

2016 5-Year Inspection and Site Status Report for the Grand Junction, Colorado, UMTRCA Title I Processing Site

1.1 Inspection Summary

The Grand Junction, Colorado, Processing Site, a U.S. Department of Energy (DOE) Office of Legacy Management (LM) Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I site, was inspected on April 12, 2016. There was no evidence of unapproved groundwater extraction or exposure. Institutional controls were verified and found to be effective. No need for a follow-up or contingency inspection was identified. A slough restoration project was recently implemented at the site, and more development in the near future is planned by the City of Grand Junction for the use of the site as a city park.

On January 5, 2016, surface and groundwater samples were collected and analyzed for site-related constituents. Sampling results were generally consistent with historical results, and concentrations of site-related constituents are not degrading the water quality of the Colorado River.

1.2 Inspection Requirements

Requirements for the long-term management of the site are specified in the *Long-Term Management Plan for the Former UMTRCA Title I Processing Site at Grand Junction, Colorado* (GJO-2002-354-TAC, GJO-LGJT 1.1.3) (LTMP). The site is not required to be licensed by the U.S. Nuclear Regulatory Commission (NRC), so there are no license requirements. However, LM developed the LTMP as a best-management practice to ensure that long-term site stewardship remains protective of human health and the environment. In accordance with the LTMP, DOE conducts groundwater monitoring (Section 1.6) in conjunction with site inspections. Site inspections were conducted annually between 2002 and 2006, and groundwater monitoring was conducted annually between 2000 and 2006. Inspections and monitoring continued at 5-year intervals beginning in 2011. The LTMP specifies that site inspections (verification of institutional controls) will continue until 2026, and groundwater monitoring will continue until 2036 or until site-related constituents are consistently below their respective standards or background values.

1.3 Institutional Controls

The former processing site was transferred from the Colorado Department of Public Health and Environment (CDPHE) to the City of Grand Junction in 1997. In the transfer agreement, the City agreed not to use the groundwater from the site, not to construct wells, and not to expose groundwater on the property without prior written approval by CDPHE and DOE. In addition, City of Grand Junction Ordinance 2432 stipulates that all locations within city limits shall be served by the city water treatment and distribution system (i.e., groundwater shall not be used for residential purposes).

To verify the effectiveness of institutional controls, C. Bahrke of the DOE Legacy Management Support contractor contacted the City of Grand Junction and reviewed the Office of the State Engineer's website on March 7, 2016 (see attachment). No construction has occurred, and no

wells have been permitted for the Colorado River alluvial aquifer on or in the vicinity of the site. This information was visually verified during the inspection.

1.4 Inspection Results

The site was inspected on April 12, 2016. The purposes of the inspection were to confirm compliance with the LTMP, to verify that the site's institutional controls are effective (i.e., groundwater had not been extracted or exposed without DOE approval), and to determine the need, if any, for additional inspections or monitoring. L. Sheader, P. Wetherstein, and G. Baur of the DOE Legacy Management Support contractor conducted the inspection, with K. Elsberry of CDPHE in attendance.

1.4.1 Site Surveillance Features

Features discussed in this report are shown on Figure 1. Photographs supporting specific observations are identified in the text and on Figure 1 by photograph location (PL) numbers and are provided at the end of the text.

1.4.1.1 Site Access and Improvements

The former processing site, historically known as the Climax mill site, is owned by the City of Grand Junction and is administered by the Parks and Recreation Department. The Colorado Riverfront Trail and a sidewalk along the Riverside Parkway provide site access. Improvements include the Riverside Parkway (PL-1), the Colorado Riverfront Trail (PL-2), two storm water retention basins that control runoff, and a slough restoration project (Figure 1). The slough project is approximately 50 percent complete. A portion of the former mill site is being leased by the city to a private lumber company for lumber storage (PL-3). Most of the site is undeveloped (PL-4), although park development activities are planned for the near future. Stockpiles of soil and other fill materials have been placed across the site in preparation of the improvements (PL-5).

1.4.1.2 Signs, Site Markers, Survey Monuments, and Fences

No DOE signs, site markers, or survey monuments exist at the Grand Junction processing site. DOE does not own fences that border portions of the site and is not responsible for maintaining them.

