	N	N	N
GJ84-09	MLY-735	03/18/1992	N	N	N	N	N	N	N	N
GJ84-10	MLY-727	03/16/1992	N	N	N	N	N	N	N	N
P-2A	MLY-688	03/18/1992	N	N	N	N	N	N	N	N
P-3A	MLY-685	03/17/1992	N	N	N	N	N	N	N	N
P-4A	MLY-689	03/18/1992	N	N	N	N	N	N	N	N
P-6	MLY-686	03/18/1992	N	N	N	N	N	N	N	N
QA/QC										
Equipment Blank	MLY-732	03/17/1992	~4	N	N	N	N	N	N	N
Trip Blank	MLY-676	03/16/1992	N	N	N	N	N	N	N	N
Trip Blank	MLY-687	03/18/1992	N	N	N	N	N	N	N	N

[a]CAS Number UNK-19.92 Unknown
CAS Number UNK-20.57 Unknown
CAS Number UNK-32.57 Unknown hydrocarbon
CAS Number UNK-33.41 Unknown
CAS Number UNK-34.54 Unknown hydrocarbon
CAS Number UNK-37.02 Unknown hydrocarbon
CAS Number UNK-37.04 Unknown hydrocarbon
CAS Number UNK-39.09 Unknown hydrocarbon
[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-23 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, March 16 through March 18, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-9.37[c,d] (µg/L)
Ground Water			
1-9SA	MLY-734	03/18/1992	N[e]
10-19N	MLY-684	03/17/1992	N
11-1S	MLY-682	03/17/1992	~3
13-16NA	MLY-728	03/17/1992	N
13-16NA (Dup)	MLY-729	03/17/1992	N
14-13NA	MLY-730	03/17/1992	N
14-6NA	MLY-683	03/17/1992	N
3-3NA	MLY-736	03/18/1992	N
5-12NA	MLY-737	03/18/1992	N
GJ84-04	MLY-731	03/17/1992	N
GJ84-05	MLY-733	03/17/1992	N
GJ84-06	MLY-690	03/18/1992	N
GJ84-09	MLY-735	03/18/1992	N
GJ84-10	MLY-727	03/16/1992	N
P-2A	MLY-688	03/18/1992	N
P-3A	MLY-685	03/17/1992	N
P-4A	MLY-689	03/18/1992	~3
P-6	MLY-686	03/18/1992	N
QA/QC			
Equipment Blank	MLY-732	03/17/1992	N
Trip Blank	MLY-676	03/16/1992	N
Trip Blank	MLY-687	03/18/1992	N

[a]CAS Number UNK-9.37 Unknown
[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-24. Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	1004-29-1[c,d] (µg/L)	106-46-7[c,e] (µg/L)	109-19-3[c,d] (µg/L)	111-76-2[c,d] (µg/L)	111-77-3[c,d] (µg/L)	117-81-7[c,e] (µg/L)	54063-09-1[c,d] (µg/L)	UNK-4.52[c,d] (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	N[f]	<10	N	N	N	<10	N	N
10-19N	NAW-293	09/10/1992	N	<10	N	~4.0	~6.0	<10	N	N
11-12NA	NAW-292	09/10/1992	N	<10	N	N	N	~4	N	N
11-1S	MLY-900	09/09/1992	N	<10	N	N	N	~8	N	N
13-16NA	NAW-294	09/11/1992	~13	<10	N	N	N	<10	N	N
14-13NA	NAW-295	09/11/1992	N	<10	N	N	N	<10	N	N
14-6NA	NAW-290	09/10/1992	N	~1	N	N	N	~1	N	N
5-12NA	MLY-750	09/09/1992	N	<10	N	N	N	<10	N	N
GJ84-04	MLY-747	09/08/1992	N	<10	N	N	N	<10	~35	N
GJ84-04 (Dup)	MLY-748	09/08/1992	N	<10	~5.0	N	N	~3	N	N
GJ84-09	NAW-289	09/09/1992	N	<10	N	N	N	<10	N	~4.0
GJ84-10	MLY-746	09/08/1992	N	<10	~7.0	N	N	<10	N	N
GJ87-15	NAW-291	09/10/1992	N	<10	N	N	N	~1	N	N

[a]CAS Number 1004-29-1 Furan, 2-butyltetrahydro-
CAS Number 106-46-7 1,4-Dichlorobenzene
CAS Number 109-19-3 Butanoic acid, 3-methyl-, bu
CAS Number 111-76-2 Ethanol, 2-butoxy-
CAS Number 111-77-3 Ethanol, 2-(2-methoxyethoxy)
CAS Number 117-81-7 Bis(2-ethylhexyl)phthalate
CAS Number 54063-09-1 Diisoamylene
CAS Number UNK-4.52 Unknown hydrocarbon

[b]A "<" indicates that the maximum concentration was below reporting limits (number shown is reporting limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

[f]Not observed.

Table A-24 (continued) Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-4.53[c,d] (µg/L)	UNK-5.12[c,d] (µg/L)	UNK-5.13[c,d] (µg/L)	UNK-5.15[c,d] (µg/L)	UNK-5.35[c,d] (µg/L)	UNK-5.43[c,d] (µg/L)	UNK-5.45[c,d] (µg/L)	UNK-5.47[c,d] (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	N[e]	-11	N	N	N	~2.0	N	N
10-19N	NAW-293	09/10/1992	N	N	N	N	~22	N	N	N
11-12NA	NAW-292	09/10/1992	N	N	N	N	N	N	N	~26
11-1S	MLY-900	09/09/1992	N	N	N	N	N	N	N	N
13-16NA	NAW-294	09/11/1992	N	N	N	N	N	N	N	N
14-13NA	NAW-295	09/11/1992	N	N	N	N	N	N	N	N
14-6NA	NAW-290	09/10/1992	~4.0	N	N	N	N	N	N	N
5-12NA	MLY-750	09/09/1992	N	~13	N	N	N	~2.0	N	N
GJ84-04	MLY-747	09/08/1992	N	N	~10	N	N	~2.0	N	N
GJ84-04 (Dup)	MLY-748	09/08/1992	N	~8.0	N	N	N	N	N	N
GJ84-09	NAW-289	09/09/1992	N	N	N	N	N	N	N	~19
GJ84-10	MLY-746	09/08/1992	N	N	N	~10	N	N	~2.0	N
GJ87-15	NAW-291	09/10/1992	N	N	N	N	N	N	N	N

[a]CAS Number UNK-4.53 Unknown hydrocarbon
CAS Number UNK-5.12 Unknown hydrocarbon
CAS Number UNK-5.13 Unknown hydrocarbon
CAS Number UNK-5.15 Unknown hydrocarbon
CAS Number UNK-5.35 Unknown hydrocarbon
CAS Number UNK-5.43 Unknown hydrocarbon
CAS Number UNK-5.45 Unknown hydrocarbon
CAS Number UNK-5.47 Unknown hydrocarbon

[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-24 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-5.48[c,d] (µg/L)	UNK-5.63[c,d] (µg/L)	UNK-5.65[c,d] (µg/L)	UNK-5.67[c,d] (µg/L)	UNK-5.73[c,d] (µg/L)	UNK-5.75[c,d] (µg/L)	UNK-5.90[c,d] (µg/L)	UNK-5.97[c,d] (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	N[e]	~3.0	N	N	N	N	N	N
10-19N	NAW-293	09/10/1992	N	~3.0	N	N	N	N	N	N
11-12NA	NAW-292	09/10/1992	N	N	N	N	~6.0	N	N	~3.0
11-1S	MLY-900	09/09/1992	N	N	N	N	N	N	N	N
13-16NA	NAW-294	09/11/1992	N	N	N	N	N	N	N	N
14-13NA	NAW-295	09/11/1992	N	N	N	N	N	N	~5.0	N
14-6NA	NAW-290	09/10/1992	~20	N	N	N	N	~3.0	N	N
5-12NA	MLY-750	09/09/1992	N	N	~4.0	N	N	N	N	N
GJ84-04	MLY-747	09/08/1992	N	N	~3.0	N	N	N	N	N
GJ84-04 (Dup)	MLY-748	09/08/1992	N	~2.0	N	N	N	N	N	N
GJ84-09	NAW-289	09/09/1992	N	N	N	N	~3.0	N	N	N
GJ84-10	MLY-746	09/08/1992	N	N	N	~3.0	N	N	N	N
GJ87-15	NAW-291	09/10/1992	~16	N	N	N	N	~2.0	N	N

[a]CAS Number UNK-5.48 Unknown hydrocarbon
CAS Number UNK-5.63 Unknown hydrocarbon
CAS Number UNK-5.65 Unknown hydrocarbon
CAS Number UNK-5.67 Unknown hydrocarbon
CAS Number UNK-5.73 Unknown hydrocarbon
CAS Number UNK-5.75 Unknown hydrocarbon
CAS Number UNK-5.90 Unknown hydrocarbon
CAS Number UNK-5.97 Unknown chlorinated hydrocarbon
[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-24 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-6.02[c,d] (µg/L)	UNK-6.03[c,d] (µg/L)	UNK-6.05[c,d] (µg/L)	UNK-6.07[c,d] (µg/L)	UNK-6.10[c,d] (µg/L)	UNK-6.20[c,d] (µg/L)	UNK-6.22[c,d] (µg/L)	UNK-6.25[c,d] (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	N[e]	~42	N	N	N	N	N	N
10-19N	NAW-293	09/10/1992	N	N	N	N	~15	N	N	~3.0
11-12NA	NAW-292	09/10/1992	N	N	N	N	N	~18	N	N
11-1S	MLY-900	09/09/1992	~17	N	N	N	N	N	N	N
13-16NA	NAW-294	09/11/1992	N	N	N	N	N	N	N	N
14-13NA	NAW-295	09/11/1992	N	N	N	N	N	N	N	N
14-6NA	NAW-290	09/10/1992	N	N	N	N	N	N	~13	N
5-12NA	MLY-750	09/09/1992	N	~48	N	N	N	N	N	N
GJ84-04	MLY-747	09/08/1992	N	N	~46	N	N	N	N	N
GJ84-04 (Dup)	MLY-748	09/08/1992	N	~29	N	N	N	N	N	N
GJ84-09	NAW-289	09/09/1992	N	N	N	N	N	~12	N	N
GJ84-10	MLY-746	09/08/1992	N	N	N	~41	N	N	N	N
GJ87-15	NAW-291	09/10/1992	N	N	N	N	N	N	~11	N

[a]CAS Number UNK-6.02 Unknown hydrocarbon
CAS Number UNK-6.03 Unknown hydrocarbon
CAS Number UNK-6.05 Unknown hydrocarbon
CAS Number UNK-6.07 Unknown
CAS Number UNK-6.10 Unknown hydrocarbon
CAS Number UNK-6.20 Unknown hydrocarbon
CAS Number UNK-6.22 Unknown hydrocarbon
CAS Number UNK-6.25 Unknown hydrocarbon

[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-24 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-6.28[c,d] (µg/L)	UNK-6.30[c,d] (µg/L)	UNK-6.32[c,d] (µg/L)	UNK-6.35[c,d] (µg/L)	UNK-6.37[c,d] (µg/L)	UNK-6.53[c,d] (µg/L)	UNK-6.58[c,d] (µg/L)	UNK-6.58a[c,d] (µg/L)
Ground Water										
1-9SA	MLY-749	09/09/1992	N[e]	~7.0	N	N	N	N	~3.0	N
10-19N	NAW-293	09/10/1992	N	N	N	N	N	N	N	N
11-12NA	NAW-292	09/10/1992	N	N	N	~3.0	N	N	N	N
11-1S	MLY-900	09/09/1992	~2.0	N	N	N	N	N	N	N
13-16NA	NAW-294	09/11/1992	N	N	N	N	N	N	N	N
14-13NA	NAW-295	09/11/1992	N	N	N	N	N	N	N	N
14-6NA	NAW-290	09/10/1992	N	N	N	N	~2.0	N	N	N
5-12NA	MLY-750	09/09/1992	N	~8.0	N	N	N	N	~4.0	N
GJ84-04	MLY-747	09/08/1992	N	N	~6.0	N	N	~4.0	N	~2.0
GJ84-04 (Dup)	MLY-748	09/08/1992	N	N	N	N	N	N	N	N
GJ84-09	NAW-289	09/09/1992	N	N	N	~2.0	N	N	N	N
GJ84-10	MLY-746	09/08/1992	N	N	N	N	N	N	N	N
GJ87-15	NAW-291	09/10/1992	N	N	N	N	N	N	N	N

[a]CAS Number UNK-6.28 Unknown hydrocarbon
CAS Number UNK-6.30 Unknown hydrocarbon
CAS Number UNK-6.32 Unknown hydrocarbon
CAS Number UNK-6.35 Unknown hydrocarbon
CAS Number UNK-6.37 Unknown hydrocarbon
CAS Number UNK-6.53 Unknown
CAS Number UNK-6.58 Unknown hydrocarbon
CAS Number UNK-6.58a Unknown thiophene
[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).
[c]Semivolatile compound.
[d]Tentatively identified compound.
[e]Not observed.

