DOE–LM/GJ885–2005

U.S. Department of Energy
Office of Legacy Management

Grand Junction, Colorado, Site Site Environmental Report for Calendar Year 2004

August 2005

U.S. Department of Energy

Office of Legacy Management

Work Performed Under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management.

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Contents

Figures

Tables

Appendixes

Acronyms

ALARA	as low as reasonably achievable
CCR	*Colorado Code of Regulations*
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generator
CFR	*Code of Federal Regulations*
CY	calendar year
DOE	U.S. Department of Energy
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GJORAP	Grand Junction Office Remedial Action Program
GJPORAP	Grand Junction Project Office Remedial Action Program
ha	hectare(s)
kg	kilogram(s)
lb	pound(s)
LLW	low-level waste
LM	Office of Legacy Management
mg	milligram(s)
mg/L	milligram(s) per liter
MLLW	mixed low-level waste
µg	microgram(s)
µg/L	microgram(s) per liter
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NiCad	nickel-cadmium
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
pCi	picocurie(s)
pCi/L	picocurie(s) per liter
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RRM	residual radioactive materials
RTC	Riverview Technology Corporation
SARA	Superfund Amendments and Reauthorization Act
TAC	Technical Assistance Contractor
TSCA	Toxic Substances Control Act
U-234	uranium-234
U-238	uranium-238
UMTRCA	Uranium Mill Tailings Radiation Control Act

End of current text

Executive Summary

Highlights for Calendar Year 2004

Radiological Monitoring (excluding ground water monitoring)

All activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003. Therefore U.S. Department of Energy (DOE) activities at the Grand Junction Site did not produce radiological air emissions during calendar year (CY) 2004 and no air monitoring was required.

Radionuclide concentrations in samples collected from the Gunnison River in CY 2004 were consistent with past sample results and remained below the Colorado Department of Public Health and Environment's (CDPHE) surface water quality standards.

Radiological constituents were elevated in samples collected from on-site ponds and are reflective of ground water quality. Pond water quality has improved compared to historical maximum concentrations. Ground water modeling of the alluvial aquifer predicts that ground water will be below applicable standards in 50 to 80 years. At this time surface water quality in the ponds also is predicted to be below applicable standards.

Ground water and surface water use at the Grand Junction Site is restricted, and elevated concentrations are not expected to have any impacts on human health or the environment.

Nonradiological Monitoring (excluding ground water monitoring)

All activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003. Therefore, DOE activities at the Grand Junction Site did not produce nonradiological air emissions during CY 2004 and no air monitoring was required.

With the exception of manganese, selenium, and sulfate, nonradiological concentrations in samples collected from the Gunnison River in CY 2004 were consistent with past sample results and remained below the CDPHE's surface water quality standards. However, upstream samples as well as downstream samples exceeded manganese, selenium, and sulfate standards, indicating these concentrations are not site-related and reflect general river water quality.

Nonradiological constituents were elevated in samples collected from on-site ponds and are reflective of ground water quality. Chloride, manganese, selenium, and sulfate exceeded CDPHE surface water standards. Pond water quality has improved compared to historical maximum concentrations. Ground water modeling of the alluvial aquifer predicts that ground water will be below applicable standards in 50 to 80 years. At this time surface water quality in the ponds also is predicted to be below applicable standards. Surface water bodies on the site support a thriving and healthy ecosystem. Elevated water quality concentrations do not appear to adversely affect wildlife or the environment.

Ground Water Monitoring

On-site and downgradient ground water samples were collected during one monitoring event in CY 2004. Maximum on-site concentrations exceed Federal or State standards for total dissolved solids, molybdenum, selenium, and uranium, though all were significantly lower than maximum historical concentrations. This indicates that natural flushing is proceeding as expected. Maximum downgradient concentrations were below applicable standards with the exception of uranium. The maximum downgradient uranium concentration was an order of magnitude less than the historical maximum concentration. Ground water is predicted to be below applicable standards for all constituents within 50 to 80 years.

Waste Management

The Grand Junction Site generated a larger-than-normal volume of waste in 2004 as a result of closure of the Analytical Laboratory. Two shipments of Resource Conservation and Recovery Act hazardous waste occurred in February and August 2004 that totaled approximately 4,122 kilograms (kg) (9,087 pounds [lb]). These wastes were packaged and sent off site for treatment and disposal by a U.S. Environmental Protection Agency-licensed waste broker. No polychlorinated biphenyl- or asbestos-containing wastes were generated at the Grand Junction Site in CY 2004.

In the past, residual radioactive material (RRM) was generated in the form of excess samples, sample extracts, and other materials associated with activities conducted under Title I of the Uranium Mill Tailings Radiation Control Act. With the closure of the Analytical Laboratory, these materials are no longer generated, but some materials considered to be RRM remained in the lab after closure. These included items such as expired standards, equipment, and miscellaneous hardware, and was disposed of at the Grand Junction Disposal Site. No low-level waste (LLW) was disposed of in CY 2004, though a significant amount of what was originally considered to be LLW was reclassified as RRM and disposed of at the Grand Junction disposal site. At the end of CY 2004, 255 kg (562 lb) of LLW was stored on site. A LLW shipment is expected in 2005.

Waste Minimization

The Grand Junction Site incorporates pollution prevention as part of a larger goal of prudent environmental management. Source reduction is achieved through reducing or eliminating waste generation, substituting a less hazardous or nonhazardous material for a hazardous material, and waste segregation. Many manuals and administrative documents are available electronically in an effort to reduce paper wastes.

In 2004 an extensive effort was made to reuse as much of the closed Analytical Laboratory's equipment and supplies as possible. Approximately $3 million worth of Analytical Laboratory materials were provided to other DOE facilities, universities, and colleges. During the first quarter of 2005, the DOE Grand Junction Site was awarded two pollution prevention awards for its successes related to using the Analytical Laboratory's equipment and supplies.

The Grand Junction Site routinely generates other types of wastes that are suitable for recycling or reuse. These include used oil, lead-acid and nickel-cadmium batteries, scrap metal, office paper, cardboard, aluminum cans, glass, plastic, printer toner cartridges, and miscellaneous paper-based wastes.

Environmental Management System

The Environmental Management System was initiated during CY 2004. Beginning in October of 2004, all activities at the Grand Junction Site were evaluated for consideration of significant environmental impacts; no specific actions were identified as being significant.

End of current text

1.0 Introduction

This Annual Site Environmental Report (ASER) describes calendar year (CY) 2004 U.S. Department of Energy (DOE) Office of Legacy Management (LM) environmental-related activities conducted at the Grand Junction, Colorado, Site. This report was prepared according to the requirements of DOE Order 231.1, *Environmental Safety and Health Reporting*. Because major environmental requirements at the site have been completed, culminating in closure of the Analytical Laboratory in December 2003, this will be the final ASER for this site.

DOE−LM conducts operations from a privately-owned site in Grand Junction, Colorado, immediately south and west of the Grand Junction city limits at 2597 B 3/4 Road (Figure 1–1). The Grand Junction Site is 1 kilometer (0.6 mile) from heavily populated areas of Grand Junction. According to the U.S. Census Bureau, the 2003 population estimate for Grand Junction and the surrounding areas of Mesa County is approximately 124,700. The entire site encompasses 22.8 hectares (ha) (56.4 acres) in Government Land Office Lots 1, 6, and 7 in Sections 26 and 27, Township 1 South, Range 1 West, Ute Meridian, Mesa County, Colorado, at an elevation of approximately 1,390 meters (4,560 feet) above sea level (U.S. Geological Survey 1962).

The Grand Junction Site lies adjacent to the Gunnison River and is separated from the river by an earthen flood-control dike. The facility occupies an elongated, north-south-trending tract bounded on the west and north by the river and on the south and east by agricultural, open-range, and railroad lands. Moderate, semiarid climatic conditions prevail in the Grand Junction area. Daily temperatures range from an average maximum summer (June, July, and August) temperature of 32 °C (89 °F) to an average minimum winter (December, January, and February) temperature of –7.1 °C (20 °F). Annual precipitation in the Grand Junction area averages approximately 22.1 centimeters (8.69 inches).

The property now occupied by the Grand Junction Site was originally acquired by the U.S. War Department in August 1943 to refine uranium for the Manhattan Project. Uranium was milled, analyzed, or stored on-site from 1943 to 1975. All known environmental contamination is believed to be the result of these past activities. Site characterization and remedial action studies to assess the radiological hazards at the facility began in 1984 (Henwood and Ridolfi 1986) when the facility was accepted into the DOE Surplus Facilities Management Program. Remedial action oversight was transferred to the Defense Programs Decontamination and Decommissioning Program in 1988. In 1990, oversight of the Grand Junction Site was transferred to the DOE Office of Environmental Management, and in 2004 the site was designated as the DOE−LM.

In planning for cleanup of the facility, DOE complied with the National Environmental Policy Act (NEPA) process and, pursuant to direction from DOE Headquarters, used the environmental management protocols of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), even though the site did not qualify for placement on the National Priorities List. A remedial investigation/feasibility study−environmental assessment that addressed remediation of the facility was completed in 1989 (DOE 1989). Removal of contaminated soils from open-land areas began in 1989 and was completed in June 1994. Cleanup of most of the remaining contamination in and beneath on-site buildings was completed by 2001 (see Section 3.0). Figure 1–2 shows current remediation and ownership status of the Grand Junction Site.

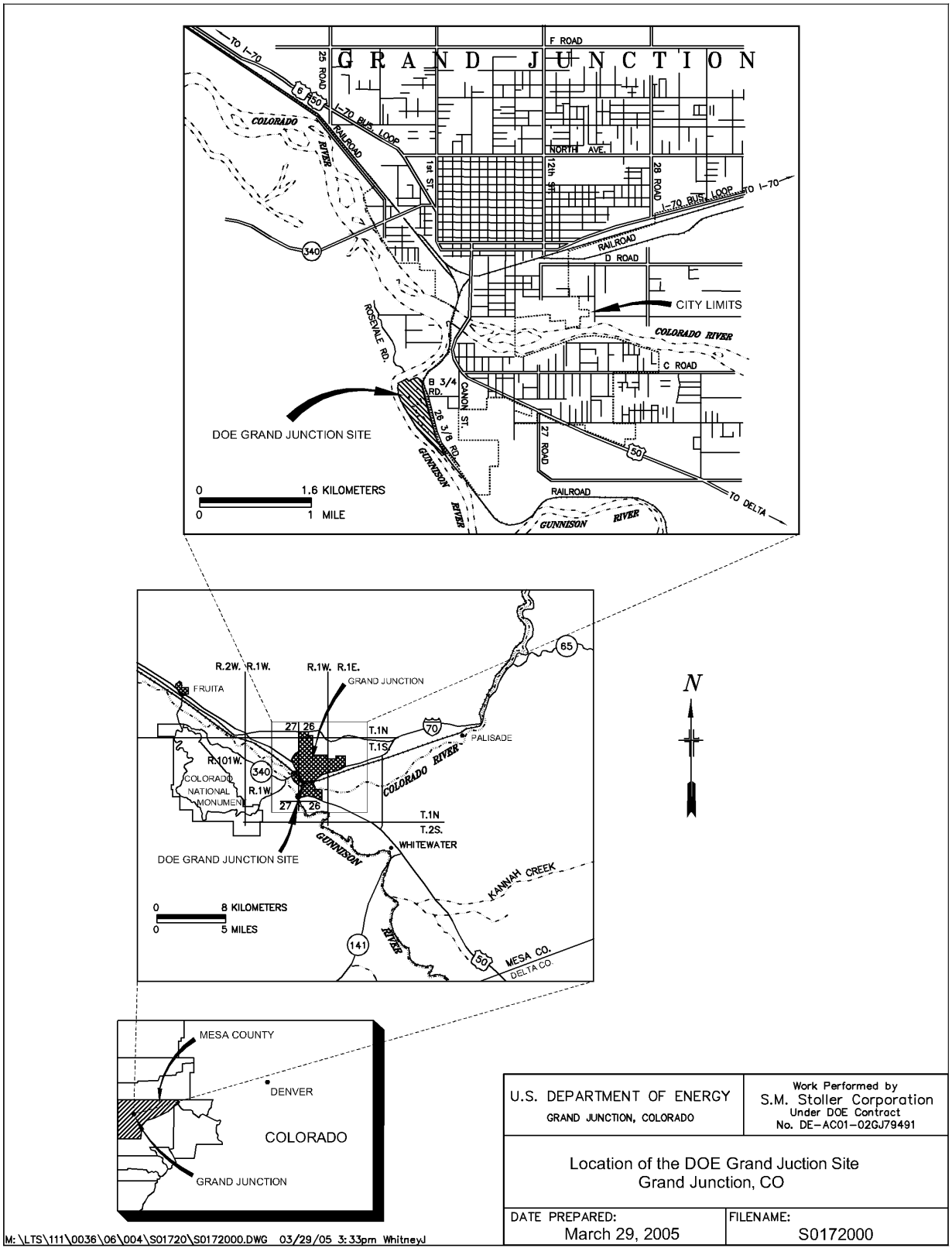

Figure 1–1. Location of the DOE Grand Junction, Colorado, Site

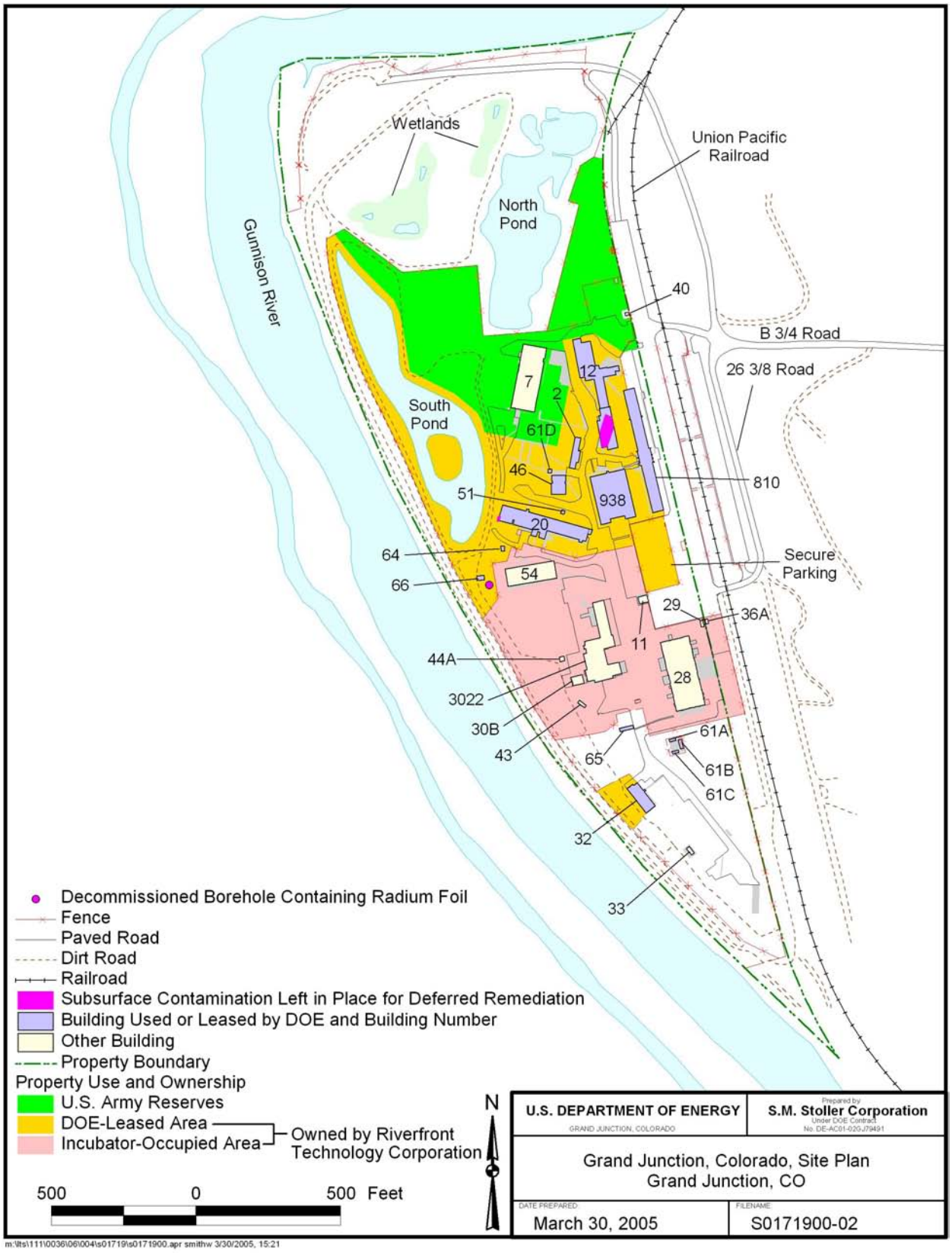

Figure 1–2. Grand Junction, Colorado, Site Plan

Ground water within the alluvial aquifer beneath the site is contaminated with the leached products of uranium mill tailings. Water from the aquifer is not used for any purpose.
All domestic surface water sources for the Grand Junction area are located upstream of the site, or are obtained from the Colorado River drainage system. The Gunnison River, which converges with the Colorado River about 0.8 kilometer (0.5 mile) downstream of the site, is used for seasonal recreational activities such as boating, fishing, and swimming.

In February 1999, DOE leased the southern portion of the site to the Grand Junction Economic Partnership Small Business Incubator Project (Incubator). The Incubator houses approximately 20 small businesses. The offices are used primarily for service-type businesses (e.g., distribution of food stuffs) and light manufacturing (e.g., machining equipment).

In 2000, DOE filed a petition with the Governor of Colorado requesting permission to defer remediation on several areas of the site until a later date. The process is regulated under CERCLA, Section 120(h)(3). The Governor approved the request on August 15, 2001, which allowed DOE to transfer most of the site to a non-DOE owner, the Riverview Technology Corporation (RTC), in September 2001. DOE remains as a tenant on the site. In December 2001, DOE transferred ownership of the remaining 7.97 acres on the northwest portion of the property to the U.S. Army Reserve.

The DOE mission at Grand Junction is to provide project management, engineering, and scientific support to the Federal Government's long-term stewardship and environmental restoration programs. Major programs administered from the DOE office in Grand Junction include the long-term surveillance and maintenance operations for remediated sites assigned to DOE−LM, and the Moab Site Project. Major sites managed under DOE−LM include the Tuba City, Arizona, Disposal Site; Shiprock, New Mexico, Disposal Site; Monticello, Utah, Disposal and Processing Sites; and the Pinellas County, Florida, Site. The DOE office in Grand Junction also provides support to other DOE work initiatives and technical projects (e.g., the Hanford Tank Farm Project).

The purpose of this report is to provide DOE, State officials, the people of Colorado, and other interested parties with current information on Grand Junction Site activities and the effects of these activities on the environment. This report is structured as follows:

- **Section 2** defines the laws and regulations that govern operations at the Grand Junction Site and includes information about the site's compliance status.
- **Section 3** describes the environmental programs operating at the site.
- **Section 4** summarizes the data acquired under the radiological monitoring program.
- **Section 5** summarizes the data acquired under the nonradiological monitoring program (including waste management and pollution prevention).
- **Section 6** discusses in detail the ground water monitoring program and data.
- **Section 7** discusses the new Environmental Management System requirements for the site.
- **Section 8** provides an overview of the quality assurance (QA) measures implemented at the site.
- **Section 9** provides the list of references used in the preparation of this document.
- **Appendixes A and B** provides monitoring data for CY 2004 and time-concentration plots for monitored locations, respectively.

2.0 Compliance Summary

This section describes the status of Grand Junction Site compliance with applicable environmental laws and regulations, describes current issues and actions such as environmental audits, and contains a summary of the permits held by DOE for management of the Grand Junction Site.

2.1 Compliance Status

The Grand Junction Site operated during CY 2004 without incident. The site was in full compliance with all applicable environmental laws, regulations, and DOE requirements as discussed in this section. Issues related to surface water and ground water are discussed in Sections 5 and 6, respectively.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act

Although the Grand Junction Site was not placed on the National Priorities List by the U.S. Environmental Protection Agency (EPA), DOE elected to follow the CERCLA process for environmental cleanup of the facility. The Grand Junction Office Remedial Action Project (GJORAP)[1] was initiated to remove contaminated materials associated with past uranium milling and procurement activities on the site. A remedial investigation/feasibility study−environmental assessment (DOE 1989) was completed in 1989, and a Record of Decision (ROD; DOE 1990) was approved by the DOE Idaho Operations Office in April 1990.

GJORAP was completed in September 2001; all available records were archived in accordance with DOE Records Management procedures. The GJORAP Information Repositories required by CERCLA are in the Mesa County Public Library in Grand Junction and in the Technical Library at the Grand Junction Site. No updates of the repositories were required in 2004. The repositories will likely be archived in the near future as all remediation activities are complete.

In 2000, DOE filed a Request for Deferred Remediation (DOE 2000a) under CERCLA 120(h)(3) to request approval from the Governor of Colorado to defer remediation on portions of the site and to transfer the site prior to completion of remedial action. CERCLA 120(h)(3) applies to the transfer of federally-owned properties that are not officially CERCLA sites, but where the use, storage, or release of CERCLA hazardous substances has occurred. The Governor approved the request on August 15, 2001, and transfer of the property to non-DOE ownership was completed in December 2001.