1.4.1.3 Monitoring Wells

All monitoring wells at the site are in good condition, although a bollard is bent at well MW-0590 (PL-6). Well MW-1036 was installed in October 2009 to replace well MW-1014, which was affected by the construction of the Riverside Parkway. However, both wells were sampled in 2016 because well MW-1014 contains the highest concentrations of site-related constituents, and well MW-1036 may not yield comparable data (it could not be located any closer than about 150 feet to the south of well MW-1014). Well MW-0748, which replaced well MW-0745 in 2009, is upgradient, and wells MW-1001 (onsite) and MW-0590 (offsite) are downgradient. All of the wells are completed in the unconfined Colorado River alluvial aquifer.

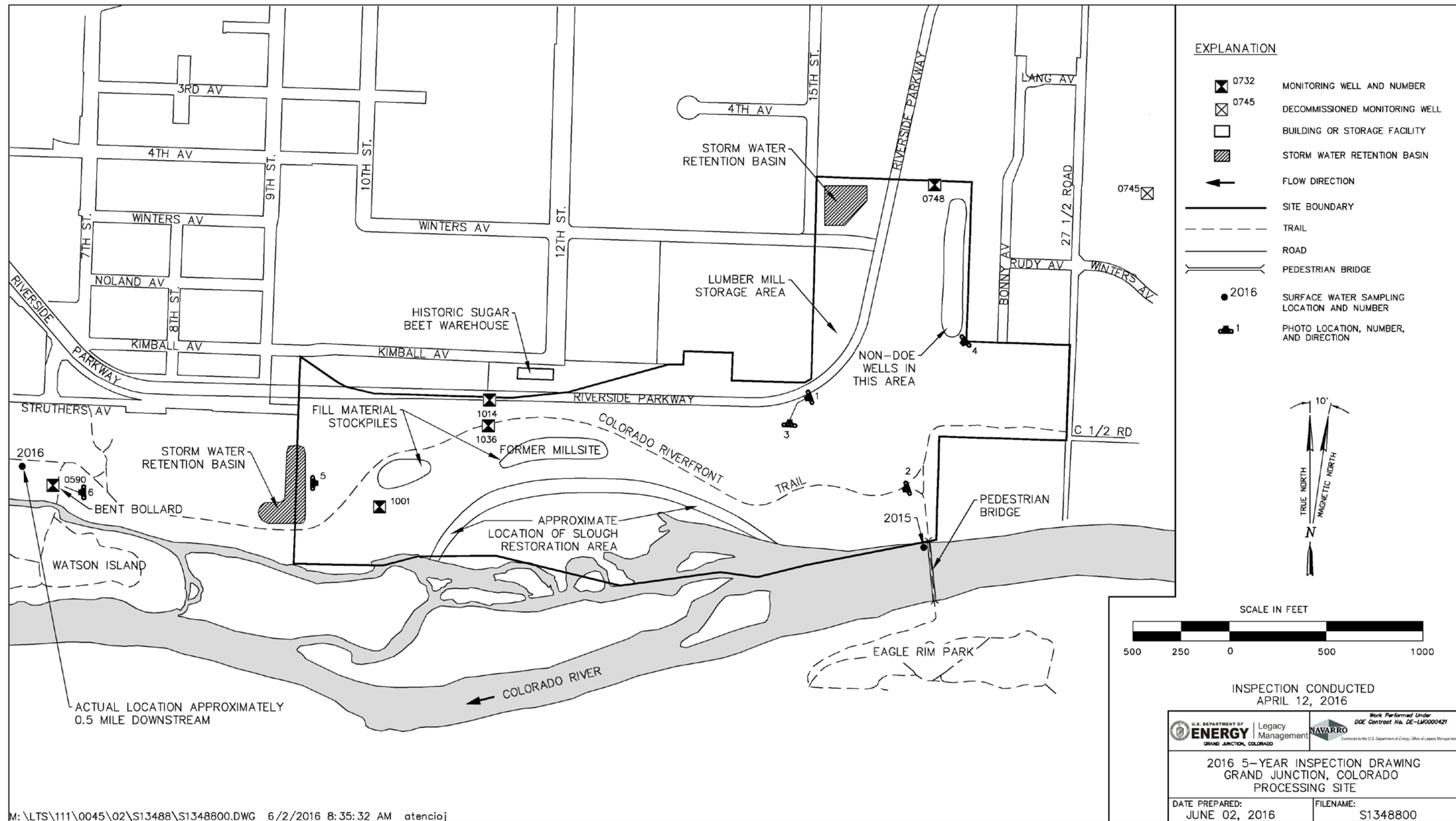


Figure 1. Grand Junction, Colorado, Processing Site

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1.5 Follow-Up Inspections

No need for a follow-up or contingency inspection was identified.