Table A-24 (continued). Organic Constituents Observed in Samples Collected from Ground Water at the GJPO, September 8 through September 14, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-6.60[c,d] (µg/L)	UNK-6.75[c,d] (µg/L)	UNK-6.77[c,d] (µg/L)	UNK-6.90[c,d] (µg/L)	UNK-6.92[c,d] (µg/L)
Ground Water							
1-9SA	MLY-749	09/09/1992	N[e]	~41	N	~5.0	N
10-19N	NAW-293	09/10/1992	N	N	N	N	N
11-12NA	NAW-292	09/10/1992	N	N	N	N	N
11-1S	MLY-900	09/09/1992	N	~11	N	N	N
13-16NA	NAW-294	09/11/1992	N	N	N	N	N
14-13NA	NAW-295	09/11/1992	N	N	N	N	N
14-6NA	NAW-290	09/10/1992	N	N	N	N	N
5-12NA	MLY-750	09/09/1992	N	~45	N	~5.0	N
GJ84-04	MLY-747	09/08/1992	N	N	N	~4.0	N
GJ84-C4 (Dup)	MLY-748	09/08/1992	N	~28	N	~3.0	N
GJ84-09	NAW-289	09/09/1992	N	N	N	N	N
GJ84-10	MLY-746	09/08/1992	~4.0	N	~39	N	~5.0
GJ87-15	NAW-291	09/10/1992	N	N	N	N	N

[a]CAS Number UNK-6.60 Unknown hydrocarbon
CAS Number UNK-6.75 Unknown hydrocarbon
CAS Number UNK-6.77 Unknown hydrocarbon
CAS Number UNK-6.90 Unknown hydrocarbon
CAS Number UNK-6.92 Unknown hydrocarbon

[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]Not observed.

Appendix B

Time-Concentration Graphs

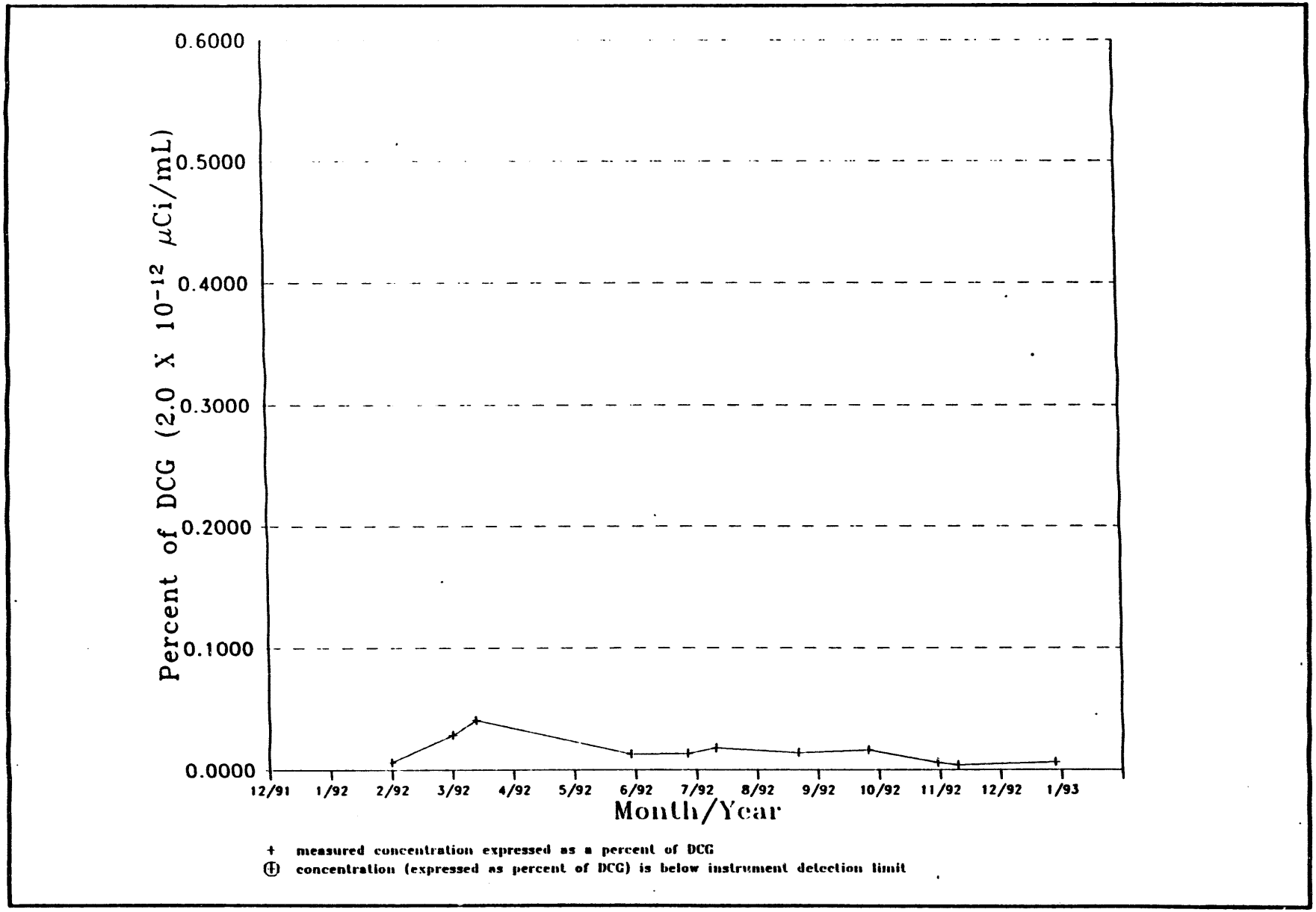

Figure B-1. Uranium Concentrations in Ambient Air as a Percentage of the DCG at Station AIR-G-2 from January to December 1992

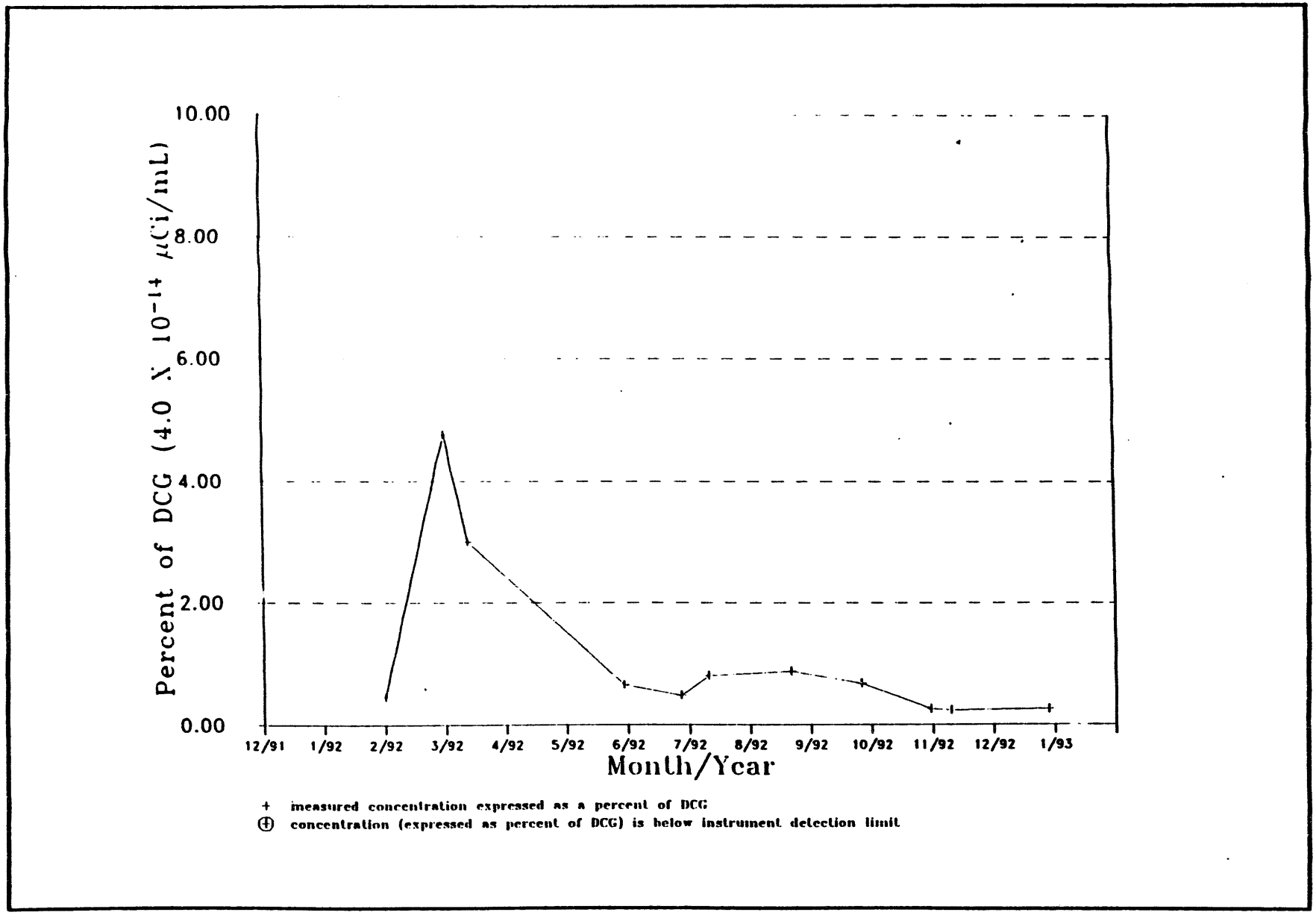

Figure B-2. Thorium-230 Concentrations in Ambient Air as a Percentage of the DCG at Station AIR-G-2 from January to December 1992

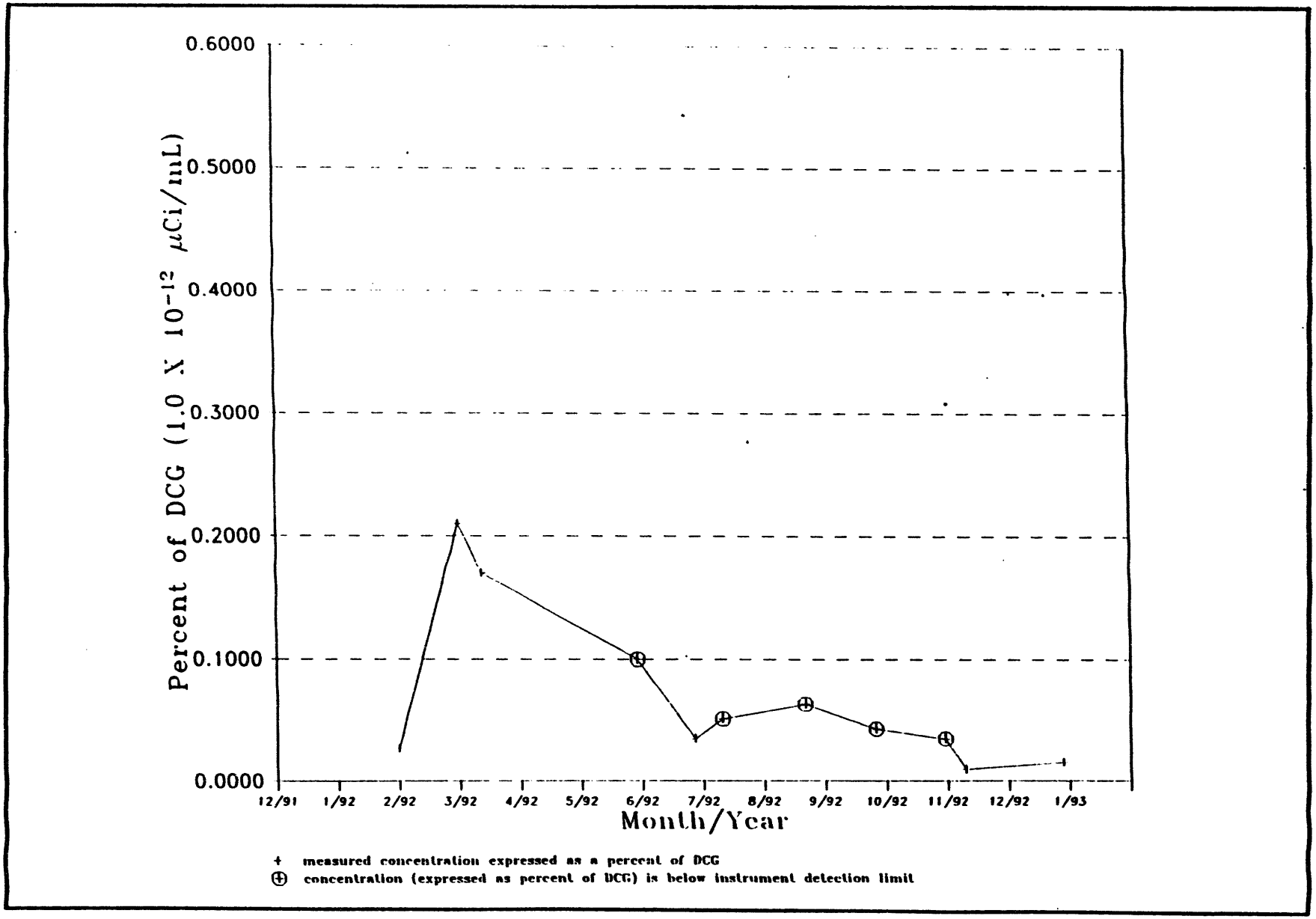

Figure B-3. Radium-226 Concentrations in Ambient Air as a Percentage of the DCG at Station Air-G-2 from January to December 1992

