



Verification Monitoring Report for the Gunnison, Colorado, Processing Site

September 2006



U.S. Department
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Office of Legacy Management

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Gunnison, Colorado, Processing Site**

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Work Performed by S.M. Stoller Corporation under DOE Contract No. DE-AC01-02GJ79491
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

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Acronyms and Abbreviations

CDPHE	Colorado Department of Public Health and Environment
CFR	United States <i>Code of Federal Regulations</i>
COPC	constituent of potential concern
DOE	U.S. Department of Energy
DWEL	Drinking Water Equivalent Level
EPA	U. S. Environmental Protection Agency
ft	foot (feet)
GCAP	Ground Water Compliance Action Plan
IC	institutional control(s)
LM	Legacy Management
MCL	maximum concentration limit
mg/L	milligram(s) per liter
NRC	U.S. Nuclear Regulatory Commission
RRM	residual radioactive material
SOWP	Site Observational Work Plan
VMR	Verification Monitoring Report

End of current text

1.0 Introduction

The former Gunnison uranium processing site is located in Gunnison County, Colorado, approximately 0.5 mile southwest of the City of Gunnison, between the Gunnison River and Tomichi Creek (Figure 1). Site characterization details for the site are available in the Final Site Observational Work Plan (SOWP) (DOE 2001).

The compliance strategy for ground water cleanup at the Gunnison site is natural flushing in conjunction with continued ground water and surface water monitoring and institutional controls (IC). Ground water modeling predicts that natural flushing of the alluvial aquifer will be completed within the 100-year timeframe specified in Subpart B of title 40 of the *Code of Federal Regulations*, Section 192 (40 CFR 192). The U.S. Department of Energy (DOE) and the Colorado Department of Public Health and Environment (CDPHE) funded an alternate domestic water supply system in 1994, with upgrades in 2005, to service existing ground water users in the area of potentially contaminated ground water and to provide a potable water source for future development within the IC area.

Detailed information for the Gunnison site and water quality data through 1999 are found in the SOWP (DOE 2001). Water quality data from 2000 through 2005 are found in previous Verification Monitoring Reports (VMR) (DOE 2003, DOE 2004b, and 2005b). Water quality data for 2006 are provided in Appendices A through C of this report. All water quality data for the Gunnison site are archived in the SEEPro database at the DOE Office of Legacy Management (LM) in Grand Junction, Colorado.

The purpose of this VMR is to present and evaluate ground water and surface water monitoring data collected during the annual 2006 sampling event at the Gunnison site and to provide an update on the progress of the natural flushing compliance strategy.

2.0 Site Conditions

2.1 Hydrogeology

Ground water occurs under unconfined conditions in the alluvial (uppermost) aquifer, with an average depth to the water table of 5 feet (ft). The alluvium is composed of poorly sorted sediments ranging from clay-sized material to gravel, with cobbles and occasional boulders. It ranges in thickness from 70 to 130 ft. Ground water in the alluvial aquifer generally flows to the southwest, with an average gradient of 0.005 ft/ft. Hydraulic conductivity ranges from 100 to 170 feet per day (ft/day). The average linear ground water velocity ranges from 1.9 to 3.2 ft/day.

Ground water in the alluvial aquifer system is recharged by ground water underflow, adjacent streams, precipitation, flood irrigation of the pasture downgradient from the site, and irrigation of the golf course and residential areas southwest of the site. Ground water is discharged naturally to adjacent streams and by evapotranspiration. Ground water also is discharged via dewatering operations at the Valco Inc. gravel pit located south of the site.

