DOE–LM/GJ676–2004

U.S. Department of Energy
Grand Junction, Colorado, Site

Site Environmental Report for Calendar Year 2003

September 2004

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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Acronyms

ALARA	as low as reasonably achievable
APEN	Air Pollution Emission Notification
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
DOE−LM	U.S. Department of Energy Office of Legacy Management
EMCAP	Environmental Management Consolidated Audit Program
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GJORAP	Grand Junction Office Remedial Action Program
ha	hectare(s)
kg	kilogram(s)
lb	pound(s)
LLW	low-level waste
MEI	maximally exposed individual
mg	milligram(s)
mg/L	milligram(s) per liter
MLLW	mixed low-level waste
mrem/yr	millirem per year
µg	microgram(s)
µBq/mL	microbequerel(s) per milliliter
µCi/mL	microcurie(s) per milliliter
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
OU	Operable Unit
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
TSCA	Toxic Substances Control Act
U-234	uranium-234
U-238	uranium-238
UMTRA	Uranium Mill Tailings Remedial Action (Project)
UMTRCA	Uranium Mill Tailings Radiation Control Act

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Executive Summary

This annual Site Environmental Report presents information pertaining to environmental activities conducted during calendar year (CY) 2003 at the U.S. Department of Energy's (DOE) office located in Grand Junction, Colorado. S.M. Stoller Corporation, the Technical Assistance Contractor for the DOE at Grand Junction, prepared this report in accordance with the requirements of DOE Order 231.1, *Environment, Safety, and Health Reporting*, and supplemental guidance from DOE Headquarters.

In 2001, DOE transferred ownership of the Grand Junction Site to the Riverview Technology Corporation (RTC), and DOE remains at the site under a lease agreement with the new owner. Although requirements for management of the site have been reduced, DOE continues to monitor activities to ensure the protection of workers, public health and safety, and the environment. Approximately 170 people (including DOE and contractor staff) were employed at the Grand Junction Site at the end of CY 2003.

Primary activities occurring at the Grand Junction Site in 2003 include the administration and oversight of various DOE legacy management and environmental restoration projects and programs. The primary nature of the work performed at this location is associated with the engineering, scientific, technical, and administrative aspects of implementing these projects and programs. In addition, activities associated with site facility operations and maintenance, waste management/waste minimization, environmental monitoring, and the operation of an Analytical Chemistry Laboratory and the associated Sample Plant were conducted at the Grand Junction Site during 2003.

Due to the changing mission of the Grand Junction Site and the declining use of the Analytical Chemistry Laboratory (Building 20) and the Sample Plant (Building 46) over the last several years, the DOE permanently discontinued operation of these facilities effective December 31, 2003. This action resulted in the loss of approximately 17 full time employees at the Grand Junction Site. Also as a result of the laboratory closure, all air emissions, liquid effluent discharges, and analytical wastes associated with the operation of these facilities were discontinued during 2003.

All activities conducted at the Grand Junction Site during 2003 were performed in compliance with applicable Federal, State, and local regulations and requirements and by applicable DOE orders as directed by contract.

Highlights for Calendar Year 2003

Radiological Monitoring (excluding ground water monitoring)

- Due to the extremely low quantities and radioactivity levels of materials processed at the Grand Junction Site during CY 2003, the National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart H Report was prepared according to the guidelines in Appendix E of Title 40 *Code of Federal Regulations* (CFR) Part 61. Appendix E was authorized for use in a Memorandum of Understanding signed by the U.S. Environmental Protection Agency and DOE in September 1994. This reporting procedure is commensurate with, and appropriate for determining compliance with the NESHAP

Subpart H standard, given the small quantities of materials processed at this site. DOE's review concluded that none of the quantities of materials processed or used at the Grand Junction Site during 2003 exceeded any of the possession quantities listed in Appendix E. Air emissions associated with the Grand Junction Site activities could not cause a dose greater than the Subpart H standard (10 millirem per year). Consequently, site operations and activities during CY 2003 were in compliance with NESHAP Subpart H; DOE Order 231.1, *Environment, Safety, and Health Reporting*; and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. This finding is consistent with modeling results performed in previous years. No accidental releases of radioactivity occurred at the Grand Junction Site in 2003.

- Radionuclide concentrations in samples collected from the Gunnison River in 2003 were below applicable standards in the Colorado Water Quality Control Commission's Regulations 31 and 35 (surface water quality standards).

- Concentrations of total uranium in all samples from the site surface water locations (i.e. the North Pond, South Pond, and the wetland locations) exceeded the uranium standard established for the corresponding segment of the Gunnison River in 2003. The maximum total uranium concentration (2,130 micrograms per liter [µg/L]) was detected in the January 2003 sample from wetland location WW-3. The North Pond, South Pond, and wetland location samples were also analyzed for gross alpha and gross beta. Gross alpha and gross beta activities in these samples were elevated, which correlate to the elevated uranium concentrations; no surface water quality standards currently exist for these constituents for comparison.

  Water in these surface water bodies is concentrated by evaporation in late summer and samples are collected in later winter when concentrations are highest, before spring runoff. Any exceedances observed in the on-site surface-water sampling program are not expected to have any impacts upon human health or the environment. There is no public access to any of the on-site surface-water bodies. The surface water bodies support a healthy community of plants and fish. These areas are only occasionally used by other wildlife. Therefore, as discussed below and in Section 4.2.2, there does not appear to be any unacceptable ecological risk. Non-radiological monitoring results are discussed below.

Ground Water Monitoring

- During 2003, concentrations of uranium, molybdenum, selenium, and total dissolved solids in samples from the alluvial aquifer exceeded applicable ground water quality standards. The original ground water modeling of the alluvial aquifer predicted that concentrations of ground water contaminants will be below applicable standards within 50 to 80 years after removal of the contaminant source (uranium mill tailings). Any exceedances observed in the on-site ground-water sampling program are not expected to have any impacts upon human health or the environment. There are no uses of the ground water at or near the Grand Junction Site. Ground water use is restricted through the quit claim deed transferring the property to non-DOE owners (see Section 6.3.2).

Nonradiological Monitoring

- Visible emissions from stationary sources in 2003 did not exceed the permit-specified limit of 20 percent opacity.

- No air emission permit limits associated with operation of the Grand Junction Site Analytical Laboratory were exceeded in 2003.

- Manganese and selenium were the only constituents reported in samples collected from the Gunnison River in 2003 to have exceeded a surface water standard. The manganese concentration at the Lower Gunnison location was reported at 0.0945 mg/L, exceeding the standard of 0.05 mg/L. This is the fifth time since 1993, when most of the remediation was completed, that manganese was reported to have exceeded the standard at this location. Selenium concentrations reported at the lower and upper middle Gunnison River sampling locations (0.0114 mg/L and 0.0116 mg/L) exceeded the standard of 0.006 mg/L. 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. Since 1981, concentrations of selenium, lead, manganese, radium, sulfate, and zinc have sporadically been near or exceeded state water quality standards for the Gunnison River upstream of the Grand Junction site. 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.

- The North Pond, South Pond, and wetland locations contain elevated quantities of some chemical constituents typically associated with uranium mill tailings (e.g., manganese, molybdenum, selenium, and sulfate). In 2003, State of Colorado standards for the Gunnison River, which are used to monitor water quality in on-site water bodies, were exceeded for chloride, manganese, selenium, and sulfate in samples collected at one or more of these locations (see Section 3.2.2 and Table 5−2). These elevated constituents do not pose an unacceptable ecological risk (see Section 5.2.2).

  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* (DOE 2001) 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.

- During 2003, no extremely hazardous substances or hazardous chemicals (as defined by 40 CFR Part 355) were stored at the Grand Junction Site in amounts exceeding the threshold planning quantities established in Sections 311 and 312 of the Superfund Amendments and Reauthorization Act (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 during 2003.

- Because the Analytical Laboratory was permanently closed December 31, 2003, all air particulate and radiological monitoring activities were likewise suspended at the time of closure. In a letter dated February 18, 2004, DOE petitioned the Colorado Department of Public Health and Environment (CDPHE) to terminate the air emissions permits issued to the Analytical Laboratory and the Sample Plant. In a letter dated May 26, 2004, CDPHE issued notice to DOE that the air emissions permits issued to these facilities were terminated.

Waste Management

- In 2003, the Grand Junction Site operated as a conditionally exempt small quantity generator (CESQG) (as defined by the Resource Conservation and Recovery Act [RCRA]) by generating less than 100 kilograms (kg) (220 pounds [lb]) per month and storing less than 1,000 kg (2,200 lb) of hazardous waste on site.

- In January 2003, the Grand Junction Site shipped various RCRA-regulated wastes from the Analytical Laboratory for treatment and disposal to an off-site facility. These wastes totaled 2.15 kg (4.7 lb).

- In January 2003, the Grand Junction Site shipped 0.35 kg (0.77 lb) of polychlorinated biphenyl (PCB) waste (i.e., analytical standards) from the Analytical Laboratory for treatment and disposal at an off-site facility.

- The Grand Junction Site generated approximately 31 kg (68 lb) of low-level waste (LLW) in CY 2003. DOE did not ship LLW from the Grand Junction Site during CY 2003; DOE is managing the waste on site and intends to ship it for disposal in 2004.

- No residual radioactive materials (RRM) were remediated from the Grand Junction Site during CY 2003. Residual contamination remains under the Analytical Laboratory (Building 20) and the Computer Control Center (Building 12). This contamination was addressed in a *Request for Deferred Remediation*, which was approved by the State of Colorado in 2001.

Waste Minimization

- Spent batteries are a routine waste generated at the Grand Junction Site. The site routinely recharges nickel-cadmium (NiCad) batteries and reconditions them 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 are sent to a local recycler. The backup power supply for the Grand Junction Site's main computer systems

uses deep-cycle rechargeable batteries. A vendor exchanges and reuses these batteries according to a contract schedule.

- The Grand Junction Site donated 122 used computers and related items to Mesa County, Colorado, School District 51 in 2003.

- The Grand Junction Site generates used oil from equipment maintenance. The oil is recycled at an appropriate processing, re-refining, or fuel burning facility on a regular basis. Approximately 75.7 liters (approximately 61.3 kg or 135 lb) of used oil (generated in 2002) was recycled through a waste broker in January 2003.

- The Grand Junction Site regularly recycles office paper, cardboard, glass, plastics, aluminum, steel, telephone books, magazines, and newspaper through a local recycling service. In 2003, the site recycled approximately 32,841 kg (72,402 lb) of these materials.

- As a result of the Analytical Laboratory closure, approximately 22 kg (49 lb) of liquid scintillation cocktail waste and 3 kg (7 lb) of non-hazardous chemical waste were identified for disposal. These wastes were shipped for off-site disposal during January 2004.

Environmental Management System

During 2003, the Grand Junction Site operated under the concepts and best management practices that will become the foundation of an Environmental Management System (EMS) as required by Executive Order 13148, "*Greening of the Government Through Leadership in Environmental Management.*" The overall objective of a sitewide EMS is to establish a set of environmental policies and objectives that support environmental protection and prevent pollution, to assess the effectiveness of the system, and to communicate conformance with the objectives to others. The Grand Junction Site's EMS will be developed in fiscal year 2004 and implemented in fiscal year 2005.

Federal, State, and local laws and regulations, and numerous DOE directives establish the regulatory framework for Grand Junction Site operations. Personnel at the Grand Junction Site continue to ensure that all site operations and activities maintain compliance and seek areas for improving and enhancing the effectiveness of environmental management.

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1.0 Introduction

The U.S. Department of Energy (DOE), 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.

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.

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., machining equipment, distribution of food stuffs, light manufacturing, etc.).

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. The 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 the Grand Junction Site 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 DOE's office in Grand Junction include the long-term surveillance and maintenance operations for remediated sites assigned to DOE Office of Legacy Management (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 Grand Junction Site 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** provides an overview of the quality assurance measures implemented at the site.
- **Section 8** provides the list of references used in the preparation of this document.

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 calendar year (CY) 2003 without incident. The site was in full compliance with all applicable environmental laws, regulations, and DOE requirements.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act

Although the Grand Junction Site was not placed on the National Priorities List by 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 (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 Library in Grand Junction and in the Technical Library at the Grand Junction Site. The repositories were updated in July 2003.

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).
- Surface and ground water (subject to passive remediation discussed in Sections 4.4.1 and 6.0 of this document).

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

DOE will manage a sealed borehole containing radium foil in perpetuity. The radium-foil borehole (Figure 1–2) 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 2003, 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 2003 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.

Although "negative" reporting is not required under the statutes, DOE informed the Colorado Emergency Response Commission, the Mesa County Emergency Planning Committee, and the Grand Junction Fire Department by letter that no chemicals were stored in quantities that exceed the applicable thresholds during 2003.

2.1.3 Resource Conservation and Recovery Act

The Grand Junction Site usually operates under the special requirements (codified at Title 40, Section 261.5, of the *Code of Federal Regulations* [CFR]) for conditionally exempt small-quantity generators (CESQGs) of hazardous waste. 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) before shipping off site for treatment and disposal. CESQG wastes are not subject to full regulation under 40 CFR 124, 262 through 266, 268, and 270; however, the generator must comply with certain requirements. CESQGs can accumulate waste on site and

remain exempt from full regulation as long as generation and storage requirements are not exceeded. If on-site waste accumulation exceeds 1,000 kg (2,200 lb), all the accumulated wastes become subject to small-quantity (or large-quantity) generator requirements, including the land disposal restrictions codified at 40 CFR 268.

In 2003, although the Grand Junction Site was operated as a CESQG, DOE maintained all programs necessary to operate as a small or large quantity generator if needed. Such programs generally include increased personnel training, inspections, and facility record keeping.

During 2003, hazardous wastes were generated primarily by activities associated with the operations of the Analytical Chemistry Laboratory. The Grand Junction Site stores hazardous and mixed waste in satellite accumulation areas and in designated hazardous waste storage areas, including commercially manufactured storage modules (Buildings 61A and 61C). Hazardous wastes are shipped off site to commercial treatment and disposal facilities once or twice each calendar year, or as required by law. The U.S. Environmental Protection Agency (EPA) Identification number assigned to the DOE Grand Junction Site is CO6890090065.

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 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 2003. 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, and GJORAP met the specific objectives of release surveys in order to release property to the public. The guidelines, detailed in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, are as follows:

- *Surface radioactivity on buildings and structures*—Release surveys must show that average surface-contamination levels and hot spots are within guidelines and that reasonable efforts have been made to clean up removable radioactivity.

- *Volume of radioactivity in soil and concrete*—Release surveys must show that average radionuclide and hot spot concentrations are within guidelines.

- *Airborne radon decay-product concentrations*—Release surveys must show that radon decay concentrations are within guidelines.

- *External gamma radiation*—Release surveys must show that average levels of gamma radiation inside occupied buildings or habitable structures and average levels of gamma radiation in outside areas do not exceed guidelines.

- *As low as reasonably achievable (ALARA) requirements*—Release surveys must show that DOE's ALARA policy has been implemented and that quantities of radioactivity and residual radioactive materials are as low as reasonably achievable.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment* will be superseded when 10 CFR 834 is promulgated; however, the guidelines will remain essentially the same.

Release Surveys

Under GJORAP, radiologically contaminated soil, building debris (including asbestos), and other radiologically contaminated wastes were managed to protect the environment and personnel, and were disposed of at a DOE-owned repository (Section 3.4.3). After contamination in an open land area or building was remediated, release surveys were performed and closeout reports prepared to release the area or building for unrestricted use. By the end of the project in 2001, GJORAP had demolished 16 buildings and remediated or verified for release for unrestricted use most of the remaining 33 buildings present at the facility and all open land areas. DOE manages remaining contamination as described in Section 2.1.1.

2.1.6 Clean Air Act/National Emission Standards for Hazardous Air Pollutants

In 1991, the Colorado Department of Public Health and Environment (CDPHE) granted the Grand Junction Site an air emission permit for the Analytical Laboratory. 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. As in previous years, no limits were exceeded in 2003.

Due to the extremely low quantities and radioactivity of materials processed at the Grand Junction Site during CY 2003, the NESHAP Subpart H Report was prepared according to the guidelines in Appendix E of 40 CFR 61. This alternative reporting method was authorized for use in a Memorandum of Understanding signed by EPA and DOE in September 1994. This reporting procedure is commensurate with, and appropriate for determining compliance with, the NESHAP Subpart H standard given the small quantities of materials processed at this site. None of the quantities of materials processed or used at the Grand Junction Site during 2003 exceeded any of the possession quantities listed in Appendix E. As a result, air emissions associated with activities at the site could not cause a dose greater than the Subpart H standard (10 millirem per year [mrem/yr]). Consequently, site operations and activities during CY 2003 were determined to be in compliance with NESHAP Subpart H; DOE Order 231.1, *Environment, Safety, and Health Reporting*; and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.

This finding is consistent with modeling results performed in previous years. No accidental releases of radioactivity occurred at Grand Junction Site in 2003.

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, DOE has petitioned CPDPHE to terminate 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 2003 NESHAP Subpart H report is the final NESHAP Subpart H report to be prepared and submitted for the Grand Junction Site.