The areas that remain to be remediated are:

- A contaminated slab and underlying soil from a former mill building under Building 12 (this will be remediated when the building is demolished at the end of DOE use).
- An area of contaminated soil and construction debris under the southwest corner of Building 20 (this will be remediated when the building is demolished at the end of DOE use).

[1] The project was called the Grand Junction Projects Office Remedial Action Project (GJPORAP) until fiscal year 1997.

- Surface and ground water (subject to passive remediation discussed in Sections 4.2 and 6.0 of this document).

DOE will manage a sealed borehole containing radium foil in perpetuity. The radium-foil borehole was used for calibrating down-hole logging instrumentation. Although its use has been discontinued, DOE does not plan on removing or remediating the structure, as it presents no risk to human health or the environment.

DOE has taken all appropriate measures to ensure protection of human health and the environment and, as required by CERCLA 120(h)(3), has committed to funding actions that may be required to remediate contamination resulting from past DOE activities at the site.

2.1.2 Superfund Amendments and Reauthorization Act, Title III, Executive Order 12856

DOE developed a Chemical Tracking System in 1995 to comply with the reporting and notification requirements of the Superfund Amendments and Reauthorization Act of 1986 (SARA), Emergency Planning and Community Right-To-Know Act of 1986 (Sections 311, 312, and 313); and Executive Order 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*.

During 2004, no extremely hazardous substances or hazardous chemicals were stored at the Grand Junction Site in amounts exceeding the threshold planning quantities established in Sections 311 and 312 of SARA Title III. No toxic chemicals were used at the Grand Junction Site in excess of applicable threshold quantities established in Section 313 of SARA Title III, and no reportable releases of hazardous substances (as defined by Section 304 of SARA Title III) occurred at the site; therefore, the applicability of SARA Title III reporting requirements for CY 2004 is as follows:

- Sections 302−303: Planning Notification—not required.
- Section 304: Extremely Hazardous Substance Release Notification—not required.
- Sections 311−312: Material Data Safety Sheets/Chemical Inventory—not required.
- Section 313: Toxic Chemical Release Inventory Reporting—not required.

2.1.3 Resource Conservation and Recovery Act (RCRA)

The Grand Junction Site usually operates under the special requirements for conditionally exempt small-quantity generators (CESQGs) of hazardous waste (codified at Title 40, Part 261.5, of the *Code of Federal Regulations* [CFR]). The Grand Junction Site maintains its CESQG status by generating no more than 100 kilograms (kg) (220 pounds [lb]) of hazardous waste or 1 kg (2.2 lb) of acutely hazardous waste in a calendar month and storing no more than 1,000 kg (2,200 lb) of hazardous waste at any time. CESQG wastes are not subject to full regulation under 40 CFR Parts 124, 262 through 266, 268, and 270 as long as generation and storage limits are not exceeded. Despite its CESQG status, DOE maintains all programs necessary to operate as a small or large quantity generator if needed. Such programs generally include increased personnel training and facility record-keeping. The EPA Identification number assigned to the Grand Junction Site is CO6890090065.

The site was required to operate as a large quantity generator in August 2004 during the shipment of laboratory chemicals (originating from the closed Analytical Laboratory) to off-site commercial treatment and disposal facilities. The site returned to CESQG status for the remainder of 2004.

2.1.4 National Environmental Policy Act

During 1996, the *Environmental Assessment of Facility Operations at the U.S. Department of Energy Grand Junction Projects Office, Grand Junction, Colorado* (DOE 1996) was completed. This Environmental Assessment described the potential environmental and human health effects associated with operations at the Grand Junction Site. Completion of the Environmental Assessment and issuance of the accompanying Finding of No Significant Impact reduced the number of activity reviews required under NEPA at the site. In January 2000, DOE prepared the *Environmental Assessment for the Transfer of the U.S. Department of Energy Grand Junction Office to Non-DOE Ownership* (DOE 2000b) to review the potential impacts, both environmental and economic, of the transfer of the site. Following public comment resolution, a Finding of No Significant Impact was issued in April 2000.

As part of the site NEPA compliance program, the Grand Junction Site submits information for the DOE NEPA Annual Planning Summary in accordance with DOE Order 451.1B, *National Environmental Policy Act Compliance Program*, which lists the Environmental Assessments and Environmental Impact Statements to be prepared during the year. No new NEPA documents were initiated or completed during 2004. All activities and operations at the Grand Junction Site were conducted in compliance with existing NEPA documents and applicable NEPA requirements.

2.1.5 Formerly Utilized Sites Remedial Action Program

The Formerly Utilized Sites Remedial Action Program controls the DOE procedures for release of contaminated sites. All such activities were completed in 2001. DOE manages remaining contamination as described in Section 2.1.1.

2.1.6 Clean Air Act/National Emission Standards for Hazardous Air Pollutants (NESHAP)

In 1991, the Colorado Department of Public Health and Environment (CDPHE) granted the Grand Junction Site an air emission permit for the Analytical Laboratory per 40 CFR 61. The permit established limitations on (1) the annual emissions of particulate matter, volatile organic compounds, and benzene; (2) the annual consumption of acids, volatile organic compounds, and benzene; and (3) the opacity of emissions.

Because all activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003, all air emissions (and monitoring) associated with the operation of these facilities have likewise ceased. Accordingly, CDPHE terminated the air emissions permits issued to the Analytical Laboratory and the Sample Plant. Similarly, because the potential for radiological air emissions from these facilities no longer exists, the NESHAP Subpart H report is no longer required for the Grand Junction Site and was not submitted in 2004.

2.1.7 Clean Water Act/National Pretreatment Program

Sewer effluent from the site is routed to the publicly owned treatment works operated by the City of Grand Junction. In 2000, the City re-evaluated the status of the facility and determined that the site no longer met the requirements of an "industrial user." Therefore, the City did not renew the Class II Industrial Pretreatment Permit. Because the site remained subject to the discharge limits, the Analytical Laboratory implemented administrative controls and best management practices to ensure compliance with the substantive requirements of the Industrial Pretreatment Program.

Although the site did not require a permit for its waste water discharges, DOE notified the Industrial Pretreatment Coordinator for the City of Grand Junction that the Analytical Laboratory and the Sample Plant were permanently closed and that all waste water effluent discharges from these facilities ceased December 31, 2003.

The Grand Junction Site has no wastewater or storm-water discharges that are regulated by the National Pollutant Discharge Elimination System (NPDES; 40 CFR 122) and, therefore, is not required to have NPDES discharge permits for its current activities and operations.

2.1.8 Clean Water Act

Executive Order 11990, *Protection of Wetlands*

Wetland areas are present on the Grand Junction Site along the shores of the South and North Ponds and in depressional areas in the northern portion of the facility. During 2004, no actions were taken at the site that affected these wetland areas.

2.1.9 Safe Drinking Water Act

The provisions of the Safe Drinking Water Act are not applicable to the Grand Junction Site because neither ground water nor surface water at or near the site is used for public consumption. All potable water is provided to the site by the City of Grand Junction, whose drinking water system conforms to the requirements of the Safe Drinking Water Act.

2.1.10 Toxic Substances Control Act (TSCA)

TSCA was enacted in 1976 to regulate the manufacturing and distribution of certain chemical substances. TSCA provides EPA with authority to require testing of chemical substances, both new and old, entering the environment and to regulate their production, sale, and management as a waste, where necessary.

TSCA specifically addresses the use and management of polychlorinated biphenyls (PCBs) and asbestos. The quantity of TSCA-related wastes generated at the Grand Junction Site has historically been small and resulted primarily from the removal of PCB light ballasts and asbestos-contaminated ceiling insulation, exterior siding (i.e., transite), and floor tile. The site owner, the RTC, is now responsible for the management of such wastes. In 2004, the Grand Junction Site shipped a minor quantity of PCB waste (analytical standards) off-site for treatment and disposal. Details of this shipment are provided in Section 3.4.2.

2.1.11 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA governs the use, storage, registration, and disposal of pesticides. FIFRA categorizes pesticides as either "restricted use" or "general use." EPA may classify a pesticide as restricted use if (1) it is determined that substantial adverse effects to the applicator or environment may occur without additional regulatory restrictions or (2) if unreasonable harm to humans or the environment may occur, even if the pesticide is used as directed by the label instructions. FIFRA regulations require that restricted-use pesticides be used or applied only by a certified private or commercial applicator or under the direct supervision of a certified applicator. There were no applications of restricted use pesticides at the site in 2004.

2.1.12 Endangered Species Act

Section 7 of the Endangered Species Act requires DOE to ensure that any actions authorized, funded, or performed at the facility do not "jeopardize the continued existence of threatened or endangered species and do not destroy or adversely modify critical habitat required for the continued existence of that species." The Gunnison River adjacent to the facility provides habitat to four endangered fish: the Colorado pike minnow, humpback chub, bonytail chub, and razorback sucker. DOE did not withdraw or use water from the Gunnison River in 2004 and has no plans for withdrawing or discharging water in the future. No other threatened or endangered species are affected by Grand Junction Site operations.

2.1.13 National Historic Preservation Act

Subsequent to the 1999 building survey (Schweigert 1999), the Grand Junction Site complex was recommended for listing as a historic district on the basis of its significance in uranium exploration, milling, and processing from 1943 to 1970.

Before the Grand Junction Site was transferred to the RTC in 2001, DOE conducted a survey of on-site buildings to determine if any would qualify for listing in the National Register of Historic Places. Because divestiture of the property to RTC was considered an adverse effect on the historic district, DOE was required by the Colorado State Historical Preservation Office to preserve the historical values of the property by completing an Historic American Engineering Record of the site and erecting a sign with historic information on the site. This sign was fabricated in 2003, and will be erected after RTC establishes its landscape design. The RTC is not required to comply with the National Historic Preservation Act unless their action is federally funded or licensed. During 2004, no actions were funded, licensed, or undertaken by DOE that affected historic buildings on the Grand Junction Site.

2.1.14 Floodplain Management

Executive Order 11988, *Floodplain Management*

The Grand Junction Site, because it is located behind the dike adjacent to the Gunnison River, is not on a floodplain (http://gis.mesacounty.us/). Therefore, this executive order is not applicable.

2.2 Current Issues and Actions

There were no major ongoing environmental issues at the Grand Junction Site, and there were no nonroutine or unplanned releases to the environment during CY 2004. DOE uses internal and external environmental audits, and management compliance assessments to evaluate environmental compliance and to implement corrective actions.

The QA organization performed surveillances and management assessments to verify system descriptions and compliance with internal procedures. Activities examined in 2004 related to environmental compliance included laboratory analyses, radiation protection, document control and records management.

2.3 Summary of Facility Permits

In 2004, there were eight active permits for wells associated with the Grand Junction Site.

3.0 Environmental Program Information

Environmental programs at the Grand Junction Site include ground and surface water monitoring, environmental remediation, waste management, and pollution prevention. This section provides descriptions of all program elements except the ground water program, which is presented in Section 6.0, "Ground Water Monitoring and Protection Program." Results of air and surface water monitoring are presented in Section 4.0, "Environmental Radiological Program Information," and in Section 5.0, "Environmental Nonradiological Program Information." This section also presents brief discussions of data associated with environmental remediation, waste management, and pollution prevention.

In addition to the environmental programs, the Grand Junction Site adheres to a comprehensive Integrated Safety Management System and Radiological Control Program to minimize workplace hazards and to ensure protection of employees and the public. These programs are described in the *Health and Safety Manual* (STO 2), the *Site Radiological Control Manual* (STO 3), and the *Integrated Safety Management System Description* (STO 10).

3.1 Air Monitoring

Because all activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003, all air emissions (and monitoring activities) associated with the operation of these facilities likewise ceased. Accordingly, in a letter dated February 18, 2004, DOE petitioned CDPHE to terminate the air emissions permits issued to the Analytical Laboratory and the Sample Plant. In letters dated May 26, 2004, and June 7, 2004, CDPHE agreed with DOE's request to terminate these emissions permits and provided DOE with official notification that the respective emissions permits had been cancelled.

Similarly, because the potential for radiological air emissions from these facilities no longer exists, the 2003 NESHAP Subpart H report was the final NESHAP Subpart H report to be prepared and submitted for the Grand Junction Site. The NESHAPs Subpart H report for CY 2003 was submitted to EPA in a letter dated June 20, 2004. No accidental releases of radioactivity occurred at the Grand Junction Site during CY 2004.

3.2 Water Monitoring

DOE monitors the surface water and ground water on and adjacent to the Grand Junction Site. This section presents descriptions of monitoring performed in 2004 associated with the surface water and includes a brief summary for the discontinuance of the sewer effluent monitoring. Section 6.0 presents descriptions of ground water monitoring activities and results.

3.2.1 Sewer Effluent

The RTC facility sewer effluent consists of domestic sewage and wastewater discharges from DOE activities (e.g., the Environmental Sciences Laboratory) and from other tenant businesses. The RTC sewer system discharges to the City sewer, which is treated at the City of Grand Junction's Persigo Waste Water Treatment Plant.

In accordance with the regulatory provisions of the Industrial Pretreatment Program and with the City of Grand Junction's approval, the Grand Junction Site did not renew its Industrial

Pretreatment Permit after it expired in June 1999 (DOE 2001a and Tonello 2001). Sampling of the sewer effluent by DOE for nonradioactive constituents continued as a best management practice during the first quarter of 2000, after which it was discontinued.

The site sewer effluent was also monitored for radioactive constituents through the first quarter of 2000. This sampling was conducted to demonstrate compliance with the requirements of DOE Orders 5400.1, *General Environmental Protection Program*, and 5400.5. In March 2000, the site received approval from the DOE Albuquerque Operations Office to discontinue monitoring the sewer effluent for radioactive constituents. DOE Albuquerque's approval to discontinue monitoring was based on historically low radioactivity in the effluent samples and the site administrative controls that ensure continued compliance with DOE Order 5400.5.

Sewer effluent was not monitored for radioactive components or for hazardous constituents in 2004. Best management practices and procedures are in place to ensure compliance with effluent parameters including pH, radioisotopes, total toxic organics, and mercury in accordance with City ordinances (Grand Junction Code, Section 38-49).

Any significant changes to the existing laboratory processes or procedures that could impact discharges to the sanitary sewer system require notification to the City's Wastewater Administrator. Accordingly, S.M. Stoller (the Technical Assistance Contractor [TAC]) notified the City Wastewater Administrator in February 2004, that all operations associated with the Analytical Laboratory were permanently discontinued effective December 31, 2003, and all effluent discharges associated with laboratory shutdown activities would cease by February 27, 2004. No further notification was required.

3.2.2 Surface Water

Surface water monitoring is conducted to assess compliance with State water quality standards and to detect changes in water quality resulting from remedial actions. Surface water bodies located at or near the Grand Junction Site consist of the North Pond, South Pond, Wetland Area, and Gunnison River, all of which contain water year-round. The North Pond, South Pond, and Wetland Area are located on the Grand Junction Site, and the Gunnison River is contiguous to the facility's west and north boundaries (Figure 3–1).

The wetland was created in spring 1994 from the excavation of contaminated soils during GJORAP operations. Although most of the wetland is dry during low ground water periods (September through March), a portion of the area was designed to contain water year-round for monitoring purposes; this area forms the sampling location called the Wetland Area.

In accordance with the Water Quality Control Commission regulation entitled "Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins" (5 *Colorado Code of Regulations* [CCR] 1002–35), the State has designated four use classifications for the segment of the Gunnison River near the Grand Junction Site: (1) Recreation—Class I, (2) Cold Water Aquatic Life—Class I, (3) Domestic Water Supply, and (4) Agriculture. Table 5–1 lists the State water quality standards for the segment of the Gunnison River adjacent to the Grand Junction Site. Where more than one standard applies based on multiple river uses, the most stringent standard is listed. These standards also were used to evaluate the water quality in the North Pond, South Pond, and Wetland Area, though these standards do not apply to constructed wetlands.

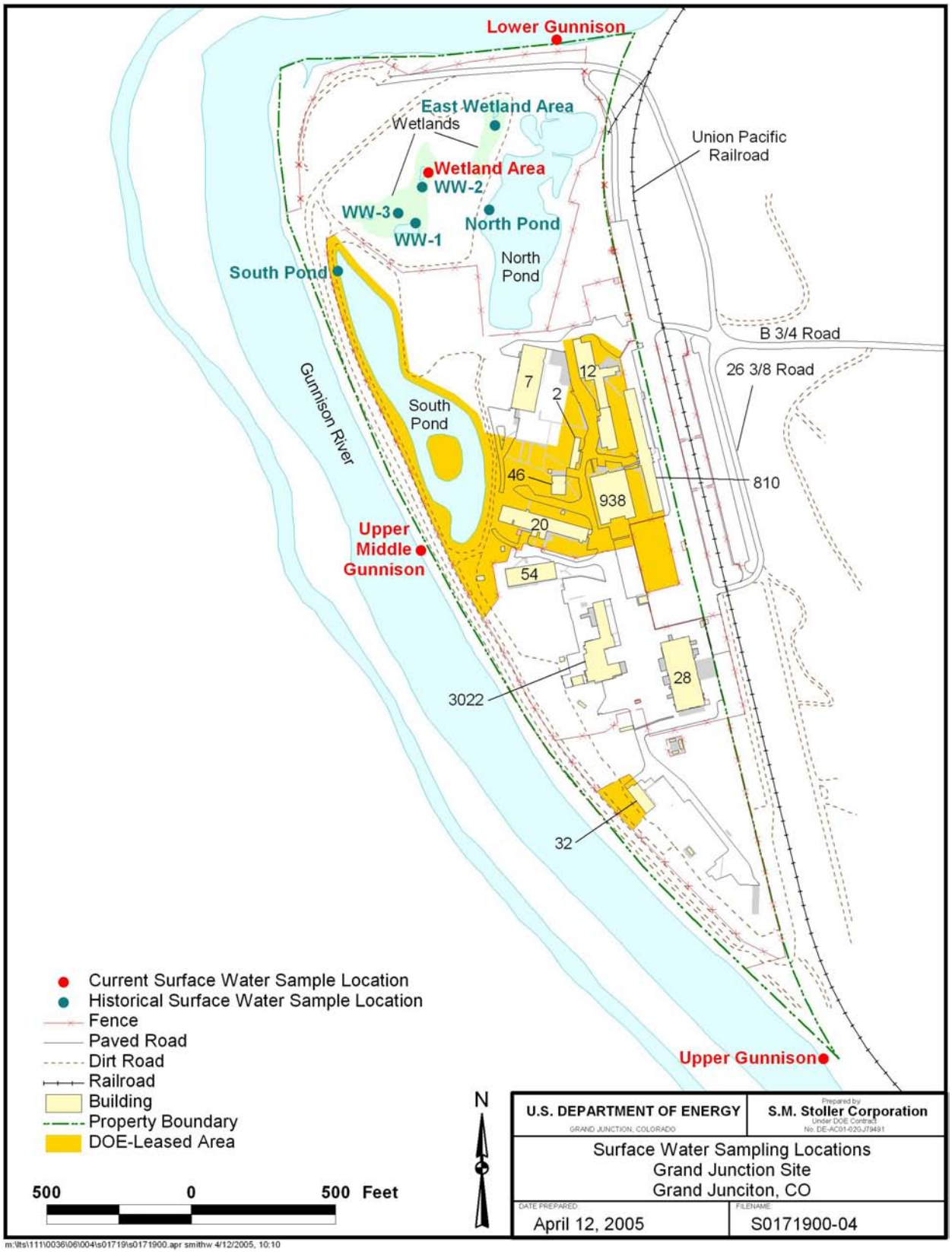

Figure 3–1. Surface Water Sampling Locations Grand Junction Site, Grand Junction, Colorado

The surface water sampling locations are near the shore of the Gunnison River adjacent to the facility (Upper Middle Gunnison), downstream of the facility (Lower Gunnison), upstream of the facility (Upper Gunnison), near the western shores of the North and South Ponds, and at the Wetland Area**.**

Surface water samples are collected annually during January. Flows and water levels are typically low during this time of year, and contaminant concentrations are typically highest. Sampling during low water each year minimizes seasonal fluctuation and allows better assessment of the effects of natural flushing of the ground water system on surface water quality. The North Pond and South Pond locations were not sampled in 2004 because the ice was too thick to obtain a sample during a period of subzero temperatures in January. The East Wetland location was not sampled because it was dry.

Locations scheduled for sampling and analyses conducted for the Grand Junction Site water-sampling program in 2004 are shown in Table 3–1. Analytes in Table 3–1 are used to characterize general water quality and to monitor the effects of alluvial ground water under the Grand Junction Site on surface water quality. Historical and 2004 analyte concentrations in samples from the Gunnison River and the on-site ponds (if available) are compared with applicable State standards in Section 5.0, Table 5–1 and Table 5–2, respectively.

Table 3–1. Grand Junction, Colorado, Site Water Sampling Requirements

Month	Matrix	Locations Sampled	Analytes Measured
January	Ground Water	10-19N, 11-1S, 14-13NA, 6-2N, 8-4S, GJ01-01, GJ01-02, GJ84-04	Total alkalinity, arsenic, chloride, chromium, gross alpha, gross beta, manganese, molybdenum, nitrate (ground water only), oxidation-reduction potential, pH, selenium, specific conductance, sulfate, temperature, total dissolved solids, turbidity, and uranium.
January	Surface Water	Lower Gunnison, Upper Mid Gunnison, Upper Gunnison, North Pond, South Pond, Wetland Area, East Wetland Area	

The elevated concentrations of selenium and other constituents do not appear to pose an unacceptable ecological risk. Sample results for on-site surface water are collected in winter before spring runoff and reflect the highest concentrations during the year. Concentrations are elevated for the last several years because of regional drought conditions, which causes lower than usual water levels. Concentrations for the metals only slightly exceeded ambient concentrations in the Gunnison River. As noted previously, plants and animals are thriving in the on-site surface water bodies, and no sensitive species are resident year-round. Abundant frogs appear healthy and normal (amphibians can indicate early signs of ecological damage because they spend most of their time in the water). Other animals, such as migratory birds, get only a portion of their food and water from these water bodies.