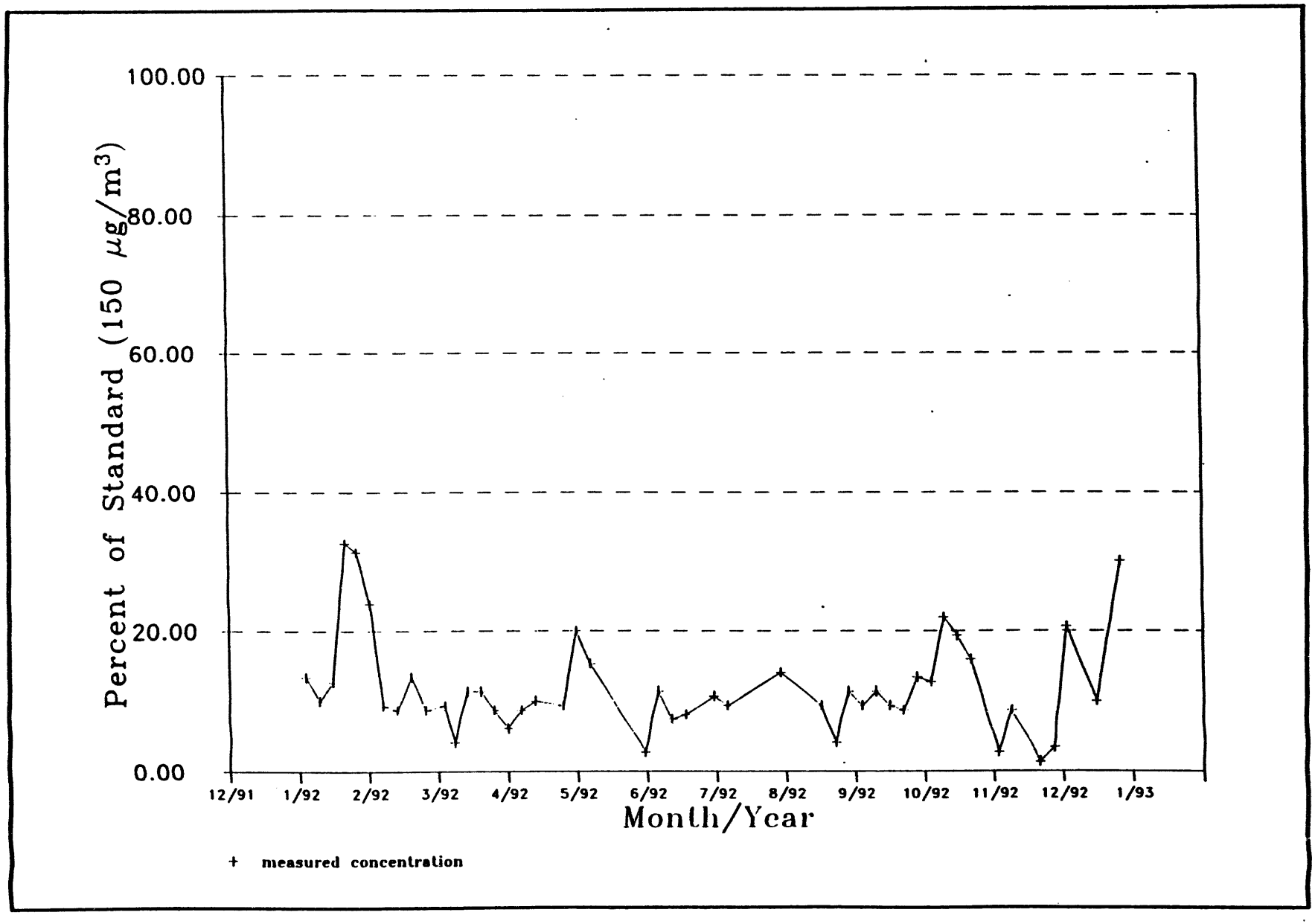

Figure B-4. PM_{10} Concentrations in Ambient Air as a Percentage of the EPA/State Standard at Station AIR-G-2

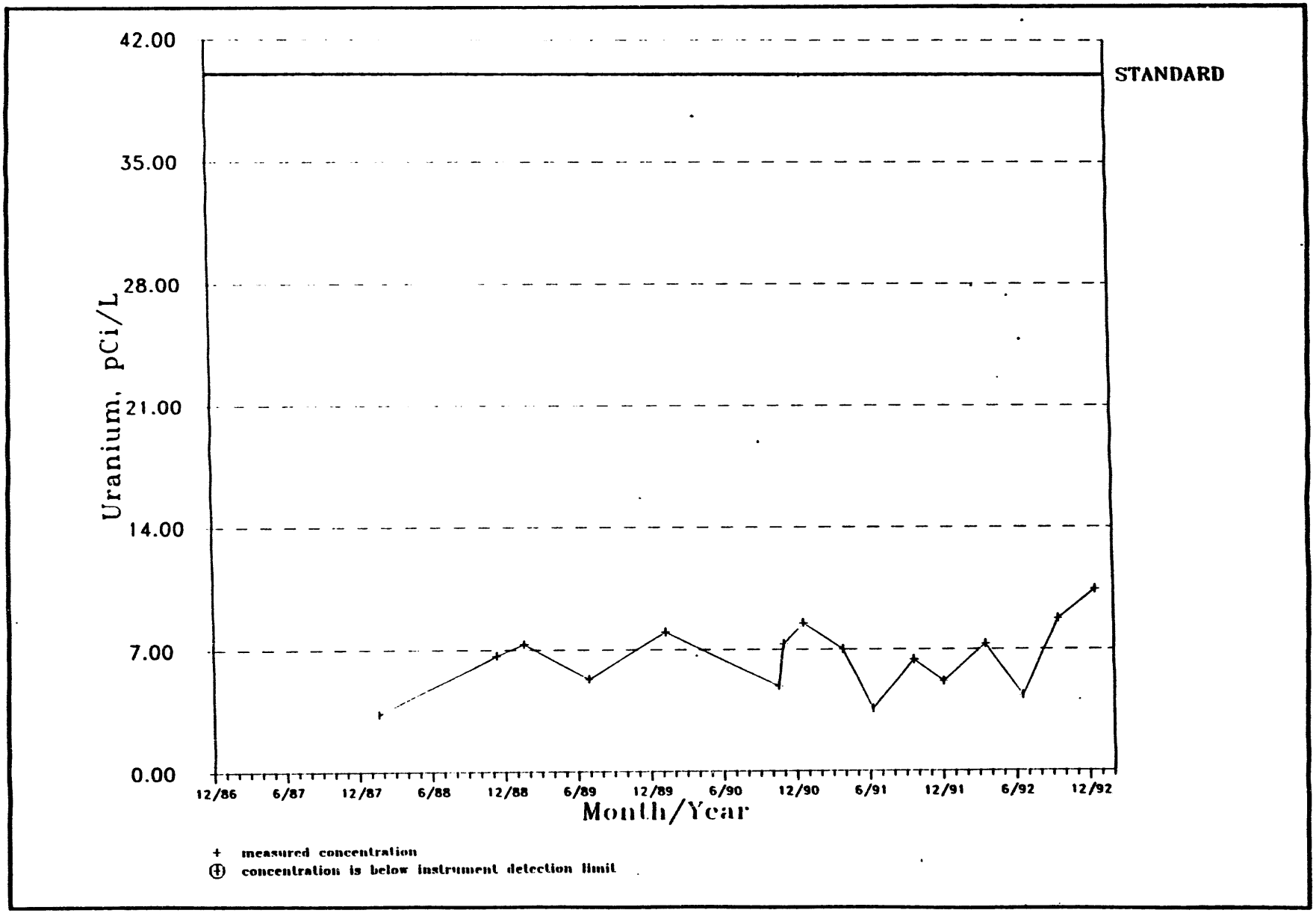

Figure B-5. Uranium Concentrations at the Upstream Gunnison River Sampling Location from January 1988 through December 1992

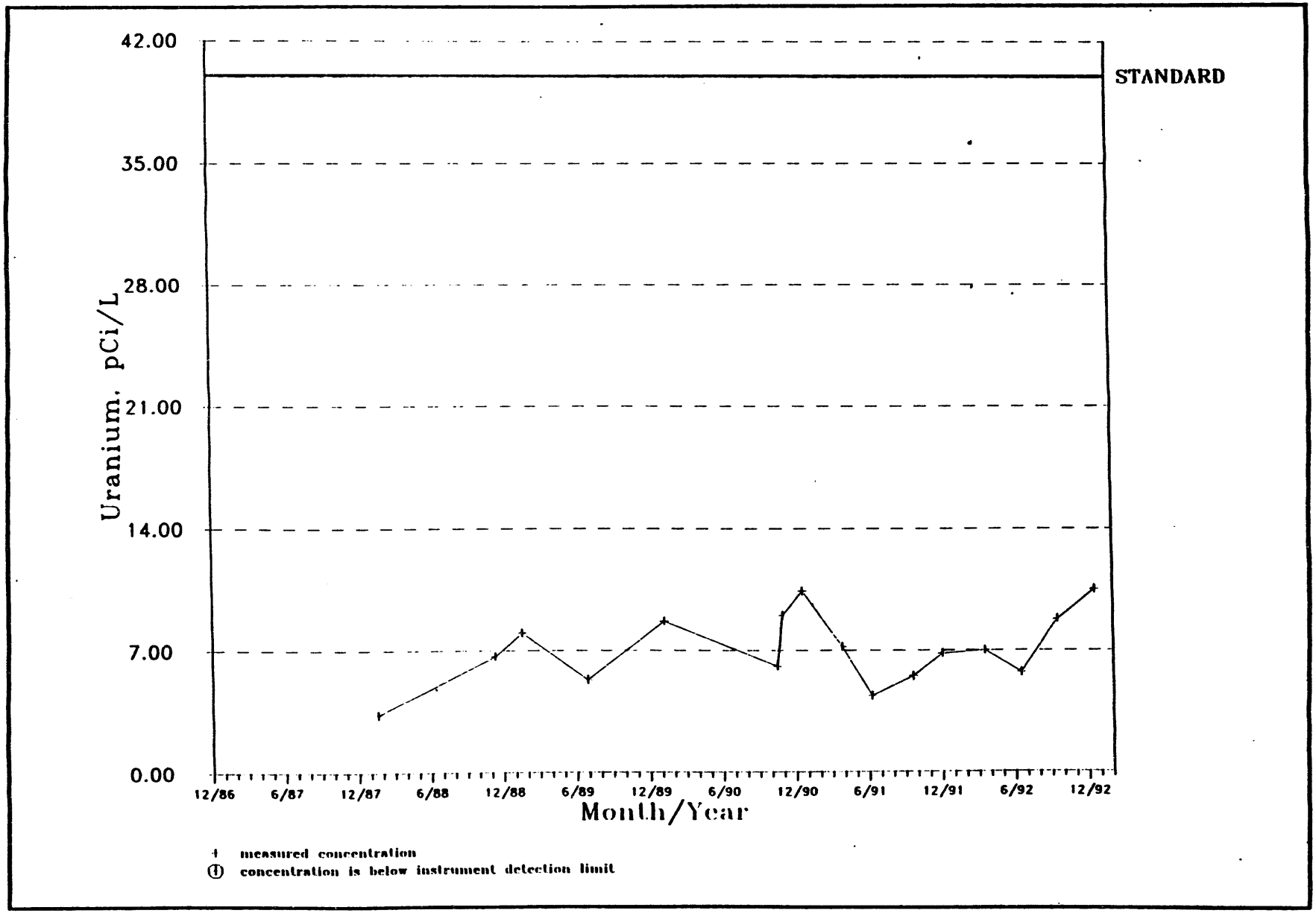

Figure B-6. Uranium Concentrations at the On-Site Gunnison River Sampling Location from January 1988