1.6 Environmental Monitoring

Groundwater sampling was performed annually between 2000 and 2006 and, in accordance with the LTMP, at 5-year intervals thereafter until site-related constituents are below their respective standards or background values (or until 2036). The LTMP also states that, with NRC concurrence, DOE may modify the sampling program based on monitoring results. Groundwater monitoring is conducted at five locations on and near the site (Figure 1). Although there are no expressions of groundwater at the site, surface water monitoring is conducted at two locations on the Colorado River to demonstrate that site-related constituents are not significantly affecting water quality in the river.

1.6.1 Groundwater Monitoring

Historic processing operations resulted in several site-related constituents in concentrations above guidelines in the shallow unconfined alluvial aquifer: ammonia, iron, manganese, molybdenum, uranium, and vanadium. Uranium concentration is also above guidelines in upgradient groundwater because uranium is abundant in the Mancos Shale formation that underlies most of the Grand Valley. Naturally high uranium and selenium concentrations lower water quality and have resulted in limited use of the alluvial aquifer.

The site's compliance strategy is no remediation and application of supplemental standards on the basis of limited use of groundwater (40 *Code of Federal Regulations* [CFR] 192.21[g]). Groundwater monitoring is conducted to determine when concentrations of site-related constituents are at levels that allow for certain uses of groundwater without restrictions.

Monitoring wells were sampled on January 5, 2016. Results are summarized in Table 1. Standards shown in Table 1 are taken from the LTMP. Figure 2 shows a comparison of ammonia, molybdenum, and uranium levels over time. Only these three site constituents were sampled between 2000 and 2011 and are shown in Figure 2.

Table 1. Concentration of Groundwater Constituents in 2016

Constituent	Monitoring Well					
	Standard (mg/L)	0590 (mg/L)	0748 (mg/L)	1001 (mg/L)	1014 (mg/L)	1036 (mg/L)
Ammonia (total as Nitrogen)	97.9 ¹	6.1	11	9.4	36	51
Iron	0.3 ²	0.091	0.14	0.24	0.22	3.5
Manganese	0.05 ²	0.31	0.82	2.5	1.9	2.9
Molybdenum	0.1 ³	0.042	0.032	0.17	0.14	0.13
Uranium	0.044 ⁴	0.13	0.045	0.37	2.3	2.3
Vanadium	0.26 ⁵	0.0012	0.036	0.22	0.21	0.065

mg/L = milligrams per liter

¹ Human health risk-based concentration for ammonia (converted from ammonia as NH₃ value of 0.2 mg/L)

² Secondary maximum contaminant level (Safe Drinking Water Act)

³ Maximum concentration limit for groundwater established in 40 CFR 192

⁴ Maximum concentration limit for groundwater established in 40 CFR 192 (also the maximum contaminant level for drinking water established by the U.S. Environmental Protection Agency in 2003)