3.3 Environmental Remediation

Remediation under GJORAP was completed in 2001. GJORAP encompassed activities associated with the removal of uranium mill tailings and mill- and procurement-related contamination from earlier site operations. All known on-site radioactive contamination of ground water, surface water, and soils and most of the building contamination is believed to be a

result of those past activities. Remedial action site investigations formally began in 1984 when the facility was accepted into the DOE Surplus Facilities Management Program. The GJORAP remedial investigation/feasibility study report for the Grand Junction Site (DOE 1989) was issued in July 1989 and the ROD (DOE 1990) was issued in April 1990.

Removal of uranium mill tailings and contaminated soil began in late 1989, and most of the contaminated soil was removed by 1994. Additional small deposits of contaminated soil subsequently were removed during remedial action activities conducted during 1998 through 2001. The total volume of uranium mill tailings and tailings-contaminated material removed from open land areas was approximately 195,985 cubic meters (256,340 cubic yards). The tailings and related materials occupied approximately 13.5 ha (33.3 acres). The primary locations of remediation included the North Pond and South Pond areas, areas located on the north and northwest of the property, and the dike along the Gunnison River.

In addition to soil, ground water, and surface water contamination, DOE also identified 24 buildings at the Grand Junction Site which were radiologically contaminated as a result of past uranium milling, sample preparation, and raw material procurement activities. By the end of 2001, GJORAP had demolished 16 of these buildings, and remediated and/or verified for release for unrestricted use the remaining 33 buildings present at the site.

Although the structure of Building 12, which houses the Grand Junction Site computer system, was remediated and released for unrestricted use, radiologically contaminated concrete and soil were left in place under the building so that operations in Building 12 could continue.

Building 20, the former Analytical Laboratory, was approved by DOE–Albuquerque for release for unrestricted use following a release survey based on an approved derived concentration guideline level. Radiologically contaminated soil and debris were left in place under the southwest corner of the building so that laboratory operations could continue. DOE included these locations of contamination in the *Request for Deferred Remediation* (DOE 2000a).

3.4 Waste Management

The Grand Junction Site normally generates small volumes of hazardous or toxic waste regulated under RCRA and TSCA, low-level radioactive waste (LLW), and mixed LLW (MLLW) (i.e., contaminated with radioactivity and RCRA- or TSCA-regulated constituents). The site generated a larger-than-normal volume of waste in 2004 as a result of the closure of the Analytical Laboratory. Residual radioactive material is also generated in the form of excess samples, sample extracts, and other materials derived from activities associated with sites regulated under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA). Wastes are stored at the Grand Junction Site in designated on-site storage areas/facilities prior to off-site shipment to commercial or DOE-owned disposal facilities. Programs, policies, and procedures are in place to minimize waste generation, and to manage wastes that cannot be minimized in compliance with applicable Federal and State regulations and DOE directives. The Grand Junction Site subcontracts off-site shipment and disposal of waste through reputable, DOE-audited waste brokers and disposal facilities.

3.4.1 RCRA Hazardous and Mixed Waste

Strict characterization and segregation requirements (waste minimization efforts) are implemented to reduce the amount of waste classified and managed as hazardous or MLLW at the Grand Junction Site. Administrative controls such as establishing radioactive materials areas, limiting the use of materials in contamination areas, and surveying wastes for segregation as radioactive or nonradioactive, further reduces the volume of MLLW. Hazardous and MLLW generated at the Grand Junction Site are stored in designated hazardous waste storage areas. Hazardous wastes are shipped off-site to commercial treatment and disposal facilities once or twice each calendar year, or as required by law. Because DOE leases the property from the RTC, responsibility for maintenance, including management of such potentially hazardous items as spent fluorescent light tubes, light fixtures and ballasts, and miscellaneous property wastes, resides with the site owner, the RTC.

The Grand Junction Site operated for most of 2004 as a CESQG by generating less than 100 kg (220 lb) per month and storing less than 1,000 kg (2,200 lb) of hazardous waste on-site. Despite its CESQG status, DOE maintains all programs necessary to operate as a small or large quantity generator if needed. Such programs generally include increased personnel training and facility record-keeping. The site was required to operate as a large quantity generator in August 2004 during the off-site shipment of laboratory chemicals originating from the closed Analytical Laboratory. The site returned to CESQG status for the remainder of 2004.

During 2004, the Grand Junction Site generated approximately 4,009 kg (8,838 lb) of RCRA hazardous waste, which primarily consisted of hazardous chemicals and expired laboratory standards that remained after the Analytical Laboratory closed. Two shipments of RCRA hazardous waste occurred in February and August 2004 that totaled approximately 4,122 kg (9,087 lb). These wastes were lab-packed and transported for off-site treatment and disposal by an EPA-licensed waste broker. At the end of 2004, 9.39 kg (20.7 lb) of RCRA hazardous waste remained in storage at the site.

The Grand Junction Site generated 4.6 kg (10.1 lb) of mixed waste during 2004, which consisted of expired radioactive inorganic laboratory standards. Mixed waste was not shipped from the site in 2004, but a mixed waste shipment is planned for 2005. At the end of 2004, 99.72 kg (219.8 lb) of mixed waste was stored at the site, the bulk of which consisted of radioactive liquid scintillation cocktail that was generated by the Analytical Laboratory prior to 2004.

3.4.2 PCBs and Asbestos

PCB wastes are stored in designated TSCA waste storage areas at the Grand Junction Site. Nonradioactive and radioactive PCB wastes are shipped off-site for treatment and disposal at appropriate commercial facilities. If PCB waste is contaminated with residual radioactive material (RRM), risk-based approval is sought for disposal at the Grand Junction Disposal Site.

Asbestos-containing wastes, which consist primarily of construction debris from site renovations, are the responsibility of the site owner, the RTC.

The Grand Junction Site did not generate any PCB waste in 2004. In February 2004, 0.01 kg of PCB waste (laboratory standards) generated in 2003 was shipped off-site by an EPA-licensed

waste broker for treatment and disposal. There were no PCB wastes remaining at the site at the end of 2004.

3.4.3 Residual Radioactive Materials

RRM is defined by 40 CFR Part 192.01, as "(1) Waste (which the Secretary determines to be radioactive) in the form of tailings resulting from the processing of ores for the extraction of uranium and other valuable constituents of the ores; and (2) Other wastes (which the Secretary determines to be radioactive) at a processing site which relate to such processing, including any residual stock of unprocessed ores or low-grade materials."

In the past, soil and water samples collected from remote UMTRCA Title I-related sites have been sent to the Analytical Laboratory for analysis. Resulting excess soil samples, soil sample extracts, and associated laboratory wastes were considered contaminated with RRM and were disposed of at the Grand Junction Disposal Site. With the closure of the site's Analytical Laboratory, such samples are now sent to other commercial laboratories for analysis. However, certain radiologically contaminated items that supported UMTRCA Title I projects and programs remained in the Analytical Laboratory after its closure. These materials, which included analytical reference materials, expired standards, equipment, and miscellaneous hardware, were considered RRM and were disposed of at the Grand Junction Disposal Site. It is expected that more of these materials will be shipped to the Grand Junction Disposal Site in 2005.

Contaminated concrete and soils remain beneath Grand Junction Site Buildings 12 and 20 during 2004. With the closure of the Analytical Laboratory, DOE is obligated by the property transfer agreement to demolish Building 20 and dispose of all RRM-contaminated materials at the Grand Junction Disposal Site. Noncontaminated construction debris from this structure will be disposed of at the Mesa County Landfill. Actual demolition of this building is not expected to occur until CY 2006 or later, as funding for this task becomes available. There are no current plans for remediating the RRM-like materials that remain beneath Building 12. Although the Grand Junction Site is not designated under Title I of UMTRCA, the U.S. Nuclear Regulatory Commission-approved Remedial Action Plan for the UMTRCA Title I Grand Junction Disposal Site specifically allows co-disposal of waste from the Grand Junction Site.

3.4.4 Low-Level Waste

Grand Junction Site radioactive wastes that are clearly not RRM do not qualify for disposal at the Grand Junction Disposal Site and must be managed as LLW in compliance with DOE Order 435.1, *Radioactive Waste Management*. The Grand Junction Site Analytical Laboratory previously generated LLW from the analysis of environmental samples received from other DOE sites. Strict radiological characterization and segregation requirements (waste minimization efforts) are in place at the site to reduce the amount of waste classified and managed as LLW. Administrative controls such as the establishment of radioactive materials areas, limiting the use of materials in those areas, and surveying wastes for segregation as contaminated or noncontaminated further reduces the volume of LLW.

The Grand Junction Site generated approximately 118.8 kg (262 lb) of LLW in CY 2004, consisting primarily of radioactive soil residues, liquid scintillation cocktail, and miscellaneous trash that was inventoried as LLW after the Analytical Laboratory closed. The Grand Junction Site did not conduct a LLW shipment in CY 2004, but a LLW shipment is planned for 2005. At

the end of CY 2004, a total of 255 kg (562 lb) of LLW was stored on-site. A significant quantity of the LLW that was stored onsite at the end of 2003 was reevaluated in 2004 and was subsequently redesignated as RRM (primarily soil residues and miscellaneous trash), which allowed this material to be disposed of at the Grand Junction Disposal Site. Additional efforts are planned in 2005 to reevaluate LLW that has been stored on-site for a number of years to determine the appropriate disposal requirements.

3.5 Pollution Prevention

The Grand Junction Site actively incorporates pollution prevention as part of a larger goal of prudent environmental management. Wastes generated from site operations are reduced at the source wherever technically and economically feasible. Recycling options are explored for wastes that cannot be prevented though source reduction. Treatment options are considered for wastes that cannot be prevented or recycled. Disposal is the final option after all other avenues have been considered.

3.5.1 Source Reduction

Source reduction at the site is achieved through reducing or eliminating waste generation, substituting a less hazardous or nonhazardous material for a hazardous material, such as replacing hazardous solvents with nonhazardous substitutes, and waste segregation. Most of the hazardous materials used at the Grand Junction Site are required for specific analytical procedures performed by the Environmental Sciences Laboratory. Therefore, the potential for source reduction through hazardous material elimination or substitution is limited.

Waste segregation consists of separating hazardous from nonhazardous materials, and separating radiologically contaminated materials from noncontaminated materials. ALARA principles are used to keep materials from becoming radiologically contaminated, and radiological surveys are used to segregate radioactive from nonradioactive waste.

DOE actively attempts to reduce wasteful practices and to replace inefficient equipment at the Grand Junction Site. For example, employees are encouraged to use their computers to reduce the amount of paper waste, and many manuals and administrative documents are available electronically rather than as paper copies.

3.5.2 Reuse and Recycling

Reusing Laboratory Equipment and Supplies

An extensive effort was made in 2004 to reuse as much of the closed Analytical Laboratory's equipment and supplies as possible. Reuse opportunities for laboratory items were developed through extensive communications with DOE facilities, universities, and colleges and through use of federal government databases, such as the Energy Asset Disposal System, a database used to make excess DOE property available to other DOE entities, and the Energy Related Laboratory Equipment Program, a database used to make excess DOE laboratory equipment available to universities and colleges.

The Grand Junction Site was able to successfully reuse approximately $3 million worth of Analytical Laboratory materials in 2004, including the following:

- Instrumentation and equipment, such as gas chromatographs, energy analyzers, spectrometers, germanium detectors, filtration systems, and sample storage refrigerators, valued at $2.9 million;
- Precious metals, including gold, silver, platinum, and palladium, valued at $160,000;
- Radioactive sources and standards;
- Various hazardous chemicals, compressed gas cylinders, water treatment resin columns, and a deionized water system;
- 3,500 cubic feet of miscellaneous laboratory equipment and supplies, such as spare parts for instrumentation, software, microscopes, water filtration system parts, pumps, heating elements, glassware, Teflon beakers, utensils, and sample racks, carts, and tables.

Recipients of these reusable laboratory materials included other DOE facilities (Argonne National Laboratory-West in Idaho, the Waste Isolation Pilot Plant in New Mexico, and the DOE Business Center for Precious Metals Sales and Recovery in Tennessee), universities and colleges (University of Oklahoma, University of Tulsa, Alfred University, Carnegie Mellon University, Colorado State University Research Center, and Mesa State College in Grand Junction), and other projects at the Grand Junction Site.

During the first quarter of 2005, the DOE Grand Junction Site was awarded two pollution prevention awards for its successes in 2004 related to reusing the closed Analytical Laboratory's equipment and supplies — a DOE P2 Best-in-Class Award presented by the DOE−LM, and a DOE P2 Stars Award, presented by the DOE Office of Environment, Safety, and Health.

Recycling Other Materials

The Grand Junction Site routinely generates several other types of hazardous and nonhazardous waste that are suitable for recycling or reuse. These materials include used oil, lead-acid and nickel-cadmium (NiCad) batteries, scrap metal, office paper, cardboard, aluminum cans, glass, plastic, printer toner cartridges, and miscellaneous paper-based wastes (e.g., magazines, newspapers, telephone books, etc.).

Normal operations, such as replacing batteries in electric vehicles, computer backup systems, and radios, generate spent batteries. The Grand Junction Site routinely recharges NiCad batteries, then reconditions the batteries to increase the number of possible recharges. NiCad batteries are sent to a recycling facility when the batteries can no longer be recharged. Lead-acid batteries from vehicles and computer backup systems are sent to a local recycler. Approximately 322 kg (710 lb) of batteries were recycled in 2004.

The Grand Junction Site regularly recycles office paper, cardboard, magazines, steel, glass, plastic, aluminum, newspaper, and telephone books through a local recycling service. In 2004, the site recycled approximately 23,298 kg (51,364 lb) of these materials. In addition, the site recycled approximately 222 printer toner cartridges in 2004.

Used oil is generated from equipment maintenance, and is recycled through an appropriate processing, re-refining, or fuel burning facility on an as-needed basis. The Grand Junction Site recycled approximately 55 gallons (182 kg, or 401 lb) of used oil in 2004.

Some other materials at the Grand Junction Site are not wastes because they are still usable without reprocessing. These materials include computers and associated equipment. The Grand Junction Site donated approximately 500 used computer systems to Mesa County, Colorado, School District 51 during 2004.

3.5.3 Affirmative Procurement

The Grand Junction Site purchases materials with recycled content whenever practical. These efforts are coordinated under the Contracts and Procurement group as part of their affirmative procurement program. The affirmative procurement program favors the acquisition of environmentally preferable and energy-efficient products and services.

The Contracts and Procurement group routinely adds language to contracts that specifies a preference for the use of recycled or otherwise recovered materials and removes language that prohibits the use of recycled materials.

Environmental Services personnel review purchase requisitions for hazardous materials before funds are committed. This review enables DOE to track hazardous materials kept on site, and includes a discussion with the requestor to determine whether alternate compounds or materials could be substituted for the hazardous materials, thus reducing or eliminating the generation of hazardous waste.

4.0 Environmental Radiological Program Information

Environmental radiological monitoring programs at the Grand Junction Site include sampling of surface water and ground water. Results of surface water monitoring are described in this section; the ground water program and monitoring results are described in Section 6.0.

4.1 Radiological Air Emissions

Because all activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003, all radiological air emissions (and monitoring activities) associated with the operation of these facilities were also discontinued as of this date. DOE activities at the Grand Junction Site did not produce radiological air emissions during CY 2004.

4.2 Surface Water

4.2.1 Gunnison River

Radionuclide concentrations (i.e., uranium) in samples collected from the Gunnison River in 2004 were below the applicable standard in the CDPHE Water Quality Control Commission's Regulations 31 and 35 (surface water quality standards). Historical and 2004 maximum uranium concentrations in the Gunnison River are presented and compared with the applicable surface water quality standard in Section 5.2, Table 5–1. Appendix A presents the Gunnison River surface water sampling results for 2004.

Uranium concentrations in 2004 were consistent with previous sampling results. Uranium results were well below the 40 picocuries per liter (pCi/L) (0.058 milligrams per liter [mg/L]) [2] standard (Section 5.3, Table 5–1). Following remediation (early 1990s), uranium concentrations in samples from locations on the Gunnison River upstream, adjacent to the site, and downstream have generally remained between 5 and 10 pCi/L uranium; 2004 results also were within this range. Appendix B shows uranium concentrations measured from January 1992 through January 2004. Appendix A shows uranium reported for the upstream location (Upper Gunnison), downstream location (Lower Gunnison), and the location adjacent to the site (Upper Mid-Gunnison) in CY 2004. The Gunnison River surface water concentrations of uranium will continue to be monitored for changes that may result from passive remediation (natural flushing) of ground water at the Grand Junction Site.

The Gunnison River surface water samples were also analyzed for gross alpha and gross beta activity. These results are also presented in Appendix A .

[2] The ratio of uranium isotopes U-234, U-235, and U-238 at the Grand Junction Site represent the average crustal abundance. Total uranium concentrations are converted to specific activity using 687 pCi/L = 1 mg/L.

4.2.2 North Pond, South Pond, and the Wetland Area

Water in the North Pond, South Pond, and the Wetland Area is recharged by the shallow alluvial aquifer underlying the facility and shows the same radioactive characteristics as the aquifer. The North Pond and South Pond locations were not sampled in 2004 because the ice was too thick to obtain a sample during a period of subzero temperatures in January. Appendix A presents the Wetland Area surface water sampling results for 2004. The uranium surface water quality standard used for the Gunnison River samples (40 pCi/L) (0.058 mg/L) was used to evaluate uranium concentrations in samples from the Wetland Area. The concentration of uranium in the samples collected from the Wetland Area location (1,717 pCi/L, 2.5 mg/L) exceeded the Gunnison River standard in 2004. Uranium concentrations in historical North Pond and South Pond samples, and the Wetland Area sample are presented and compared with the applicable surface water quality standard in Section 5.2, Table 5–2. Appendix B shows time-concentration plots of uranium concentrations versus time in the North Pond, South Pond, and the Wetland Area.

The Wetland Area sample was also analyzed for gross alpha and gross beta. Gross alpha and gross beta activities in these samples were elevated and correlate to the elevated uranium concentration. No surface water quality standards currently exist for these constituents for comparison.

Surface water quality is expected to correlate with ground water quality because the on-site surface water sources are recharged by alluvial ground water. Surface water concentrations will be higher in the on-site water bodies because of evaporation. When 2004 surface water results are compared to historical maximum concentrations (Table 5–2), surface water quality at the Grand Junction Site has improved. Surface water quality should continue to improve over time as passive remediation (natural flushing) of the alluvial aquifer continues. Ground water modeling of the alluvial aquifer predicts that concentrations of contaminants in ground water and water in the on-site ponds will be below applicable standards within 50 to 80 years after mill tailings removal. This 50- to 80-year period is within the 100-year cleanup period required under UMTRCA ground water regulations (40 CFR 192) as indicated in the GJORAP ROD (DOE 1990). UMTRCA Title I was found to be relevant and appropriate at the Grand Junction Site.

Any exceedances observed in the on-site ground-water or surface-water sampling program are not expected to have any adverse impacts upon human health or the environment. DOE restricts ground water use at or near the Grand Junction Site, and public access to the on-site surface-water bodies is restricted by fences and warning signs. These restrictions are conveyed in the Quit Claim Deed, which is appended to the *Request for Deferred Remediation* (DOE 2000a).

Prior to transferring ownership of the Grand Junction Site to the RTC, DOE conducted an ecological risk assessment to evaluate potential impacts of surface and/or ground water contaminants upon the local ecosystem. The *Summary of Ecological Risk for the U.S. Department of Energy Grand Junction Office* (in DOE 2001c) concluded that ground water and/or surface water contaminant levels do not appear to be affecting site ponds or wetland ecosystems. Declining contaminant trends and field observations confirm that the potential for ecological risk to sensitive and nonsensitive plant and wildlife receptors is minimal.

5.0 Environmental Nonradiological Program Information

During CY 2004, samples were collected at the Grand Junction Site for analysis of nonradiological constituents in the ground water and surface water. This section presents analytical results of nonradiological surface water samples. Results for both nonradiological and radiological ground water monitoring are presented in Section 6.0. There were no releases of nonpermitted hazardous substances or other unplanned releases at the Grand Junction Site in 2004.

5.1 Nonradiological Air Emissions

Previously, nonradiological air emissions at the Grand Junction Site were associated with the operation of the Analytical Laboratory and the Sample Plant. Because all activities associated with operation of the Analytical Laboratory and the Sample Plant were discontinued effective December 31, 2003, all nonradiological air emissions (and monitoring activities) associated with the operation of these facilities likewise ceased. Accordingly, in a letter dated February 18, 2004, DOE petitioned CDPHE to terminate the air emissions permits issued to the Analytical Laboratory and the Sample Plant. In letters dated May 26, 2004, and June 7, 2004, CDPHE agreed with DOE's request to terminate these emissions permits and provided DOE with official notification that the respective emissions permits had been cancelled.