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 (No. 023). 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) 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 2003, 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

The Toxic Substances Control Act (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 Grand Junction Site is historically small and resulted primarily from removal of PCB light ballasts and asbestos wastes such as ceiling insulation, exterior siding (i.e., transite) and floor tile. In January 2003, the Grand Junction Site shipped 0.35 kg (0.77 lb) of PCB waste (analytical standards) from the Analytical Laboratory for treatment and disposal at an off-site facility. Details of this shipment are provided in Section 3.4.2.

2.1.11 Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (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 2003.

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 2003 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 in 2004. The RTC is not required to comply with the National Historic Preservation Act unless their action is federally funded or licensed. During 2003, no actions were funded, licensed, or undertaken by DOE that affected historic buildings on the Grand Junction Site.

2.1.14 Executive Order 11988, *Floodplain Management*

The Grand Junction Site, located behind the dike adjacent to the Gunnison River, is not on a floodplain (Mesa County Flood Maps 2003). 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 2003. DOE uses internal and external environmental audits, and management compliance assessments to evaluate environmental compliance and to implement corrective actions.

2.2.1 Audits and Assessments

An audit of management systems employed by the Grand Junction Site Analytical Chemistry Laboratory was conducted by the DOE Environmental Management Consolidated Audit Program (EMCAP) from November 19 to November 21, 2002. The audit resulted in no significant findings and 12 observations. All corrective actions for the observations were developed and implemented by April 2003. The completed corrective action plan was submitted to the DOE EMCAP Audit Committee on May 7, 2003. Due to the reduced demand for analytical chemistry services, DOE determined it was no longer cost effective to continue operation of the on-site Analytical Laboratory and Sample Plant. In September 2003, DOE decided that all operations associated with these facilities would be terminated December 31, 2003.

Although DOE's need for analytical services could not support a full-time, dedicated laboratory, a limited need for such services remained. To fulfill the limited need for analytical services, DOE began the process of reviewing and selecting a subcontracted analytical service provider. During 2003, laboratory service providers were evaluated against Department of Energy, State, and national consensus standards during the process of subcontractor selection. A subcontract to provide analytical services to support the Grand Junction Site activities and operations was awarded in January 2004. DOE also maintains and operates the on-site Environmental Sciences Laboratory (Building 32), which performs limited chemical analyses in support of various DOE environmental studies and investigations.

Four internal independent assessments were conducted during 2003 that evaluated on-site activities. Topics for the internal assessments included laboratory analyses, radiation protection, document control, and records management.

Contractor management completed one management assessment of on-site activities. Also during 2003, four surveillances were conducted that verified compliance with internal procedures.

2.3 Summary of Facility Permits

Table 2–1 shows the permits that were active at the Grand Junction Site during 2003.

Table 2–1. Grand Junction, Colorado, Site Permits Active in 2003

Permit	Issuing Agency	Number of Permits
Air Emission Permit	State of Colorado, Air Pollution Control Division	2
Well Permit	State of Colorado, State Engineers Office	8

3.0 Environmental Program Information

Environmental programs at the Grand Junction Site include air monitoring, ground and surface water monitoring, radiological 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 *GJO Health and Safety Manual* (STO 2), the *GJO Site Radiological Control Manual* (STO 3), and the *Grand Junction Office Integrated Safety Management System Description* (STO 10).

3.1 Air Monitoring

3.1.1 Air Emissions Monitoring and Estimation for Radiological Constituents

Radiological air-emissions monitoring and evaluation was conducted on the Grand Junction Site to assess the potential for radiation dose to members of the public that could result from site operations and to demonstrate compliance with the dose standards established by NESHAP, 40 CFR 61 Subpart H; and DOE Order 5400.5.

Historically, radiological air emissions at the site consisted of both point- and non-point sources of radiological air emissions. The point-sources for potential radiological air emissions included the Sample Plant (Building 46) and Building 20, the Analytical Laboratory (Figure 3–1). Non-point sources of potential radiological air emissions were associated with residual radiological contamination (i.e., contaminated soils and buildings) that remained at the site. Historical radiological air monitoring results indicate that these non-point sources were the major contributor to the total effective dose equivalent that was previously calculated for the site. Except for minor controlled occurrences of residual radioactive contaminants remaining at the Grand Junction Site, the non-point sources of contamination were removed by 2001; therefore, monitoring in these same areas was not conducted in 2003. The only point sources of radiological air emissions associated with activities at the Grand Junction Site were emissions from the Analytical Laboratory and the Sample Plant exhaust stacks.

Point Source Particulates

One point source (the Sample Plant) and one grouped point source (the Analytical Laboratory) contributed to radionuclide emissions from the Grand Junction Site during 2003. The four Analytical Laboratory point sources were combined into a grouped point source because they have similar function, controls, and location. EPA granted an indefinite waiver of sampling requirements for the Analytical Laboratory and required that the Sample Plant emissions be subject to periodic confirmatory measurements (November 2, 1990, and December 20, 1991, correspondence between EPA and DOE).

An occupant of Building 7 has been designated as the maximally exposed individual (MEI) and represents the member of the public receiving the largest dose from all sources of radionuclide emissions combined. For CY 2003, the Grand Junction Site point and group sources, effluent controls, estimation of control efficiency, and distance from the release points to the MEI are presented in Table 3–1.

Table 3–1. 2003 Grand Junction, Colorado, Site Point Source Information

Point Source	Type of Control	Efficiency (%)	Distance to Nearest Receptor (MEI)
Sample Plant	Pre and Final Filter	95	122 meters (402 feet)
Grouped Source	**Type of Control**	**Efficiency (%)**	**Distance to Nearest Receptor (MEI)**
Analytical Laboratory (4 sources total)	Wet scrubbers	50–75	152 meters (502 feet)

MEI = maximally exposed individual

Due to the extremely low quantities and radioactivity of materials processed at the Grand Junction Site during CY 2003, the radiological air emissions for CY 2003 were estimated according to guidelines in 40 CFR 61, Appendix E. Use of these guidelines was authorized in a Memorandum of Understanding signed by EPA and DOE in September 1994. This reporting procedure is commensurate with, and appropriate for determining compliance with, the NESHAP Subpart H standard given the small quantities of materials processed at this site. None of the quantities of materials processed or used at the Grand Junction Site during 2003 exceeded any of the possession quantities listed in Appendix E. Accordingly, air emissions associated with site activities could not cause a dose greater than the Subpart H standard (10 mrem/yr). Consequently, site operations and activities during CY 2003 were in compliance with NESHAP Subpart H; DOE Order 231.1, *Environment, Safety, and Health Reporting*; and DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. This finding is consistent with modeling results performed in previous years. No accidental releases of radioactivity occurred at the Grand Junction in 2003. Because the potential for radiological air emissions from the Analytical Laboratory and the Sample Plant no longer exists, the 2003 NESHAP Subpart H report is the final report to be prepared and submitted for the Grand Junction Site.

3.1.2 Air Emissions Monitoring and Estimation for Nonradiological Constituents

Air emissions monitoring and estimation of nonradiological constituents is conducted at the Grand Junction Site to demonstrate compliance with specific permit and Air Pollution Emission Notification (APEN) exemption requirements. Air emission sources of nonradiological constituents at the site include the Analytical Laboratory and the Sample Plant. These sources are regulated by the Colorado Air Quality Control Commission Regulation No. 3.

The Analytical Laboratory is subject to the requirements of Emission Permit No. 90ME402–1 issued by the Air Pollution Control Division of the CDPHE. The permit specifies visible emission (opacity) limits; sets limits on particulate matter (as acids), volatile organic compounds, and benzene emissions; and sets maximum consumption rates on acids, volatile organics, and benzene. The Sample Plant emission source was granted APEN and permit exemptions (No. 90 ME402−2) by the Air Pollution Control Division (letter dated January 12, 1994).

Opacity

Air Emission Permit No. 90ME402–2, the APEN/permit exemptions granted to the Sample Plant, and Colorado Air Quality Control Commission Regulation No. 1 require that visible emissions from sources at the site not exceed 20 percent opacity. No emissions requiring opacity observations occurred during 2003.

Permitted Releases

In addition to the opacity requirement, Air Emission Permit No. 90ME402–1 for the Analytical Laboratory establishes limits on the annual emissions of particulate matter, volatile organic compounds, and benzene and the annual consumption of acids, volatile organic compounds, and benzene. For CY 2003, all emissions of regulated pollutants were below the limits specified in the emission permit. Consumption rates are monitored annually to demonstrate compliance with these permit conditions. The APEN exemption granted for the Sample Plant establishes limits on the quantity of soil processed annually. Soil processing is monitored to demonstrate compliance with this APEN exemption requirement. Section 5.0 provides a comparison of the 2003 chemical consumption and the quantity of soil processed.

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 2003 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, including that from tenant businesses, and wastewater discharges from DOE activities, (i.e., Analytical Laboratory, the Environmental Sciences Laboratory, [Building 32] and the microfiche processing center [Building 12]) (Figure 3–1). The RTC sewer system discharges to the City sewer, which is treated at the City of Grand Junction's Persigo Waste Water Treatment Plant.

From March 1989 to June 1999, the site was subject to the provisions of a Class II Industrial Pretreatment Permit issued under the authority of the City of Grand Junction's Industrial Pretreatment Program, Chapter 38 of the Code of Ordinance; the Colorado Water Quality Control Act; and the Federal Water Pollution Control Act as amended by the Clean Water Act of 1977. 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 2003. Best management practices and procedures were used in the laboratories 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). In addition, the Analytical Laboratory maintained an automated batch neutralization unit that received all laboratory analytical wastewater and performed neutralization to meet effluent standards prior to discharge into the site sewer system.

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, Stoller (the Technical Assistance Contractor) 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.

Sewer Effluent Monitoring for Radioactive and Nonradioactive Constituents

Historically, the primary sources of radioactive and nonradioactive liquid discharges to the sewer system have been the Analytical Laboratory and the Environmental Sciences Laboratory (Building 32) (Figure 3–1). Liquid waste containing low levels of radioactivity are generated in the course of environmental sample preparation and analysis and are discharged directly to the site sewer system. Administrative controls are in place to ensure that the radioactivity does not exceed levels established in DOE Order 5400.5, conservatively set at 1.5×10^{-7} microcuries per milliliter (µCi/mL) (5,550 microbecquerels per milliliter [µBq/mL]) at the sewer outfall.

In 2001, a complete review of all waste management practices was conducted, including disposal options for aqueous process waste streams and excess aqueous samples. The intent of the waste management review was to clarify practices where appropriate and to provide more specific direction if necessary. The Analytical Laboratory's standard practice for disposal of aqueous process wastes and excess aqueous samples was acid neutralization to meet effluent pH standards prior to discharge to the city sewer system.

As a part of this waste management review, a baseline composition of the Analytical Laboratory effluent was derived from calculations of chemicals contributed from the laboratory's analytical procedures, and also from the theoretical disposal of all aqueous client samples. Both process knowledge and analytical data were used to calculate the values. The management practices exercised by the Analytical Laboratory maintained compliance with effluent limitations on pH, radioisotopes, and total toxic organics. It was concluded, and concurred by the city, that with the exception of mercury, all discharges from the Analytical Laboratory to the city sewer system met the current local limits and all other discharge limitations contained in the City code of ordinances (Grand Junction Code, Section 38−49).

Mercury is subject to a "zero-discharge" effluent standard, which is interpreted by the City as less than 0.2 micrograms per liter. Prior to analyzing for mercury, the laboratory prepared a process-specific analysis of all waste streams that were generated during mercury analysis, and determined the management provisions for these wastes. This waste management plan for controlling potential mercury discharges to the sewer system was approved by the city (DOE 2001a and Tonello 2001).

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 Areas, 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 3–2).

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. Three additional locations within the wetland area were sampled in 2002 at the request of CDPHE; only one of additional these locations, WW-3, was sampled in 2003.

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 5–2 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.

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 Areas**.**

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.

Locations sampled and analyses conducted for the Grand Junction Site water-sampling program in 2003 are shown in Table 3–2. Analytes in Table 3–2 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 2003 analyte concentrations in samples from the Gunnison River and the on-site ponds are compared with applicable State standards in Section 5.0, Table 5–2 and Table 5–3, respectively.

Table 3–2. Grand Junction, Colorado, Site Water Sampling and Analytical Design Schedule

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, WW-3	

The elevated concentrations of selenium and other constituents do not 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 Record of Decision (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 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 generates small volumes of waste regulated under RCRA and TSCA, low-level waste (LLW), and mixed LLW (MLLW) (i.e., contaminated with radioactivity and RCRA- or TSCA-regulated constituents). Residual radioactive material is also generated in the form of excess samples and sample extracts derived from activities associated with sites regulated under Title I of Uranium Mill Tailings Radiation Control Act (UMTRCA). These wastes are stored 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.

3.4.1 RCRA-Regulated and Mixed Waste Management

Hazardous and MLLW at the site are generated primarily by the Analytical Laboratory. These wastes are stored in satellite accumulation areas and in designated hazardous waste storage areas. Hazardous wastes are shipped off the 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 spent fluorescent light tubes, light fixtures and ballasts, lead-acid batteries, and miscellaneous property and wastes resides with the site owner, the RTC.

Strict characterization and segregation requirements (waste minimization efforts) are implemented to reduce the amount of waste classified and managed as hazardous or mixed. 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 generated at the Grand Junction Site.

In 2003, the Grand Junction Site operated 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. 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.

A single shipment of RCRA-regulated waste occurred in January 2003 that totaled 2.15 kg (4.7 lb). The shipment consisted of various expired laboratory standards, waste solvents, and mercury thermometers that were lab-packed and transported for treatment and disposal by an EPA-licensed waste broker. During CY 2003, the Grand Junction Site generated a total of 87 kg (192 lb) of RCRA-regulated waste. At the end of CY 2003, 191 kg (421 lb) of RCRA-regulated waste was stored in satellite accumulation areas and waste storage areas at the Grand Junction Site.

3.4.2 PCBs and Asbestos

The Analytical Laboratory occasionally uses very small quantities of PCBs as reference standards for PCB analysis. As asbestos or PCB waste is generated, process knowledge or radiation surveys are used to determine whether the material is also contaminated with RRM and must be managed as a radioactive waste. At the Grand Junction Site:

- Nonradioactive asbestos waste is disposed of in the Mesa County Landfill.
- Radioactive asbestos is disposed of as RRM at the Grand Junction Disposal Cell.
- Nonradioactive PCB wastes are shipped off site for treatment and disposal.
- Radioactively contaminated PCB wastes are stored on site awaiting commercial disposal. If the PCB waste is contaminated with RRM, risk-based approvals for disposal at the Grand Junction Disposal Site is sought.

In January 2003, 0.35 kg (0.77 lb) of PCB waste (generated in CY 2002) was shipped off-site for treatment and disposal by an EPA-licensed waste broker. The Grand Junction Site generated just 0.01 kg of PCB waste (laboratory standards) in CY 2003, which were the only PCB wastes remaining at the site at the end of CY 2003. These wastes were shipped to an off-site disposal facility for treatment and disposal in February 2004.

3.4.3 Residual Radioactive Materials

RRM is defined by 40 CFR 192, Section 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."

Remote UMTRCA Title I-related projects and programs have sent RRM-contaminated soil and water samples to the Analytical Laboratory for analysis. Excess soil samples, soil sample extracts, and associated laboratory wastes are considered contaminated with RRM and have been disposed of at the Grand Junction Disposal Site. With the closure of the Analytical Laboratory, this source of RRM no longer exists.

Contaminated concrete and soils beneath Buildings 12 and 20 also remained on-site during CY 2003. With the closure of the Analytical Laboratory, DOE is obligated by the property transfer agreement to demolish Building 20 and dispose of all RRM-like materials at the Grand Junction Disposal Site (all non-RRM-like materials from this structure will be disposed 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 residual RRM-like materials that remains beneath Building 12. Although the Grand Junction Site is not designated under Title I of UMTRCA, the NRC-approved Remedial Action Plan for the UMTRCA Title I Grand Junction Disposal Cell specifically allows co-disposal of waste from the Grand Junction Site.

3.4.4 Low-Level Waste Management

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 generates LLW from the analysis of environmental samples received from other DOE sites. Typical LLW includes soil sample residues; excess sample materials; contaminated sand derived from the cleaning of sample grinders and blenders; laboratory debris such as planchettes, filters, latex gloves, paper wipes, and glassware; and resins used for radionuclide separation of samples from projects that are not regulated under Title I of UMTRCA. Occasionally, the Analytical Laboratory generated LLW as fluids from decontamination of treatability study equipment and excess radioactive sources.

The Grand Junction Site has implemented strict radiological characterization and segregation requirements (waste minimization efforts) 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 31 kg (68 lb) of LLW in CY 2003. The Grand Junction Site did not conduct a LLW shipment in CY 2003. At the end of CY 2003, a total of 555 kg (1,224 lb) of LLW was stored on-site (Building 61D on Figure 1–2). Included in this LLW inventory is a 55-gallon drum containing 105 kg (231 lb) of LLW generated in previous years that has not been shipped off site due to the presence of an isotope (polonium 209) that is not easily accepted by a disposal facility. LLW and MLLW are stored in a separate dedicated building to minimize exposure to workers and to isolate the materials from the environment.