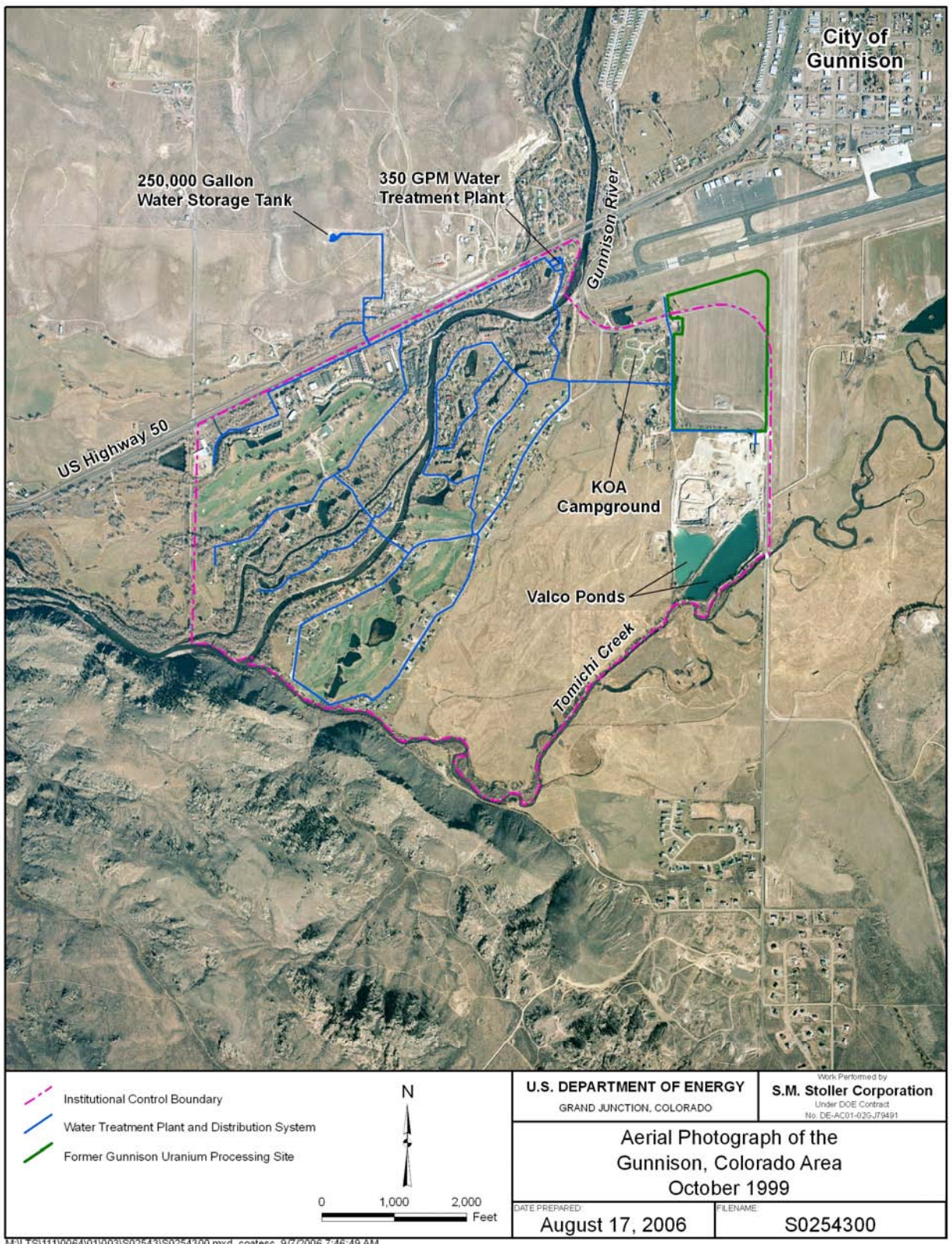


Figure 1. Aerial Photograph of the Gunnison, Colorado, Area – October 1999

2.2 Water Quality

Ground water in the alluvial aquifer beneath and downgradient from the Gunnison site was contaminated by uranium processing activities. A variety of tailings-related contaminants in the subsurface and ground water at the site were evaluated and the potential risks to human health and the environment were assessed in the SOWP (DOE 2001). Only two constituents of potential concern (COPC) were identified that warranted ongoing monitoring at the site.