Point sources for nonradiological air emissions did not exist at the Grand Junction Site during CY 2004. Consequently, nonradiological air emissions monitoring activities were not conducted at the Grand Junction Site during CY 2004.

5.2 Nonradiological Surface Water Sampling and Analysis

5.2.1 Gunnison River

Nonradiological analyte concentrations in samples from the Gunnison River in 2004, with the exception of manganese, selenium, and sulfate, were below or within acceptable ranges of applicable State standards. Historical and 2004 maximum analyte concentrations in the Gunnison River are presented and compared with current applicable State standards in Table 5–1. This table contains only analytical results that have an associated surface water quality standard. Appendix A presents the Gunnison River surface water sampling results for 2004.

Manganese, selenium, and sulfate were the only constituents reported in samples collected from the Gunnison River in 2004 with concentrations that exceeded a surface water standard. However, these constituents exceeded the State standards at all three locations, including the upstream location, which indicates these elevated concentrations are not site related and reflect general river water quality. As shown in the time-concentration graphs (Appendix B), concentrations of these constituents have exceeded the standard periodically during the past. Because the Gunnison River receives ground water discharge from the contaminated alluvial aquifer, occasional increases in concentrations adjacent to and downstream of the site compared to upstream concentrations are expected, particularly during low flows of the Gunnison River in drought conditions.

Table 5–1. Comparison of State Surface-Water Quality Standards to 2004 and Historical Maximum Concentrations in the Gunnison River[a,b]

		2004 Results			Historical Maximum[c]		
Constituent	**State Standard**	**Upgradient (Upper Gunnison)**	**Adjacent to Site (Upper Mid Gunnison)**	**Downgradient (Lower Gunnison)**	**Upgradient**	**Adjacent to Site**	**Downgradient**
Common Ions (mg/L)							
Chloride	250	14	15	17	14	15	80
Sulfate	480	500	500	530	513	512	584
Field Measurements							
pH	<6.5 or >9.0	8.28	8.16	7.80	7.20−9.04	7.29−9.19	7.33−9.01
Metals (mg/L)[d]							
Arsenic	0.05	0.001	0.0009	0.0009	0.011	0.0086	0.011
Chromium+6[e]	0.011	<0.01	<0.01	<0.01	0.0092	0.0123	0.0057
Manganese	0.050	0.057	0.058	0.078	0.2	0.0766	0.122
Selenium	0.006[f]	0.015	0.016	0.017	0.015	0.016	0.017
Radiological (pCi/L)							
Uranium[g]	40	7.6	7.6	8.2	10.42	14.39	23.36

[a]CDPHE Water Quality Control Commission surface water standards; Regulations 31 and 35, both effective February 20, 2002.
[b]"<" indicates that the maximum concentration was below the detection limit (number shown is detection limit).
[c]Based on maximum concentrations detected from 1980 through 2004.
[d]All values given are for dissolved constituents.
[e]Analytical results are for total chromium.
[f]The surface water standard for selenium was lowered from 8 to 6 micrograms per liter (µg/L) in the February 2002 revision of Regulation No. 35; this is a temporary modification that expires 12/31/06.
[g]Uranium concentrations measured in milligrams per liter were converted to picoCuries per liter for total uranium activity using a conversion factor of 687 pCi/mg, which assumes average relative abundance among uranium isotopes.

Elevated concentrations of non-radiological water quality parameters observed in the Gunnison River sampling locations are not expected to have any impacts upon human health and the environment. Upstream sampling has shown that many of these constituents (especially selenium) have historically been elevated with respect to Gunnison River water quality standards. Elevated levels of selenium and various salts are common surface water-quality issues observed within the entire Colorado River drainage system (and its tributaries—which includes the Gunnison River). This is mostly attributed to the fact that a large portion of the areas drained by Colorado River system are rich in sediments that have high concentrations of certain metals, anions, and salts. As a result, water quality observed at downstream locations is a direct reflection of the minerals that have been dissolved from the upstream areas.

Because molybdenum concentrations in ground water exceeded the applicable standard in 2004 alluvial ground water samples, surface water concentrations for this constituent will continue to be monitored; however, molybdenum concentrations in the samples collected from Gunnison River locations in 2004 were low and near the detection limit. Time-concentration graphs for molybdenum in samples from the Gunnison River are included in Appendix B.

5.2.2 North Pond, South Pond, and the Wetland Area

The North Pond, South Pond, and Wetland Area historically contained elevated quantities of some chemical constituents typically associated with uranium mill tailings (e.g., manganese, molybdenum, selenium, and sulfate). As with uranium, Gunnison River surface water quality standards were used to evaluate concentrations of nonradiological analytes in the Wetland Area (North Pond and South Pond not sampled in 2004 due to presence of thick ice). Appendix A presents the 2004 sampling results for these surface water analytes.

Chloride, manganese, and sulfate values in the sample collected from the Wetland Area location in 2004 exceeded surface water quality standards. Table 5–2 shows 2004 Wetland Area concentrations compared to State standards and historical maximum values. Appendix B shows time-concentration plots for manganese, molybdenum, and sulfate. Sampling of the North Pond, South Pond, and Wetland Area will continue to monitor these constituents.

Table 5–2. 2004 Wetland Area Concentrations Compared with Gunnison River Standards and Historical Maximum Concentrations

Analyte	Standard[a,b]	Historical Maximum Location (Concentration)[b]	2004 Wetland Area Concentration[b]	Exceeds Standard (yes/no)
Chloride	250	Wetland Area (3,830)	1,500	Yes
Manganese	0.05	South Pond (3.86)	0.250	Yes
Selenium	0.006	South Pond (0.064)	0.0046	No
Sulfate	480	Wetland Area (45,200)	15,000	Yes
Uranium[c]	40	South Pond (13,053)	1,717	Yes

[a]Standards are CDPHE Water Quality Control Commission surface water standards, Regulation 31 and 35, both effective February 20, 2002.
[b]Units are in mg/L, except for uranium, which is reported in pCi/L.
[c]Uranium concentrations measured in mg/L were converted to total uranium activity using a conversion factor of 687 pCi/mg, which assumes average relative abundances among uranium isotopes.

Although water quality in the on-site bodies of surface water has historically exceeded various surface water quality standards, there appears to be little affect to the environment or wildlife. On-site surface water areas support a thriving and healthy ecosystem consisting of abundant fish, wildlife, and vegetation.

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6.0 Ground Water Monitoring and Protection Program

Ground water in the alluvial aquifer beneath the Grand Junction Site is contaminated from leached constituents of uranium mill tailings generated during milling operations. Uranium mill tailings removal from open-land areas on the facility began in late 1989, and most of the tailings and contaminated soil were removed from those areas by 1994. Modeling of the alluvial aquifer predicts that concentrations of ground water contaminants will be below applicable standards within 50 to 80 years after removal of the contaminant source (DOE 1990).

The objective of the ground water monitoring and protection program is to verify improvement in ground water quality and to verify the effectiveness of natural flushing of the alluvial aquifer. This section summarizes the Grand Junction Site hydrogeology, describes the 2004 ground water sampling and analysis activities, provides ground water analytical results, and interprets trends in ground water remediation to date. Responsibility for the ground water monitoring program was transferred to the former Long-Term Surveillance and Maintenance Program in September 2000. Since that time, the DOE−LM was created; the Grand Junction Site is now managed by DOE−LM.

6.1 Hydrogeology

Two hydrogeologic units are of importance at the Grand Junction Site: the unconsolidated alluvial aquifer along the Gunnison River and the underlying Morrison Formation aquitard. These two units and the Gunnison River itself influence ground water flow and discharge into the river.

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 6–1). Well logs from 1984 well installations indicate that both units are laterally continuous throughout the Grand Junction Site. The portion of the alluvial aquifer underlying the Grand Junction Site occupies about 22.8 ha (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. Aquifer pumping tests show that the hydraulic conductivity of the alluvium is approximately 9 meters (30 feet) per day, and the specific yield is on the order of 0.05. Generally, depth to ground water ranges from 1.5 to 3 meters (5 to 10 feet). Currently, the alluvial ground water is not used for any purpose.

Field observations suggest that a simple depositional model is adequate to represent the alluvial aquifer. The basal portion was deposited as the Gunnison 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 deposition resulted in a continuous layer of gravel, sand, and silt.

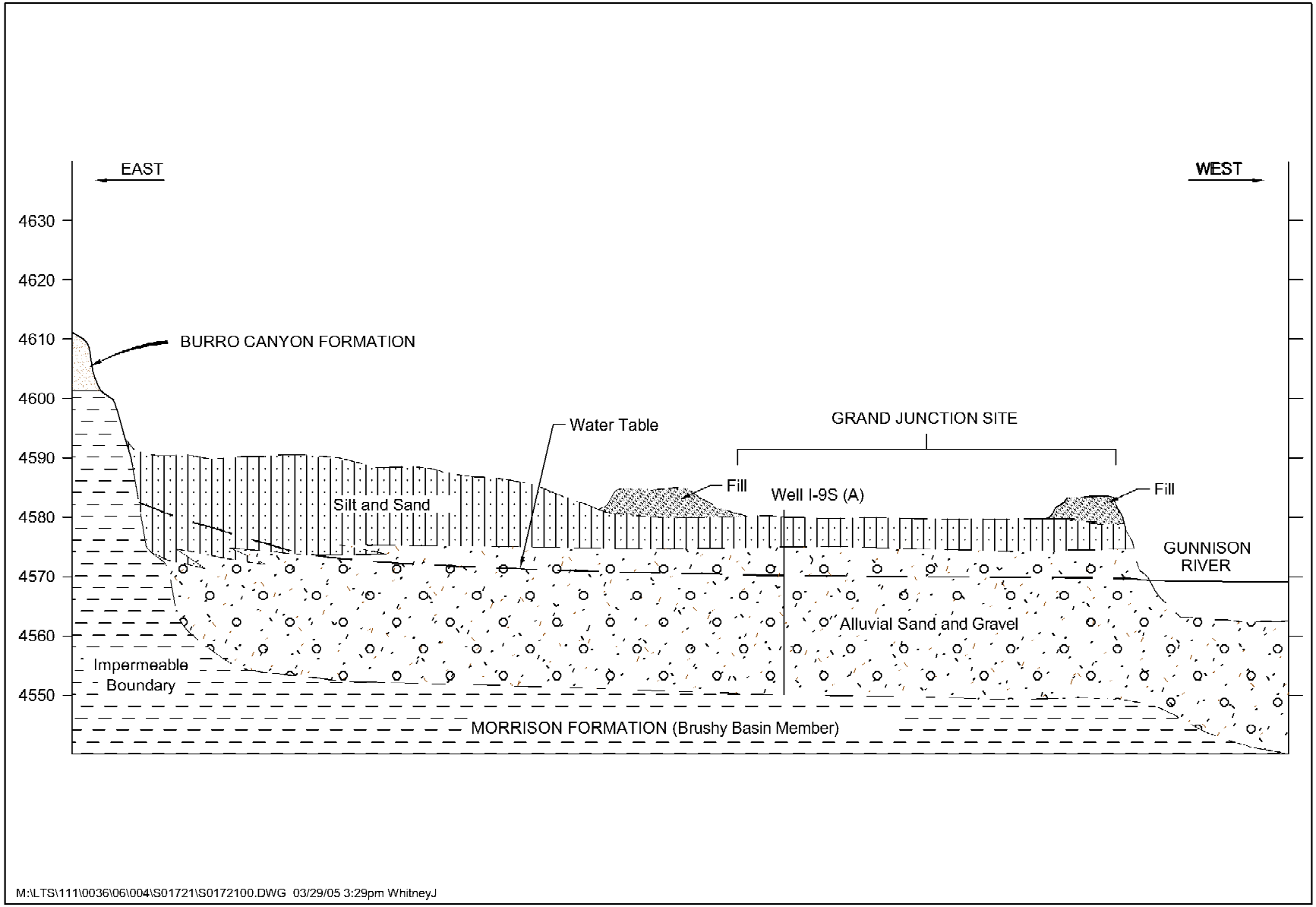

Figure 6–1. Typical Geologic Cross Section of the Alluvial Aquifer Underneath the Grand Junction, Colorado, Site

Periodic flood events deposited sand and silt on top of the gravel to produce the alluvial stratigraphy shown on Figure 6–1. Such a depositional model is similar to the alluvial-floodplain facies model of Allen (1970); the primary difference between the two is that the alluvium at the Grand Junction Site was deposited in an area that was more restricted laterally, and where, as a result, the water flowed more swiftly. The result is a thicker and more consistent basal gravel unit than the Allen model would indicate. Figure 6–2 presents a typical stratigraphic column at the Grand Junction Site.

Upgradient ground water (southeast of the facility) has water quality characteristics similar to those of the Gunnison 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 constituents of uranium mill tailings—uranium, arsenic, radium, selenium, and molybdenum. Only uranium and molybdenum, however, were mobile enough to migrate throughout the downgradient portion of the aquifer.

Underlying the alluvial aquifer at the Grand Junction Site is the Morrison Formation, which in the Grand Junction area consists of the Brushy Basin and Salt Wash Members. The formation is composed primarily of shale, although minor lenticular sandstones are present in the upper Brushy Basin Member, and increasing sandstone facies occur in the Salt Wash Member. The Morrison Formation serves as an aquitard beneath the facility, inhibiting downward ground water flow and preventing hydraulic communication between the overlying alluvial aquifer and the underlying Entrada Sandstone aquifer.

At the Grand Junction Site, 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.

Recharge of the alluvial aquifer occurs mainly through fluctuations in the Gunnison River and, to a much lesser extent, precipitation. During normal flows of the Gunnison River, ground water enters the alluvial aquifer from the river along the southern perimeter of the Grand Junction Site and flows to the north. Ground water is discharged into the river along the north and west boundaries of the facility. During periods of high river flow, Gunnison River water recharges the alluvial aquifer, and ground water flow is toward the middle of the aquifer.

6.2 Ground Water Sampling and Analysis

In 2004, Grand Junction Site ground water monitoring involved one sampling event. DOE continued ground water sampling under a long-term monitoring strategy that was designed to verify the progress of natural flushing of the alluvial aquifer in the 50- to 80-year period predicted in the ROD (DOE 1990). At the request of the State of Colorado, monitoring is performed at the same time every year (in the winter, when historical data indicate the highest contaminant concentrations occurred as a result of the low-flow conditions) to minimize seasonal fluctuations in monitoring results.

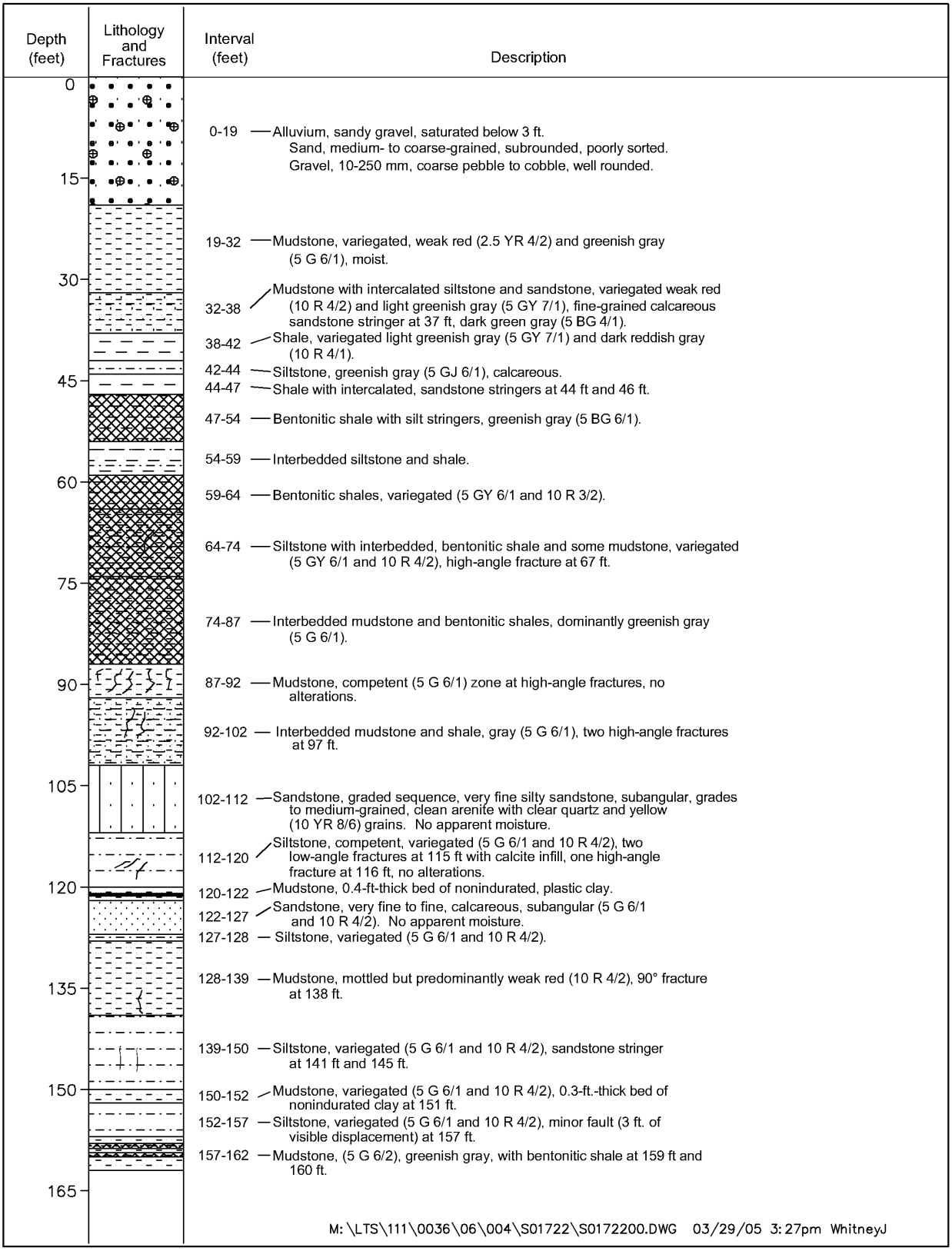

Figure 6–2. Typical Stratigraphic Column at the Grand Junction, Colorado, Site

In 2000, at the direction of DOE, the ground water and surface water monitoring strategy at the Grand Junction Site was evaluated to determine the feasibility of decreasing the number of monitoring locations and analytes, while maintaining the objectives and regulatory requirements of the monitoring program. Based on this evaluation, 42 of 48 wells were decommissioned in CY 2000, leaving six wells for ongoing monitoring purposes. Included are five on-site wells (8−4S, 6–2N, 11–1S, 14–13NA, and 10−19N) and one downgradient well (GJ84–04) (Figure 6–3). The upgradient well (GJ84–09) was decommissioned because historical data are adequate for background comparison. The wells were decommissioned in accordance with the State of Colorado Water Well Construction Rule 15 (2 CCR 402–2). In 2001, two wells (GJ01-01 and GJ01-02) were added to the long-term monitoring network to monitor potential impacts from soil contamination left in place beneath Building 20. Because the soil contamination associated with Building 20 is shallow, ground water contact with the contamination is not expected.

The 2004 ground water samples were collected in January according to sampling procedures and protocol described in the *Ground Water and Surface Water Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (DOE 2005). The ground water monitoring program is detailed in the *Long-Term Surveillance and Maintenance Plan* (DOE 2001b).

Monitor wells sampled and the constituents analyzed are summarized in Table 3–1. These wells are in or downgradient of formerly contaminated areas of the facility and represent on-site and downgradient conditions. Monitor well locations sampled in 2004 are shown on Figure 6–3.

Note that the ground water standard for uranium is in terms of pCi/L, while measured concentrations were determined as mg/L. In previous annual site environmental reports, a conversion factor of approximately 0.671 pCi/µg was used to convert chemical concentrations of uranium to activities of U-234 + U-238. This conversion factor was based on a best estimate by EPA when they proposed drinking water regulations for uranium in 1991, upon which the UMTRCA ground water standard was based. However, since that time, in developing their final rule for radionuclides (EPA 2000), EPA has determined that a more appropriate mass:activity ratio is 0.9 pCi/µg and recommended using a 1:1 mass:activity ratio (pCi/µg) as a first approximation (EPA 2000). Furthermore, the final drinking water standard was established as 30 µg/L for uranium. For the purposes of this report, ground water quality data for uranium are reported both in mg/L as measured, and in pCi/L using the 0.671 pCi/µg conversion factor for purposes of comparing current results to previous results. To convert uranium concentrations to total uranium activity, a conversion factor of 0.687 pCi/µg is used that includes the activity of U-235 and assumes that relative abundances of U-234, U-235, and U-238 are the same as typical crustal abundances.

6.3 Ground Water Analytical Results and Trends

During 2004, concentrations of uranium, molybdenum, selenium, and total dissolved solids in samples from the alluvial aquifer exceeded ground water quality standards (Table 6–1). Table 6–2 lists 2004 and historical maximum analyte concentrations compared with Federal and State ground water quality standards. Both tables combine Federal and State standards for comparison and list the more stringent standard if more than one exists.