Figure B-7. Uranium Concentrations at the Downstream Gunnison River Sampling Location from January 1988 through December 1992

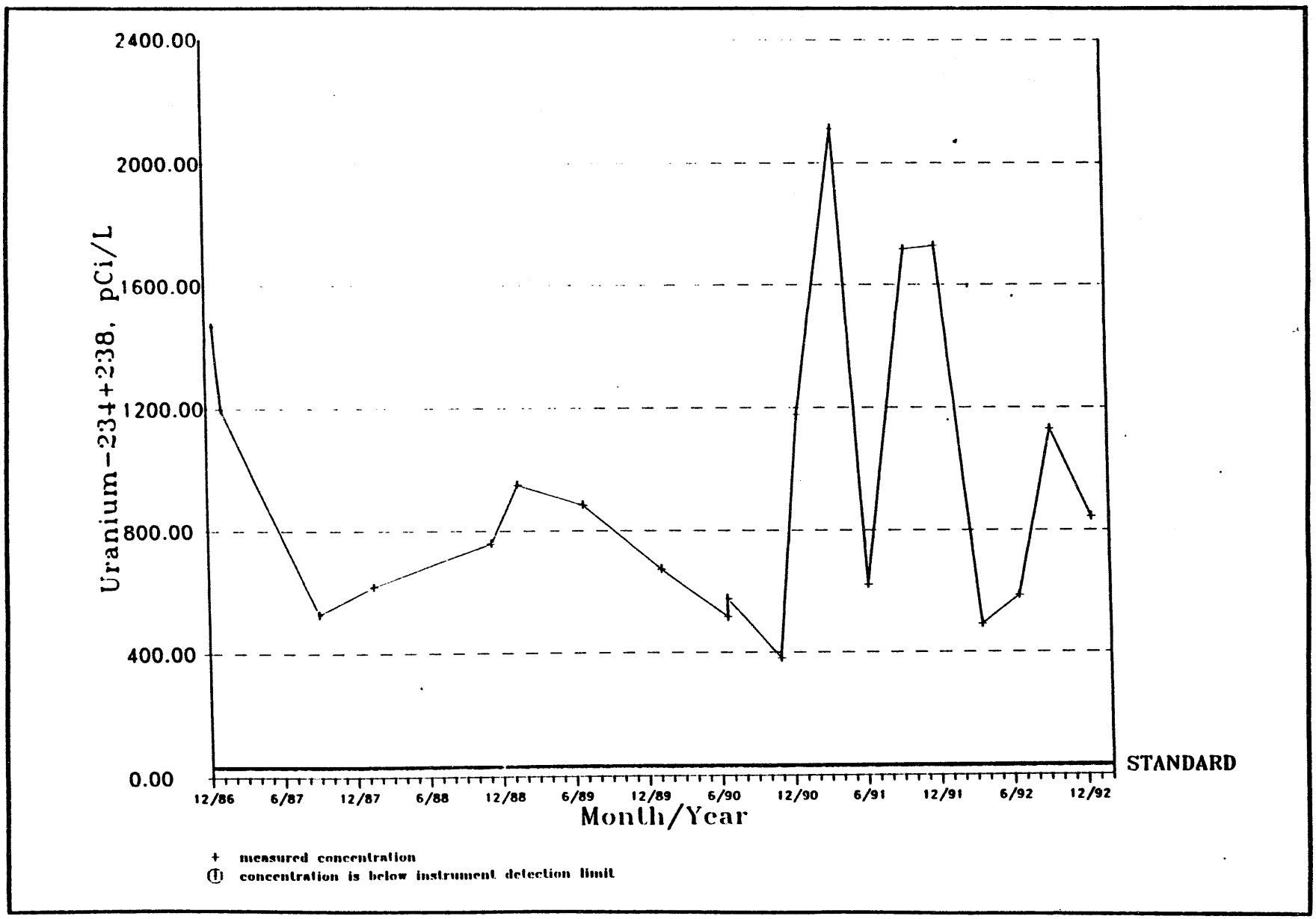

Figure B-8. Uranium Concentrations in Well 10-19N from December 1986 through December 1992

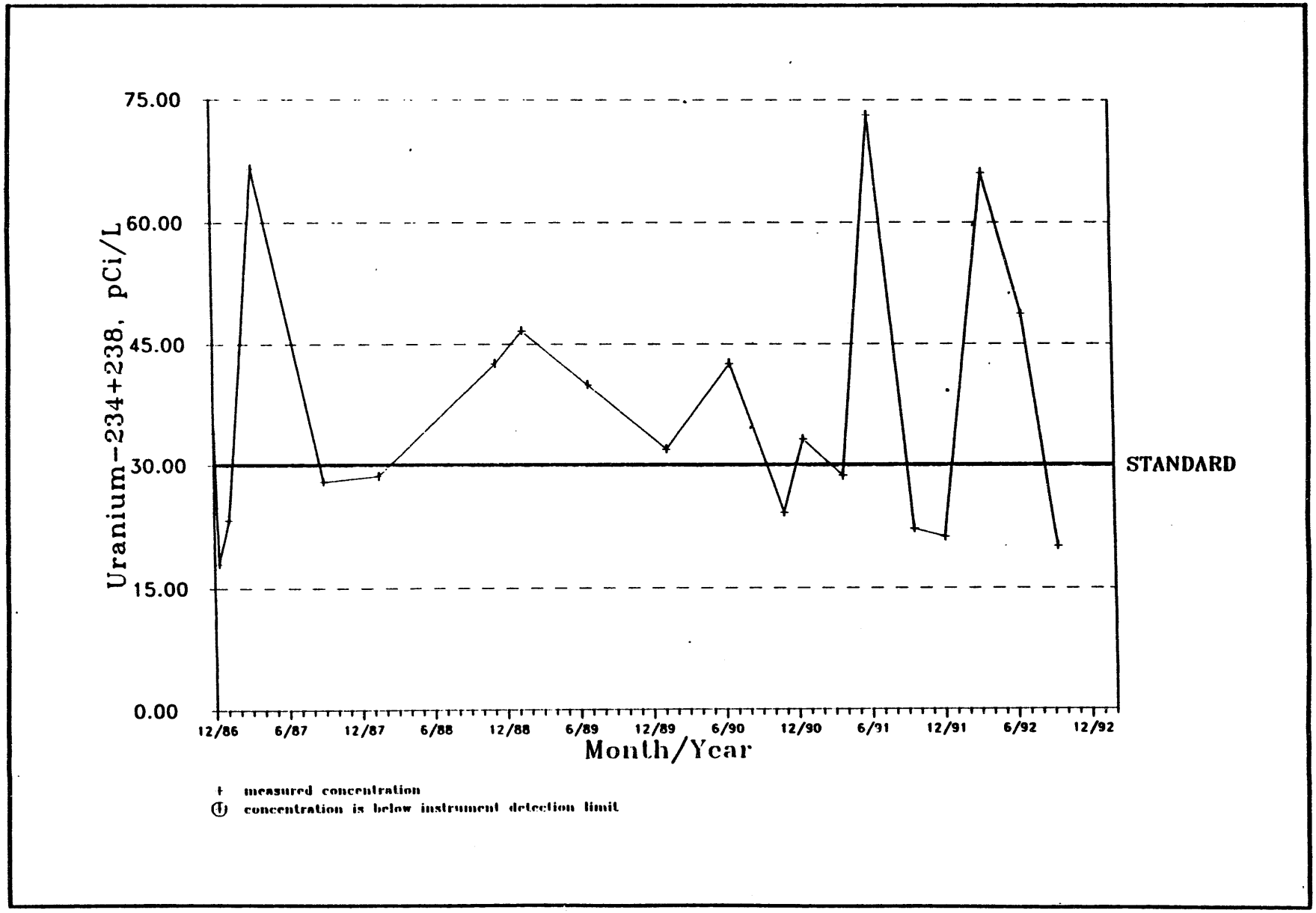

Figure B-9. Uranium Concentrations in Well 14-6NA from December 1986 through December 1992

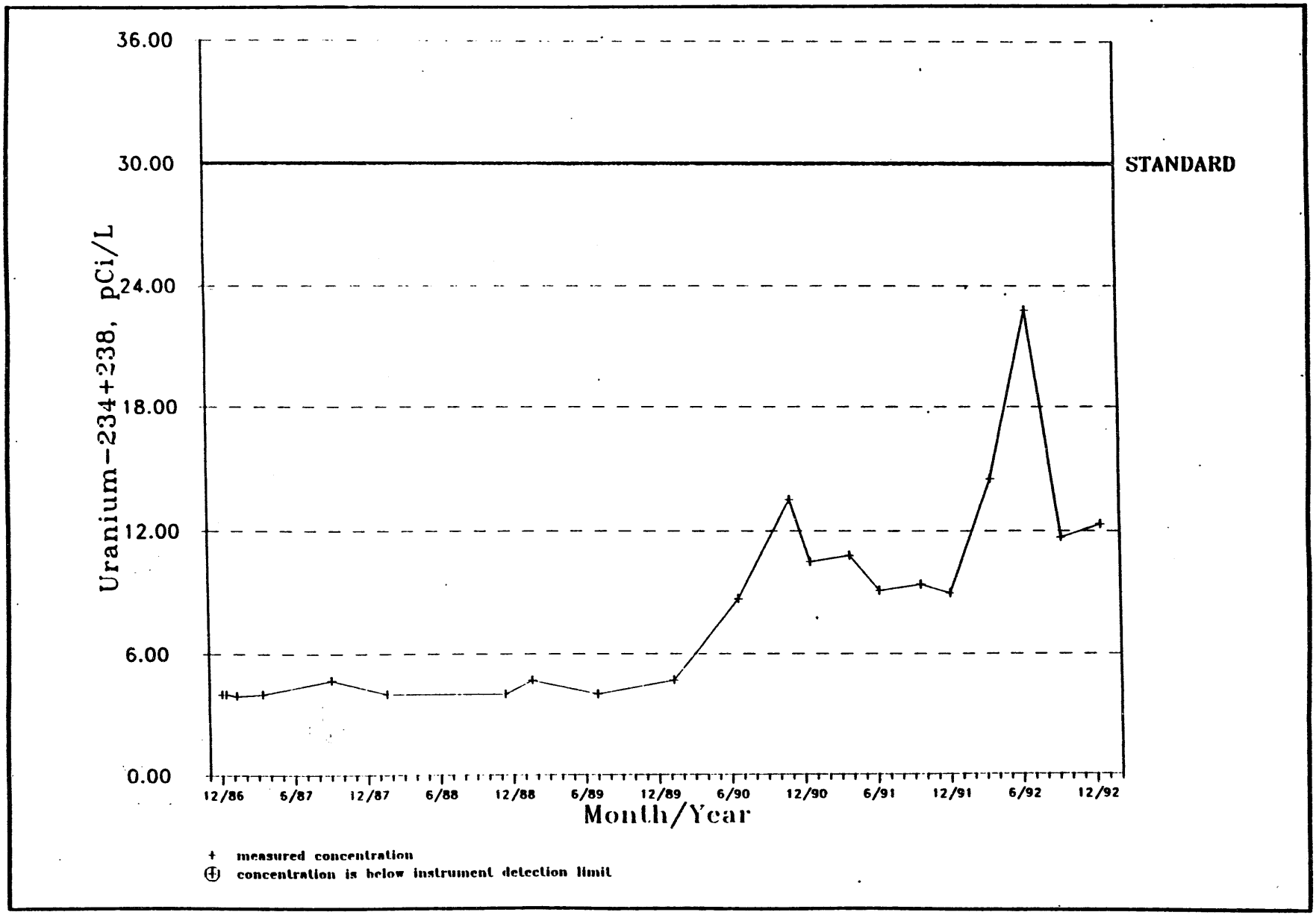

Figure B-10. Uranium Concentrations in Well GJ84-10 from December 1986 through December 1992