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.

In January 2003, DOE shipped 22 kg (49 lb) of liquid scintillation cocktail and 3 kg (7 lb) of non-hazardous liquid chemicals for off-site disposal.

3.5.1 Source Reduction

Source reduction at the site is achieved primarily through making usable materials accessible to other sites or agencies of the federal government, material substitution, and waste segregation.

Unused or reusable materials are placed on lists that are accessible to other government agencies for their operations. Substitution involves replacing a hazardous material with a less hazardous or nonhazardous material. Examples include replacing hazardous solvents and scintillation fluids with nonhazardous substitutes.

Relatively few hazardous materials are actually used or required at the Grand Junction Site. Of the hazardous materials that are used at the site, most are required for analytical procedures associated with laboratory operations; thus, the potential for reduction through substitution is limited.

Waste segregation involves separating hazardous from nonhazardous materials, and separating radiologically contaminated materials from noncontaminated materials. Examples include use of ALARA principles to keep materials from becoming radiologically contaminated, and use of radiological surveys to segregate radioactive from nonradioactive waste.

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

3.5.2 Reuse and Recycling

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

Normal operations such as replacing batteries in electric vehicles 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 are sent to a local recycler. Approximately 16 kg (35 lb) of batteries were recycled in 2003.

The Grand Junction Site regularly recycles office paper, cardboard, glass, plastics, steel, aluminum, magazines, newspaper, and telephone books through a local recycling service. In 2003, the site recycled about 32,841 kg (72,402 lb) of these materials.

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 75.7 liters (approximately 61.3 kg or 135 lb) of used oil in 2003.

Many materials at 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 122 used computers and related items to Mesa County, Colorado, School District 51 during 2003.

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.

New and renewed purchase orders for hazardous materials at the site are reviewed before commitment of funds. 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.

End of current text

4.0 Environmental Radiological Program Information

Environmental radiological monitoring programs at the Grand Junction Site include sampling and estimation of air emissions and sampling surface water and ground water. Results of air emissions and 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

The only point-source monitoring conducted at the site during CY 2003 consisted of isokinetic sampling of radioparticulate air emissions from the Sample Plant (Building 46). With the completion of GJORAP and the removal of most residual radiological contaminants (i.e., non-point sources) from the site in 2001, environmental monitoring of radioparticulate air emissions from non-point sources was discontinued after 2001.

4.1.1 Point Source Radionuclides

For the purposes of determining compliance with the NESHAP Subpart H standard, radiological emissions from the Sample Plant point source were estimated according to guidelines in 40 CFR 61, Appendix E. Use of Appendix E as an alternative procedure relative to Section 61.93(a) of Subpart H was authorized in the *Memorandum of Understanding Between the U.S. Environmental Protection Agency and the U.S. Department of Energy concerning the Clean Air Act Emission Standards for Radionuclides, 40 CFR Part 61 Including Subparts H, I, Q, and T* (EPA 1994). Appendix E to Part 61 states that "… a facility may be found in compliance (with the standard) if the quantity of radioactive material possessed during the year is less than that listed in a table of annual possession quantities." Table 1 of Appendix E provides the "Annual Possession Quantities for Environmental Compliance" and is used for determining if a facility is in compliance with the standard.

As recommended in Appendix E of Part 61, EPA's *A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions* (EPA 1989) was used as guidance in evaluating the site's annual possession quantity of radioactive materials. According to EPA's Guidance, "…There are several approaches (for demonstrating compliance) because of the diversity of facilities regulated by the standard. The simplest methods do not estimate the radiation dose directly. Instead, they determine whether your emissions could not cause a dose greater than the standard." DOE has determined that using the possession table from Appendix E to determine compliance with the NESHAP standard is appropriate to the level of DOE's operations and activities at the Grand Junction Site. Worksheets B and E from EPA's guidance document were used to determine if quantities of individual radioisotopes exceeded their corresponding values from the possession table found in Appendix E. Table 4–1 provides a summary of the quantities of radioisotopes processed by the Sample Plant during CY 2003.

Table 4–1. Summary of Activity Levels of Materials Processed at the Grand Junction, Colorado, Site During CY 2003

Radioisotope	Quantity Possessed by DOE in CY 2003 (Ci/yr)	Annual Possession Quantity (Ci/yr) - Appendix E, Table 1
Cs-137	2.3E-08	2.3E+01
K-40	3.3E-06	6.8E+01
Ra-226	2.4E-07	5.5E+00
Th-230	3.1E-07	3.2E+00
Th-232	9.2E-08	6.0E-01
Total Activity - All Radioisotopes for CY 2003	4.0E-06	NA

Ci/yr = Curies per year; CY = calendar year

As shown in this table, none of the isotopes quantities exceeded the allowable possession quantities from Table 1 of Appendix E. This comparison demonstrates that the quantities of individual radioisotopes processed (i.e., possessed) by the Grand Junction Site during CY 2003 are several orders of magnitude below their corresponding annual possession values listed in Appendix E. Also the total (summed) activity for all radioisotopes processed at this facility during CY 2003 is well below the possession quantity allowed for *any single* radioisotope identified in Table 1 of Appendix E. Therefore, based upon the total activity of materials processed at the site during CY 2003, emissions from this facility could not cause a dose greater than the standard. The Grand Junction Site was in full compliance with the NESHAP Subpart H standard during CY 2003. No unplanned releases (i.e., airborne emissions) of radioactivity occurred at the site in 2003. Because the potential for radiological air emissions from the Analytical Laboratory and the Sample Plant no longer exists, the 2003 NESHAP Subpart H report will be the final report prepared and submitted for the Grand Junction Site.

4.2 Surface Water

4.2.1 Gunnison River

Radionuclide concentrations (i.e., uranium) in samples collected from the Gunnison River in 2003 were below the applicable standard in the CDPHE Water Quality Control Commission's Regulations 31 and 35 (surface water quality standards). Historical and 2003 maximum uranium concentrations in the Gunnison River are presented and compared with the applicable surface water quality standard in Section 5.2, Table 5–2. Appendix A presents the Gunnison River surface water sampling results for 2003.

Uranium concentrations in 2003 were relatively consistent with previous sampling results. Uranium results were well below the 40 picocuries per liter (pCi/L) standard (Section 5.3, Table 5–2). 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 total uranium. Appendix B shows uranium concentrations measured from January 1992 through January 2003. Appendix A shows uranium reported for the downstream location (Lower Gunnison) and the location adjacent to the site (Upper Mid-Gunnison) in CY 2003. 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. Gross beta was below detection limits; gross alpha was near its detection limit.

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. Appendix A presents the North Pond, South Pond, and the Wetland Area surface water sampling results for 2003. The uranium surface water quality standard used for the Gunnison River samples (40 pCi/L) (0.058 mg/L)[2] was used to evaluate uranium concentrations in samples from the North Pond, South Pond, and all wetland locations. Concentrations of uranium in all samples collected from the site surface water locations (i.e., the North Pond, South Pond, and the wetland locations) exceeded the Gunnison River standard in 2003. The maximum uranium concentration of 1,461 pCi/L (2.13 mg/L) was detected in the sample from wetland location WW-3. Uranium concentrations in the North Pond, South Pond, and the Wetland Area samples are presented and compared with the applicable surface water quality standard in Section 5.3, Table 5–3. Appendix B shows time-concentration plots of uranium concentrations versus time in the North Pond, South Pond, and the Wetland Area.

The North Pond, South Pond, and Wetland Area samples were 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 concentrations. 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 2003 surface water results are compared to historical maximum concentrations (Table 5–3), 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 Record of Decision (DOE 1990). UMTRCA Title I was found to be relevant and appropriate at the Grand Junction Site (DOE 1990).

Any exceedances observed in the on-site ground-water or surface-water sampling program are not expected to have any 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).

[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.

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* (DOE 2001) 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 2003, the Grand Junction Site conducted routine monitoring of nonradiological air emissions from the Analytical Laboratory, and collected samples of nonradiological analytes in the ground water and surface water. This section presents analytical results of nonradiological air emissions monitoring and 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 2003.

5.1 Nonradiological Air Emissions

An assessment of nonradiological air emissions at the Grand Junction Site includes monitoring of opacity if required, annual chemical consumption, and annual quantity of soil processed by the Sample Plant.

No observations of visible emissions (opacity) from facility stationary sources were required in 2003.

5.1.1 Permitted Releases

The annual record of chemical consumption by the Analytical Laboratory, required by Air Emission Permit No. 90ME402–1, is summarized in Table 5–1. Chemical consumption by the Analytical Laboratory was calculated from 2003 purchase records and inventory quantities. As shown in Table 5–1, the actual consumption rates for all listed chemicals were well below the allowable annual chemical consumption rates specified in the emission permit.

The quantity of soil processed by the Sample Plant during CY 2003 was 20 lbs, which is 0.02 percent of the permitted annual quantity of 66 tons stated in the APEN/permit exemption. The records of chemical consumption and quantity of soil processed demonstrate that no limits were exceeded in 2003.

Table 5–1. Annual Chemical Consumption by the Analytical Laboratory During CY 2003

Chemical	Permitted Annual Consumption	Actual Annual Consumption in CY 2003	Percent of Permitted Annual Consumption
Acids	900 gal. (3,407 L)	207.7 gal. (786.2 L)	23.1
Volatile Organic Compounds	2,000 gal. (7,570 L)	76.3 gal. (288.8 L)	3.8
Benzene	13 gal. (49 L)	1.1 gal. (4.2 L)	8.5

gal. = gallon(s); L = liter(s)

5.2 Nonradiological Surface Water Sampling and Analysis

5.2.1 Gunnison River

Nonradiological analyte concentrations in samples from the Gunnison River in 2003, with the exception of manganese and selenium, were below or within acceptable ranges of applicable

State standards. However, sulfate at the Lower Gunnison sampling location was very close to the surface water standard (476 mg/L compared with the standard of 480 mg/L). Historical and 2003 maximum analyte concentrations in the Gunnison River are presented and compared with current applicable State standards in Table 5–2. This table also contains analytical results for several constituents that are not presented in Table 5–2 because surface water quality standards currently do not exist for these constituents. Appendix A presents the Gunnison River surface water sampling results for 2003.

Table 5–2. Comparison of State Surface-Water Quality Standards to 2003 and Historical Maximum Concentrations in the Gunnison River[a,b]

		2003 Results		Historical Maximum[c]		
Constituent	**State Standard**	**Adjacent to Site (Upper Mid Gunnison)**	**Downgradient (Lower Gunnison)**	**Upgradient**	**Adjacent to Site**	**Downgradient**
Common Ions (mg/L)						
Chloride	250	12.7	18.3	12.4	12.6	80
Sulfate	480	444	476	513	512	584
Field Measurements						
pH	<6.5 or >9.0	8.27	8.24	7.20-9.04	7.29-9.19	7.33-9.01
Metals (mg/L)[d]						
Arsenic	0.05	0.0007	0.0007	0.011	0.0086	0.011
Chromium+6[e]	0.011	<0.0008	<0.0008	0.0092	0.0123	0.0057
Manganese	0.050	0.0491	0.0945	0.2	0.0766	0.122
Selenium	0.006[f]	0.0116	0.0114	0.0096	0.014	0.0148
Radiological (pCi/L)						
Uranium[g]	40	6.9	10.2	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 2003.
[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 µg/L to 6 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/milligram (mg), which assumes average relative abundance among uranium isotopes.
mg/L = milligram(s) per liter; pCi/L = picoCuries per liter.

Manganese and selenium were the only constituents reported in samples collected from the Gunnison River in 2003 with concentrations that exceeded a surface water standard, though sulfate in the Lower Gunnison location was very close to the standard. The manganese concentration in the sample collected from the Lower Gunnison location was 0.0945 mg/L, which exceeds the standard of 0.05 mg/L. Selenium concentrations measured in samples collected from both Gunnison River locations exceeded the standard of 0.006 mg/L (Table 5–2). 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 are expected, particularly during low flows of the Gunnison River in drought conditions, which have occurred for the last several years.

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 2003 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 2003 were below or 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 North Pond, South Pond, and Wetland Area. Appendix A presents the 2003 sampling results for these surface water analytes.

Chloride, manganese, selenium, and sulfate values in samples collected from the North Pond, South Pond, and wetland locations in 2003 exceeded surface water quality standards for those analytes in at least one location. Table 5–3 shows 2003 locations where concentrations of these constituents (along with uranium) exceed State standards and are compared with historical maximum values. Appendix B shows time-concentration plots for manganese, molybdenum, and selenium. Future sampling of the North Pond, South Pond and Wetland Area will continue to monitor these constituents.

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. All on-site wetland areas support a thriving and healthy ecosystem consisting of abundant fish, wildlife, and vegetation.

Table 5–3. On-site Grand Junction, Colorado, Site Surface-Water Locations with Concentrations that Exceeded Gunnison River Standards in January 2003

Analyte	Standard[a,b]	Historical Maximum Location (Concentration)[b]	2003 Locations Exceeding Standard (Concentration)[b]
Chloride	250	Wetland Area (3,830)	North Pond (498), Wetland Area (368), WW-3 (664)
Manganese	0.05	South Pond (3.86)	South Pond (0.0687), Wetland Area (0.113)
Selenium	0.006	South Pond (0.064)	North Pond (0.0085), Wetland Area (0.0231), WW-3 (0.0316)
Sulfate	480	Wetland Area (45,200)	North Pond (3,770), South Pond (1,220), Wetland Area (2,970), WW-3 (5,190)
Uranium[c]	40	South Pond (13,053)	North Pond (381), South Pond (251), Wetland Area (1,319), WW-3 (1,463)

[a]Standards are CDPHE Water Quality Control Commission surface water standards, Regulation 31 and 35, both effective February 20, 2002.
[b]Units are in milligrams per liter (mg/L), except for uranium, which is reported in picoCuries per liter, or 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.

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 2003 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.

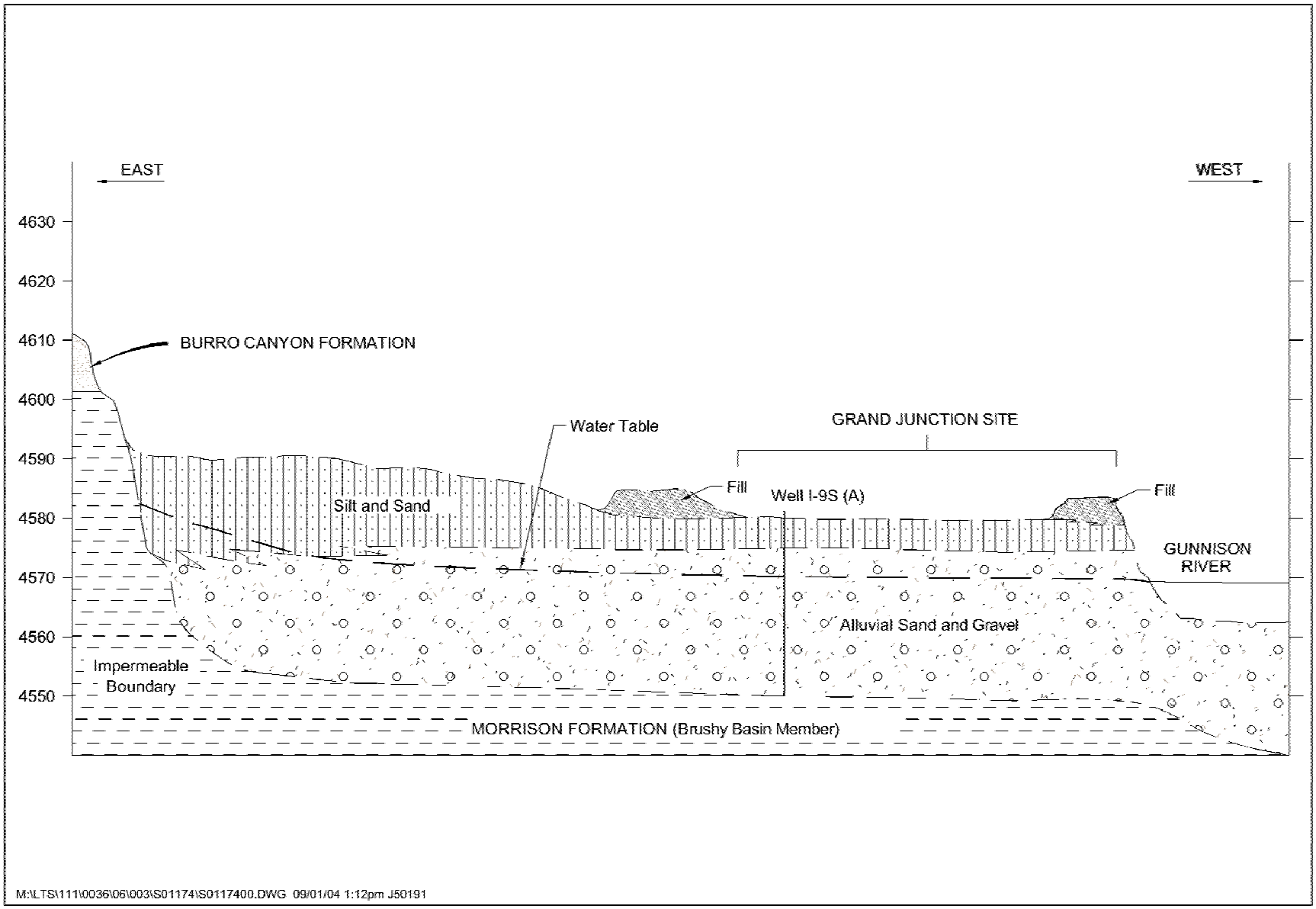

Figure 6–1. Typical Geologic Cross Section of the Alluvial Aquifer Underneath the Grand Junction, Colorado, Site

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.