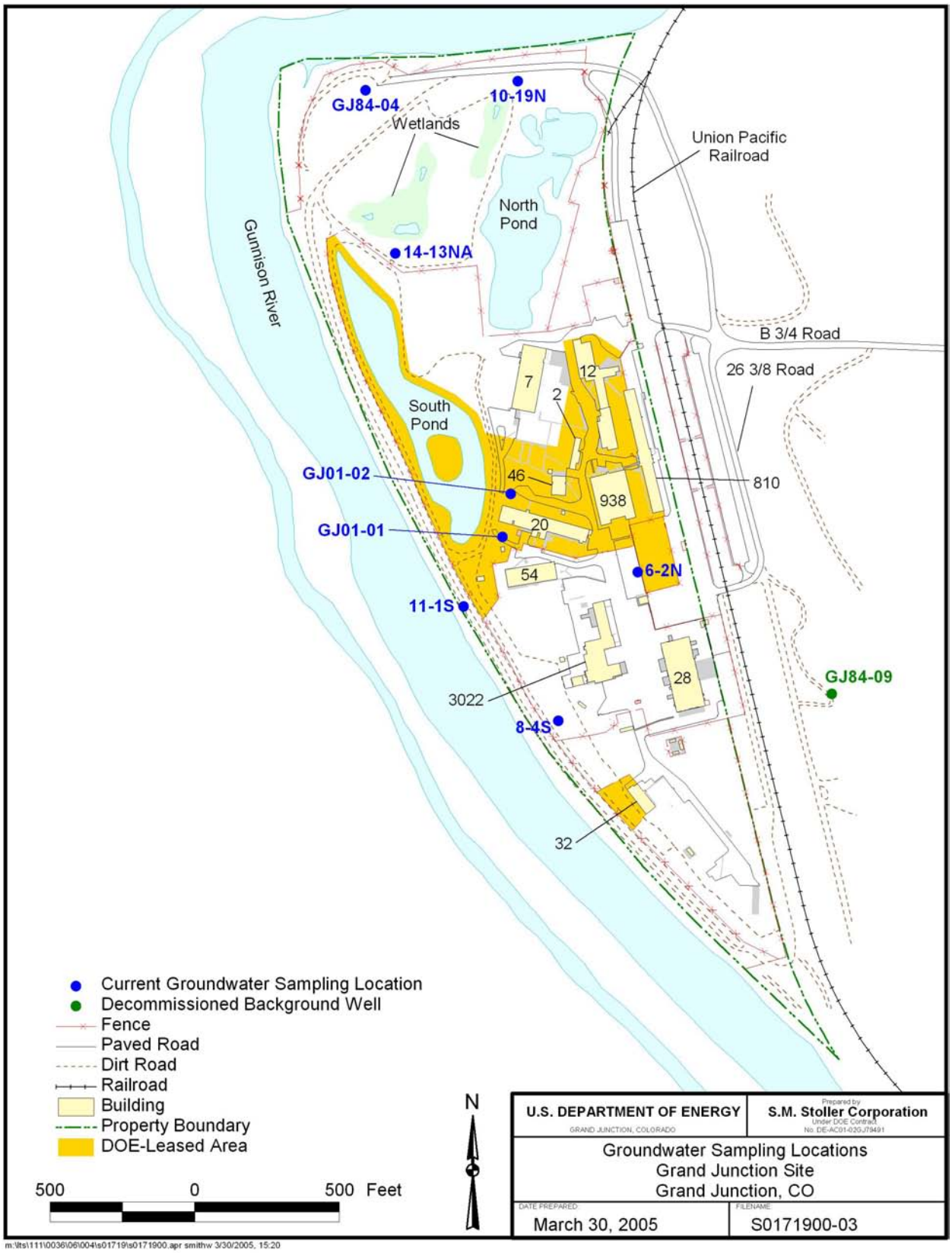

Figure 6–3. Ground Water Sampling Locations at the Grand Junction, Colorado, Site

Table 6–1. Grand Junction, Colorado, Site Wells with Sample Concentrations that Exceeded Ground Water Standards in January 2004

Analyte	Standard[a]	Wells Exceeding Standards (Concentration[a])
Molybdenum	0.1	14−13NA (0.200), 8−4S (0.270), GJ01−01 (0.150)
Selenium	0.01	6−2N (0.092), 8−4S (0.015), GJ01−01 (0.048)
Total Dissolved Solids[b]	2,210	10−19N (4,500), 14−13NA (2,600)
Uranium-234 + 238[c] (pCi/L)	30	10−19N (168), 11−1S (67), 14−13NA (309), 6−2N (174), 8−4S (322), GJ01−01 (289), GJ01−02 (248), GJ84−04 (101)
Uranium (mg/L)	0.044	10−19N (0.250), 11−1S (0.100), 14−13NA (0.460), 6−2N (0.260), 8−4S (0.480), GJ01−01 (0.430), GJ01−02 (0.370), GJ84−04 (0.150)

[a]Standards are listed in 40 CFR 192 Table 1 to Subpart A; units are in mg/L, unless otherwise indicated.
[b]This is a site-specific standard calculated as background x 1.25. The background value is based on an average of the 1991-1999 sampling events.
[c]Uranium concentrations measured in mg/L were converted to U-234 + U-238 activity using a conversion factor of 0.671 pCi/µg, which assumes average relative abundances among uranium isotopes.
mg/L = milligrams per liter; pCi/L = picoCuries per liter.

Analytical results of samples collected from ground water monitoring wells in 2004 are presented in Appendix A. These tables contain analytical results for several constituents that are not presented in Table 6–2 because either no ground water quality standard currently exists for these constituents or the measured concentration was below applicable Federal or State standards. To date, 25 ground water sampling events have been conducted since remediation of open-land areas was completed.

Time-concentration plots for ground water results are presented in Appendix B. For the most part, these plots show a decrease in contaminant levels over time at most locations (e.g., U and Mo trends for wells 14−13NA and GJ8−04) and support the applicability of a natural flushing strategy for ground water. However, trends for certain locations and contaminants do show considerable fluctuation (e.g., Se for 8−4S) and indicate that other factors also probably influence ground water chemistry (e.g., stage of the Gunnison River, river water chemistry).

6.3.1 Radiological Ground Water Sampling Results

Uranium contamination is widespread throughout the alluvial aquifer beneath the facility. Uranium concentrations above the UMTRCA standard of 30 pCi/L were recorded in samples from all alluvial wells analyzed for uranium during 2004 (8 of 8 wells) (Appendix A and Appendix B). No background wells were sampled in 2004. The highest uranium concentration measured in 2004, 0.480 mg/L, was measured in a sample from on-site well 8–4S, located near the dike in the southern portion of the facility. This highest uranium concentration measured in 2004 is significantly below concentrations observed prior to soils remediation of the Grand Junction Site (Table 6–2), which is another indication that aquifer cleanup is progressing.

Table 6–2. Comparison of Federal and State Ground Water Quality Standards to 2004 and Historical Maximum Concentrations in the Alluvial Aquifer

Constituent	Federal/State Standard	2004 Maximum[a]		Historical Maximum[d]		
		On-Site	Downgradient (GJ84-04)	Upgradient	On-Site	Downgradient
Common Ions (mg/L)						
Nitrate[e]	44.27[b]	31	<0.044	7	308	16
Total Dissolved Solids[f]	2,210[c]	4,500	1,500	2,180	10,200	8,620
Metals (mg/L)						
Arsenic	0.05[b]	0.013	0.012	0.0114	0.68	0.031
Chromium	0.05[b]	<0.01	<0.01	0.010	0.039	0.112
Molybdenum	0.1[b]	0.27	0.089	0.023	19	0.413
Selenium	0.01[b]	0.092	0.00012	0.0025	0.685	0.05
Uranium	0.044[b,j]	0.480	0.150	0.034	9	1.5
Radiological (pCi/L)						
Net Alpha (Gross Alpha excluding radon and uranium)[g]	15[b,c]	0[h]	0[h]	71.02	1,073.14	620.52
Uranium-234+238	30[b]	322	101	22.77	6,039	1,006

[a] "<" indicates that the maximum concentration was below the detection limit (number shown is detection limit).
[b] Standards from 40 CFR 192, Table 1 to Subpart A.
[c] CDPHE Water Quality Control Division, Regulation No. 41, Basic Standards for Ground Water, effective December 30, 2002. Standards in the "Potentially Usable Quality" classification were used for Grand Junction Site ground water.
[d] Based on maximum concentrations observed from 1984 through 2001.
[e] Nitrate standard as "N" (and some measured values) was converted to nitrate using the conversion $NO_3 = N \times 4.427$.
[f] This is a site-specific standard calculated as background x 1.25. The background value is based on an average of the 1991-1999 sampling events.
[g] Net alpha values represent gross alpha minus uranium activity. Uranium concentrations that were measured in grams were converted to pCi/L. The conversion assumes average relative abundance and an activity of 0.671 pCi/µg for U-234 + U-238
[h] Uranium value greater than gross alpha value.
[i] Uranium concentrations measured in mg/L were converted to uranium-234+238 activity using a conversion factor of 671 pCi/mg.
[j] Assumes average relative abundance among uranium isotopes.
µg/L = micrograms per liter; pCi/L = picoCuries per liter; mg/L = milligrams per liter

Gross alpha concentrations exceeding the UMTRCA net alpha standard of 15 pCi/L have been measured in on-site wells and reported in previous ASERs. In 2004, the standard was not exceeded in any ground water samples collected.

6.3.2 Nonradiological Ground Water Sampling Results

As with uranium, molybdenum contamination is also widespread in the alluvial aquifer. Samples from three of seven on-site wells (8−4S, GJ01−01, and 14−13NA) sampled in 2004 contained concentrations of molybdenum in excess of the UMTRCA ground water standard of 0.1 mg/L (Table 6–1). The highest concentration (0.270 mg/L) was measured in a sample from on-site well 8−4S. Generally, molybdenum concentrations with respect to time in the alluvial aquifer are decreasing. Wells 11–1S, 10–19N, and 6–2N have historically had molybdenum concentrations above the standard; however, molybdenum concentrations measured in samples collected from these wells in recent years have been consistently below the standard. In addition, downgradient

well GJ84–04 has shown a consistent decline in molybdenum concentrations, and the concentration in 2004 (0.089 mg/L) was below the standard for the first time. Time-concentration graphs of molybdenum in wells 10−19N, 11−1S, 14−13NA, 6−2N, 8−4S, and GJ84−04 are illustrated in Appendix B.

Arsenic contamination is localized in the area formerly occupied by a large tailings pile, and arsenic concentrations exceeding the UMTRCA/State standard of 0.05 mg/L have been recorded in samples from on-site wells in previous ASERs. None of the eight wells sampled during 2004 had arsenic concentrations that exceeded this standard. Historical data for this analyte in the alluvial aquifer is provided in previous ASERs.

Selenium concentrations exceeded the UMTRCA standard of 0.01 mg/L in samples from three of seven on-site wells in 2004 (Table 6–1). The highest selenium concentration, 0.092 mg/L, was detected in a sample from on-site well 6–2N. A sample from this well also yielded the highest selenium concentration in 2003. As with molybdenum, selenium concentrations in the alluvial aquifer are generally decreasing. Wells 14−13NA, 11−1S, 10−19N, and GJ84−04 had historical selenium concentrations that exceeded the selenium standard of 0.01mg/L; however, in recent years, selenium concentrations measured in samples collected from these wells have been consistently below the standard. Selenium concentrations in samples collected from well 8−4S have been consistently above the standard in recent years, but the 2004 concentration (0.015 mg/L) was near the standard.

Nitrate concentrations did not exceed the UMTRCA and State ground water standard of 44 mg/L (as nitrate) in ground water samples collected in 2004. The maximum nitrate concentration of 31 mg/L was measured in a sample from on-site well 6−2N. Nitrate concentrations measured in the alluvial aquifer have not exceeded the standard since 2000.

In 2004, concentrations of total dissolved solids exceeded the aquifer-specific State standard of 2,210 mg/L (1.25 times background) in samples in two on-site wells (10−19N and 14−13NA). Downgradient well (GJ84−04) was below the standard (Table 6–1). The highest dissolved solids concentration recorded in 2004 (4,500 mg/L) occurred in a sample from on-site well 10–19N.

DOE has prohibited ground water use, as conveyed by property transfer documents (DOE 2000a). Therefore, there are no complete exposure pathways and no unacceptable human health risks associated with contaminated ground water at the Grand Junction Site.

End of current text

7.0 Environmental Management System

The Environmental Management System (EMS) was initiated during calendar year 2004 to systematically integrate environment, safety, and health into management and work practices at all levels so that activities are accomplished in a manner that protects workers, the public, and the environment. The EMS process mandates that all activities be evaluated to determine if there are any significant environmental impacts associated with the work. The EMS (1) identifies opportunities for improvement in how work processes are performed; sets goals and establishes processes to minimize the wastes generated; (2) sets goals to reduce the toxicity of emissions and discharges to the environment; and (3) improves energy efficiency in conducting day-to-day operations. Beginning in October of 2004, all activities at Grand Junction Site were evaluated for consideration of significant environmental impacts. No site specific actions were identified as being significant and needing a goal for improvement or a plan to mitigate the potential impacts to the environment.

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8.0 Quality Assurance

A QA Program providing a structured approach for the application of QA principles to DOE work performed at the Grand Junction Site is implemented through the *Quality Assurance Manual* (STO 1). The QA Program is based on DOE Order 414.1B, *Quality Assurance,* requirements and refers to documents that implement the QA Program.

8.1 Sampling

Ground water and surface water sampling at the Grand Junction Site are described in the *Ground Water and Surface Water Sampling and Analysis Plan for the U.S. Department of Energy Office of Legacy Management Sites* (DOE 2005). This plan addresses field quality control, sampling methods, sampling equipment decontamination, sample identification, chain-of-custody, sample protection, equipment calibration, and data validation.

8.2 Laboratory

DOE ensures high-quality analytical data that meet environmental monitoring program requirements by subcontracting analytical services to qualified laboratories. The subcontract laboratories are qualified under the Environmental Management Consolidated Audit Program and participation in proficiency testing programs. Laboratories that implement a documented QA plan, employ technically competent staff, maintain suitable facilities and equipment, and follow written procedures are selected. DOE continually evaluates the quality of the data received from the laboratories through a formal data validation process.

8.3 Data and Records Management

Records are created both on paper and electronically in a retrievable format. They are protected against deterioration, damage, and loss. Records generated in support of environmental monitoring are subject to the requirements of 36 CFR 1220−1234. The *Records Management Manual* (STO 9) and the Grand Junction Site working file index implement applicable records regulations.

End of current text

9.0 References

2 CCR 402−2, Colorado Department of Natural Resources, Division of Water Resources, "Water Well Construction" *Colorado Code of Regulations.*

5 CCR 1002−35, Colorado Department of Public Health and Environment, "Classification and Numeric Standards for Gunnison and Lower Dolores River Basins," *Colorado Code of Regulations*.

36 CFR Part 1220, "Federal Records; General", and Part 1234, "Electronic Records Management", National Archives and Records Administration, *Code of Federal Regulations*.

40 CFR 122, U.S. Environmental Protection Agency, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System," *Code of Federal Regulations.*

40 CFR 192, U.S. Environmental Protection Agency, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," *Code of Federal Regulations*.

40 CFR 261, U.S. Environmental Protection Agency, "Identifications and Listing of Hazardous Waste," *Code of Federal Regulations*.

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STO 10. *Integrated Safety Management System Description*, continuously updated, prepared by S. M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado.

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U.S. Geological Survey, 1962 (photo revised 1973). Grand Junction, Colorado, 7.5-minute topographic map. Scale 1:24,000.

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Appendix A

Surface and Ground Water Monitoring Data

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3	mg/L	10-19N	WL	01/07/2004	0001		O	361		F	#	-	-
	mg/L	11-1S	WL	01/07/2004	0001		O	234		F	#	-	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	314		F	#	-	-
	mg/L	6-2N	WL	01/06/2004	0001		O	279		F	#	-	-
	mg/L	8-4S	WL	01/06/2004	0001		O	331		F	#	-	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		268		F	#	-	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		229		F	#	-	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	219		F	#	-	-
Arsenic	mg/L	10-19N	WL	01/07/2004	0001		O	0.0013	N	JF	#	0.0001	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.0013		JF	#	0.0001	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.00058		JF	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.013		JF	#	0.0001	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.0016		JF	#	0.0001	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.0012		JF	#	0.0001	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.0088		JF	#	0.0001	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.0056		JF	#	0.0001	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.012		JF	#	0.0001	-
Chloride	mg/L	10-19N	WL	01/07/2004	0001		O	300		F	#	10	-
	mg/L	10-19N	WL	01/07/2004	0002		O	300		F	#	10	-
	mg/L	11-1S	WL	01/07/2004	0001		O	12		F	#	4	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	130		F	#	4	-
	mg/L	6-2N	WL	01/06/2004	0001		O	68		F	#	4	-
	mg/L	8-4S	WL	01/06/2004	0001		O	71		F	#	4	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		59		F	#	4	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		71		F	#	4	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	46		F	#	4	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Chromium	mg/L	10-19N	WL	01/07/2004	0001		O	0.010	U	F	#	0.01	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.010	U	F	#	0.01	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.010	U	F	#	0.01	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.010	U	F	#	0.01	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.010	U	F	#	0.01	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.010	U	F	#	0.01	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.010	U	F	#	0.01	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.010	U	F	#	0.01	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.010	U	F	#	0.01	-
Gross Alpha	pCi/L	10-19N	WL	01/07/2004	0001		O	116		F	#	14.8	± 22.8
	pCi/L	10-19N	WL	01/07/2004	0002		O	51.9		F	#	14.9	± 13.8
	pCi/L	11-1S	WL	01/07/2004	0001		O	63.4		F	#	1.2	± 10.5
	pCi/L	14-13NA	WL	01/07/2004	0001		O	267		F	#	4.73	± 43.8
	pCi/L	6-2N	WL	01/06/2004	0001		O	149		F	#	4.29	± 24.8
	pCi/L	8-4S	WL	01/06/2004	0001		O	270		F	#	3.42	± 43.8
	pCi/L	GJ01-01	WL	01/06/2004	0001	AL		236		F	#	3.47	± 38.3
	pCi/L	GJ01-02	WL	01/06/2004	0001	AL		250		F	#	3.07	± 40.6
	pCi/L	GJ84-04	WL	01/07/2004	0001		D	84.3		F	#	3.69	± 14.3
Gross Beta	pCi/L	10-19N	WL	01/07/2004	0001		O	39.2		F	#	21.2	± 14.8
	pCi/L	10-19N	WL	01/07/2004	0002		O	49.5		F	#	20.6	± 15.4
	pCi/L	11-1S	WL	01/07/2004	0001		O	15.7		F	#	2.33	± 2.99
	pCi/L	14-13NA	WL	01/07/2004	0001		O	54.9		F	#	8.83	± 10.6
	pCi/L	6-2N	WL	01/06/2004	0001		O	34.6		F	#	5.72	± 6.79
	pCi/L	8-4S	WL	01/06/2004	0001		O	47.3		F	#	5.71	± 8.54
	pCi/L	GJ01-01	WL	01/06/2004	0001	AL		48.8		F	#	4.45	± 8.45
	pCi/L	GJ01-02	WL	01/06/2004	0001	AL		45.5		F	#	5.38	± 8.20