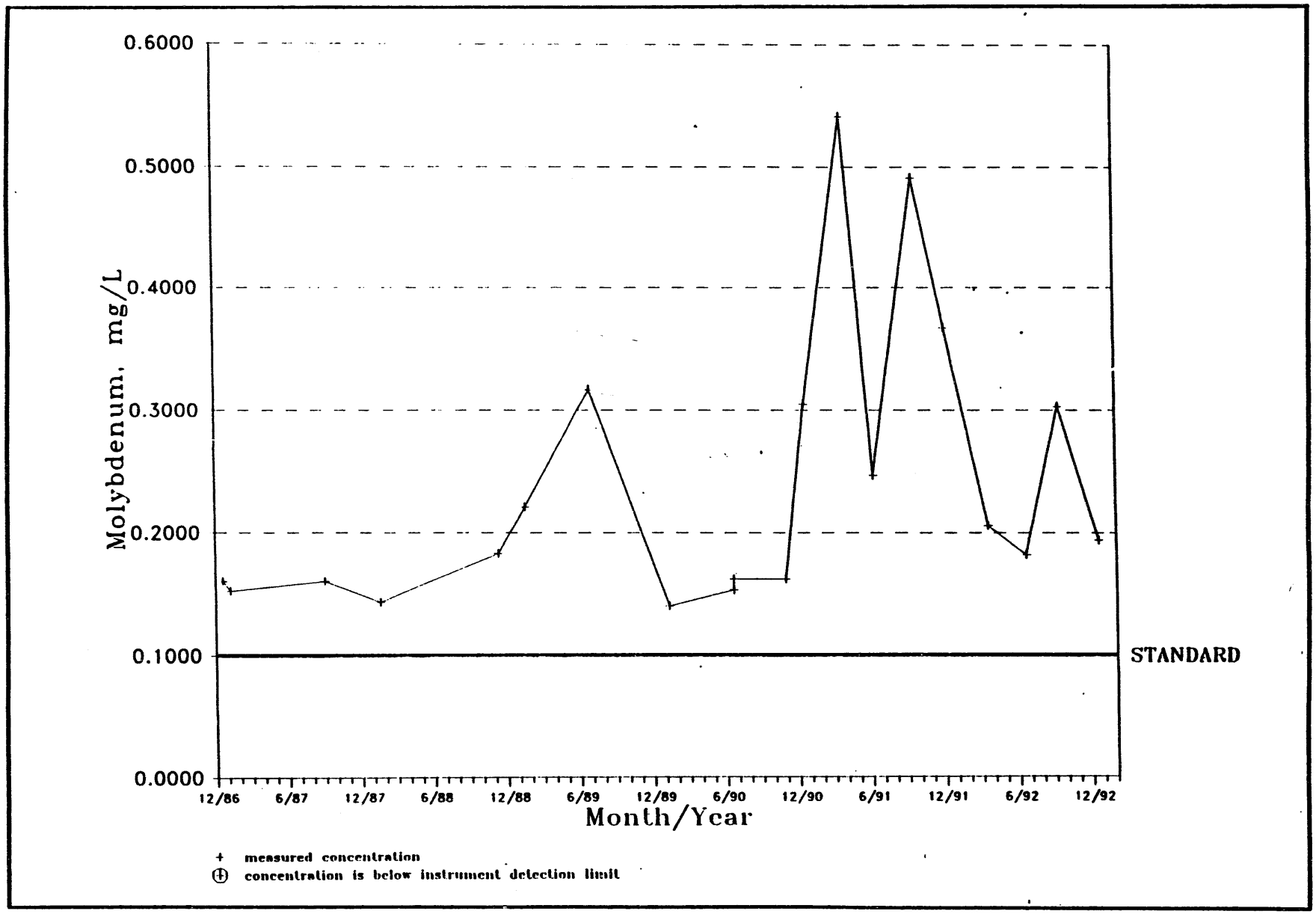

Figure B-11. Molybdenum Concentrations in Well 10-19N from December 1986 through December 1992

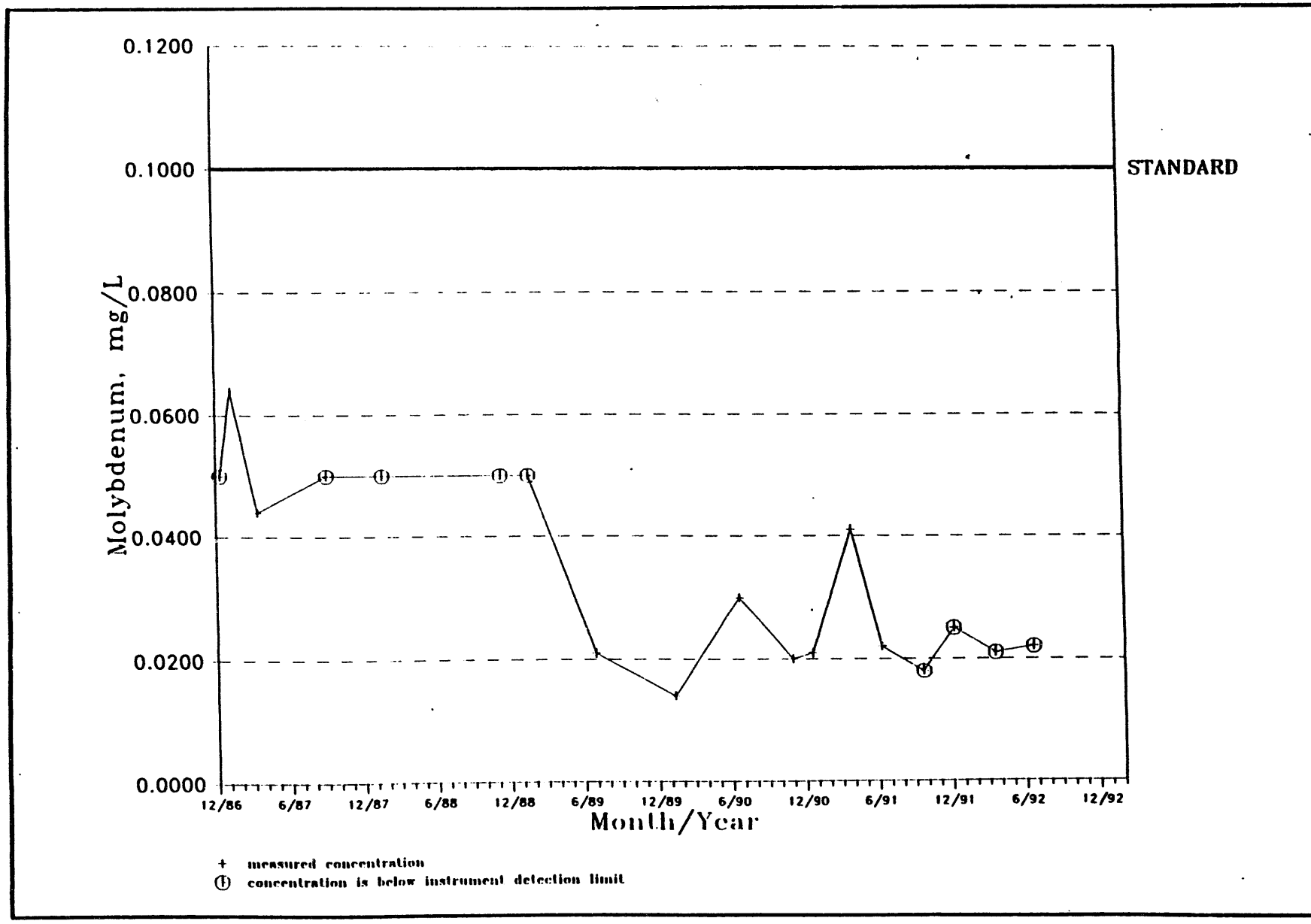

Figure B-12. Molybdenum Concentrations in Well 14-6NA from December 1986 through December 1992

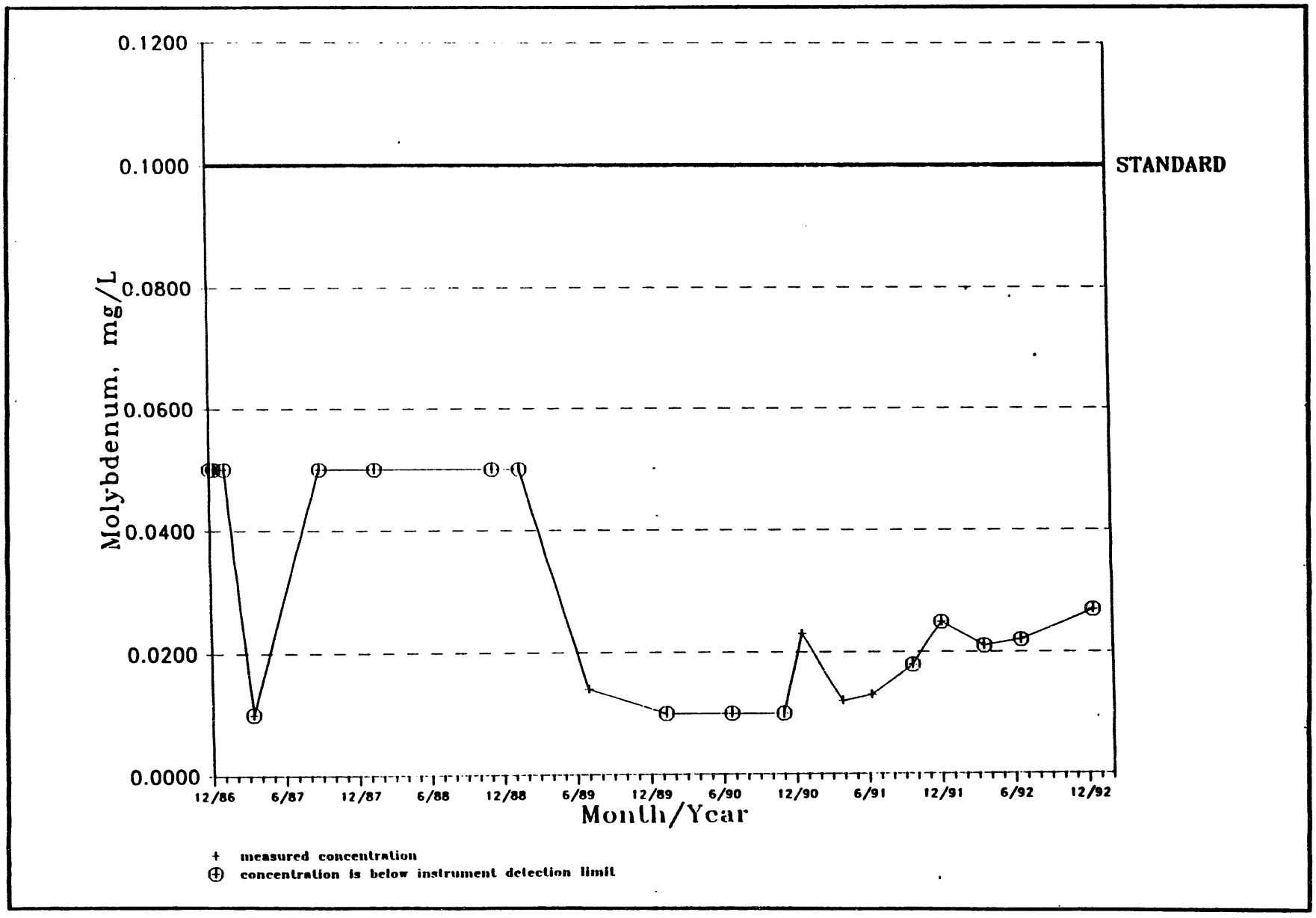

Figure B-13. Molybdenum Concentrations in Well GJ84-10 from December 1986 through December 1992