Uranium is the primary COPC in ground water, with concentrations measured up to 1.5 milligrams per liter (mg/L) beneath the site in the past, and exceeding the U.S. Environmental Protection Agency (EPA) maximum concentration limit (MCL) of 0.044 mg/L more than 4,000 ft downgradient from the site boundary. Concentrations of uranium in ground water below the MCL, but above background, extend approximately 7,000 ft downgradient from the site boundary and have migrated beneath the Gunnison River just beyond the confluence with Tomichi Creek. The zone of contamination attenuates and migrates deeper into the aquifer as it progresses laterally in a southwesterly direction.

Manganese is also a COPC in ground water, with concentrations measured up to 77 mg/L beneath the site in the past. There is no MCL for manganese. The EPA Drinking Water Equivalent Level (DWEL) for manganese is 1.6 mg/L (EPA 2004). The DWEL is a lifetime-exposure concentration protective of adverse, non-cancer health effects that assumes all of the exposure to a contaminant is from drinking water. Concentrations of manganese are above the DWEL beneath the site and in two downgradient monitor wells. Manganese does not appear to be widespread in the aquifer, and concentrations beneath the site are decreasing.

2.3 Surface Remediation Activities

Uranium mill tailings and other residual radioactive material (RRM) were removed from the former millsite from 1992 through 1995 and stabilized in a disposal cell 6 miles east of the city of Gunnison. RRM beneath the site was cleaned up to just below the water table, with some contaminated material left in place per application of supplemental standards. Clean fill was placed above these areas to prevent radiation from emanating to the surface.

2.4 Institutional Controls

ICs in effect in the vicinity of the Gunnison site were finalized in 2004 and consist of deed restrictions on the original millsite property (specified in a Quit Claim Deed transferring the property from the State of Colorado to Gunnison County), a Gunnison County Resolution (Gunnison County 2004) establishing the New Domestic Well Constraint Area, and construction of a domestic water supply system. The Quit Claim Deed specifies restrictions on and approvals needed for excavation, ground water use, and construction of habitable structures. The New Domestic Well Constraint Area is delineated by the IC boundary (Figure 1), and the Gunnison County Resolution specifies that no new wells can be constructed within the constraint area. In 2004, DOE entered into a cooperative agreement with Gunnison County, approved by the U.S. Nuclear Regulatory Commission (NRC) (DOE 2004a), in which DOE (along with CDPHE) agreed to fund an extension of the domestic water supply system to account for potential future growth within the IC boundary (Figure 1).

3.0 Monitoring Program

Verification monitoring is currently being performed on an annual basis, and will be continued annually for the first 5 years after NRC concurrence with the Ground Water Compliance Action Plan (GCAP) (DOE 2005a), to ascertain that natural flushing is progressing as predicted by ground water flow and transport modeling (DOE 2001). A review of the monitoring program will be conducted after the first 5 years to determine if a change in the frequency of monitoring is warranted. Ongoing monitoring requirements will be evaluated in subsequent VMRs and modified as determined by DOE and NRC.

The monitoring network sampled during May 2006 included 29 DOE monitor wells, 5 surface water locations, and 9 domestic wells (Figure 2 and Table 1). The COPCs, uranium and manganese, were analyzed in 2006, and results are presented in this report.

4.0 Results of 2006 Monitoring

Analytical data for uranium and manganese in ground water in DOE monitor wells, domestic wells, and surface water for 2006 are discussed below and provided in Appendices A through C, respectively. The distributions of uranium and manganese in ground water in the alluvial aquifer, based on the 2006 sampling event, are shown in Figure 3 and Figure 4, respectively. Time versus concentration plots for uranium and manganese in DOE monitor wells, domestic wells, and surface water, from 1997 (post-remedial action) through 2006, are also shown below.