⁵ Human health risk-based concentration for vanadium

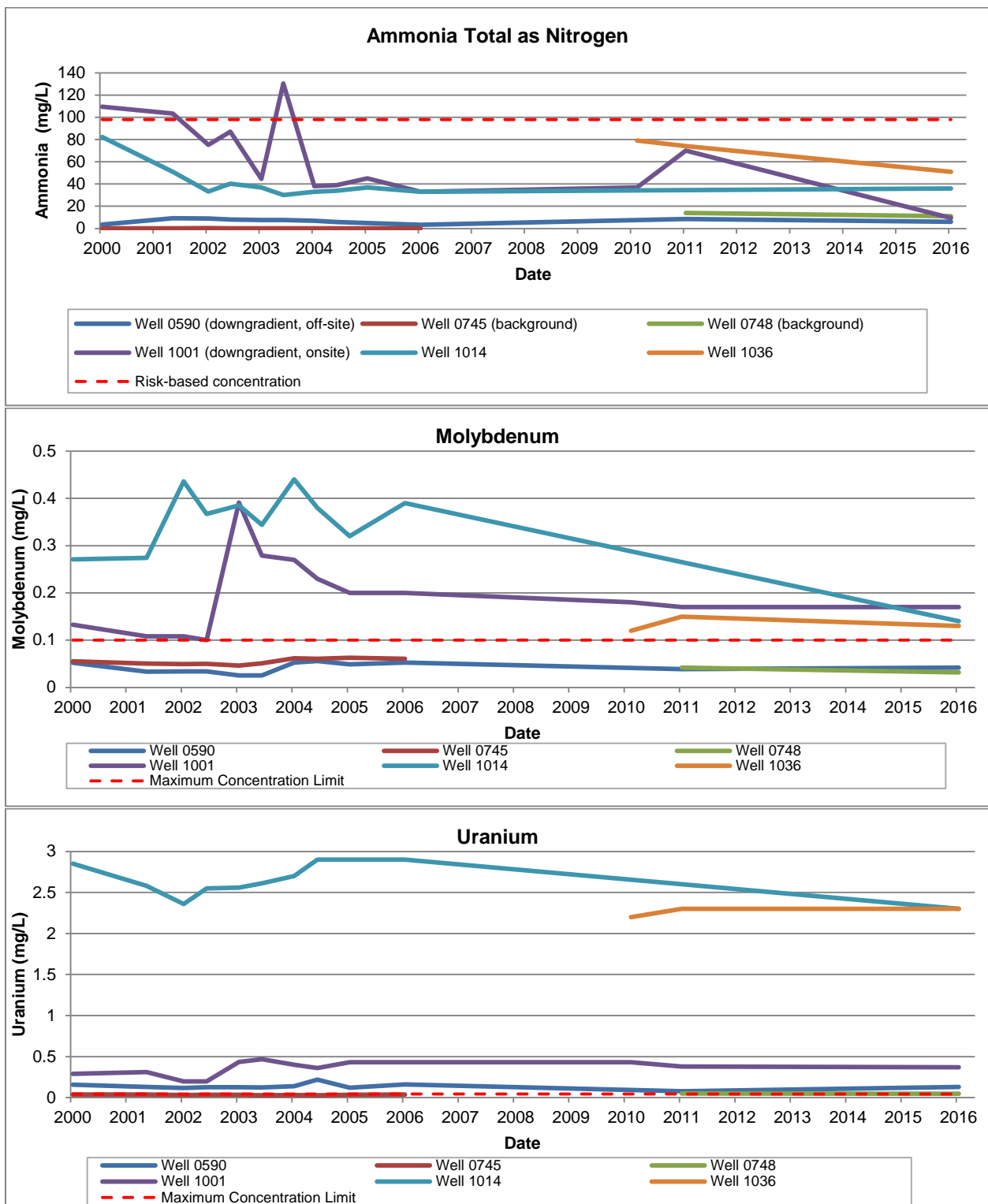


Figure 2. Changes in Site-Related Constituents over Time

Ammonia concentrations (Table 1 and Figure 2) decreased at wells MW-1001 and MW-1036 since the last 5-year inspection in 2011 and have remained stable over time at other locations. In 2016, all levels were below the risk-based concentration for human health, as they have been since 2004.

In 2016, iron concentrations (Table 1) were below the secondary maximum contaminant level of 0.3 milligrams per liter (mg/L) at all locations except at well MW-1036, where it was elevated to 3.5 mg/L. Additional monitoring is needed to determine why iron concentrations are elevated only at this well, as this is a replacement well that was not previously sampled.

Manganese concentrations (Table 1) were above the secondary maximum contaminant level of 0.05 mg/L at all wells, including the background well, which was elevated at 0.82 mg/L.

As in 2011, molybdenum concentrations (Table 1 and Figure 2) in the upgradient and downgradient wells were below the maximum concentration limit of 0.1 mg/L. The remaining wells were all less than twice the standard, with the highest concentration in well MW-1001 (0.17 mg/L).

Uranium concentrations (Table 1 and Figure 2) remain elevated above the maximum concentration limit in wells near the center of the contamination plume (wells MW-1014 and MW-1036). They were also elevated in onsite well MW-1001 and downgradient, offsite well MW-0590. The uranium level was at the maximum concentration limit in upgradient well MW-0748 (which replaced MW-0745).

Concentrations of vanadium (Table 1) were below the risk-based concentration for human health of 0.26 mg/L at all wells in 2016.