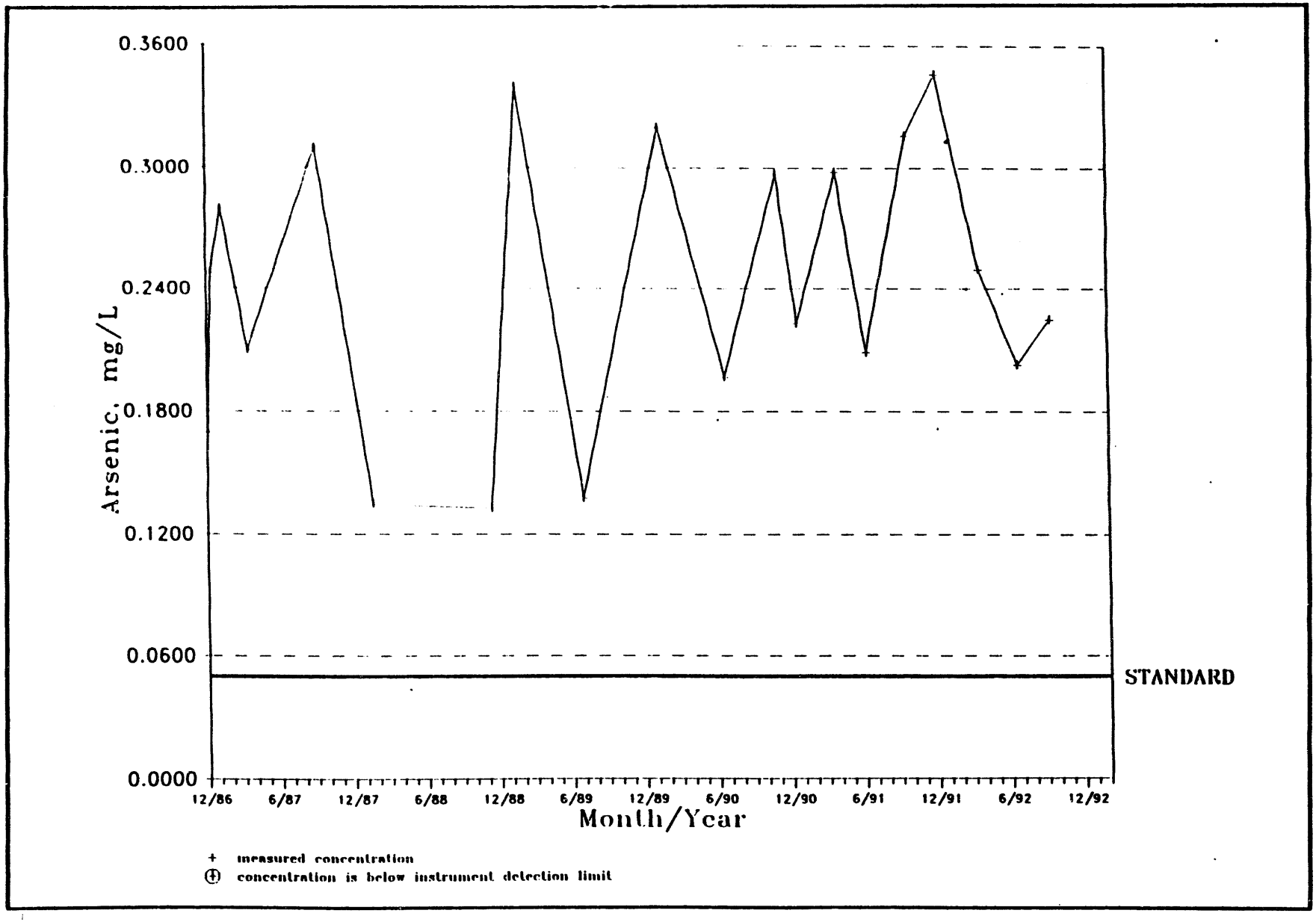

Figure B-14. Arsenic Concentrations in Well 14-6NA from December 1986 through December 1992

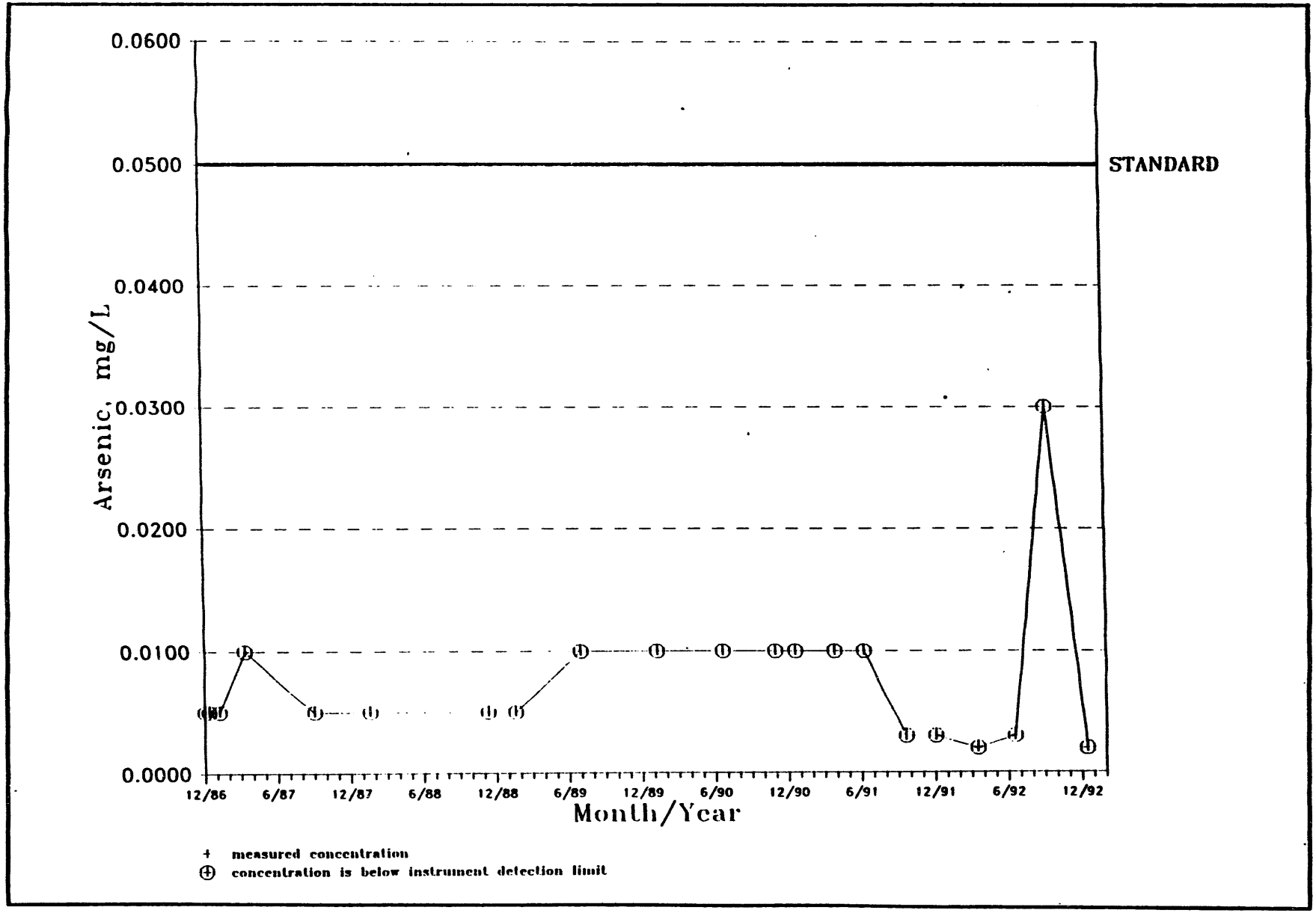

Figure B-15. Arsenic Concentrations in Well GJ84-10 from December 1986 through December 1992

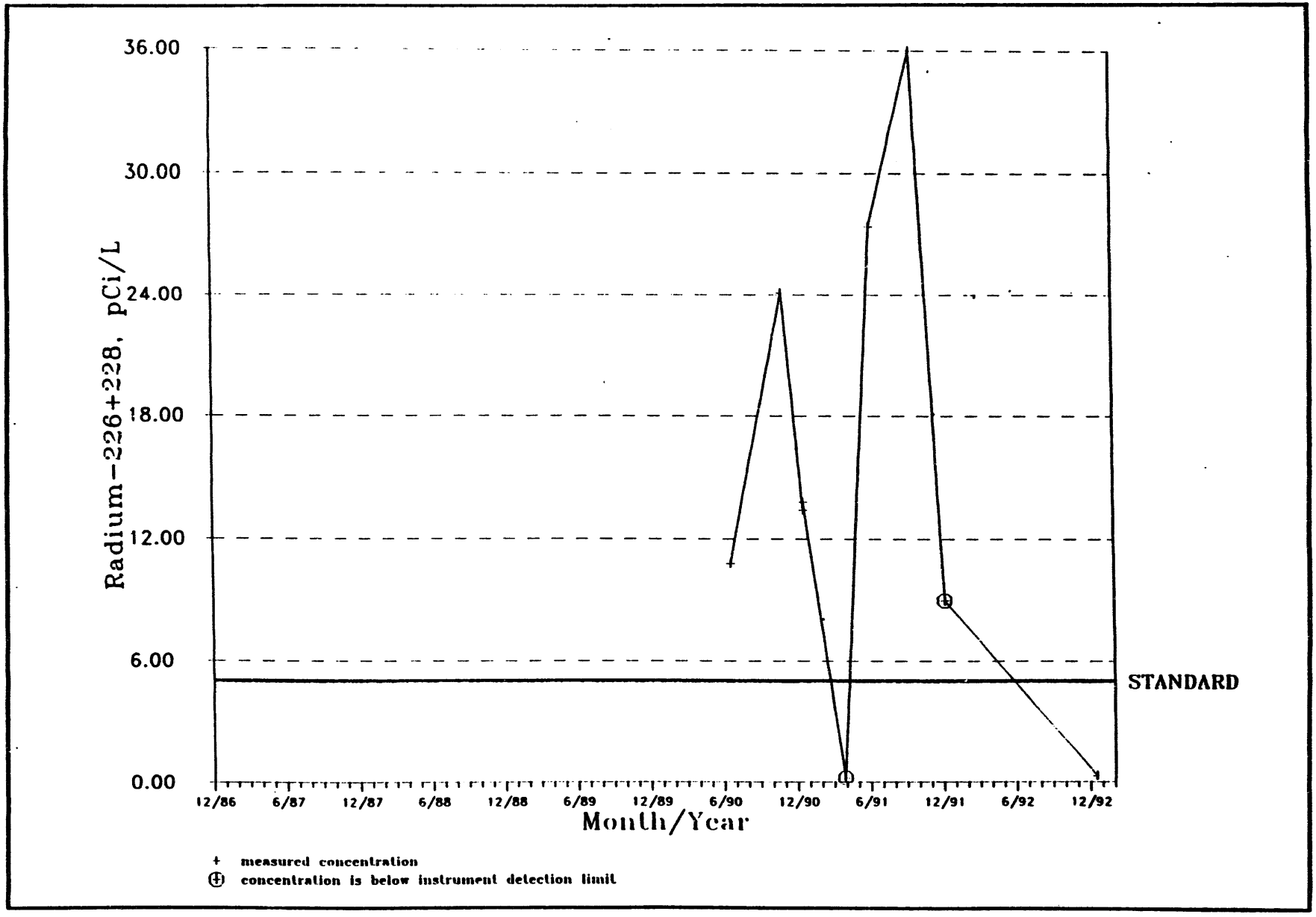

Figure B-16. Radium-226+228 Concentrations in Well 8-4S from June 1990 through December 1992

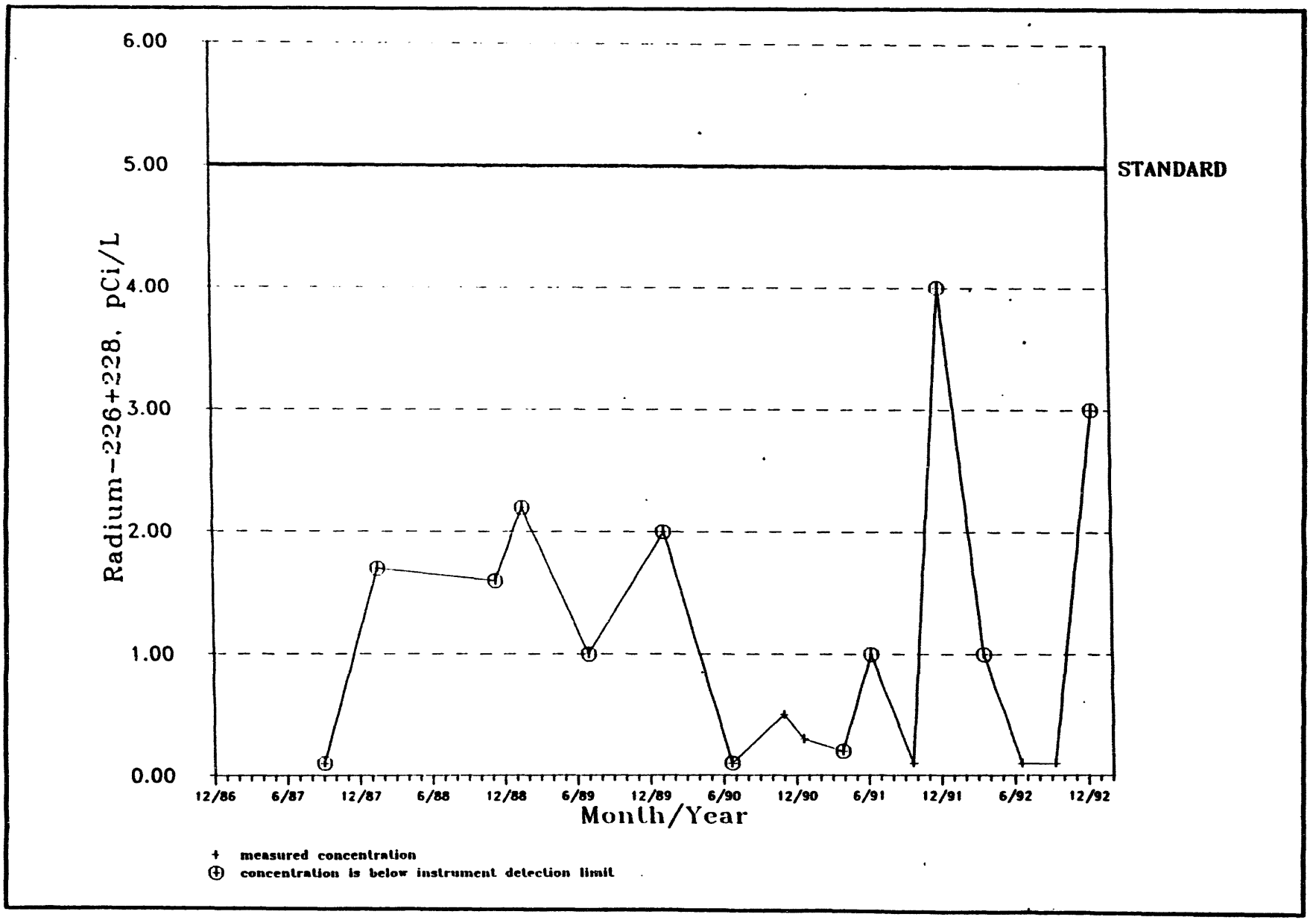

Figure B-17. Radium-226+228 Concentrations in Well GJ84-10 from September 1987 through December 1992