4.1 DOE Monitor Wells

Though not separated lithologically, the alluvial aquifer (up to 130 ft thick) has been divided into three zones to facilitate discussion of vertical contaminant migration: (1) shallow zone from 10 to 15 ft; (2) intermediate zone from 35 to 60 ft; and (3) deep zone from 90 to 100 ft (Table 1). Time versus concentration plots for uranium and manganese in DOE monitor wells have been grouped by monitor wells on-site, and in three downgradient sectors, to show the relationship between distance downgradient from the site and depth in the aquifer.

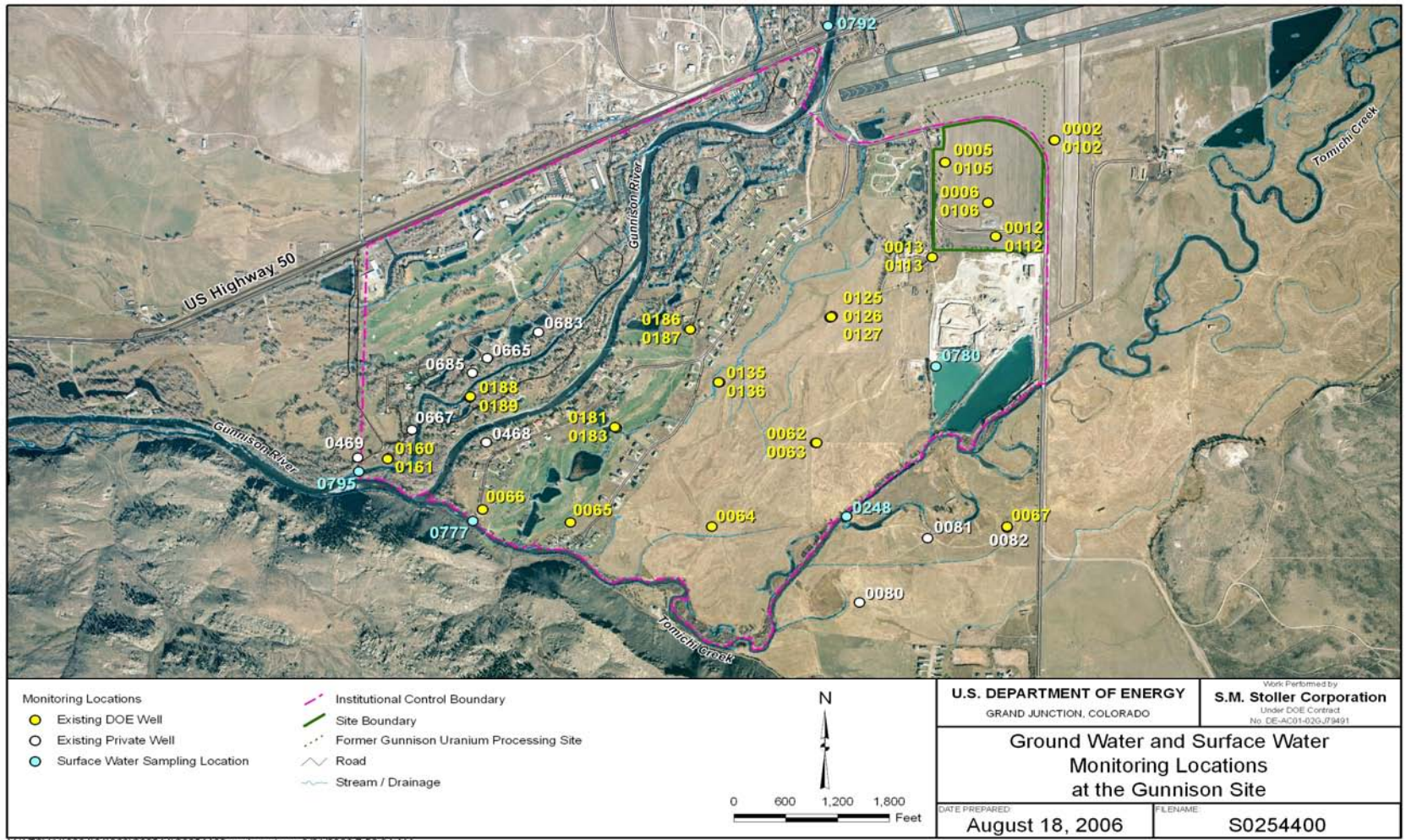


Figure 2. Monitoring Network for 2006 at the Gunnison Site

Table 1. Ground Water and Surface Water Monitoring at the Gunnison Site

Monitor Well	Aquifer Zone	Screened Interval	Location	Rationale (Uranium)
Ground Water				
0002	Shallow	10–15	Airport	Upgradient
0102	Intermediate	42–47	Airport	Upgradient
0005	Shallow	10-15	On-site	Upgradient edge of plume
0105	Intermediate	42–47	On-site	Upgradient edge of plume
0006	Shallow	10–15	On-site	“Hot spot”
0106	Intermediate	34–39	On-site	Monitor vertical migration
0012	Shallow	10–15	On-site	“Hot spot”
0112	Intermediate	40–45	On-site	Monitor vertical migration
0013	Shallow	11–16	Just off-site	Monitor vertical migration
0113	Intermediate	41–46	Just off-site	Monitor plume migration
0125	Shallow	18–23	Valco pasture	Monitor plume migration
0126	Intermediate	54–59	Valco pasture	Monitor plume migration
0127	Deep	94–99	Valco pasture	Monitor plume migration
0135	Shallow	18–23	Valco pasture	Monitor plume migration
0136	Intermediate	53–58	Valco pasture	Monitor plume migration
0064	Deep	87–97	Valco pasture	Monitor plume migration