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Gross Beta	pCi/L	GJ84-04	WL	01/07/2004	0001		D	19.9		F	#	5.24	± 4.66
Manganese	mg/L	10-19N	WL	01/07/2004	0001		O	0.470		F	#	0.005	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.460		F	#	0.005	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.460		F	#	0.005	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	3.600		F	#	0.005	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.980		F	#	0.005	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.360		F	#	0.005	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.390		F	#	0.005	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		3.100		F	#	0.005	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	1.800		F	#	0.005	-
Molybdenum	mg/L	10-19N	WL	01/07/2004	0001		O	0.076		JF	#	0.001	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.076		JF	#	0.001	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.027		JF	#	0.001	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.200		JF	#	0.01	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.060		JF	#	0.001	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.270		JF	#	0.01	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.150		JF	#	0.01	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.028		JF	#	0.001	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.089		JF	#	0.001	-
Nitrate as NO3	mg/L	10-19N	WL	01/07/2004	0001		O	0.12		F	#	0.044	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.13		F	#	0.044	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.084		F	#	0.044	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.14		F	#	0.044	-
	mg/L	6-2N	WL	01/06/2004	0001		O	31		F	#	0.22	-
	mg/L	8-4S	WL	01/06/2004	0001		O	1.3		F	#	0.044	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		27		F	#	0.22	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	SAMPLE: ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	QUALIFIERS: DATA	QUALIFIERS: QA	DETECTION LIMIT	UN-CERTAINTY
Nitrate as NO3	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.044	U	F	#	0.044	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.044	U	F	#	0.044	-
Oxidation Reduction Potent	mV	10-19N	WL	01/07/2004	N001		O	91		F	#	-	-
	mV	11-1S	WL	01/07/2004	N001		O	60		F	#	-	-
	mV	14-13NA	WL	01/07/2004	N001		O	102		F	#	-	-
	mV	6-2N	WL	01/06/2004	N001		O	202		F	#	-	-
	mV	8-4S	WL	01/06/2004	N001		O	206		F	#	-	-
	mV	GJ01-01	WL	01/06/2004	N001	AL		33		F	#	-	-
	mV	GJ01-02	WL	01/06/2004	N001	AL		-77		F	#	-	-
	mV	GJ84-04	WL	01/07/2004	N001		D	-8		F	#	-	-
pH	s.u.	10-19N	WL	01/07/2004	N001		O	7.12		F	#	-	-
	s.u.	11-1S	WL	01/07/2004	N001		O	7.2		F	#	-	-
	s.u.	14-13NA	WL	01/07/2004	N001		O	7.10		F	#	-	-
	s.u.	6-2N	WL	01/06/2004	N001		O	7.56		F	#	-	-
	s.u.	8-4S	WL	01/06/2004	N001		O	7.30		F	#	-	-
	s.u.	GJ01-01	WL	01/06/2004	N001	AL		7.31		F	#	-	-
	s.u.	GJ01-02	WL	01/06/2004	N001	AL		7.16		F	#	-	-
	s.u.	GJ84-04	WL	01/07/2004	N001		D	7.27		F	#	-	-
Selenium	mg/L	10-19N	WL	01/07/2004	0001		O	0.0058	EN	JF	#	0.0001	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.0059		JF	#	0.0001	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.00064		JF	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.00047		JF	#	0.0001	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.092		JF	#	0.001	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.015		JF	#	0.001	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.048		JF	#	0.001	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.0018		JF	#	0.0001	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	SAMPLE: ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	QUALIFIERS: DATA	QUALIFIERS: QA	DETECTION LIMIT	UN-CERTAINTY
Selenium	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.00012		JF	#	0.0001	-
Specific Conductance	umhos/cm	10-19N	WL	01/07/2004	N001		O	5173		F	#	-	-
	umhos/cm	11-1S	WL	01/07/2004	N001		O	1070		F	#	-	-
	umhos/cm	14-13NA	WL	01/07/2004	N001		O	3160		F	#	-	-
	umhos/cm	6-2N	WL	01/06/2004	N001		O	2238		F	#	-	-
	umhos/cm	8-4S	WL	01/06/2004	N001		O	4614		F	#	-	-
	umhos/cm	GJ01-01	WL	01/06/2004	N001	AL		1475		F	#	-	-
	umhos/cm	GJ01-02	WL	01/06/2004	N001	AL		1460		F	#	-	-
	umhos/cm	GJ84-04	WL	01/07/2004	N001		D	1852		F	#	-	-
Sulfate	mg/L	10-19N	WL	01/07/2004	0001		O	2500		F	#	50	-
	mg/L	10-19N	WL	01/07/2004	0002		O	2500		F	#	50	-
	mg/L	11-1S	WL	01/07/2004	0001		O	370		F	#	20	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	1500		F	#	20	-
	mg/L	6-2N	WL	01/06/2004	0001		O	1000		F	#	20	-
	mg/L	8-4S	WL	01/06/2004	0001		O	860		F	#	20	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		600		F	#	20	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		460		F	#	20	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	840		F	#	20	-
Temperature	C	10-19N	WL	01/07/2004	N001		O	14.0		F	#	-	-
	C	11-1S	WL	01/07/2004	N001		O	13.5		F	#	-	-
	C	14-13NA	WL	01/07/2004	N001		O	14.1		F	#	-	-
	C	6-2N	WL	01/06/2004	N001		O	16.5		F	#	-	-
	C	8-4S	WL	01/06/2004	N001		O	12.2		F	#	-	-
	C	GJ01-01	WL	01/06/2004	N001	AL		13.8		F	#	-	-
	C	GJ01-02	WL	01/06/2004	N001	AL		10.6		F	#	-	-
	C	GJ84-04	WL	01/07/2004	N001		D	13.2		F	#	-	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Total Dissolved Solids	mg/L	10-19N	WL	01/07/2004	0001		O	4500		F	#	80	-
	mg/L	10-19N	WL	01/07/2004	0002		O	4500		F	#	80	-
	mg/L	11-1S	WL	01/07/2004	0001		O	800		F	#	40	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	2600		F	#	40	-
	mg/L	6-2N	WL	01/06/2004	0001		O	1900		F	#	40	-
	mg/L	8-4S	WL	01/06/2004	0001		O	2200		F	#	40	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		1300		F	#	40	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		1300		F	#	40	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	1500		F	#	40	-
Turbidity	NTU	10-19N	WL	01/07/2004	N001		O	4.24		F	#	-	-
	NTU	11-1S	WL	01/07/2004	N001		O	1.18		F	#	-	-
	NTU	14-13NA	WL	01/07/2004	N001		O	3.21		F	#	-	-
	NTU	6-2N	WL	01/06/2004	N001		O	1.69		F	#	-	-
	NTU	8-4S	WL	01/06/2004	N001		O	9.85		F	#	-	-
	NTU	GJ01-01	WL	01/06/2004	N001	AL		6.28		F	#	-	-
	NTU	GJ01-02	WL	01/06/2004	N001	AL		9.74		F	#	-	-
	NTU	GJ84-04	WL	01/07/2004	N001		D	1.53		F	#	-	-
Uranium	mg/L	10-19N	WL	01/07/2004	0001		O	0.250		F	#	0.002	-
	mg/L	10-19N	WL	01/07/2004	0002		O	0.250		F	#	0.002	-
	mg/L	11-1S	WL	01/07/2004	0001		O	0.100		F	#	0.001	-
	mg/L	14-13NA	WL	01/07/2004	0001		O	0.460		F	#	0.002	-
	mg/L	6-2N	WL	01/06/2004	0001		O	0.260		F	#	0.002	-
	mg/L	8-4S	WL	01/06/2004	0001		O	0.480		F	#	0.002	-
	mg/L	GJ01-01	WL	01/06/2004	0001	AL		0.430		F	#	0.002	-
	mg/L	GJ01-02	WL	01/06/2004	0001	AL		0.370		F	#	0.002	-
	mg/L	GJ84-04	WL	01/07/2004	0001		D	0.150		F	#	0.001	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY

RECORDS: SELECTED FROM USEE200 WHERE site_code='GJO01' AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND DATE_SAMPLED between #1/1/2004# and #12/1/2004#

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LOCATION TYPES: WL WELL

ZONES OF COMPLETION:

AL ALLUVIUM

FLOW CODES: D DOWN GRADIENT O ON-SITE

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
+	Correlation coefficient for MSA < 0.995.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
M	GFAA duplicate injection precision not met.
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC).
P	> 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
S	Result determined by method of standard addition (MSA).
U	Analytical result below detection limit.
W	Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
Y	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
Z	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

F	Low flow sampling method used.	G	Possible grout contamination, pH > 9.	J	Estimated value.
L	Less than 3 bore volumes purged prior to sampling.	Q	Qualitative result due to sampling technique	R	Unusable result.
U	Parameter analyzed for but was not detected.	X	Location is undefined.		

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3	mg/L	Lower Gunnison	01/07/2004	0001	215			#	-	-
	mg/L	Upper Gunnison	01/06/2004	0001	202			#	-	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	200			#	-	-
	mg/L	Wetland Area	01/07/2004	0001	708			#	-	-
Arsenic	mg/L	Lower Gunnison	01/07/2004	0001	0.0009		J	#	0.0001	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.001		J	#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.0009		J	#	0.0001	-
	mg/L	Wetland Area	01/07/2004	0001	0.0079		J	#	0.0001	-
Chloride	mg/L	Lower Gunnison	01/07/2004	0001	17			#	4	-
	mg/L	Upper Gunnison	01/06/2004	0001	14			#	4	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	15			#	4	-
	mg/L	Wetland Area	01/07/2004	0001	1500			#	100	-
Chromium	mg/L	Lower Gunnison	01/07/2004	0001	0.010	U		#	0.01	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.010	U		#	0.01	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.010	U		#	0.01	-
	mg/L	Wetland Area	01/07/2004	0001	0.050	U		#	0.05	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Gross Alpha	pCi/L	Lower Gunnison	01/07/2004	0001	7.86			#	2.22	± 2.07
	pCi/L	Upper Gunnison	01/06/2004	0001	7.76			#	2.21	± 2.07
	pCi/L	Upper Mid Gunnison	01/07/2004	0001	7.28			#	1.65	± 1.80
	pCi/L	Wetland Area	01/07/2004	0001	1820			#	59.4	± 303.
Gross Beta	pCi/L	Lower Gunnison	01/07/2004	0001	3.6			#	2.54	± 1.69
	pCi/L	Upper Gunnison	01/06/2004	0001	4.96			#	2.56	± 1.81
	pCi/L	Upper Mid Gunnison	01/07/2004	0001	4.48			#	2.51	± 1.74
	pCi/L	Wetland Area	01/07/2004	0001	283			#	86	± 71.6
Manganese	mg/L	Lower Gunnison	01/07/2004	0001	0.078			#	0.005	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.057			#	0.005	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.058			#	0.005	-
	mg/L	Wetland Area	01/07/2004	0001	0.250			#	0.025	-
Molybdenum	mg/L	Lower Gunnison	01/07/2004	0001	0.0033		J	#	0.001	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.003		J	#	0.001	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.0033		J	#	0.001	-
	mg/L	Wetland Area	01/07/2004	0001	0.700		J	#	0.01	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Nitrate as NO3	mg/L	Lower Gunnison	01/07/2004	0001	7.4			#	0.044	-
	mg/L	Upper Gunnison	01/06/2004	0001	6.4			#	0.044	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	6.8			#	0.044	-
	mg/L	Wetland Area	01/07/2004	0001	0.044	U		#	0.044	-
Oxidation Reduction Potent	mV	Lower Gunnison	01/07/2004	N001	216			#	-	-
	mV	Upper Gunnison	01/06/2004	N001	187			#	-	-
	mV	Upper Mid Gunnison	01/07/2004	N001	214			#	-	-
	mV	Wetland Area	01/07/2004	N001	248			#	-	-
pH	s.u.	Lower Gunnison	01/07/2004	N001	7.80			#	-	-
	s.u.	Upper Gunnison	01/06/2004	N001	8.28			#	-	-
	s.u.	Upper Mid Gunnison	01/07/2004	N001	8.16			#	-	-
	s.u.	Wetland Area	01/07/2004	N001	7.92			#	-	-
Selenium	mg/L	Lower Gunnison	01/07/2004	0001	0.017		J	#	0.0001	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.015		J	#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.016		J	#	0.0001	-
	mg/L	Wetland Area	01/07/2004	0001	0.0046		J	#	0.0001	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Specific Conductance	umhos/cm	Lower Gunnison	01/07/2004	N001	1270			#	-	-
	umhos/cm	Upper Gunnison	01/06/2004	N001	1238			#	-	-
	umhos/cm	Upper Mid Gunnison	01/07/2004	N001	1276			#	-	-
	umhos/cm	Wetland Area	01/07/2004	N001	21090			#	-	-
Sulfate	mg/L	Lower Gunnison	01/07/2004	0001	530			#	20	-
	mg/L	Upper Gunnison	01/06/2004	0001	500			#	20	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	500			#	20	-
	mg/L	Wetland Area	01/07/2004	0001	15000			#	500	-
Temperature	C	Lower Gunnison	01/07/2004	N001	0.15			#	-	-
	C	Upper Gunnison	01/06/2004	N001	0.54			#	-	-
	C	Upper Mid Gunnison	01/07/2004	N001	0.60			#	-	-
	C	Wetland Area	01/07/2004	N001	0.45			#	-	-
Total Dissolved Solids	mg/L	Lower Gunnison	01/07/2004	0001	1000			#	40	-
	mg/L	Upper Gunnison	01/06/2004	0001	940			#	40	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	930			#	40	-
	mg/L	Wetland Area	01/07/2004	0001	22000			#	400	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Turbidity	NTU	Lower Gunnison	01/07/2004	N001	10.2			#	-	-
	NTU	Upper Gunnison	01/06/2004	N001	9.78			#	-	-
	NTU	Upper Mid Gunnison	01/07/2004	N001	16.5			#	-	-
	NTU	Wetland Area	01/07/2004	N001	361			#	-	-
Uranium	mg/L	Lower Gunnison	01/07/2004	0001	0.012			#	0.0001	-
	mg/L	Upper Gunnison	01/06/2004	0001	0.011			#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2004	0001	0.011			#	0.0001	-
	mg/L	Wetland Area	01/07/2004	0001	2.500			#	0.1	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 6/29/2005 8:05 am

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY

RECORDS: SELECTED FROM USEE800 WHERE site_code='GJO01' AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND DATE_SAMPLED between #1/1/2004# and #12/1/2004#

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
+	Correlation coefficient for MSA < 0.995.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
M	GFAA duplicate injection precision not met.
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC).
P	> 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
S	Result determined by method of standard addition (MSA).
U	Analytical result below detection limit.
W	Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
Y	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
Z	Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

F	Low flow sampling method used.
J	Estimated value.
Q	Qualitative result due to sampling technique
U	Parameter analyzed for but was not detected.
G	Possible grout contamination, pH > 9.
L	Less than 3 bore volumes purged prior to sampling.
R	Unusable result.
X	Location is undefined.

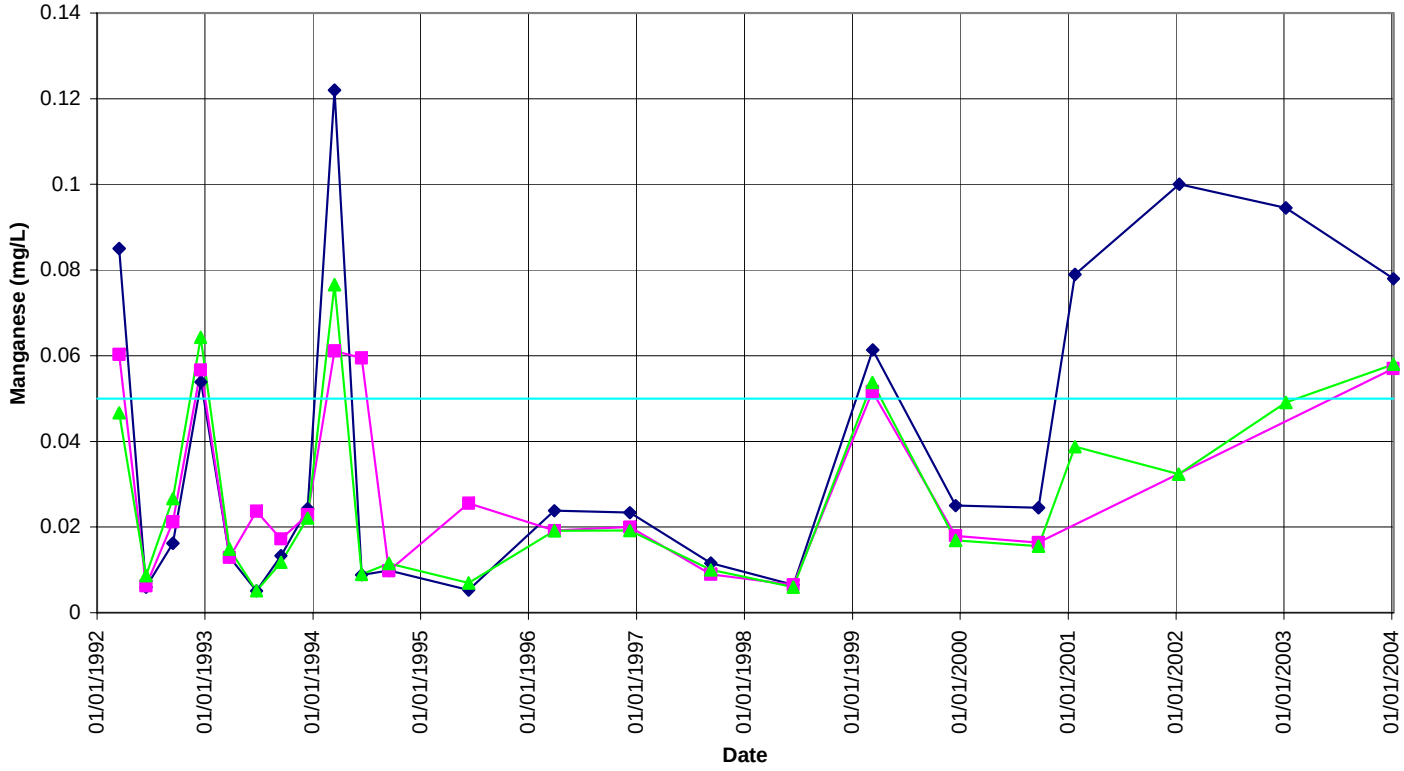
QA QUALIFIER: # = validated according to Quality Assurance guidelines.