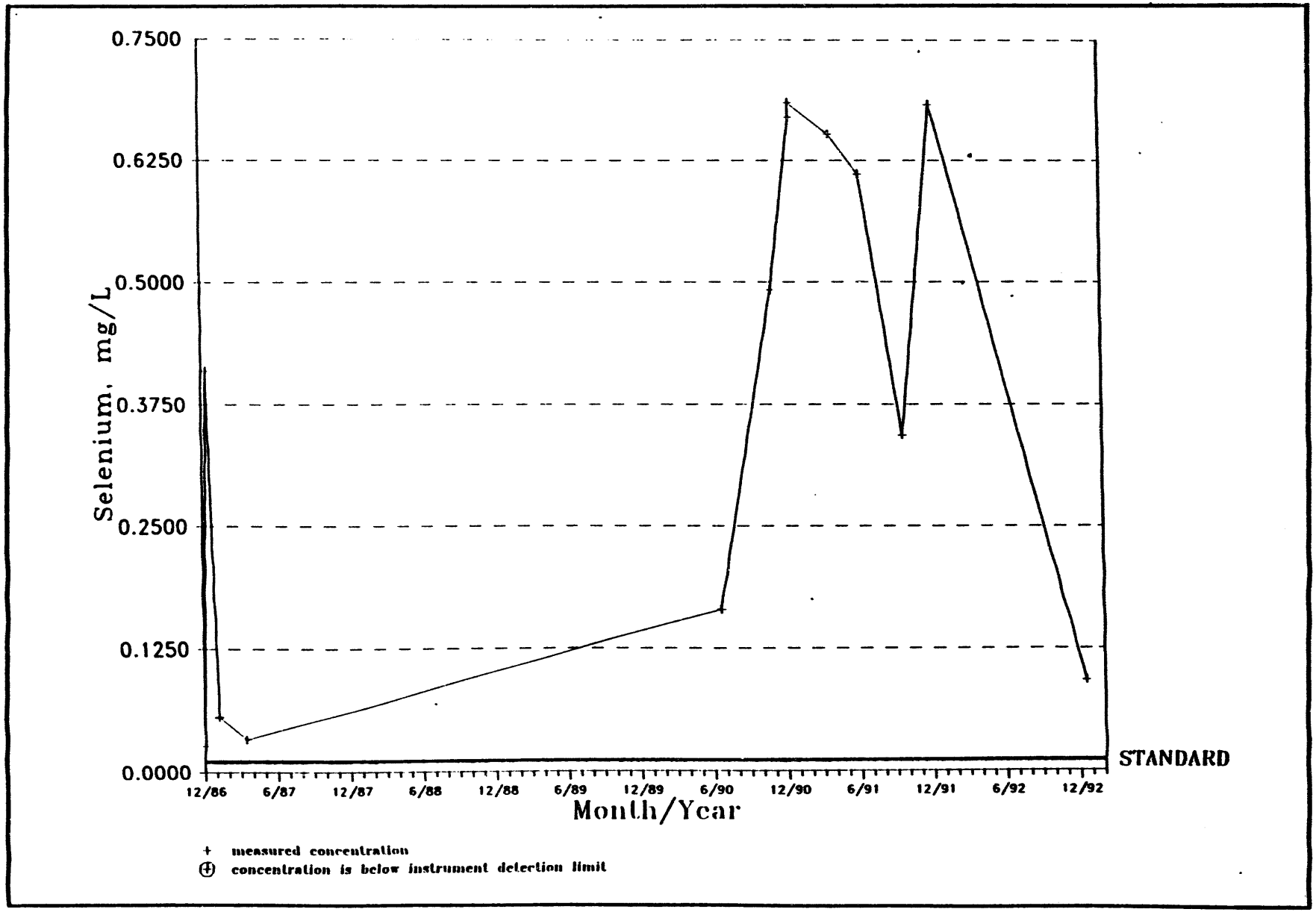

Figure B-18. Selenium Concentrations in Well 8-4S from December 1986 through December 1992

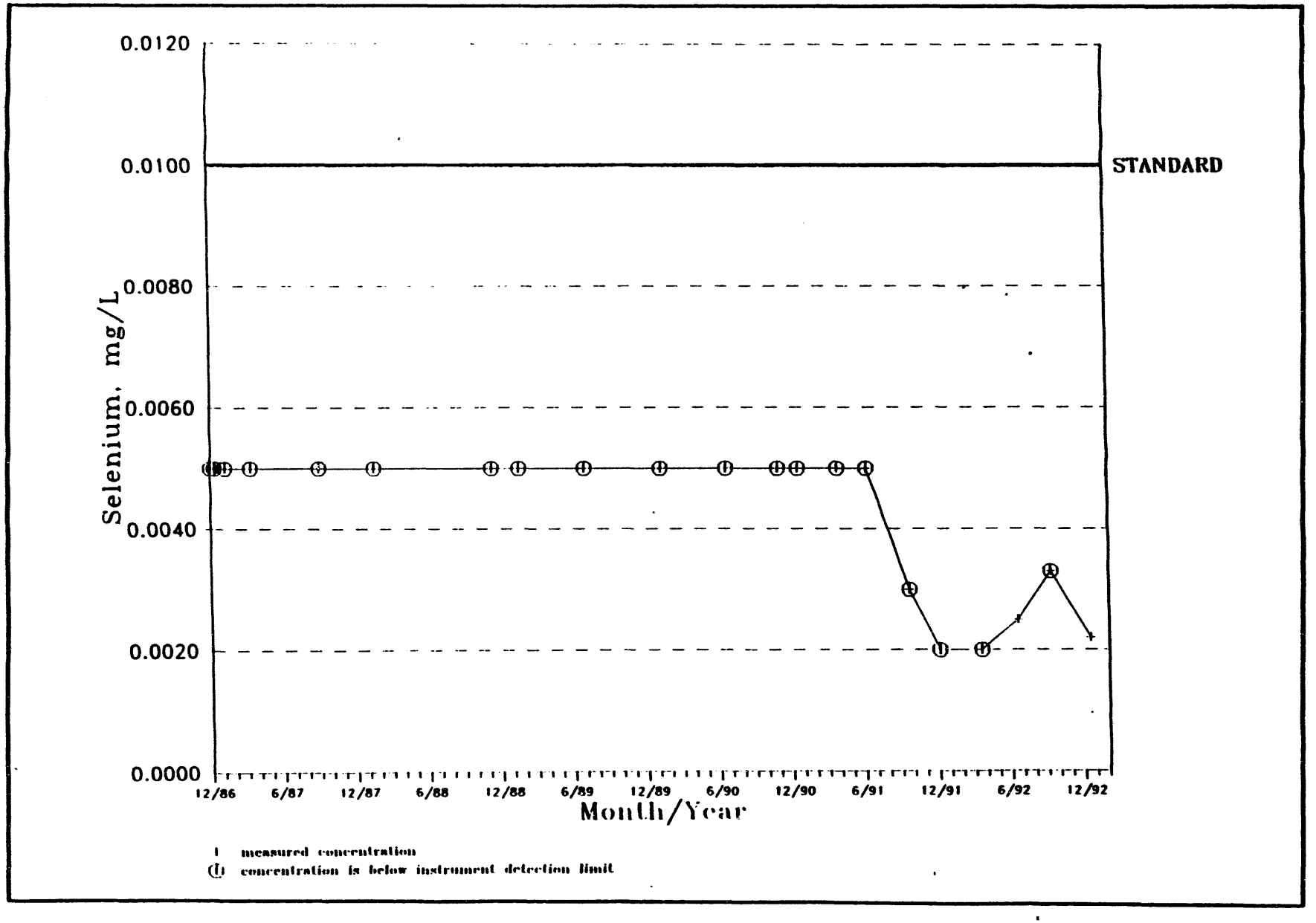

Figure B-19. Selenium Concentrations in Well GJ84-10 from December 1986 through December 1992

Appendix C

Well Location Maps Showing Ground-Water Analytes that Exceed Federal/State Standards

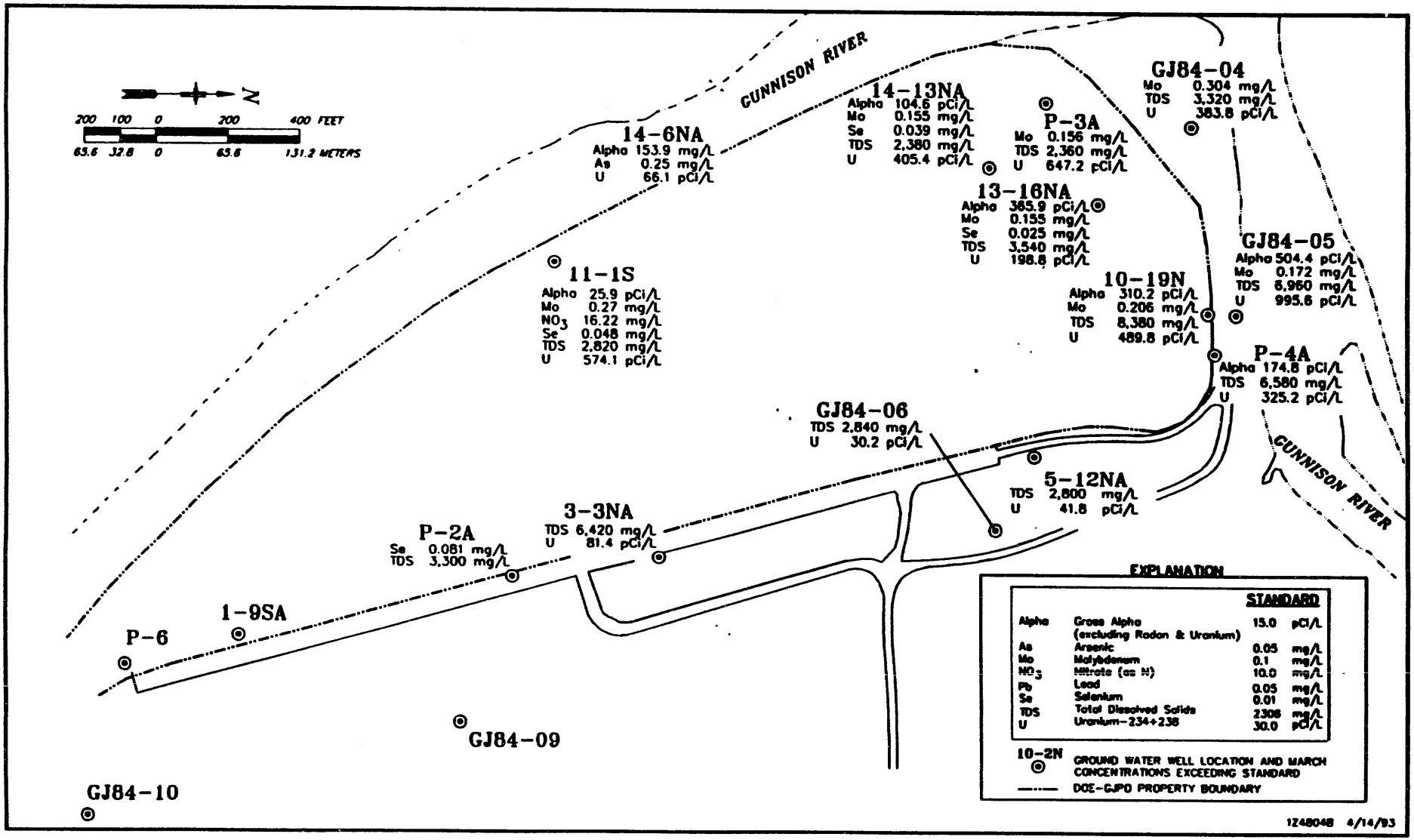

Figure C-1. Concentrations of Ground-Water Analytes Exceeding Federal/State Standards in Alluvial Aquifer Well Samples in March 1992