0062	Intermediate	48–58	Valco pasture	Monitor plume migration
0063	Deep	88–98	Valco pasture	Monitor plume migration
0181	Shallow	18–23	Golf course	Monitor plume migration
0183	Deep	93–98	Golf course	Monitor plume migration
0065	Intermediate	50–60	Golf course	Monitor plume migration
0066	Intermediate	40–50	End of Tomichi Trail	Monitor plume migration
0186	Intermediate	53–58	End of Monte Vista Dr.	Monitor plume migration
0187	Deep	93-98	End of Monte Vista Dr.	Monitor plume migration
0188	Intermediate	53–58	West of Gunnison River	Monitor plume migration
0189	Deep	93–98	West of Gunnison River	Monitor plume migration
0160	Intermediate	51–56	West of Gunnison River	Adjacent to IC boundary
0161	Deep	93–98	West of Gunnison River	Adjacent to IC boundary
0067	Intermediate	40–50	South of Tomichi Creek	Confirm results in domestic well 0082
Surface Water				
0248	NA		Tomichi Creek	Downstream of Valco pond
0777	NA		Tomichi Creek	Downstream – potential aquifer discharge
0780	NA		Valco, Inc., gravel pit	Above MCL
0792	NA		Gunnison River	Upstream
0795	NA		Gunnison River	Downstream
Domestic Wells		Use		
0080	Intermediate	Potable	South of Tomichi Creek	Verify plume not beyond IC boundary
0081	Intermediate	Not in use	South of Tomichi Creek	Verify plume not beyond IC boundary
0082	Intermediate	Not in use	South of Tomichi Creek	Verify plume not beyond IC boundary
0468	Shallow	Not in use	East of Gunnison River	Elevated uranium concentrations
0469	Shallow	Potable	West of Gunnison River	Buffer zone
0665	Shallow	Potable	West of Gunnison River	Buffer zone
0667	Shallow	Potable	West of Gunnison River	Buffer zone
0683	Shallow	Potable	West of Gunnison River	Buffer zone
0685	Shallow	Potable	West of Gunnison River	Buffer zone