Appendix B

Time-Concentration Graphs

Grand Junction Site

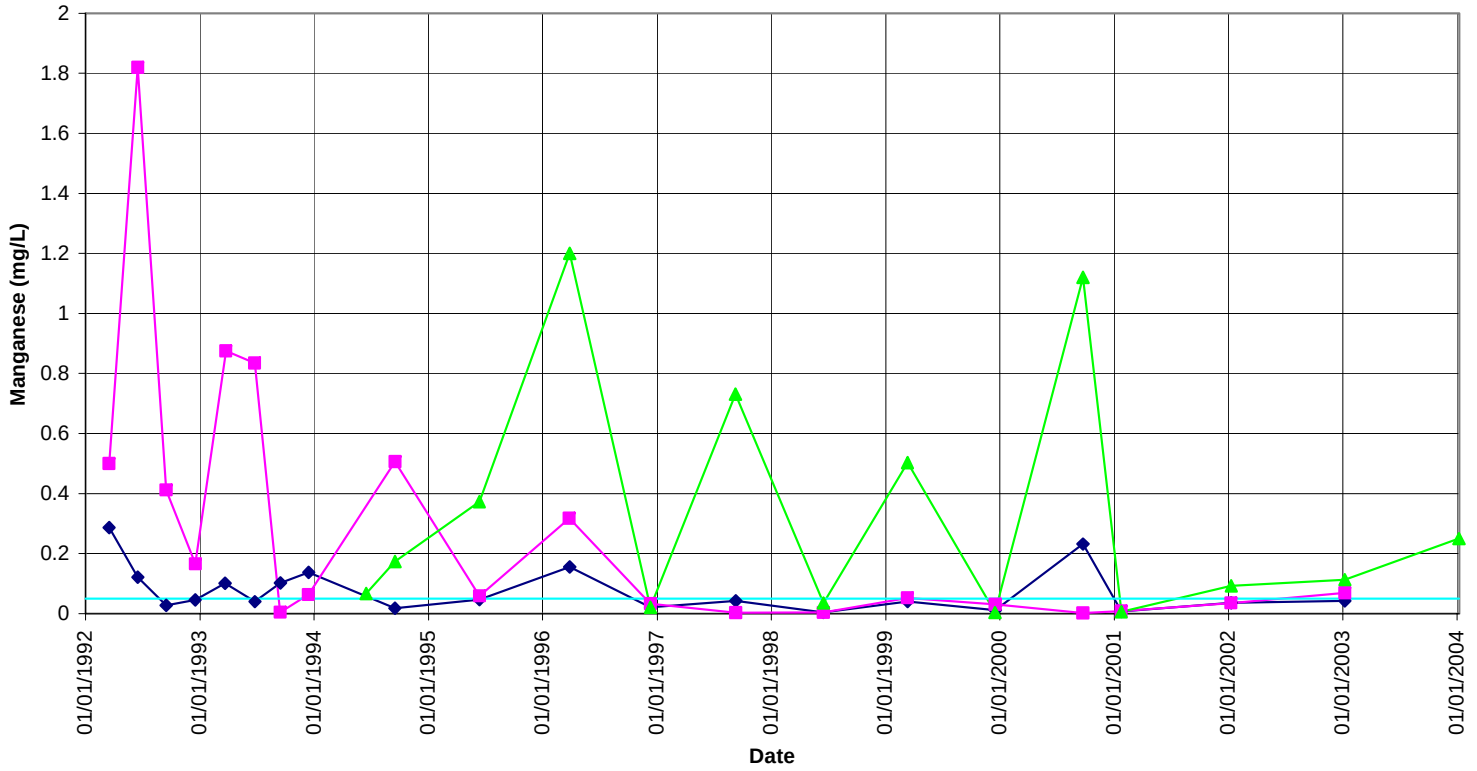
Manganese Concentration



Refer to Figure 3−1

Grand Junction Site

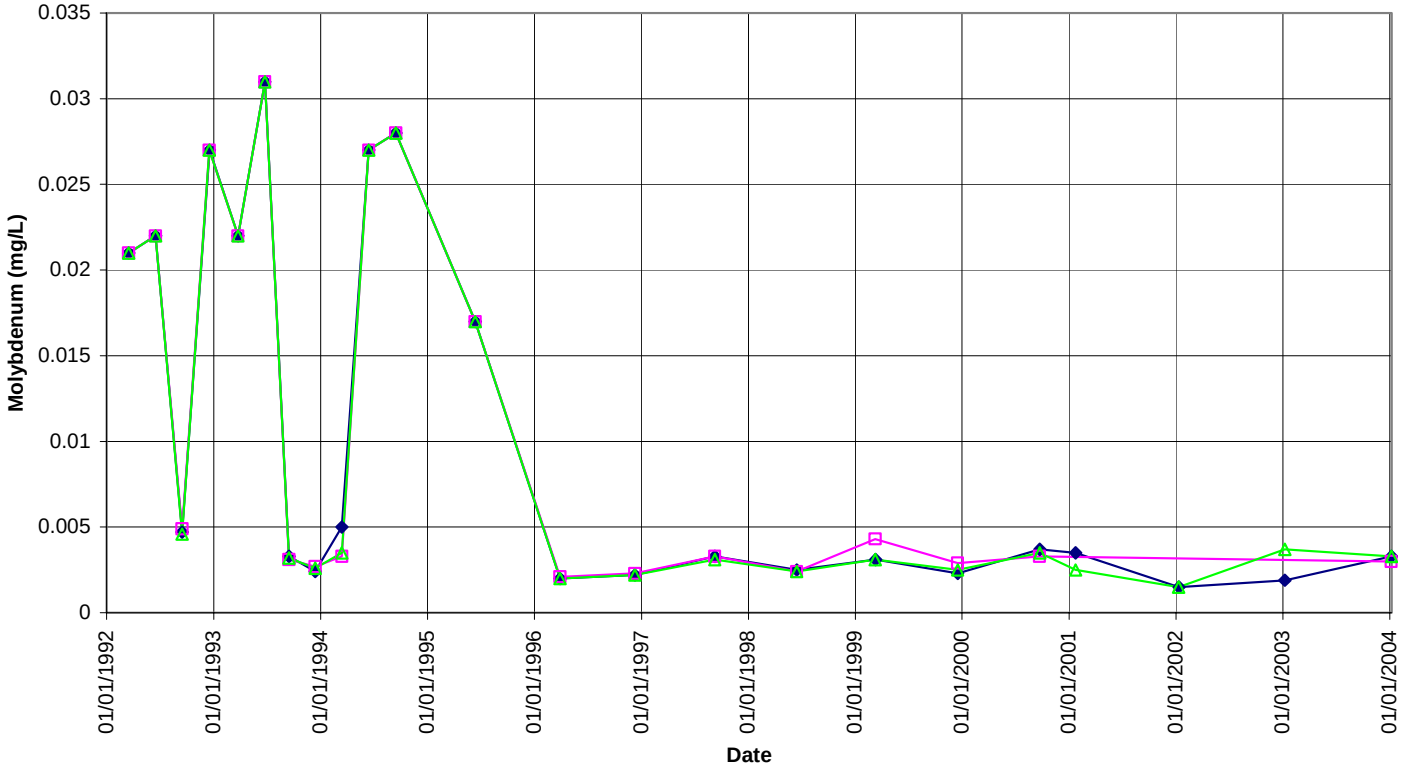
Manganese Concentration



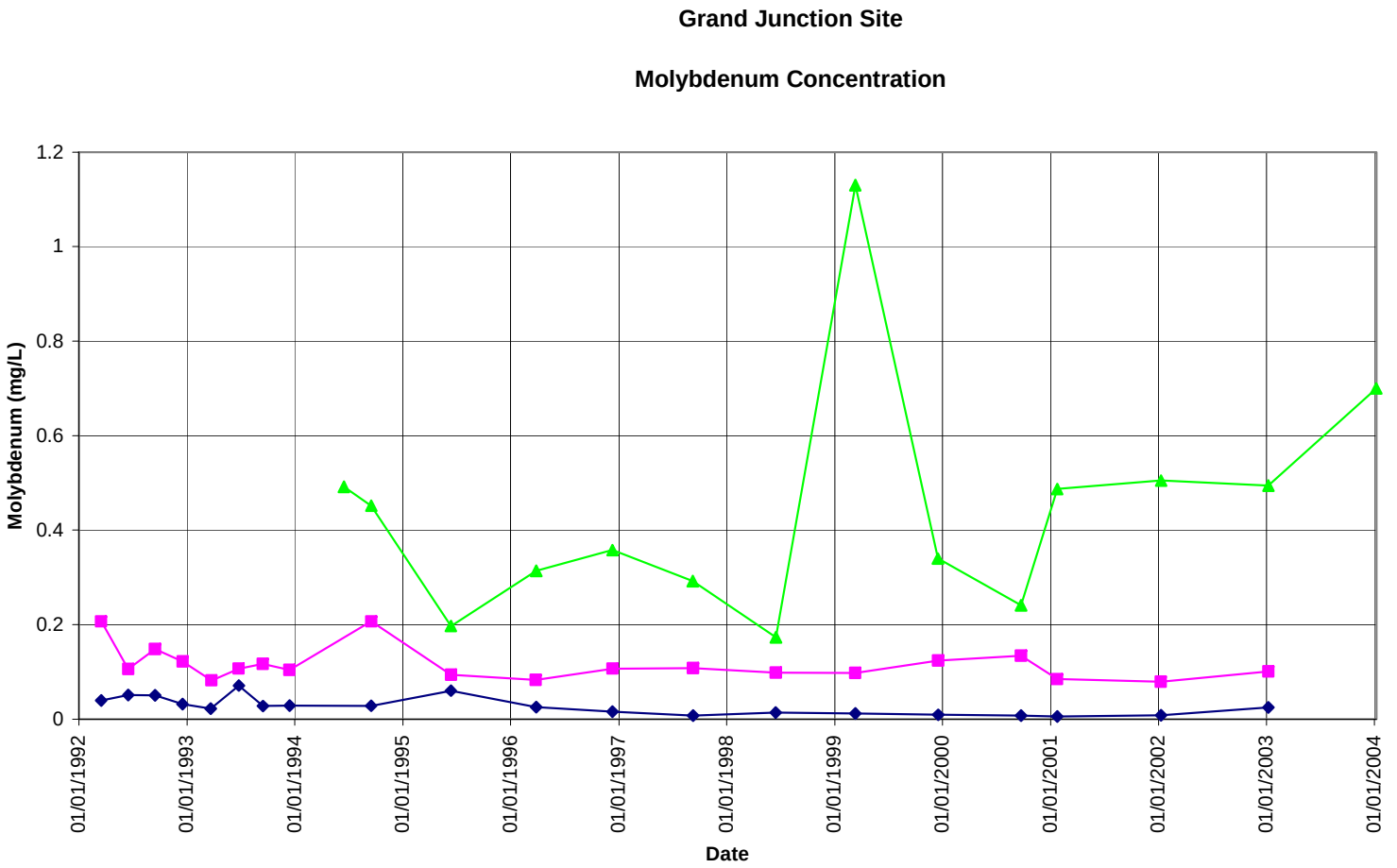
Refer to Figure 3−1

Grand Junction Site

Molybdenum Concentration



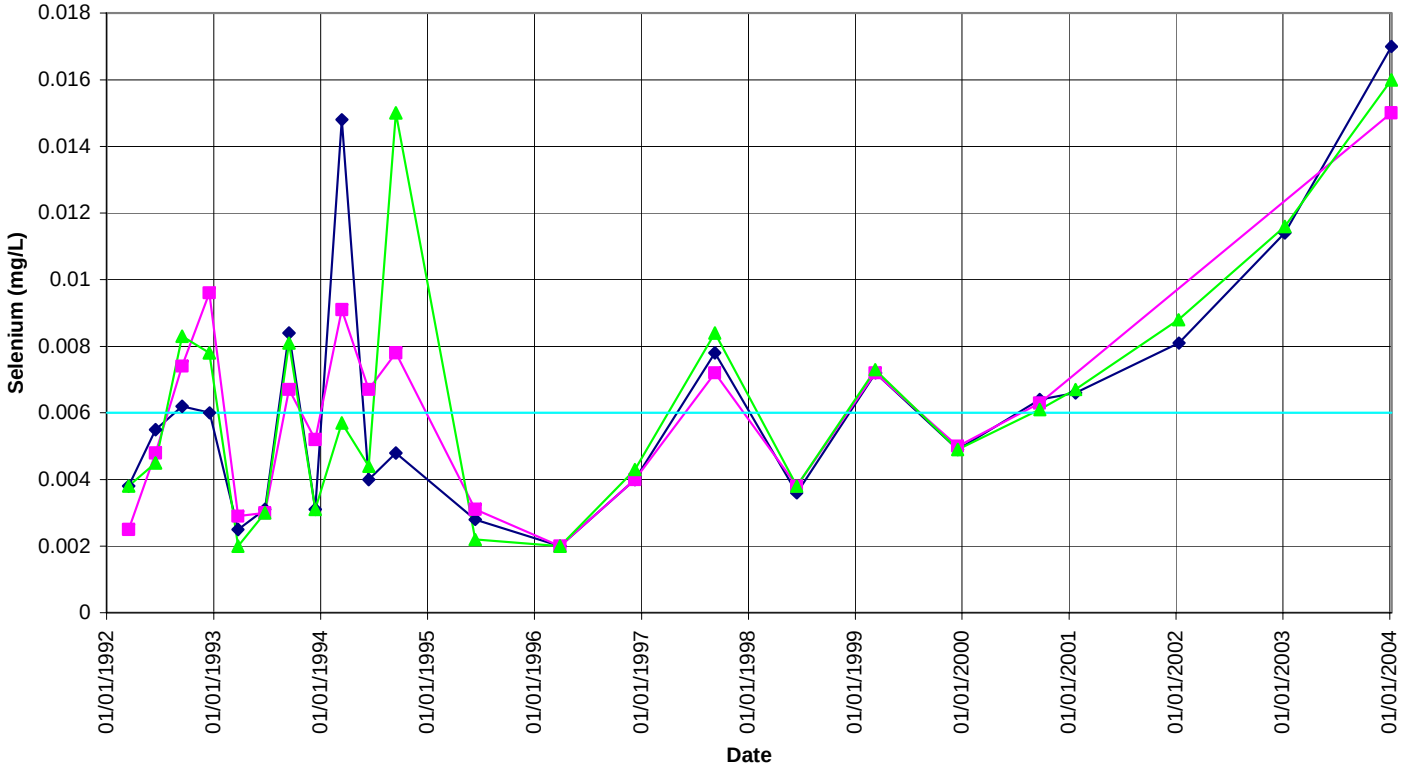
Refer to Figure 3−1



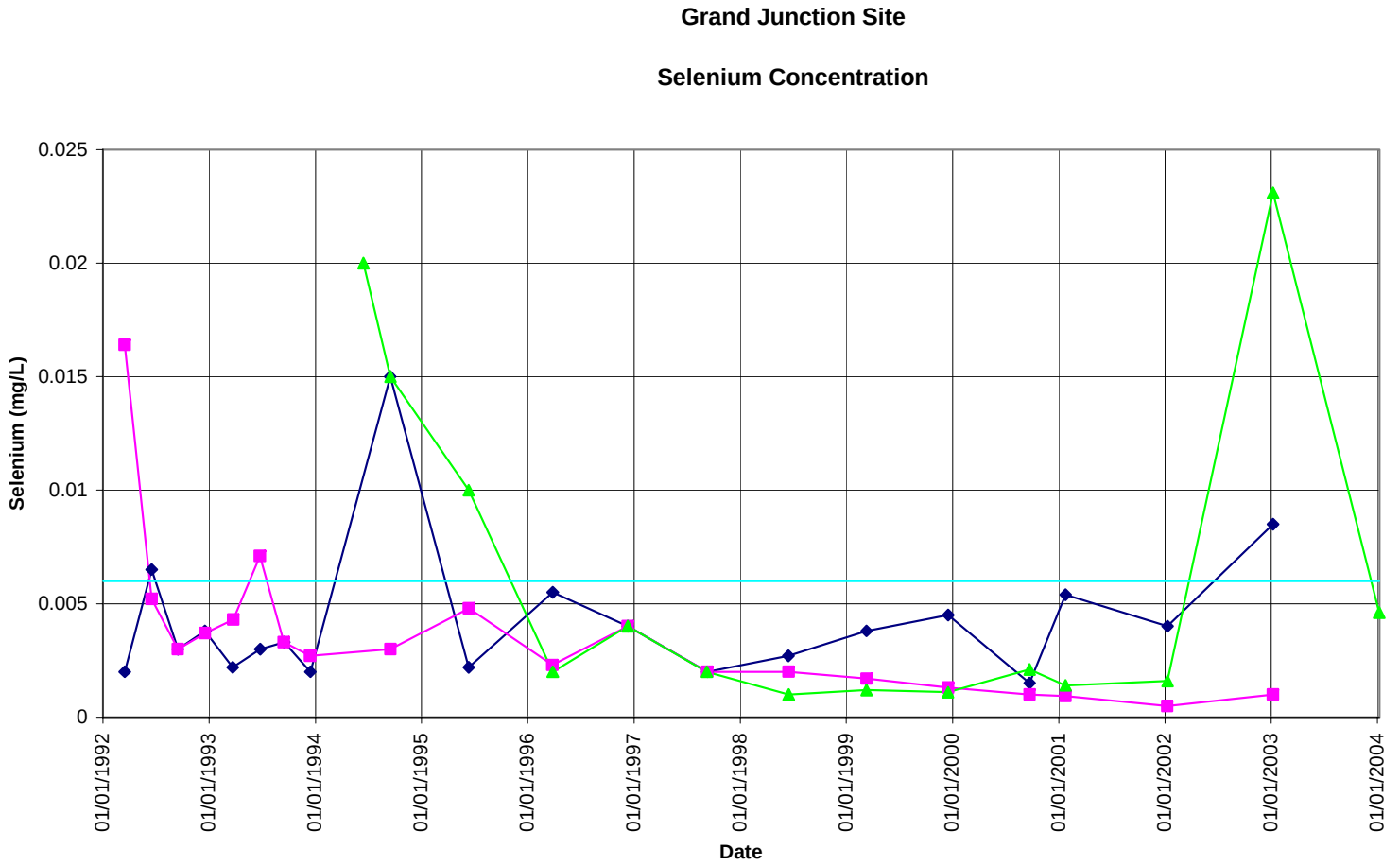
Refer to Figure 3-1

Grand Junction Site

Selenium Concentration



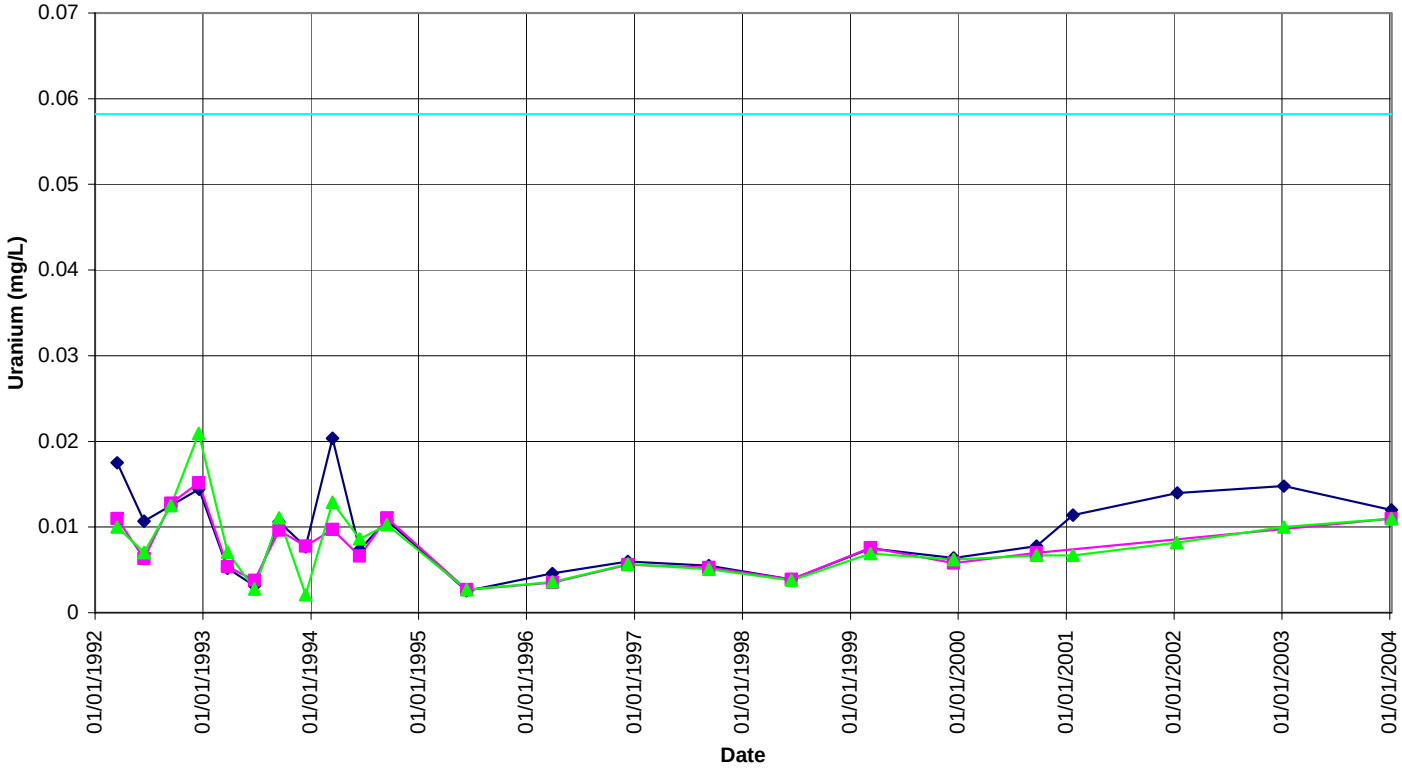
Refer to Figure 3−1



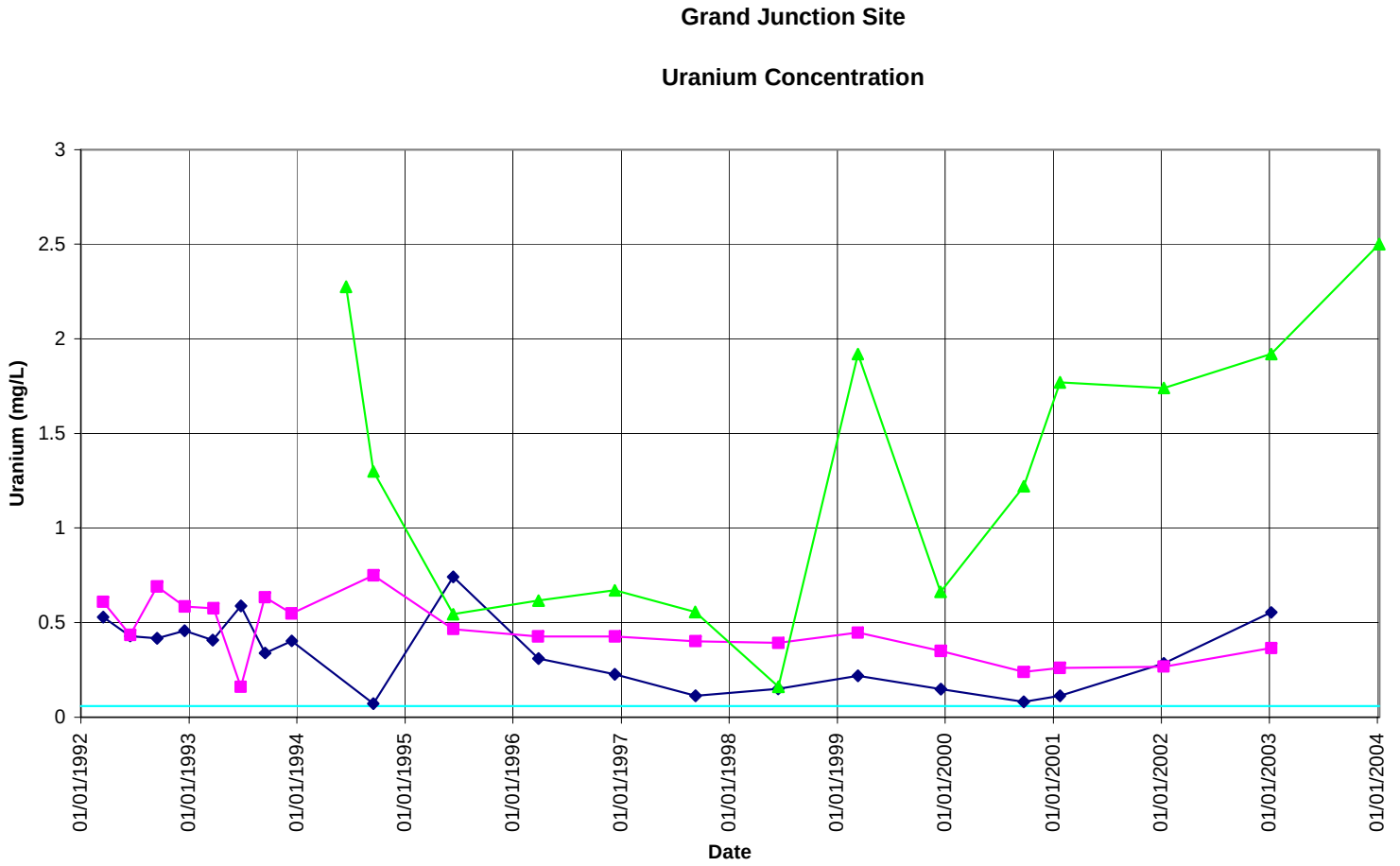
Refer to Figure 3-1