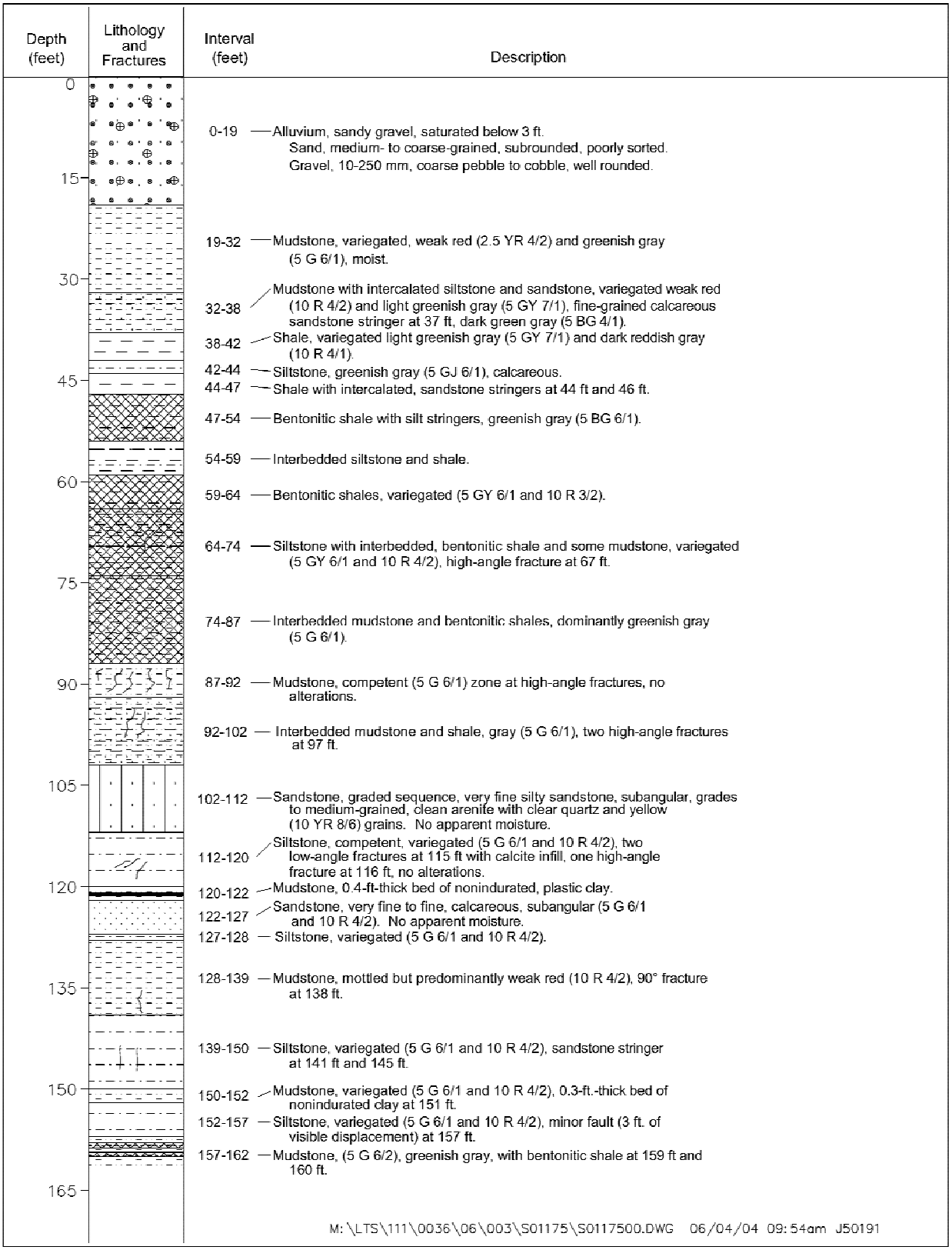

Figure 6–2. Typical Stratigraphic Column at the Grand Junction, Colorado, Site

6.2 Ground Water Sampling and Analysis

In 2003, 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 Record of Decision (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.

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 6 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 2003 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 GJO Projects* (DOE 2002). The ground water monitoring program is detailed in the Environmental Monitoring Plan (DOE 2001b).

Monitor wells sampled and the constituents analyzed are summarized in Table 3–2. 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 2003 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 or µg/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 UMTRA 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 µg/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 <u>total</u> 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 2003, 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 2003 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.

Table 6–1. Grand Junction, Colorado, Site Wells with Sample Concentrations that Exceeded Ground Water Standards in January 2003

Analyte	Standard[a]	Wells Exceeding Standards (Concentration[a])
Molybdenum	0.1	14-13NA (0.192), 8-4S (0.229), GJ01-01 (0.162), GJ84-04 (0.104)
Selenium	0.01	6-2N (0.113), 8-4S (0.0364), GJ01-01 (0.0615)
Total Dissolved Solids[b]	2,210	10-19N (4,700), 14-13NA (2,660), 8-4S (2,770)
Uranium-234 + 238[c] (pCi/L)	30	10-19N (167), 11-1S (79), 14-13NA (254),6-2N (176), 8-4S (328), GJ01-01 (304),GJ01-02 (139), GJ84-04 (104)
Uranium (µg/L)	44	10-19N (249), 11-1S (118), 14-13NA (379),6-2N (262), 8-4S (489), GJ01-01 (453),GJ01-02 (207), GJ84-04 (155)

[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 µg/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; µg/L = micrograms per liter.

Analytical results of samples collected from ground water monitoring wells in 2003 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 State standards.

To date, 24 ground water sampling events have been conducted since remediation of open-land areas was completed. Time-concentration plots in Appendix B of uranium and molybdenum values from well GJ84–04 indicate aquifer cleanup is progressing.

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 2003 (8 of 8 wells) (Appendix A and Appendix B). No background wells were sampled in 2003. The highest uranium concentration measured in 2003, 489 µg/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 2003 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 2003 and Historical Maximum Concentrations in the Alluvial Aquifer

Constituent	Federal/State Standard	2003 Maximum[a]		Historical Maximum[d]		
		On-Site	Downgradient (GJ84-04)	Upgradient	On-Site	Downgradient
Common Ions (mg/L)						
Nitrate[e]	44.27[b]	40	n/a	7	308	16
Total Dissolved Solids[f]	2,210[c]	4,700	1880	2,180	10,200	8,620
Metals (mg/L)						
Arsenic	0.05[b]	0.0092	0.0097	0.0114	0.68	0.031
Chromium	0.05[b]	<0.0008	<0.0008	0.010	0.039	0.112
Molybdenum	0.1[b]	0.229	0.104	0.023	19.	0.413
Selenium	0.01[b]	0.113	<0.0001	0.0025	0.685	0.05
Uranium (µg/L)	44[b,j]	489	155	34	9,000	1,500
Radiological (pCi/L)						
Net Alpha (Gross Alpha excluding radon and uranium)[g]	15[b,c]	83	0[h]	71.02	1,073.14	620.52
Uranium-234+238	30[b]	328	104	22.77	6,039	1,006.5

[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 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 0.671 pCi/µg.
[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 Site Environmental Reports. In 2002, the standard was not exceeded in any ground water samples collected. In 2003, two wells exceeded the net alpha standard (8-4S and GJ01-01) using a conversion factor of 0.687 pCi/µg. If a 1:1 mass:activity factor is used (µg:pCi), all net alpha values are below the standard.

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) and the single downgradient well (GJ84−04) sampled in 2003 contained concentrations of molybdenum in excess of the UMTRCA ground water standard of 0.1 mg/L (Table 6–1). The highest concentration (0.229 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 from this sampling event (0.104 mg/L) is essentially at the standard of 0.10 mg/L. One exception to the trend of decreasing concentrations is well 14-13NA, which has had consistent molybdenum concentrations above the standard since surface remediation was completed. Time-concentration graphs of molybdenum in wells 10-19N, 11-1S, 14-13NA, 6-2N, 804S, 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 Site Environmental Reports. None of the eight wells sampled during 2003 had arsenic concentrations that exceeded this standard. Historical data for this analyte in the alluvial aquifer is provided in previous Site Environmental Reports.

Selenium concentrations exceeded the UMTRCA standard of 0.01 mg/L in samples from three of seven on-site wells in 2003 (Table 6–1). The highest selenium concentration, 0.113 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 2002. 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 current concentrations are an order of magnitude lower than the concentrations measured prior to and during soil remediation at the Grand Junction Site.

Nitrate concentrations did not exceed the UMTRCA and State ground water standard of 44 mg/L (as nitrate) in ground water samples collected in 2003. The maximum nitrate concentration of 40 mg/L was measured in a sample from on-site well 8-4S. Nitrate concentrations measured in the alluvial aquifer have not exceeded the standard since 2000.

In 2003, concentrations of total dissolved solids exceeded the aquifer-specific State standard of 2,210 mg/L (1.25 times background) in samples from four of seven on-site wells (10−19N, 14−13NA, 6−2N, and 8-4S). Downgradient well (GJ84−04) was below the standard (Table 6–1). The highest dissolved solids concentration recorded in 2003 (4,700 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 Quality Assurance

The quality assurance (QA) Program provides a structured approach for the application of QA principles to work performed for DOE and was implemented through the *Quality Assurance Manual* (STO 1). The *Quality Assurance Manual* includes the requirements of DOE Order 414.1A, *Quality Assurance,* and refers to documents that implement the QA Program. All work conducted by the TAC follows the QA Program and implementing plans and procedures.

7.1 Sampling

Strategies and objectives for effluent monitoring and environmental sampling at the Grand Junction Site are described in the *Environmental Monitoring Plan* (DOE 2001b). Procedures in the *Environmental Procedures Manual* (STO 6) address field quality control, sampling methods, sample identification, chain-of-custody, equipment calibration, and independent data verification. Specific instructions are further addressed by the organizations responsible for the work performed when needed.

7.2 Laboratory Analysis

The TAC ensures high-quality analytical data that meet environmental monitoring program requirements by using analytical services of qualified laboratories. Laboratories are qualified under the Environmental Management Consolidated Audit Program (EM, Utah Department of Health Certification and participation in proficiency testing programs. Laboratories are required to maintain and implement a documented QA plan, employ technically competent staff, maintain suitable facilities and equipment, and follow written procedures. The TAC continually evaluates the quality of the data received from the laboratories.

The Grand Junction Site Analytical Chemistry Laboratory provided analytical services for environmental monitoring through October 2003, at which time the laboratory was closed. The Analytical Chemistry Laboratory implemented sound quality assurance practices through the *Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures* (DOE [current version]) and the *Analytical Chemistry Laboratory Handbook of Analytical and Sample-Preparation Procedures* (DOE [current version]).

Following closure of the Grand Junction Site Analytical Chemistry Laboratory, analytical services were subcontracted to qualified laboratories. The laboratories underwent a formal evaluation to determine the ability to meet the same level of analytical quality as that previously provided by the on-site laboratory.

7.3 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 Environmental Services working file index implement applicable records regulations.

The Sample Coordinator ensures that the laboratory has all the pertinent information, the samples are shipped, the proper analyses requested, and that the report and electronic data are received as requested. Laboratory analytical results of environmental samples are received electronically into an Oracle database. These data are maintained, protected, and archived by the Information Management group. Data validation is performed by the sampling organization.

8.0 References

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5 CCR 1002−31, Colorado Department of Public Health and Environment, "Basic Standards and Methodologies for Surface Water," *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*.

10 CFR 1021, U.S. Department of Energy, "Compliance with the National Environmental Policy Act," *Code of Federal Regulations.*

36 CFR 800. National Park Service, "Protection of Historic and Cultural Properties," *Code of Federal 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 9, 141, and 142. U.S. Environmental Protection Agency, "National Primary Drinking Water Regulations," *Code of Federal Regulations.*

40 CFR 61, U.S. Environmental Protection Agency, "National Emission Standards for Hazardous Air Pollutants," *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 141, U.S. Environmental Protection Agency, "National Primary Drinking Water Regulations," (as amended by the State Drinking Water Act), *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.*

40 CFR 300, U.S. Environmental Protection Agency, "Superfund, Emergency Planning, and Community Right-to-know Programs," *Code of Federal Regulations.*

40 CFR 700, U.S. Environmental Protection Agency, "Toxic Substances Control Act," *Code of Federal Regulations*.

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

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: 8/31/2004 4:25 pm

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	01/06/2003	0001		O	376		F	#	-	-
	mg/L	11-1S	WL	01/06/2003	0001		O	228		F	#	-	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	207		F	#	-	-
	mg/L	6-2N	WL	01/08/2003	0001		O	251		F	#	-	-
	mg/L	8-4S	WL	01/06/2003	0001		O	285		F	#	-	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		285		F	#	-	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		316		F	#	-	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	165		F	#	-	-
Arsenic	mg/L	10-19N	WL	01/06/2003	0001		O	0.00099	B	F	#	0.0001	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.00045	B	F	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	0.0092		F	#	0.0001	-
	mg/L	6-2N	WL	01/08/2003	0001		O	0.0012	B	F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.0011	B	F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.001	B	F	#	0.0001	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.0058		F	#	0.0001	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		0.0043	B	F	#	0.0001	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	0.0097		F	#	0.0001	-
Chloride	mg/L	10-19N	WL	01/06/2003	0001		O	313.000		F	#	2.005	-
	mg/L	11-1S	WL	01/06/2003	0001		O	12.300		F	#	0.2005	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	125.000		F	#	0.802	-
	mg/L	6-2N	WL	01/08/2003	0001		O	72.300		F	#	0.802	-
	mg/L	8-4S	WL	01/06/2003	0001		O	113.000		F	#	0.802	-
	mg/L	8-4S	WL	01/06/2003	0002		O	113.000		F	#	0.802	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		60.600		F	#	0.401	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		73.200		F	#	0.2005	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	65.400		F	#	0.802	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

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
Chromium	mg/L	10-19N	WL	01/06/2003	0001		O	0.0008	U	F	#	0.0008	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.0008	U	F	#	0.0008	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	0.0008	U	F	#	0.0008	-
	mg/L	6-2N	WL	01/08/2003	0001		O	0.0008	U	F	#	0.0008	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.0008	U	F	#	0.0008	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.0008	U	F	#	0.0008	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.0008	U	F	#	0.0008	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		0.0008	U	F	#	0.0008	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	0.0008	U	F	#	0.0008	-
Gross Alpha	pCi/L	10-19N	WL	01/06/2003	0001		O	149.51		F	#	30.05	± 28.7
	pCi/L	11-1S	WL	01/06/2003	0001		O	69.11		F	#	6.28	± 8.14
	pCi/L	14-13NA	WL	01/07/2003	0001		O	197.69		F	#	18.37	± 23.5
	pCi/L	6-2N	WL	01/08/2003	0001		O	183.85		F	#	13.95	± 19.5
	pCi/L	8-4S	WL	01/06/2003	0001		O	308.04		F	#	18.25	± 28.4
	pCi/L	8-4S	WL	01/06/2003	0002		O	353.42		F	#	18.29	± 30.3
	pCi/L	GJ01-01	WL	01/07/2003	0001	AL		393.92		F	#	10.03	± 23.4
	pCi/L	GJ01-02	WL	01/08/2003	0001	AL		150.64		F	#	7.81	± 12.9
	pCi/L	GJ84-04	WL	01/06/2003	0001		D	99.82		F	#	12.04	± 13.9
Gross Beta	pCi/L	10-19N	WL	01/06/2003	0001		O	49.41		F	#	28.37	± 18.1
	pCi/L	11-1S	WL	01/06/2003	0001		O	16.92		F	#	6.18	± 4.16
	pCi/L	14-13NA	WL	01/07/2003	0001		O	76.71		F	#	18.5	± 13.2
	pCi/L	6-2N	WL	01/08/2003	0001		O	45.76		F	#	13.38	± 9.29
	pCi/L	8-4S	WL	01/06/2003	0001		O	70.06		F	#	18.91	± 13.2
	pCi/L	8-4S	WL	01/06/2003	0002		O	85.26		F	#	19.07	± 13.8
	pCi/L	GJ01-01	WL	01/07/2003	0001	AL		72.23		F	#	10.24	± 8.10
	pCi/L	GJ01-02	WL	01/08/2003	0001	AL		35.81		F	#	7.38	± 5.44