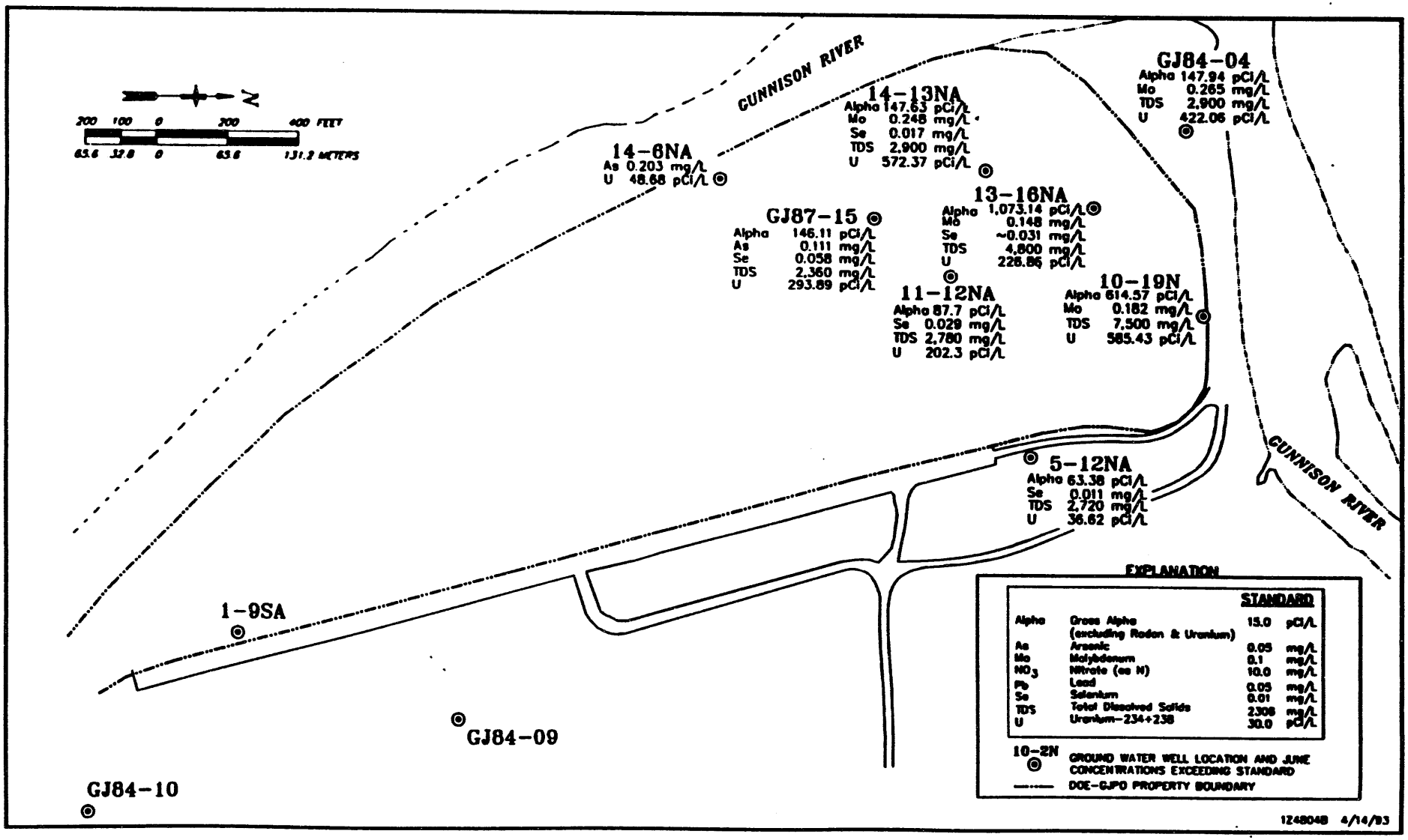

Figure C-2. Concentrations of Ground-Water Analytes Exceeding Federal/State Standards in Alluvial Aquifer Well Samples in June 1992

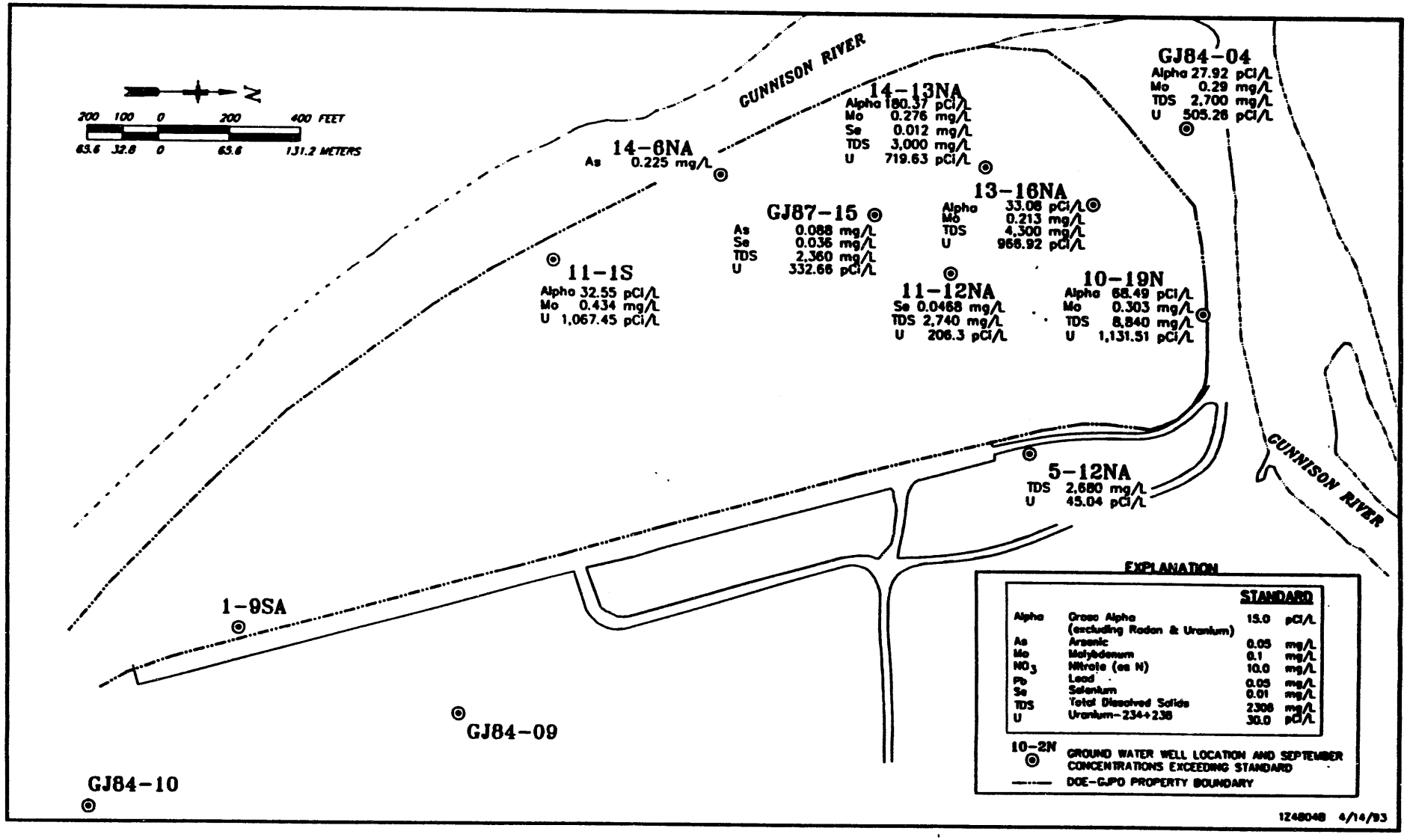

Figure C-3. Concentrations of Ground-Water Analytes Exceeding Federal/State Standards in Alluvial Aquifer Well Samples in September 1992

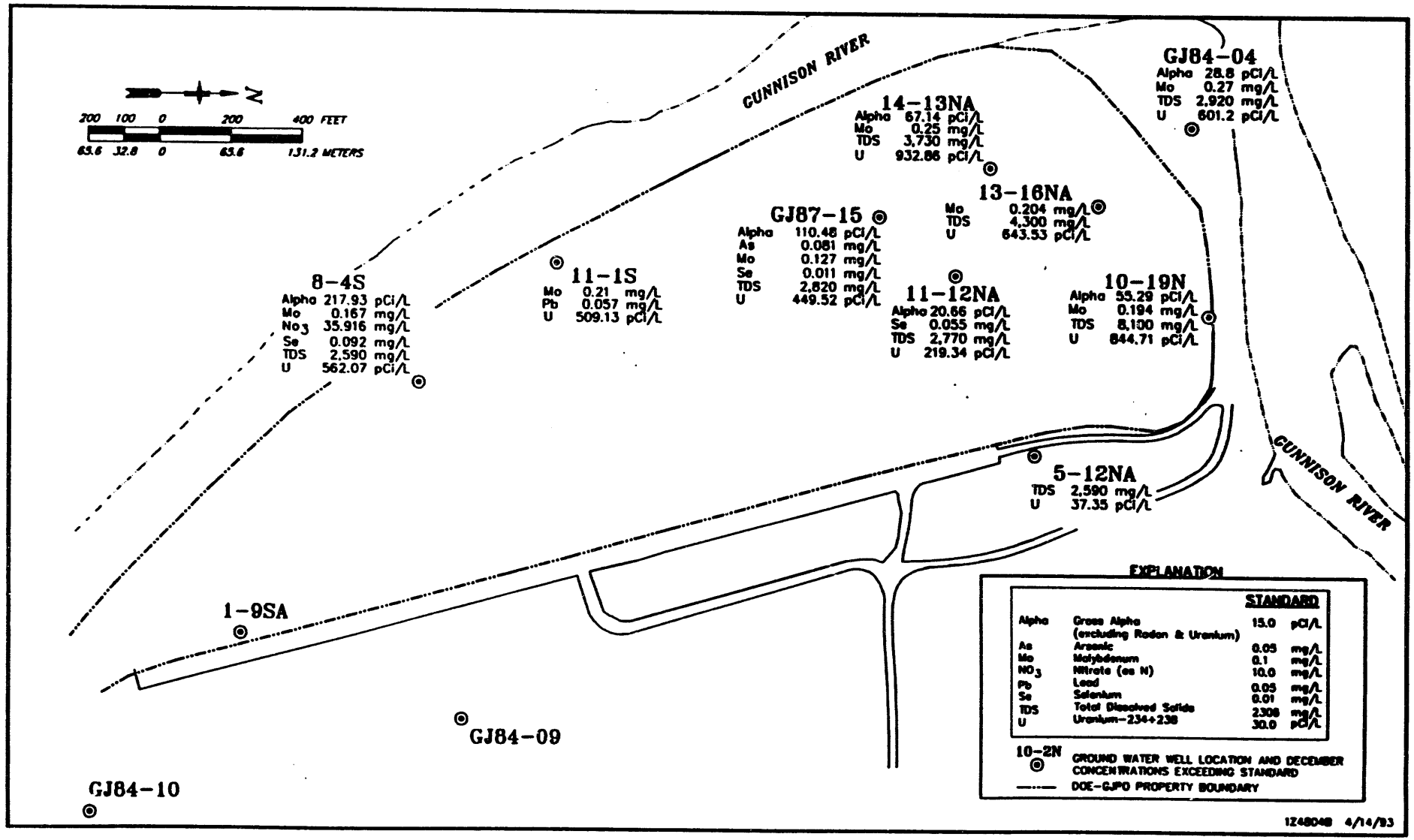

Figure C-4. Concentrations of Ground-Water Analytes Exceeding Federal/State Standards in Alluvial Aquifer Well Samples in December 1992

END

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