Grand Junction Site

Uranium Concentration



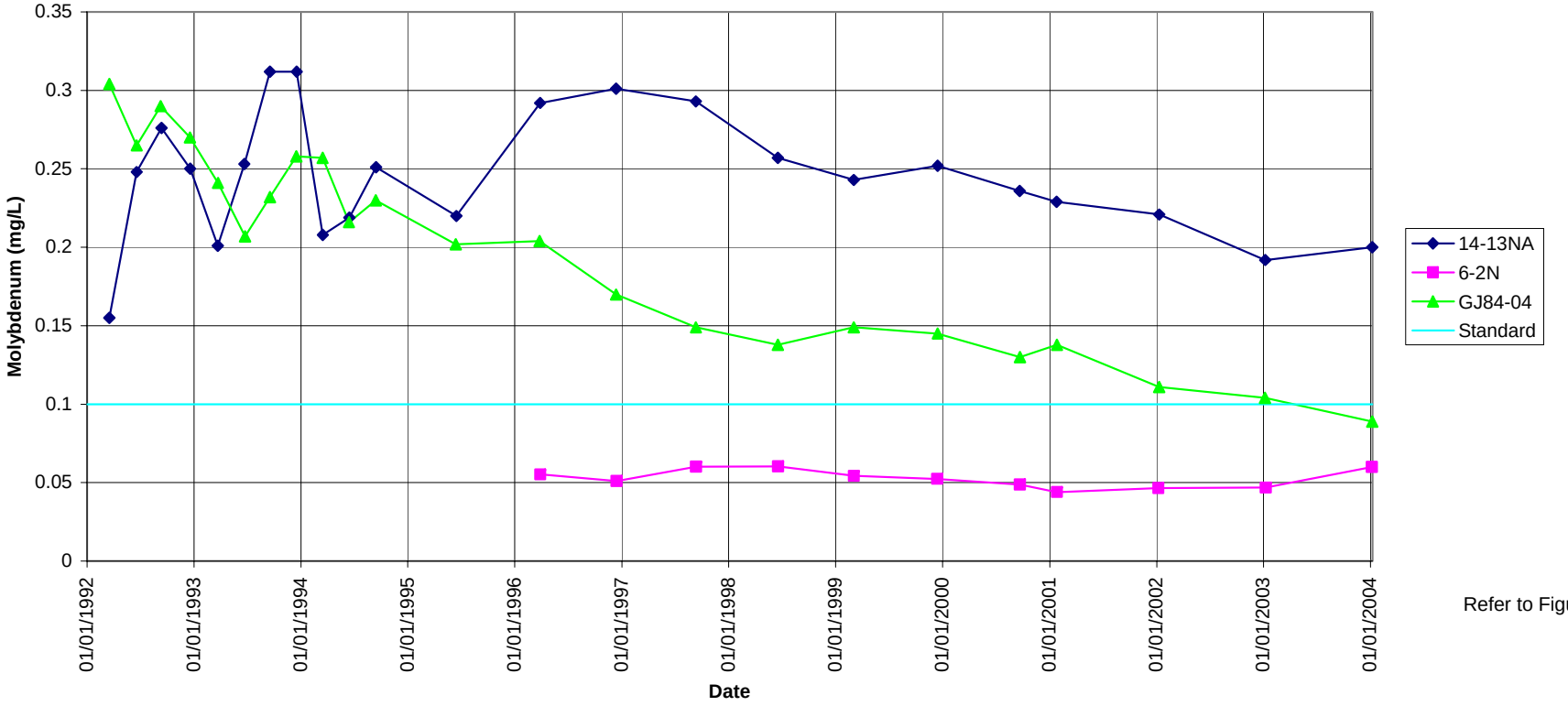
Refer to Figure 3−1



Refer to Figure 3−1

Grand Junction Site

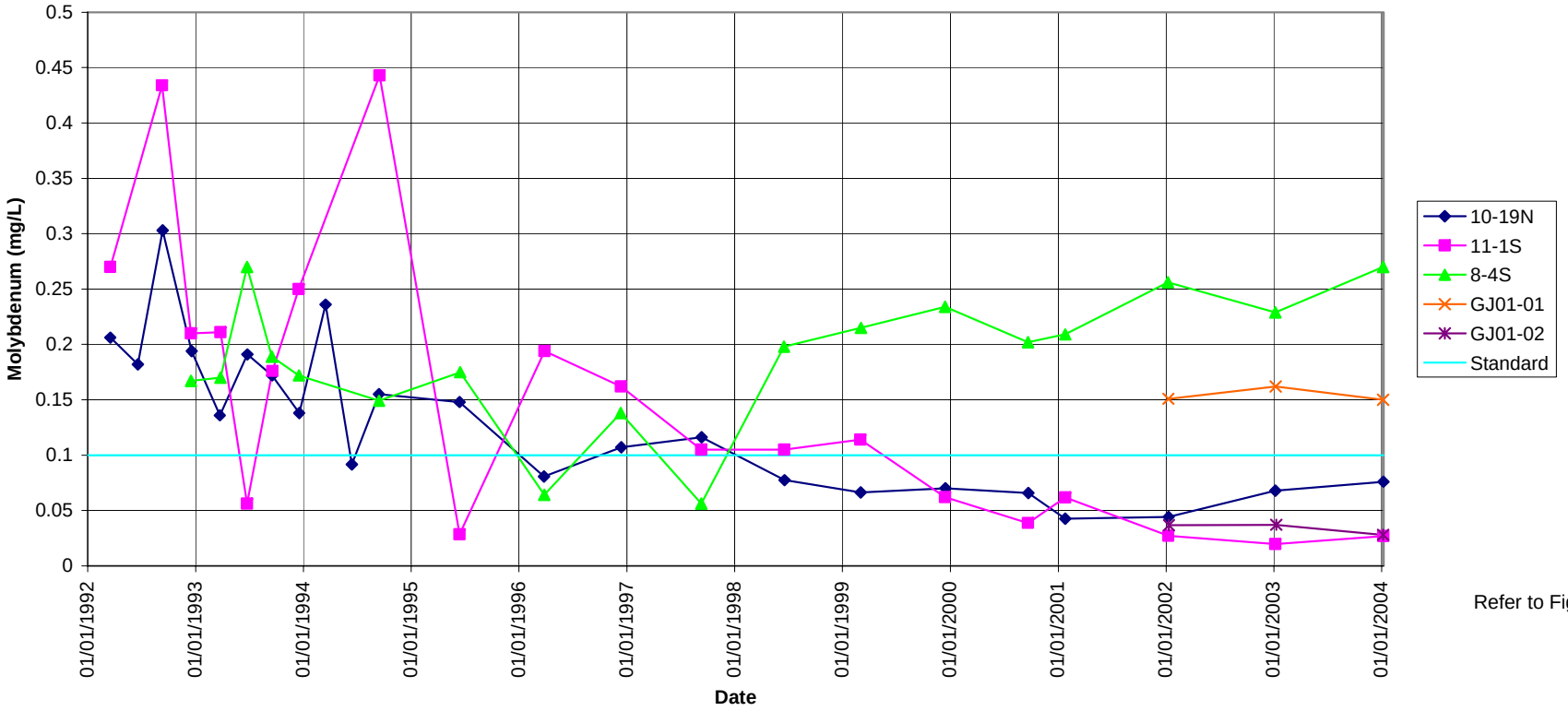
Molybdenum Concentration



Refer to Figure 6−3

Grand Junction Site

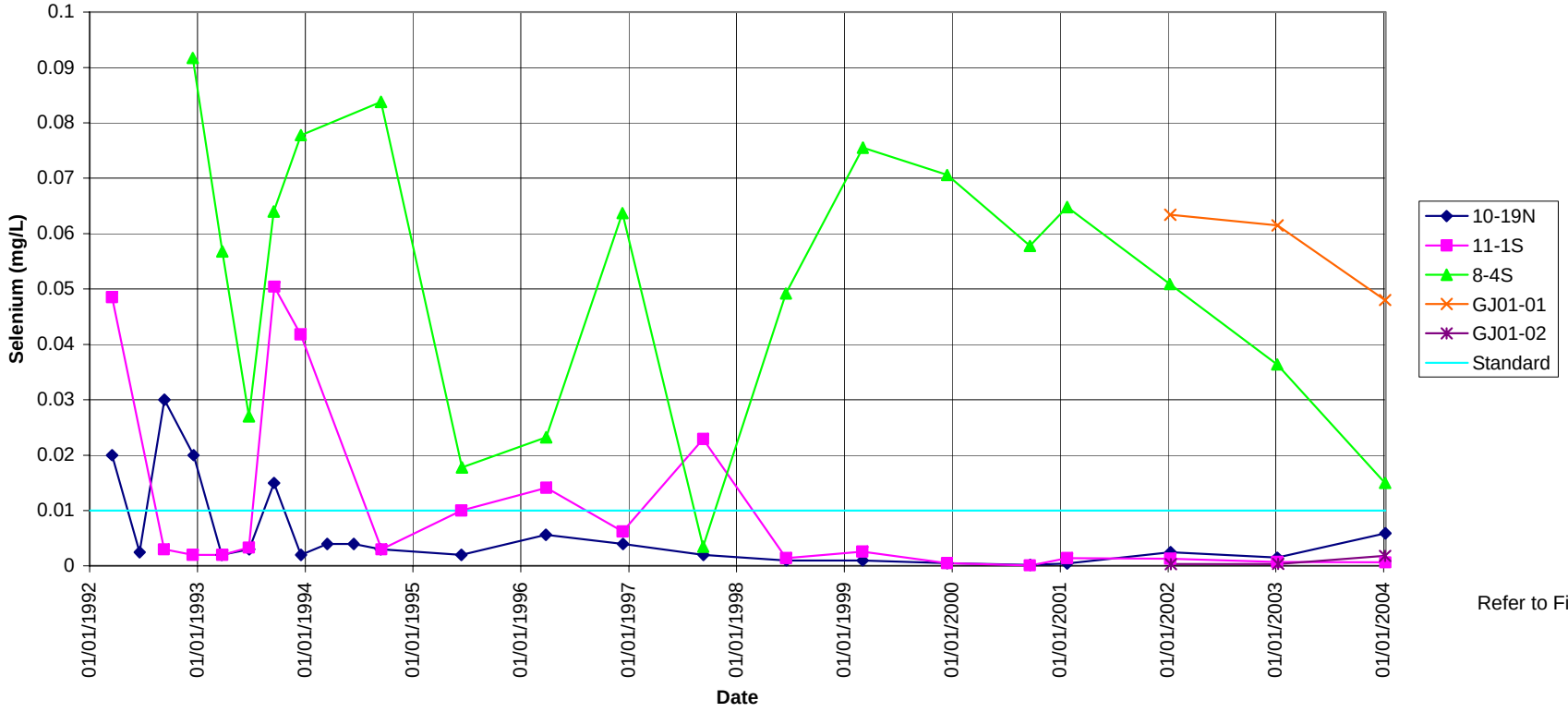
Molybdenum Concentration



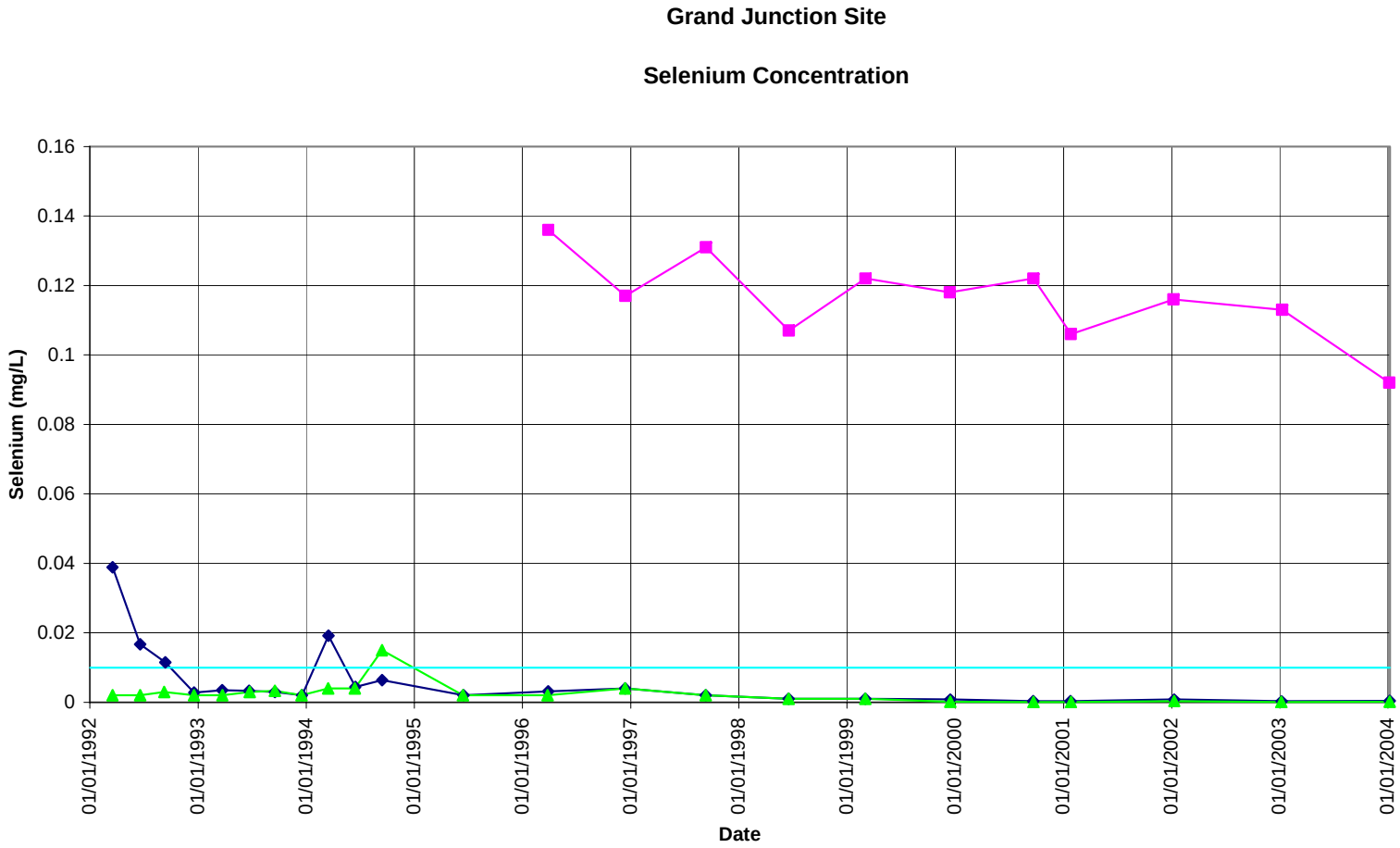
Refer to Figure 6−3

Grand Junction Site

Selenium Concentration



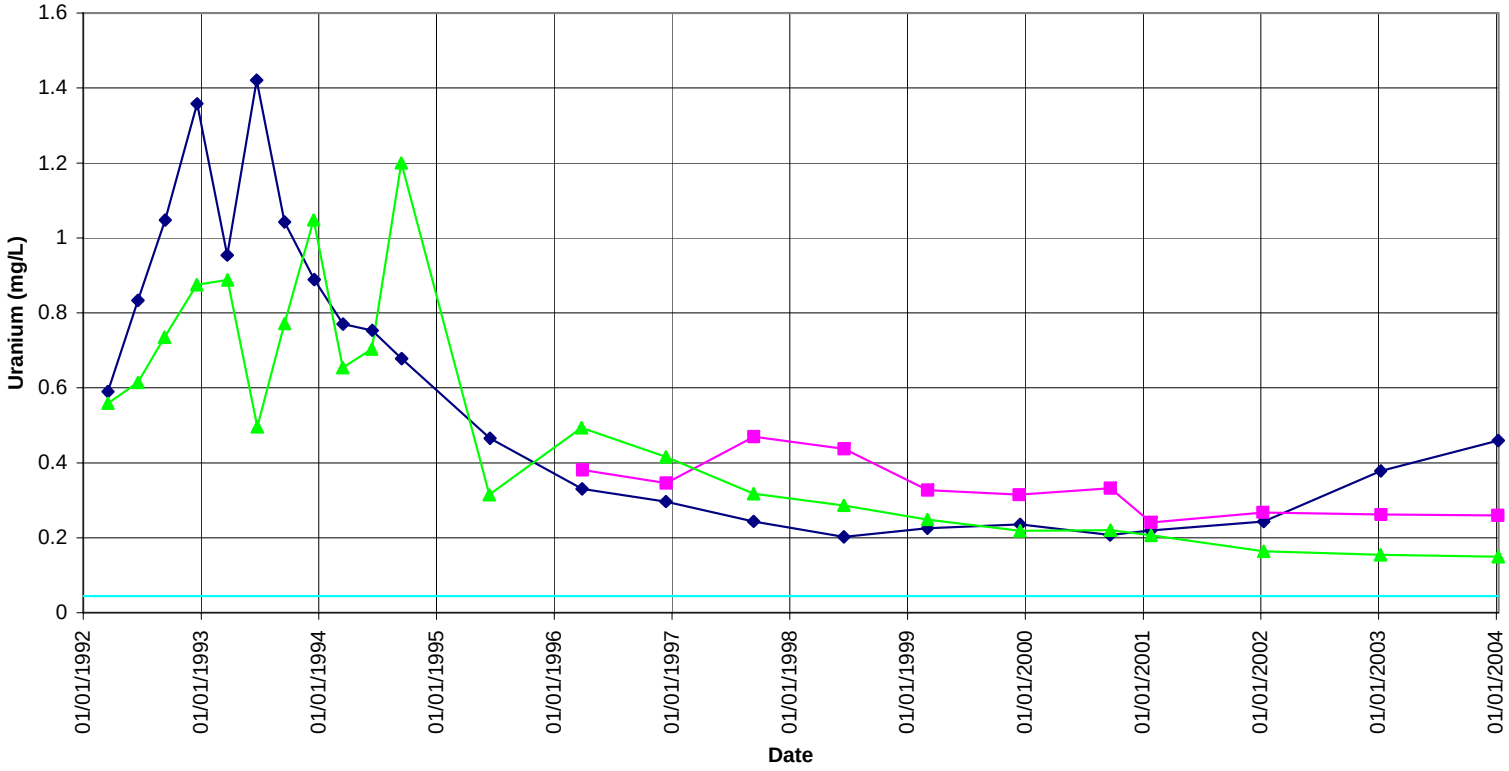
Refer to Figure 6−3



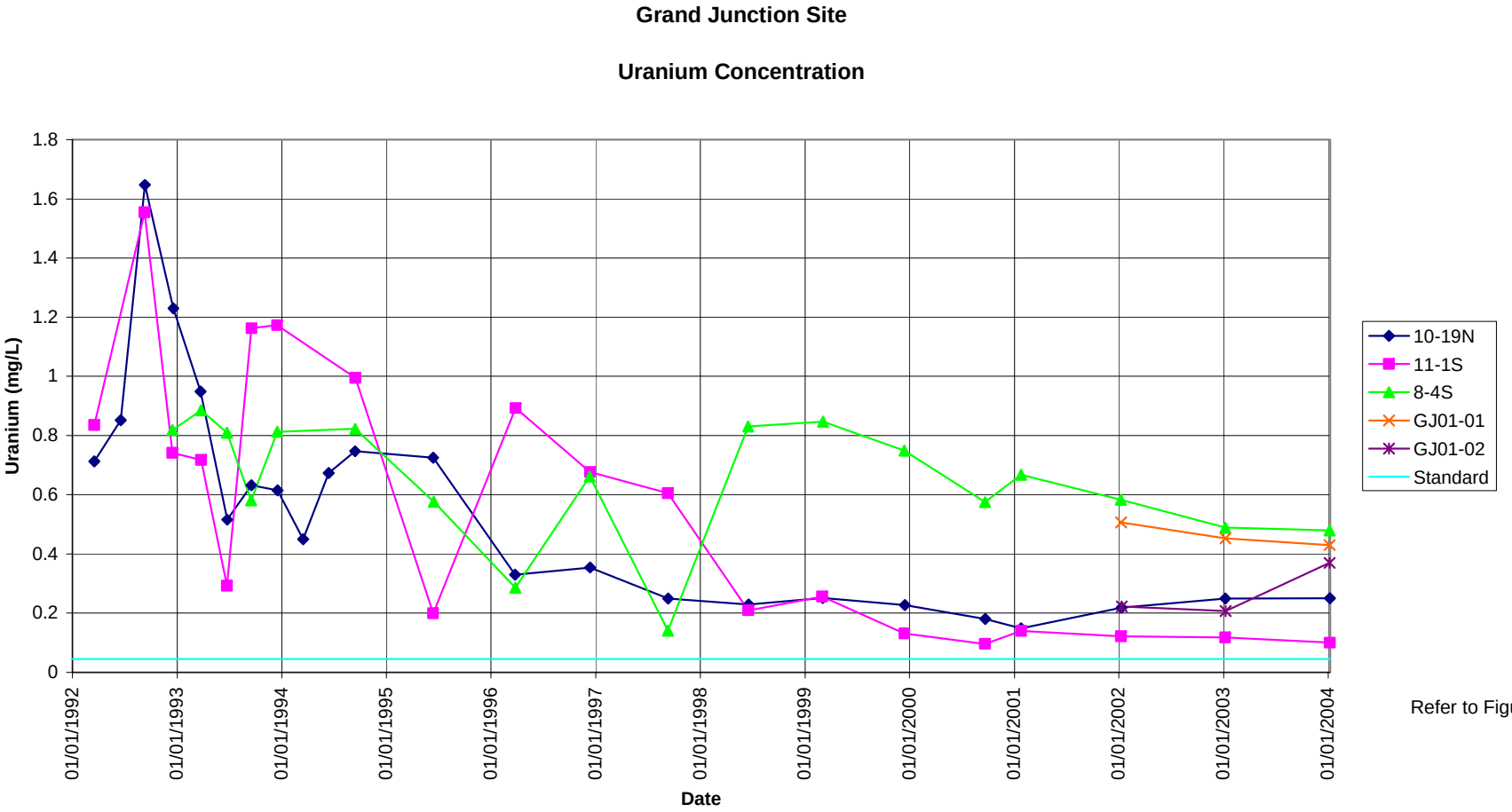
Refer to Figure 6−3

Grand Junction Site

Uranium Concentration



Refer to Figure 6−3



Refer to Figure 6−3