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

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	01/06/2003	0001		D	29.41		F	#	11.49	± 7.67
Manganese	mg/L	10-19N	WL	01/06/2003	0001		O	0.529		F	#	0.0001	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.204		F	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	3.990		F	#	0.0001	-
	mg/L	6-2N	WL	01/08/2003	0001		O	1.250		F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.652		F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.633		F	#	0.0001	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.548		F	#	0.0001	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		2.510		F	#	0.0001	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	2.500		F	#	0.0001	-
Molybdenum	mg/L	10-19N	WL	01/06/2003	0001		O	0.0678		F	#	0.0018	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.0197		F	#	0.0018	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	0.192		F	#	0.0018	-
	mg/L	6-2N	WL	01/08/2003	0001		O	0.0468		F	#	0.0018	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.229		F	#	0.0018	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.229		F	#	0.0018	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.162		F	#	0.0018	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		0.037		F	#	0.0018	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	0.104		F	#	0.0018	-
Nitrate as NO3	mg/L	6-2N	WL	01/08/2003	0001		O	39.400		FJ	#	0.02	-
	mg/L	8-4S	WL	01/06/2003	0001		O	40.800		FJ	#	0.02	-
	mg/L	8-4S	WL	01/06/2003	0002		O	30.500		FJ	#	0.02	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		31.600		FJ	#	0.02	-
Oxidation Reduction Potent	mV	10-19N	WL	01/06/2003	N001		O	178		F	#	-	-
	mV	11-1S	WL	01/06/2003	N001		O	204		F	#	-	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

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
Oxidation Reduction Potent	mV	14-13NA	WL	01/07/2003	N001		O	197		F	#	-	-
	mV	6-2N	WL	01/08/2003	N001		O	221		F	#	-	-
	mV	8-4S	WL	01/06/2003	N001		O	217		F	#	-	-
	mV	GJ01-01	WL	01/07/2003	N001	AL		233		F	#	-	-
	mV	GJ01-02	WL	01/08/2003	N001	AL		-20.1		F	#	-	-
	mV	GJ84-04	WL	01/06/2003	N001		D	137		F	#	-	-
pH	s.u.	10-19N	WL	01/06/2003	N001		O	7.12		F	#	-	-
	s.u.	11-1S	WL	01/06/2003	N001		O	7.16		F	#	-	-
	s.u.	14-13NA	WL	01/07/2003	N001		O	7.19		F	#	-	-
	s.u.	6-2N	WL	01/08/2003	N001		O	7.57		F	#	-	-
	s.u.	8-4S	WL	01/06/2003	N001		O	7.04		F	#	-	-
	s.u.	GJ01-01	WL	01/07/2003	N001	AL		7.33		F	#	-	-
	s.u.	GJ01-02	WL	01/08/2003	N001	AL		7.36		F	#	-	-
	s.u.	GJ84-04	WL	01/06/2003	N001		D	7.23		F	#	-	-
Selenium	mg/L	10-19N	WL	01/06/2003	0001		O	0.0015	B	F	#	0.0001	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.00073	B	F	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	0.00031	B	F	#	0.0001	-
	mg/L	6-2N	WL	01/08/2003	0001		O	0.113		F	#	0.001	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.0364		F	#	0.0005	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.0344		F	#	0.0005	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.0615		F	#	0.001	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		0.00034	B	F	#	0.0001	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	0.0001	B	F	#	0.0001	-
Specific Conductance	umhos/cm	10-19N	WL	01/06/2003	N001		O	5441		F	#	-	-
	umhos/cm	11-1S	WL	01/06/2003	N001		O	1235		F	#	-	-
	umhos/cm	14-13NA	WL	01/07/2003	N001		O	3202		F	#	-	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Specific Conductance	umhos/cm	6-2N	WL	01/08/2003	N001		O	2660		F	#	-	-
	umhos/cm	8-4S	WL	01/06/2003	N001		O	3075		F	#	-	-
	umhos/cm	GJ01-01	WL	01/07/2003	N001	AL		1912		F	#	-	-
	umhos/cm	GJ01-02	WL	01/08/2003	N001	AL		1573		F	#	-	-
	umhos/cm	GJ84-04	WL	01/06/2003	N001		D	2418		F	#	-	-
Sulfate	mg/L	10-19N	WL	01/06/2003	0001		O	2470.000		F	#	1.97	-
	mg/L	11-1S	WL	01/06/2003	0001		O	438.000		F	#	0.197	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	1460.000		F	#	0.788	-
	mg/L	6-2N	WL	01/08/2003	0001		O	1140.000		F	#	0.788	-
	mg/L	8-4S	WL	01/06/2003	0001		O	1470.000		F	#	0.788	-
	mg/L	8-4S	WL	01/06/2003	0002		O	1480.000		F	#	0.788	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		642.000		F	#	0.394	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		422.000		F	#	0.197	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	1060.000		F	#	0.788	-
Temperature	C	10-19N	WL	01/06/2003	N001		O	14.6		F	#	-	-
	C	11-1S	WL	01/06/2003	N001		O	15.1		F	#	-	-
	C	14-13NA	WL	01/07/2003	N001		O	14.5		F	#	-	-
	C	6-2N	WL	01/08/2003	N001		O	17.2		F	#	-	-
	C	8-4S	WL	01/06/2003	N001		O	12.8		F	#	-	-
	C	GJ01-01	WL	01/07/2003	N001	AL		16.48		F	#	-	-
	C	GJ01-02	WL	01/08/2003	N001	AL		13.7		F	#	-	-
	C	GJ84-04	WL	01/06/2003	N001		D	13.6		F	#	-	-
Total Dissolved Solids	mg/L	10-19N	WL	01/06/2003	0001		O	4700		F	#	10	-
	mg/L	11-1S	WL	01/06/2003	0001		O	945		F	#	10	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	2660		F	#	10	-
	mg/L	6-2N	WL	01/08/2003	0001		O	2150		F	#	10	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

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	8-4S	WL	01/06/2003	0001		O	2770		F	#	10	-
	mg/L	8-4S	WL	01/06/2003	0002		O	2740		F	#	10	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		1460		F	#	10	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		1100		F	#	10	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	1880		F	#	10	-
Turbidity	NTU	10-19N	WL	01/06/2003	N001		O	8.87		F	#	-	-
	NTU	11-1S	WL	01/06/2003	N001		O	7.8		F	#	-	-
	NTU	14-13NA	WL	01/07/2003	N001		O	2.75		F	#	-	-
	NTU	6-2N	WL	01/08/2003	N001		O	0.62		F	#	-	-
	NTU	8-4S	WL	01/06/2003	N001		O	4.27		F	#	-	-
	NTU	GJ01-01	WL	01/07/2003	N001	AL		2.81		F	#	-	-
	NTU	GJ01-02	WL	01/08/2003	N001	AL		8.67		F	#	-	-
	NTU	GJ84-04	WL	01/06/2003	N001		D	3.25		F	#	-	-
Uranium	mg/L	10-19N	WL	01/06/2003	0001		O	0.249		F	#	0.0001	-
	mg/L	11-1S	WL	01/06/2003	0001		O	0.118		F	#	0.0001	-
	mg/L	14-13NA	WL	01/07/2003	0001		O	0.379		F	#	0.0001	-
	mg/L	6-2N	WL	01/08/2003	0001		O	0.262		F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0001		O	0.472		F	#	0.0001	-
	mg/L	8-4S	WL	01/06/2003	0002		O	0.489		F	#	0.0001	-
	mg/L	GJ01-01	WL	01/07/2003	0001	AL		0.453		F	#	0.0001	-
	mg/L	GJ01-02	WL	01/08/2003	0001	AL		0.207		F	#	0.0001	-
	mg/L	GJ84-04	WL	01/06/2003	0001		D	0.155		F	#	0.0001	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 4:25 pm

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 #1/1/2003# and #1/1/2004#

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.

End of current table

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 6:17 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3	mg/L	Lower Gunnison	01/07/2003	0001	159			#	-	-
	mg/L	North Pond	01/07/2003	0001	163			#	-	-
	mg/L	South Pond	01/07/2003	0001	98			#	-	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	164			#	-	-
	mg/L	Wetland Area	01/07/2003	0001	253			#	-	-
	mg/L	WW-3	01/07/2003	0001	307			#	-	-
Arsenic	mg/L	Lower Gunnison	01/07/2003	0001	0.0007		B	#	0.0001	-
	mg/L	North Pond	01/07/2003	0001	0.0017		B	#	0.0001	-
	mg/L	South Pond	01/07/2003	0001	0.0014		B	#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.0007		B	#	0.0001	-
	mg/L	Wetland Area	01/07/2003	0001	0.0008		B	#	0.0001	-
	mg/L	WW-3	01/07/2003	0001	0.0029		B	#	0.0001	-
Chloride	mg/L	Lower Gunnison	01/07/2003	0001	18.300			#	0.2005	-
	mg/L	North Pond	01/07/2003	0001	498.000			#	2.005	-
	mg/L	South Pond	01/07/2003	0001	95.800			#	0.802	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	12.700			#	0.2005	-
	mg/L	Wetland Area	01/07/2003	0001	368.000			#	2.005	-
	mg/L	WW-3	01/07/2003	0001	664.000			#	2.005	-
Chromium	mg/L	Lower Gunnison	01/07/2003	0001	0.0008		U	#	0.0008	-
	mg/L	North Pond	01/07/2003	0001	0.0008		U	#	0.0008	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 6:17 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Chromium	mg/L	South Pond	01/07/2003	0001	0.0008	U		#	0.0008	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.0008	U		#	0.0008	-
	mg/L	Wetland Area	01/07/2003	0001	0.0008	U		#	0.0008	-
	mg/L	WW-3	01/07/2003	0001	0.0008	U		#	0.0008	-
Gross Alpha	pCi/L	Lower Gunnison	01/07/2003	0001	6.63			#	6.24	± 4.08
	pCi/L	North Pond	01/07/2003	0001	322.39			#	45.29	± 49.2
	pCi/L	South Pond	01/07/2003	0001	199.67			#	13.92	± 20.1
	pCi/L	Upper Mid Gunnison	01/07/2003	0001	7.39			#	6.07	± 4.06
	pCi/L	Wetland Area	01/07/2003	0001	1436.48			#	48.44	± 98.0
	pCi/L	WW-3	01/07/2003	0001	1320.13			#	60.54	± 105.
Gross Beta	pCi/L	Lower Gunnison	01/07/2003	0001	5.96	U		#	5.96	± 3.52
	pCi/L	North Pond	01/07/2003	0001	140.6			#	45.61	± 31.2
	pCi/L	South Pond	01/07/2003	0001	74.25			#	13.43	± 10.2
	pCi/L	Upper Mid Gunnison	01/07/2003	0001	5.95	U		#	5.95	± 3.58
	pCi/L	Wetland Area	01/07/2003	0001	379.15			#	49.55	± 40.2
	pCi/L	WW-3	01/07/2003	0001	429.15			#	60.32	± 48.3
Manganese	mg/L	Lower Gunnison	01/07/2003	0001	0.0945			#	0.0001	-
	mg/L	North Pond	01/07/2003	0001	0.0425			#	0.0001	-
	mg/L	South Pond	01/07/2003	0001	0.0687			#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.0491			#	0.0001	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 6:17 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Manganese	mg/L	Wetland Area	01/07/2003	0001	0.113			#	0.0001	-
	mg/L	WW-3	01/07/2003	0001	0.0256			#	0.0001	-
Molybdenum	mg/L	Lower Gunnison	01/07/2003	0001	0.0019 B		U	#	0.0018	-
	mg/L	North Pond	01/07/2003	0001	0.0248			#	0.0018	-
	mg/L	South Pond	01/07/2003	0001	0.101			#	0.0018	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.0037 B			#	0.0018	-
	mg/L	Wetland Area	01/07/2003	0001	0.494			#	0.0018	-
	mg/L	WW-3	01/07/2003	0001	0.694			#	0.0018	-
Oxidation Reduction Potent	mV	Lower Gunnison	01/07/2003	N001	232			#	-	-
	mV	North Pond	01/07/2003	N001	236			#	-	-
	mV	South Pond	01/07/2003	N001	246			#	-	-
	mV	Upper Mid Gunnison	01/07/2003	N001	220			#	-	-
	mV	Wetland Area	01/07/2003	N001	242			#	-	-
	mV	WW-3	01/07/2003	N001	246			#	-	-
pH	s.u.	Lower Gunnison	01/07/2003	N001	8.24			#	-	-
	s.u.	North Pond	01/07/2003	N001	7.46			#	-	-
	s.u.	South Pond	01/07/2003	N001	8.28			#	-	-
	s.u.	Upper Mid Gunnison	01/07/2003	N001	8.27			#	-	-
	s.u.	Wetland Area	01/07/2003	N001	7.38			#	-	-
	s.u.	WW-3	01/07/2003	N001	7.84			#	-	-
Selenium	mg/L	Lower Gunnison	01/07/2003	0001	0.0114			#	0.0001	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 6:17 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Selenium	mg/L	North Pond	01/07/2003	0001	0.0085			#	0.0001	-
	mg/L	South Pond	01/07/2003	0001	0.001	B		#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.0116			#	0.0001	-
	mg/L	Wetland Area	01/07/2003	0001	0.0231			#	0.0002	-
	mg/L	WW-3	01/07/2003	0001	0.0316			#	0.0005	-
Specific Conductance	umhos/cm	Lower Gunnison	01/07/2003	N001	1254			#	-	-
	umhos/cm	North Pond	01/07/2003	N001	7422			#	-	-
	umhos/cm	South Pond	01/07/2003	N001	2736			#	-	-
	umhos/cm	Upper Mid Gunnison	01/07/2003	N001	1215			#	-	-
	umhos/cm	Wetland Area	01/07/2003	N001	8718			#	-	-
	umhos/cm	WW-3	01/07/2003	N001	8777			#	-	-
Sulfate	mg/L	Lower Gunnison	01/07/2003	0001	476.000			#	0.197	-
	mg/L	North Pond	01/07/2003	0001	3770.000			#	1.97	-
	mg/L	South Pond	01/07/2003	0001	1220.000			#	0.788	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	444.000			#	0.197	-
	mg/L	Wetland Area	01/07/2003	0001	2970.000			#	1.97	-
	mg/L	WW-3	01/07/2003	0001	5190.000			#	3.94	-
Temperature	C	Lower Gunnison	01/07/2003	N001	4.2			#	-	-
	C	North Pond	01/07/2003	N001	5.3			#	-	-
	C	South Pond	01/07/2003	N001	2.8			#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 8/31/2004 6:17 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB	DATA	QA	DETECTION LIMIT	UN-CERTAINTY
Temperature	C	Upper Mid Gunnison	01/07/2003	N001	5.6			#	-	-
	C	Wetland Area	01/07/2003	N001	5.6			#	-	-
	C	WW-3	01/07/2003	N001	3.6			#	-	-
Total Dissolved Solids	mg/L	Lower Gunnison	01/07/2003	0001	982			#	10	-
	mg/L	North Pond	01/07/2003	0001	6680			#	10	-
	mg/L	South Pond	01/07/2003	0001	2160			#	10	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	927			#	10	-
	mg/L	Wetland Area	01/07/2003	0001	6950			#	10	-
	mg/L	WW-3	01/07/2003	0001	9400			#	10	-
Turbidity	NTU	Lower Gunnison	01/07/2003	N001	15.4			#	-	-
	NTU	North Pond	01/07/2003	N001	3.34			#	-	-
	NTU	Upper Mid Gunnison	01/07/2003	N001	9.61			#	-	-
	NTU	Wetland Area	01/07/2003	N001	3.1			#	-	-
	NTU	WW-3	01/07/2003	N001	2.99			#	-	-
Uranium	mg/L	Lower Gunnison	01/07/2003	0001	0.0148			#	0.0001	-
	mg/L	North Pond	01/07/2003	0001	0.554			#	0.0001	-
	mg/L	South Pond	01/07/2003	0001	0.365			#	0.0001	-
	mg/L	Upper Mid Gunnison	01/07/2003	0001	0.010			#	0.0001	-
	mg/L	Wetland Area	01/07/2003	0001	1.920			#	0.0005	-
	mg/L	WW-3	01/07/2003	0001	2.130			#	0.0005	-

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 #1/1/2003# and #1/1/2004#

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.	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.