1.6.2 Surface Water Monitoring

There are no surface expressions of groundwater on the property. Surface water samples were collected at two locations along the Colorado River at the same time that groundwater samples were collected. Between 2000 and 2011, the upstream location, SW-0423, was located approximately 1.5 miles east of the site, and the downstream location, SW-0427, was located approximately 0.8 mile west of the site. In 2016, the locations were moved because of concerns regarding safe access. Location SW-0423 was replaced with upstream location 2015, immediately adjacent to the site (Figure 1), and location SW-0427 was replaced with downstream location 2016, slightly upstream from SW-0427.

Ammonia, molybdenum, and uranium are sampled at the same time and on the same frequency as groundwater sampling. Sample results from locations SW-0423 and 2015 provide background values, and results from locations SW-0427 and 2016 provide downstream values. A comparison of the values is intended to verify that mill-related constituents in groundwater are not affecting the water quality of the river.

Table 2 summarizes the results of surface water monitoring in 2016. Ammonia, iron, and vanadium are below the detection limit in the river both upstream and downstream of the site. Manganese, molybdenum, and uranium are present in low concentrations. For all mill-related site constituents, upstream and downstream levels are comparable, demonstrating that they are not affecting the river's water quality. Values for 2016 are similar to values found in previous monitoring years.

Table 2. Concentration of Surface Water Constituents in 2016

Constituent	Sampling Location	
	2015 (upstream) (mg/L)	2016 (downstream) (mg/L)
Ammonia (total as Nitrogen)	undetectable	undetectable
Iron	undetectable	undetectable
Manganese	0.022	0.019
Molybdenum	0.0062	0.0068
Uranium	0.0041	0.0041
Vanadium	undetectable	undetectable

mg/L = milligrams per liter

1.7 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	250	Riverside Parkway, at the north edge of the institutional control boundary.
PL-2	250	A portion of the Colorado Riverfront Trail within the institutional control area.
PL-3	5	Lumber mill storage area within the institutional control boundary.
PL-4	230	Northeast portion of the institutional control area.
PL-5	90	West portion of the site showing fill material stockpiles.
PL-6	270	Monitoring well MW-0590 with a bent bollard.



GJT 4/2016. PL-1. Riverside Parkway, at the north edge of the institutional control boundary.



GJT 4/2016. PL-2. A portion of the Colorado Riverfront Trail within the institutional control area.



GJT 4/2016. PL-3. Lumber mill storage area within the institutional control boundary.



GJT 4/2016. PL-4. Northeast portion of the institutional control area.



GJT 4/2016. PL-5. West portion of the site showing fill material stockpiles.



GJT 4/2016. PL-6. Monitoring well MW-0590 with a bent bollard.

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ATTACHMENT 1

**Land Management Project
Meeting/Teleconference
Record**

Date: March 7, 2016

To: Gary Baur, Site Lead

From: Cheri Bahrke, Real Property Administrator

Subject: 5-Year verification of ICs for the Grand Junction Processing Site

Persons Present/Contacted:

Name	Company/Agency	Telephone Number/Extension
Tracy Weiland	City of Grand Junction, Department of Parks and Recreation	970-254-3846
Electronic Database Search	State Engineers Office	

Issue/Concern:

At the request of Gary Baur, I contacted Tracy Weiland, City of Grand Junction, Department of Parks and Recreation to determine if staff are aware of the ICs in effect for the Las Colonias Park area and to ensure that there is sufficient communication with DOE and the State of Colorado Department of Public Health and Environment (CDPHE) about planned activities for the site. I informed Ms. Weiland that this inquiry is conducted every 5 years to ensure that required protections are visible to those with authority to conduct activities at the site. Ms. Weiland's response is as follows:

The Department of Parks and Recreation staff are well aware of the ICs included in the Quitclaim deed to the property and have been in consultation with Bill Dam, LM Site Manager, Mike Cosby, CDPHE, and Gary Baur, LMS support to LM, regarding planned activities at the site.

I also reviewed the State Engineers website for well permitting to determine if any well permits have been granted for the area of interest. The website was current as of 2/1/16. There have been no new wells drilled in the area of interest since the last reporting.

Follow-up Action Required: This report will be filed in the real property files along with the quitclaim deed conveying the property to the City of Grand Junction, which includes the requirement for institutional controls.

Affect Scope/Schedule or Budget: YES ___ NO X

Explain:

CC: Real Property Working File GJT 1435.05
Project File GJT 1435.05