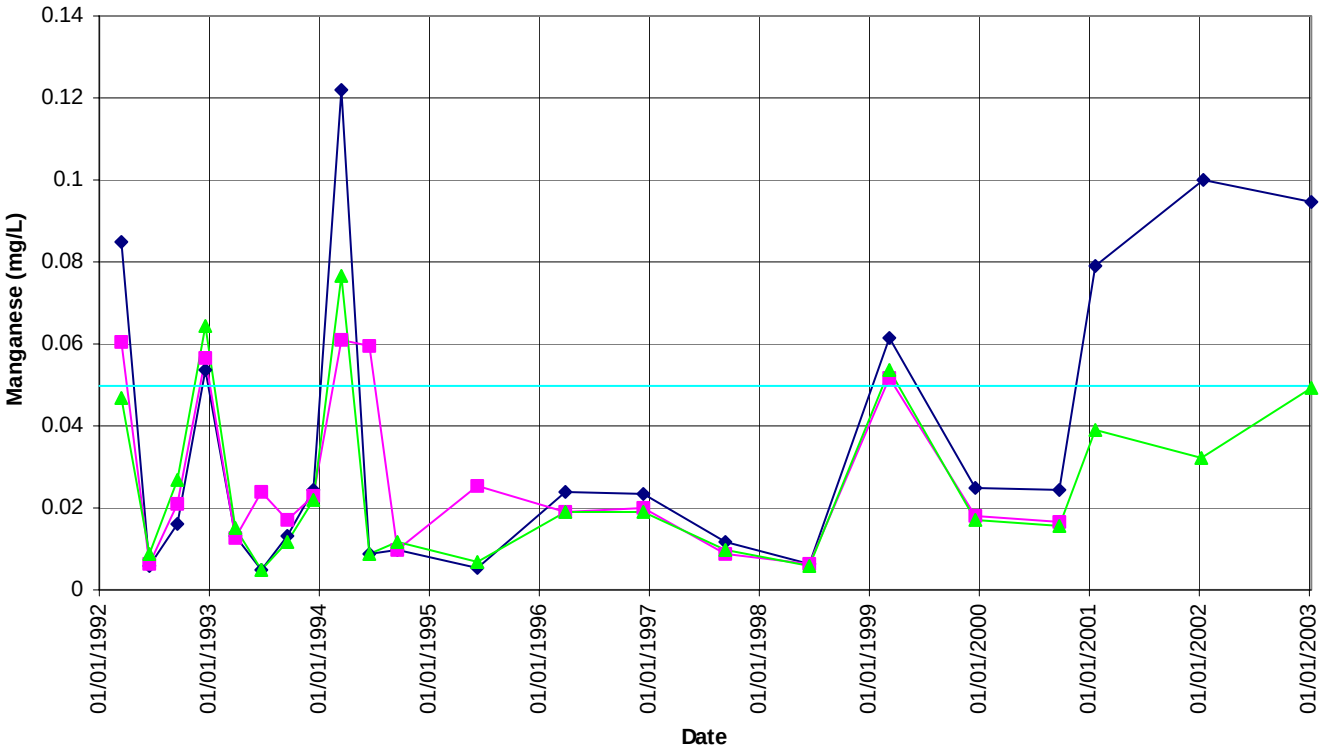
QA QUALIFIER: # = validated according to Quality Assurance guidelines.

Appendix B

Time-Concentration Graphs

Grand Junction Site

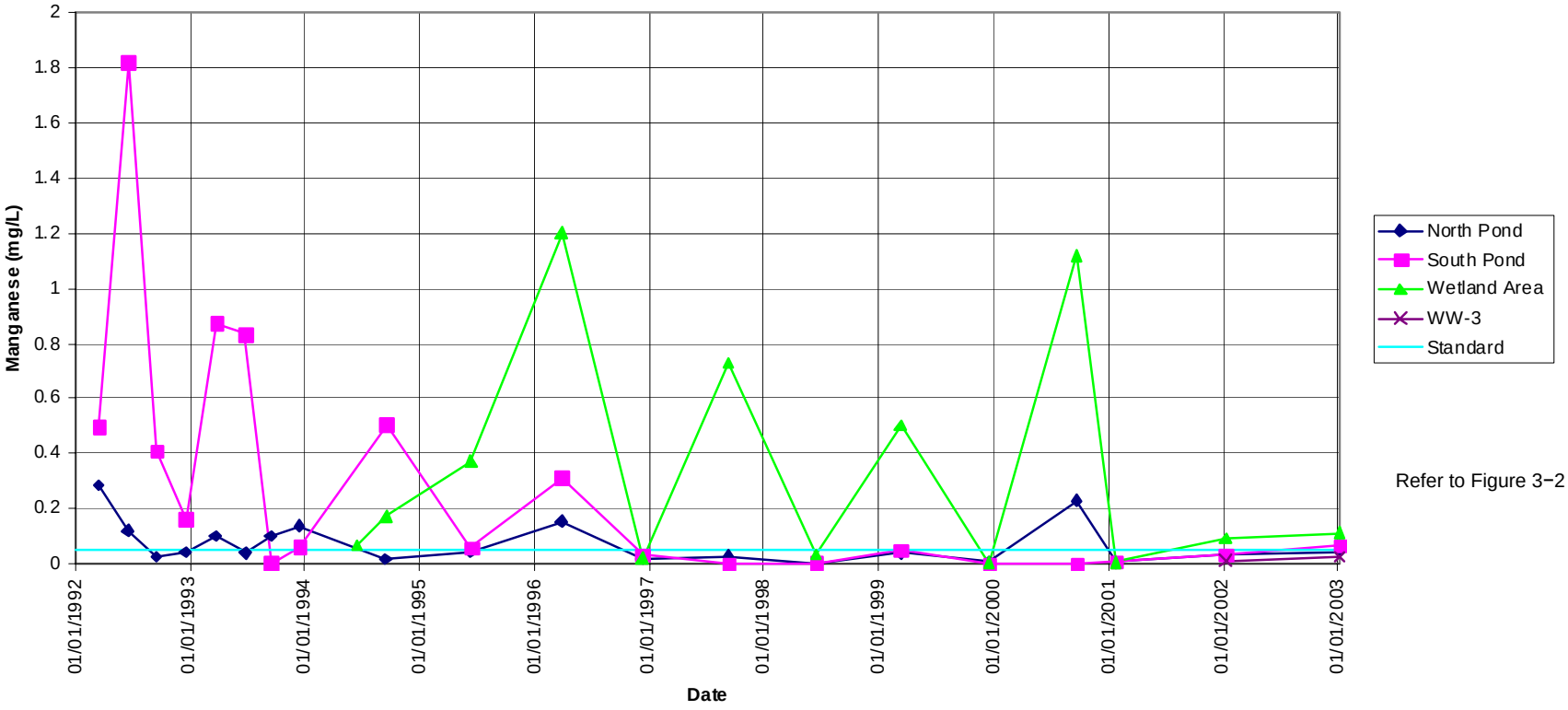
Manganese Concentration



Refer to Figure 3−2

Grand Junction Site

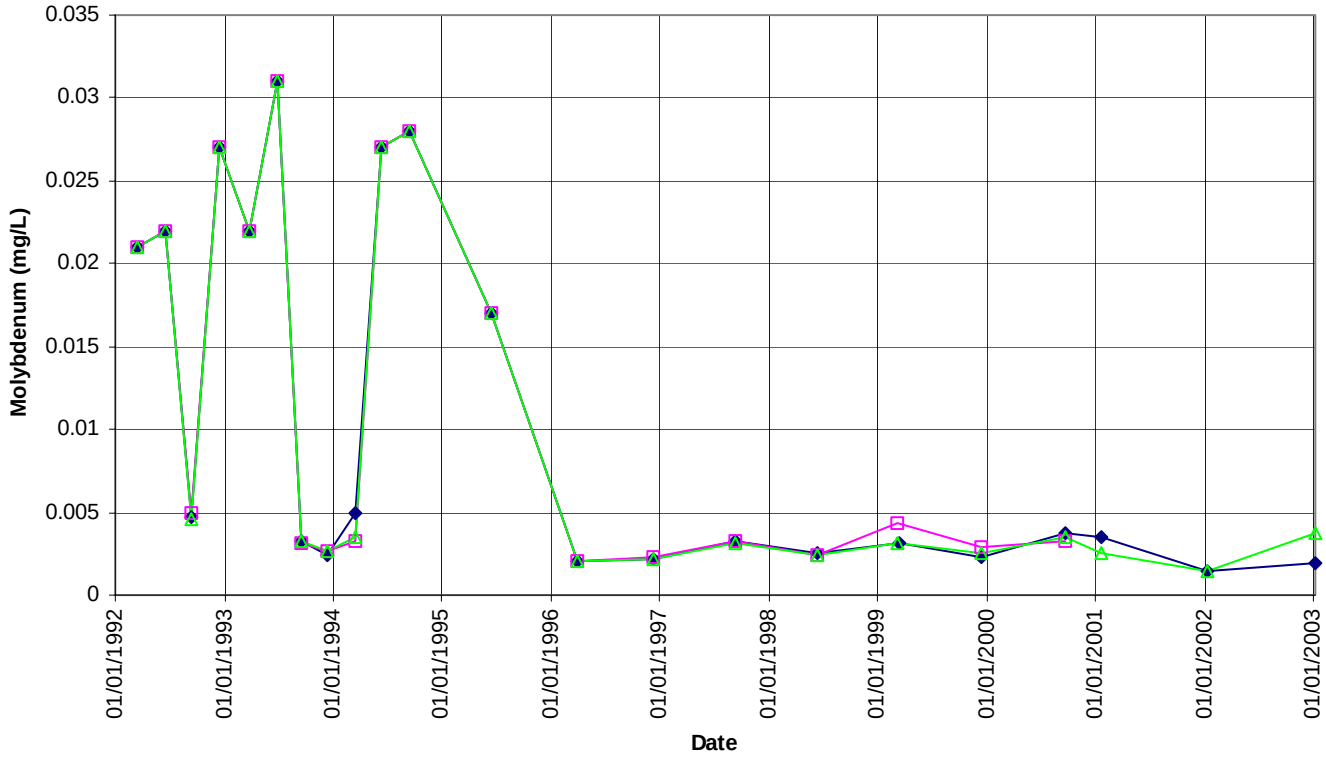
Manganese Concentration



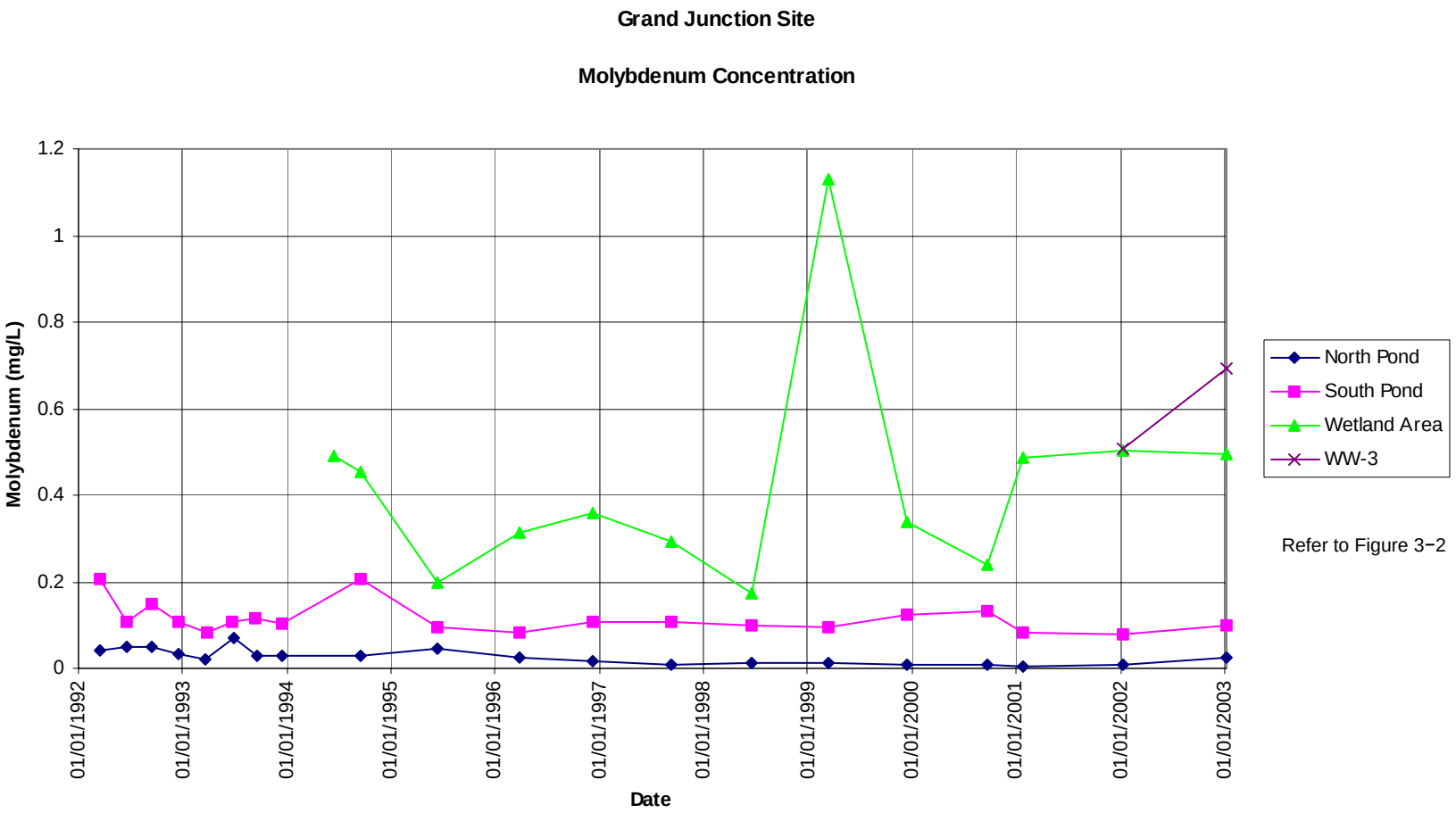
Refer to Figure 3−2

Grand Junction Site

Molybdenum Concentration



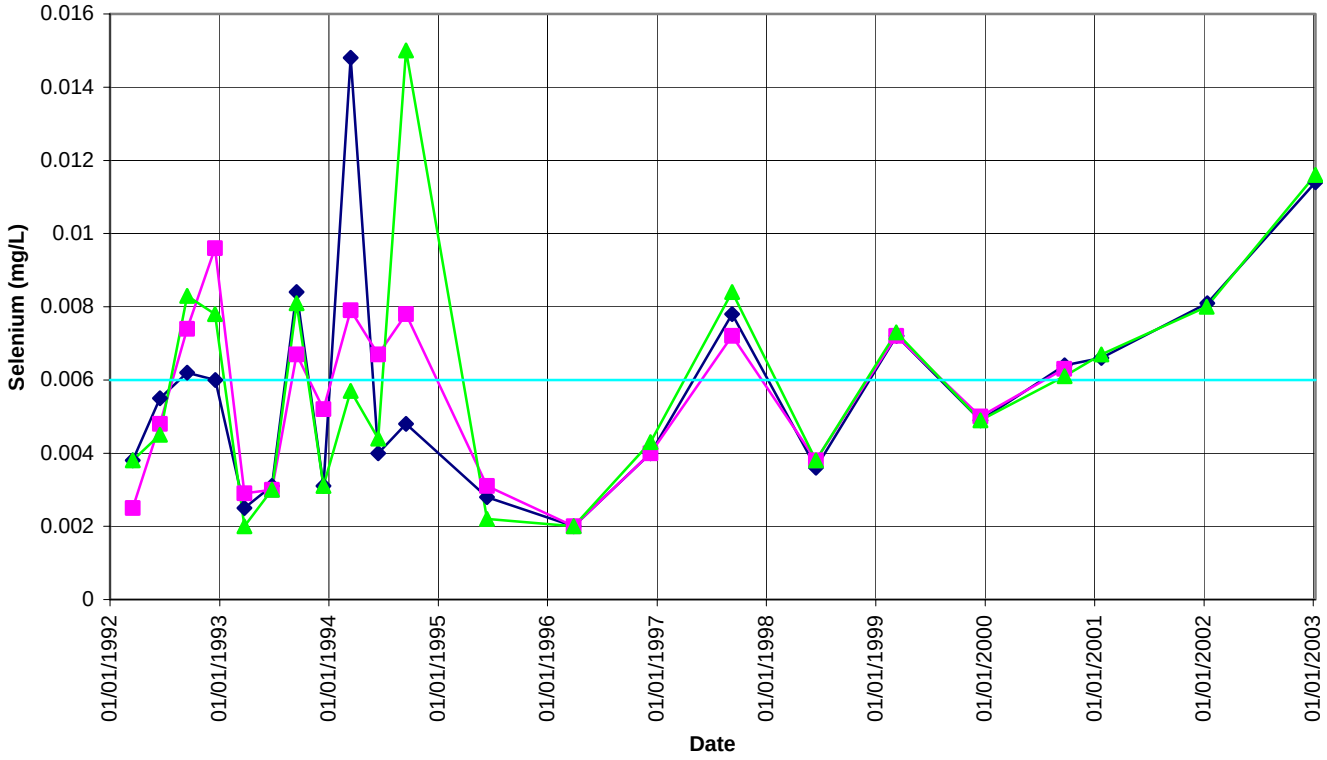
Refer to Figure 3−2



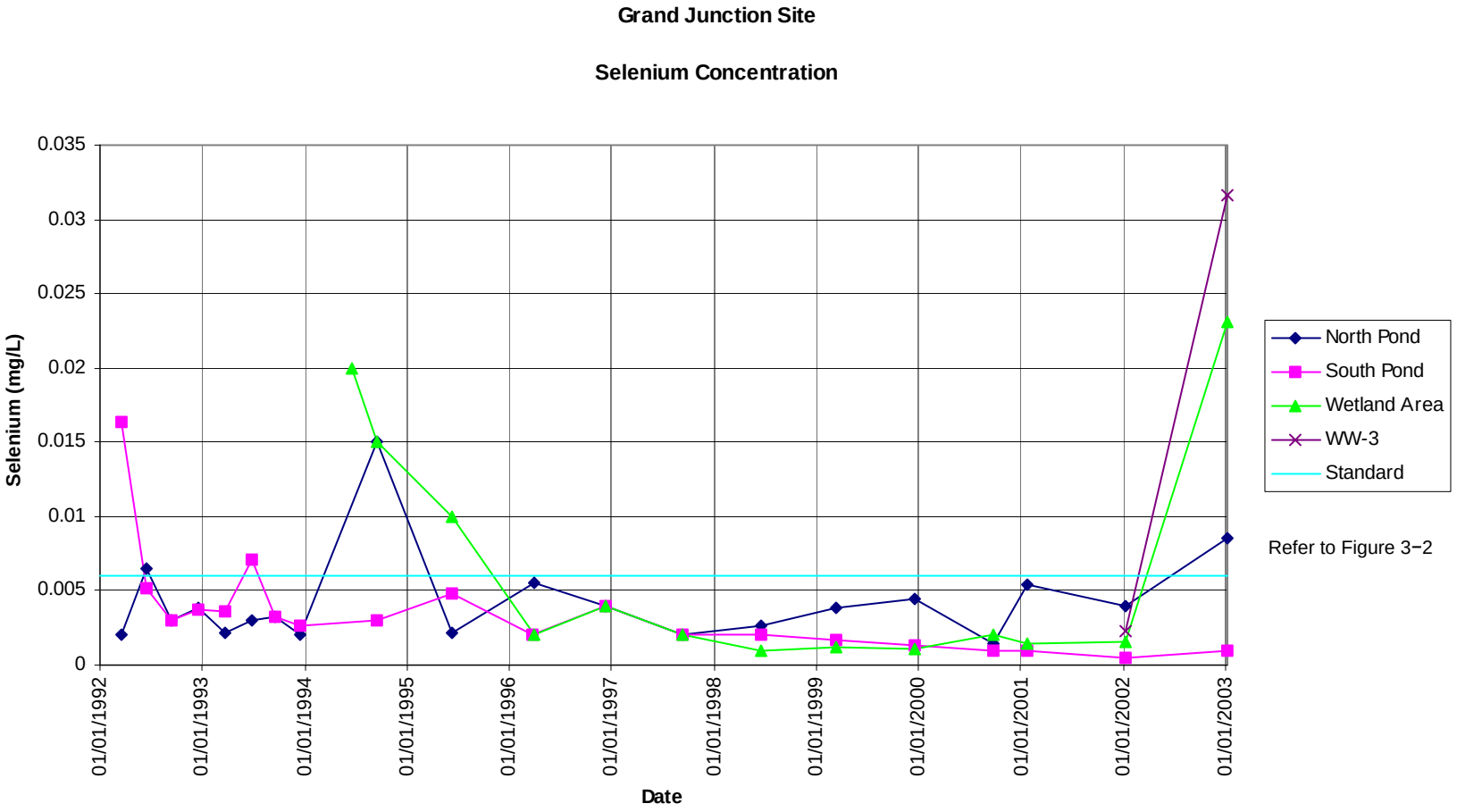
Refer to Figure 3-2

Grand Junction Site

Selenium Concentration



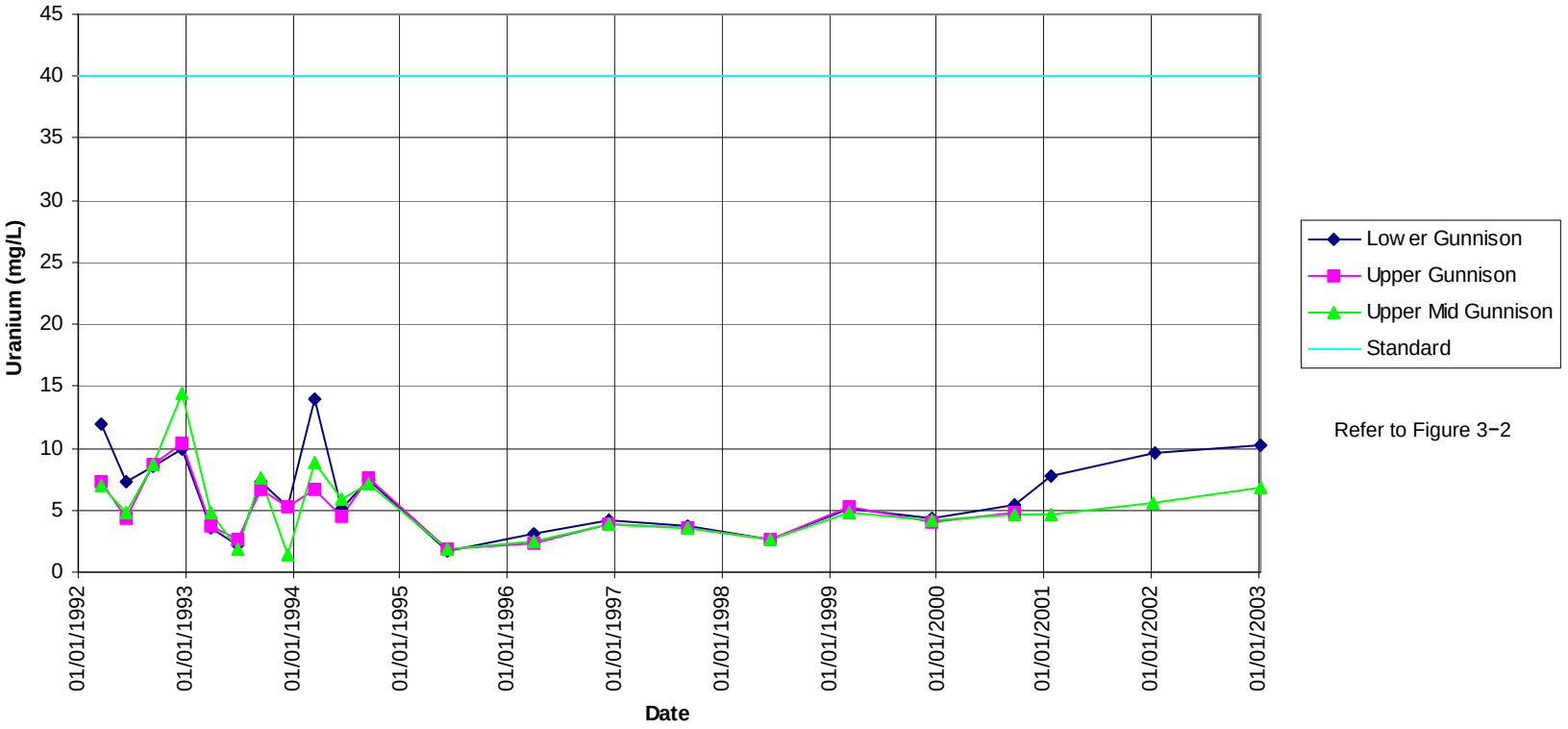
Refer to Figure 3−2



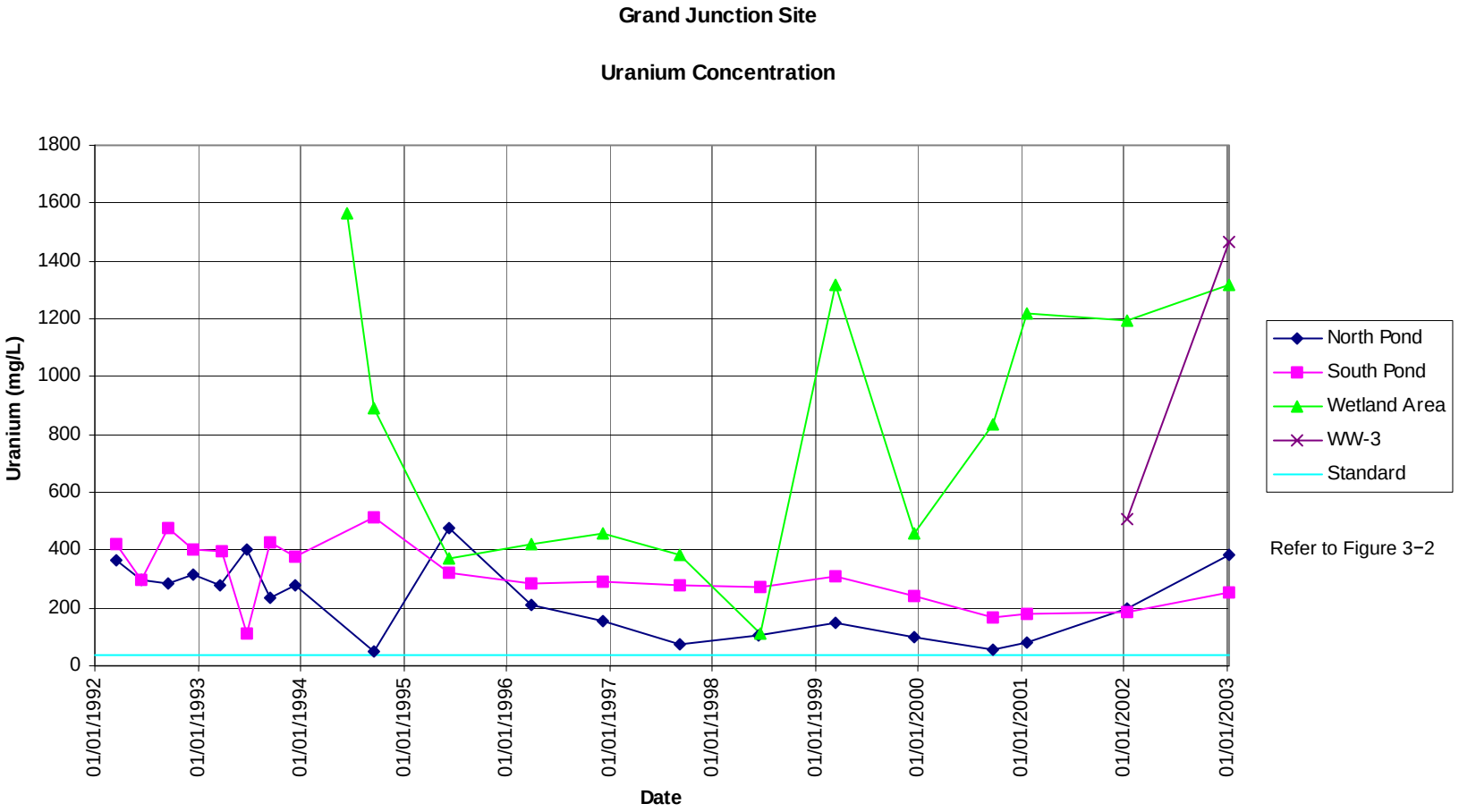
Refer to Figure 3−2

Grand Junction Site

Uranium Concentration



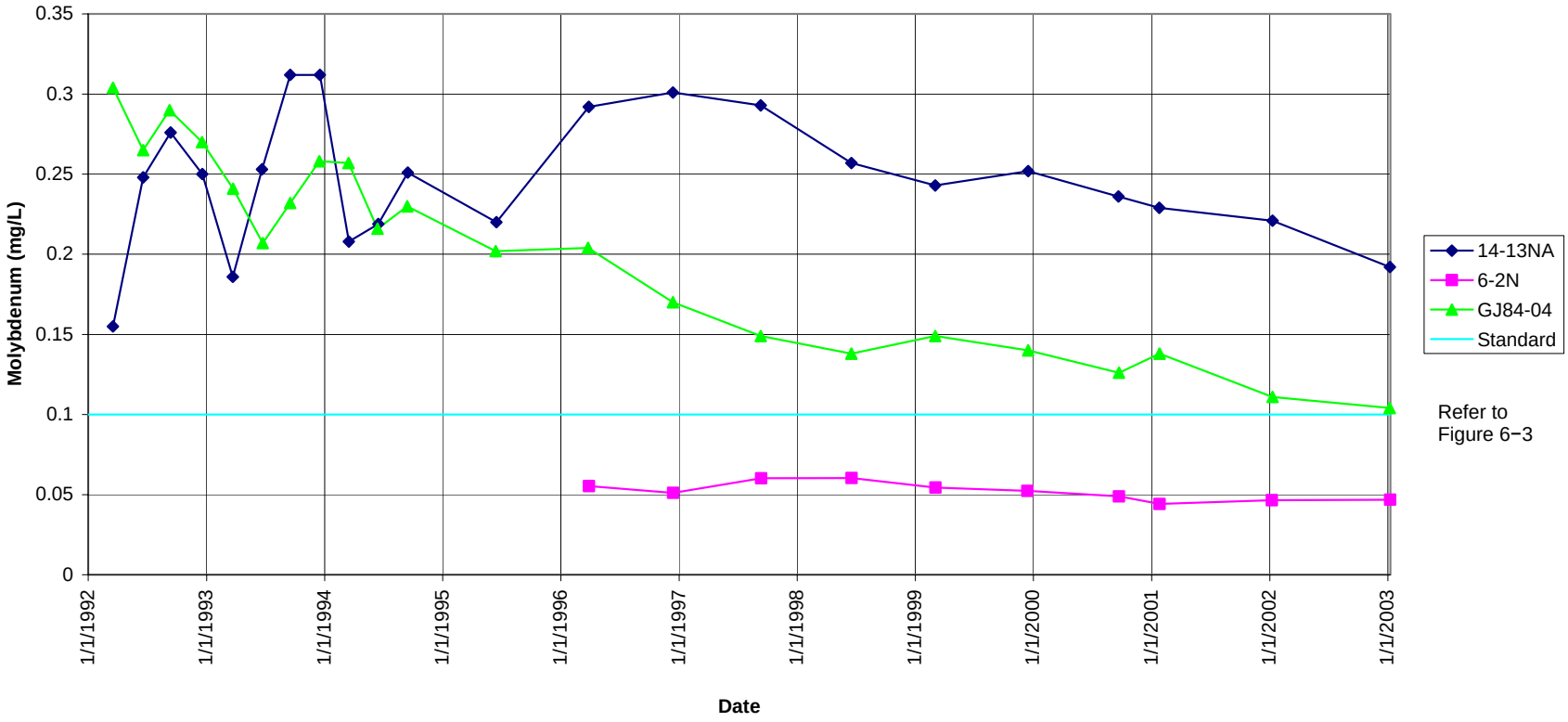
Refer to Figure 3−2



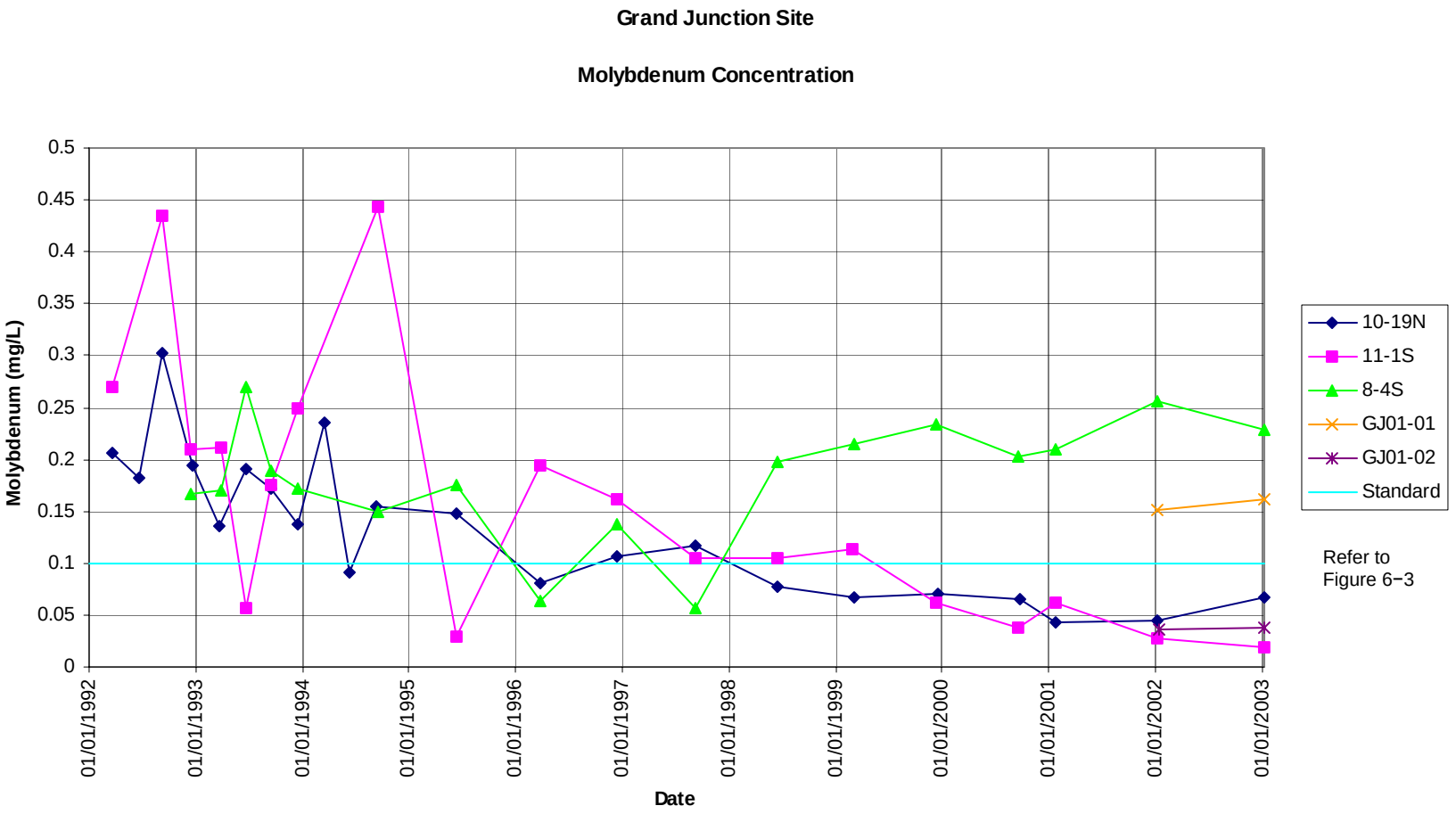
Refer to Figure 3−2

GRAND JUNCTION SITE

Molybdenum Concentration

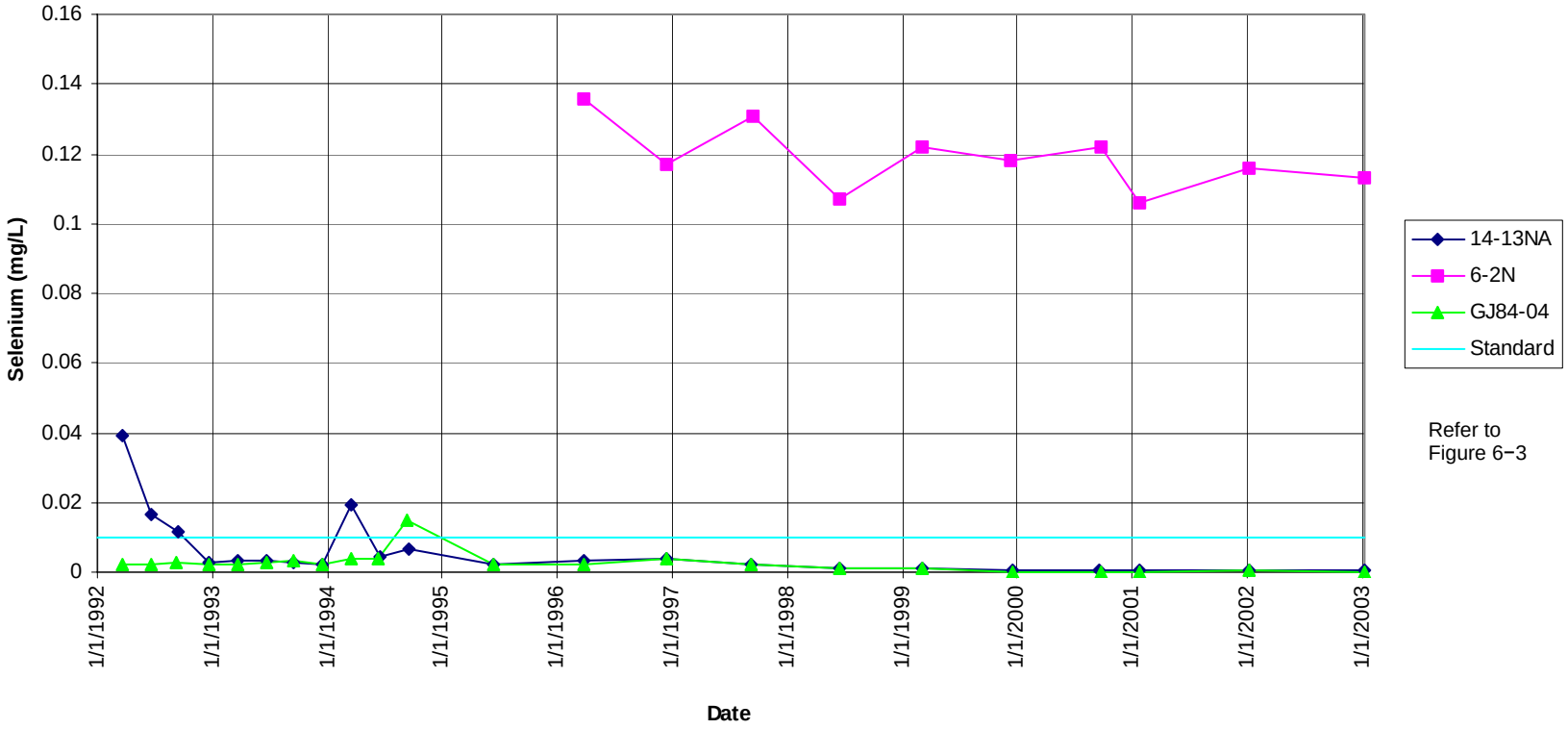


Refer to Figure 6−3

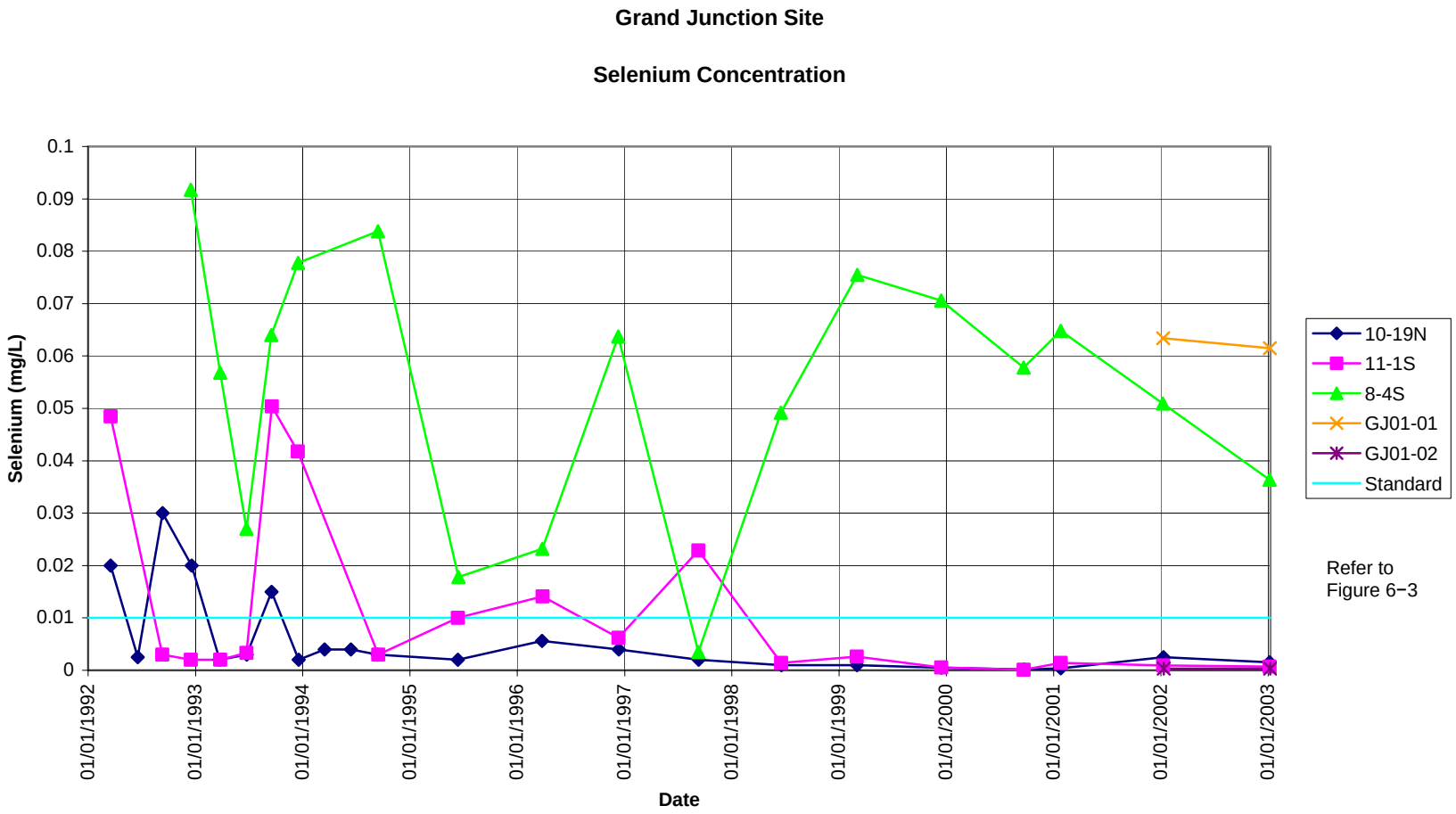

Grand Junction Site
Molybdenum Concentration
Molybdenum (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
01/01/1992
01/01/1993
01/01/1994
01/01/1995
01/01/1996
01/01/1997
01/01/1998
01/01/1999
01/01/2000
01/01/2001
01/01/2002
01/01/2003
Date
10-19N
11-1S
8-4S
GJ01-01
GJ01-02
Standard
Refer to
Figure 6−3

GRAND JUNCTION SITE

Selenium Concentration



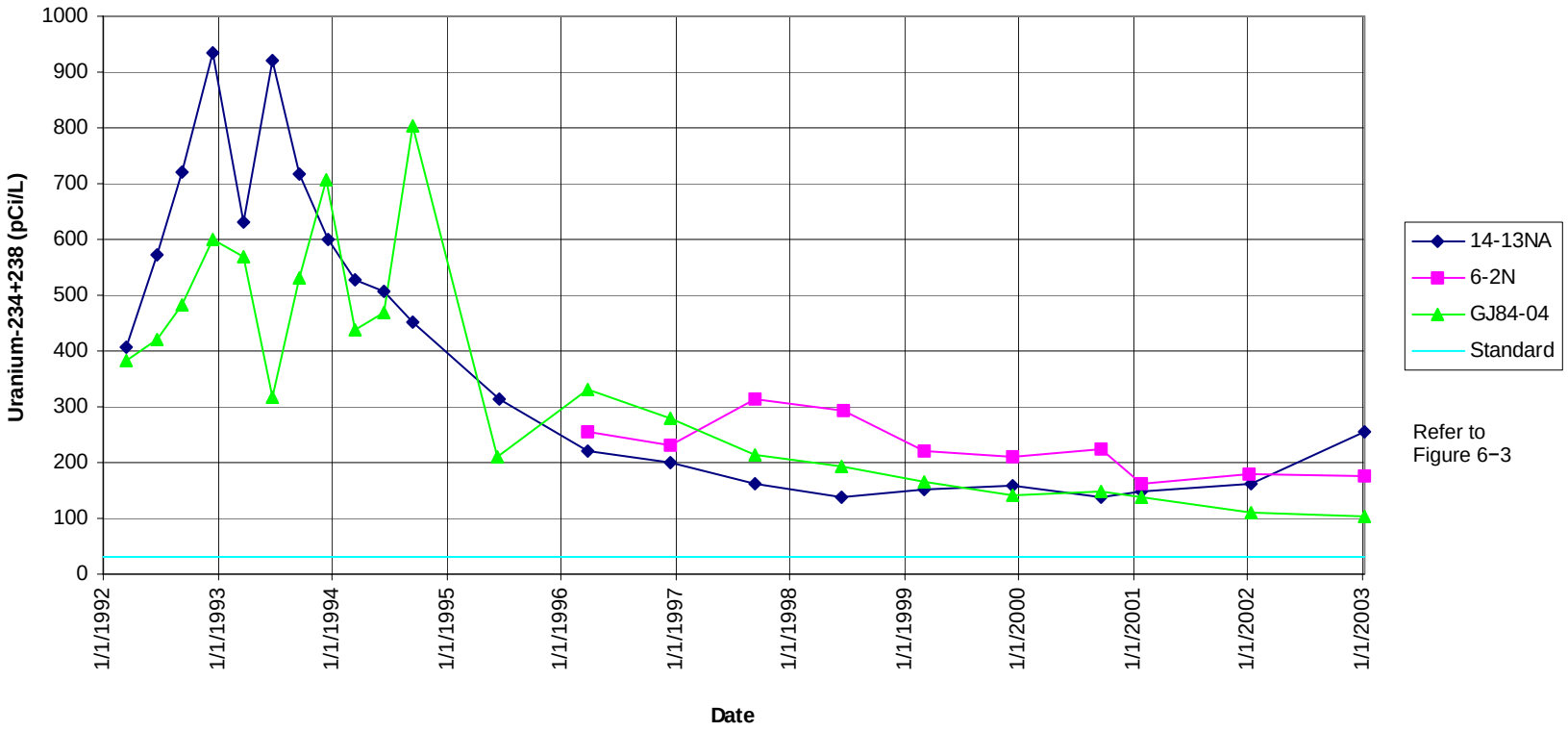
Refer to
Figure 6−3



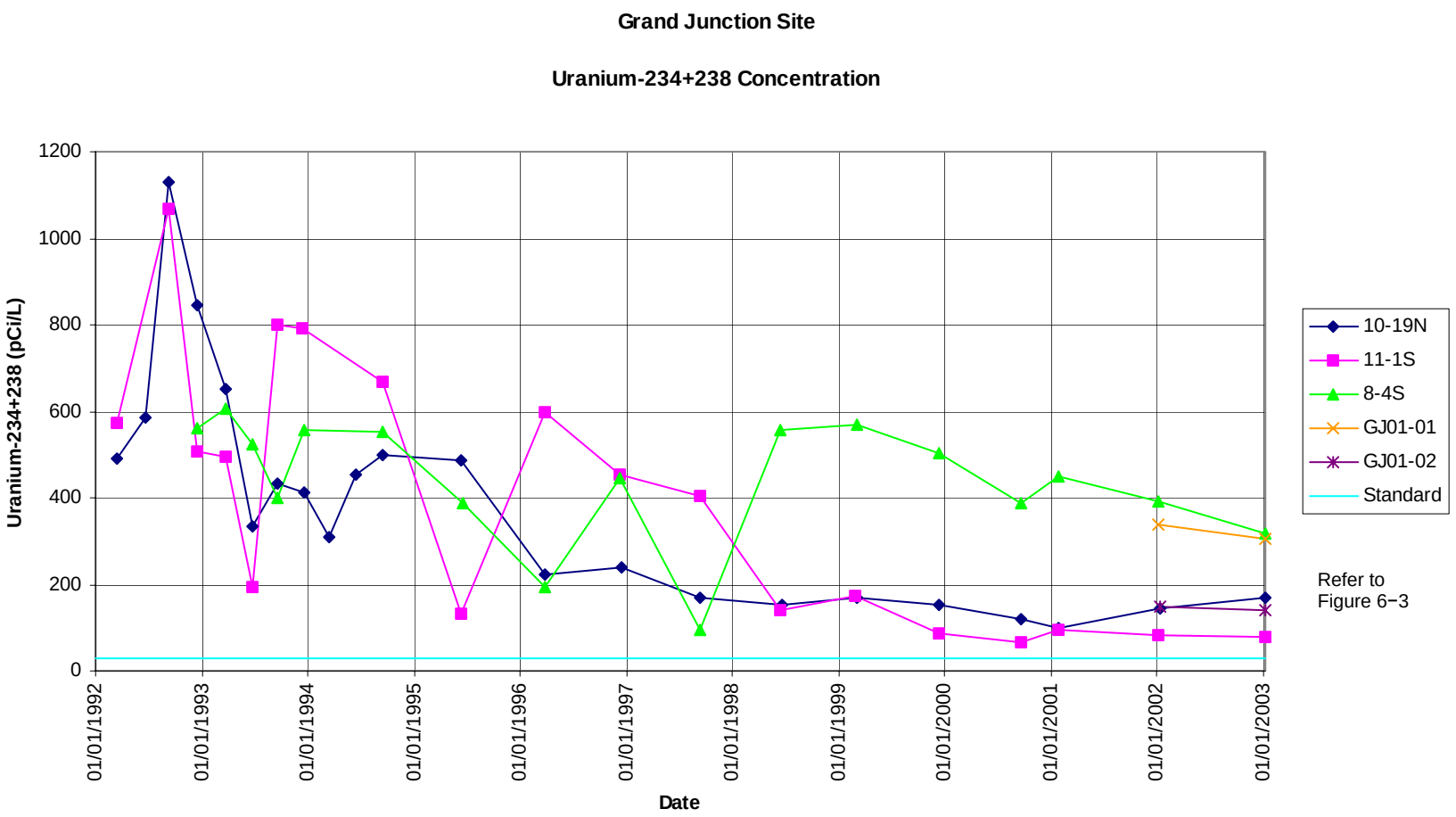
Refer to
Figure 6−3

GRAND JUNCTION SITE

Uranium-234+238 Concentration



Refer to
Figure 6−3


Grand Junction Site
Uranium-234+238 Concentration
Uranium-234+238 (pCi/L)
1200
1000
800
600
400
200
0
01/01/1992
01/01/1993
01/01/1994
01/01/1995
01/01/1996
01/01/1997
01/01/1998
01/01/1999
01/01/2000
01/01/2001
01/01/2002
01/01/2003
Date
10-19N
11-1S
8-4S
GJ01-01
GJ01-02
Standard
Refer to
Figure 6−3