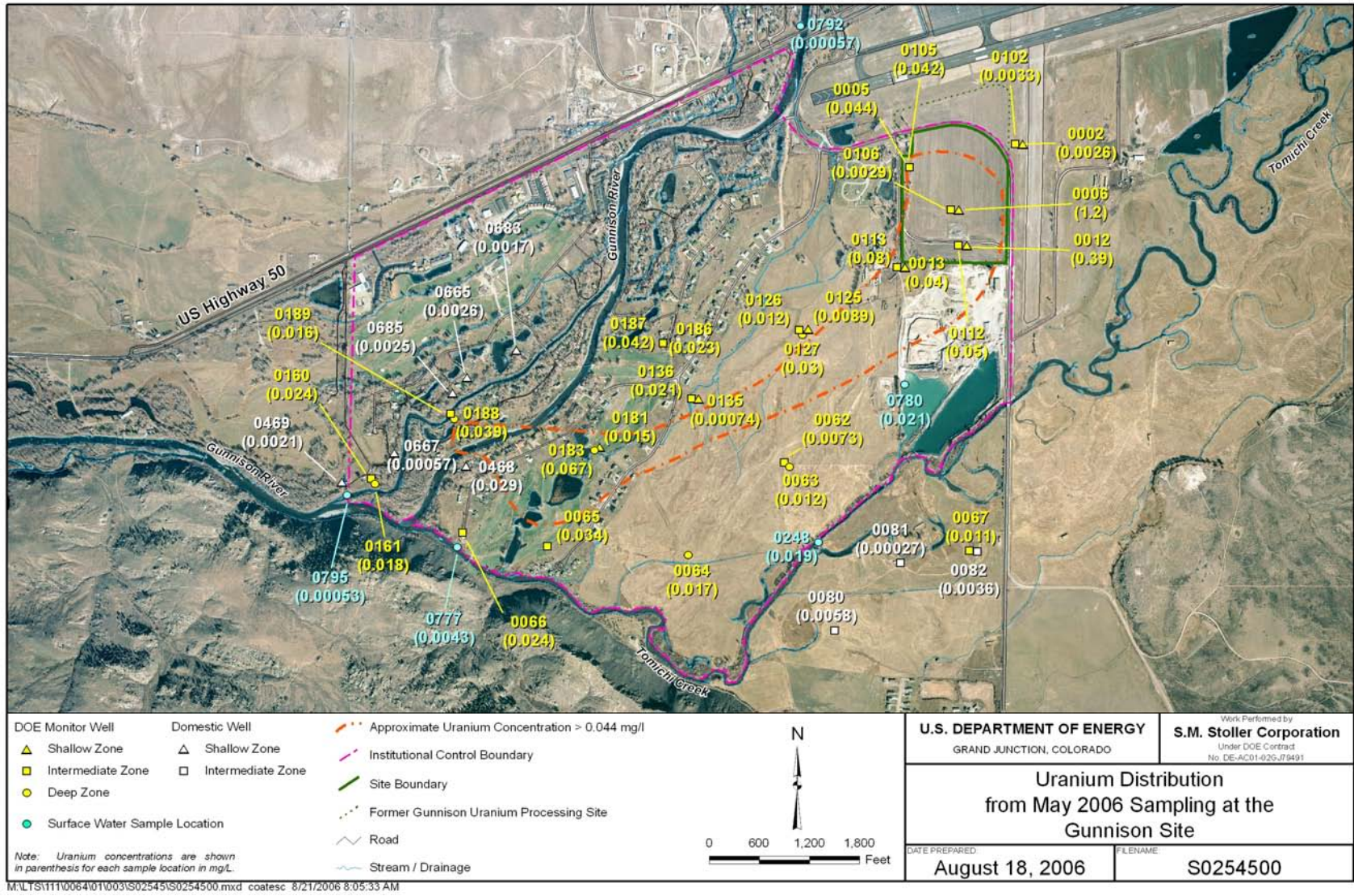


Figure 3. Distribution of Uranium at the Gunnison Site

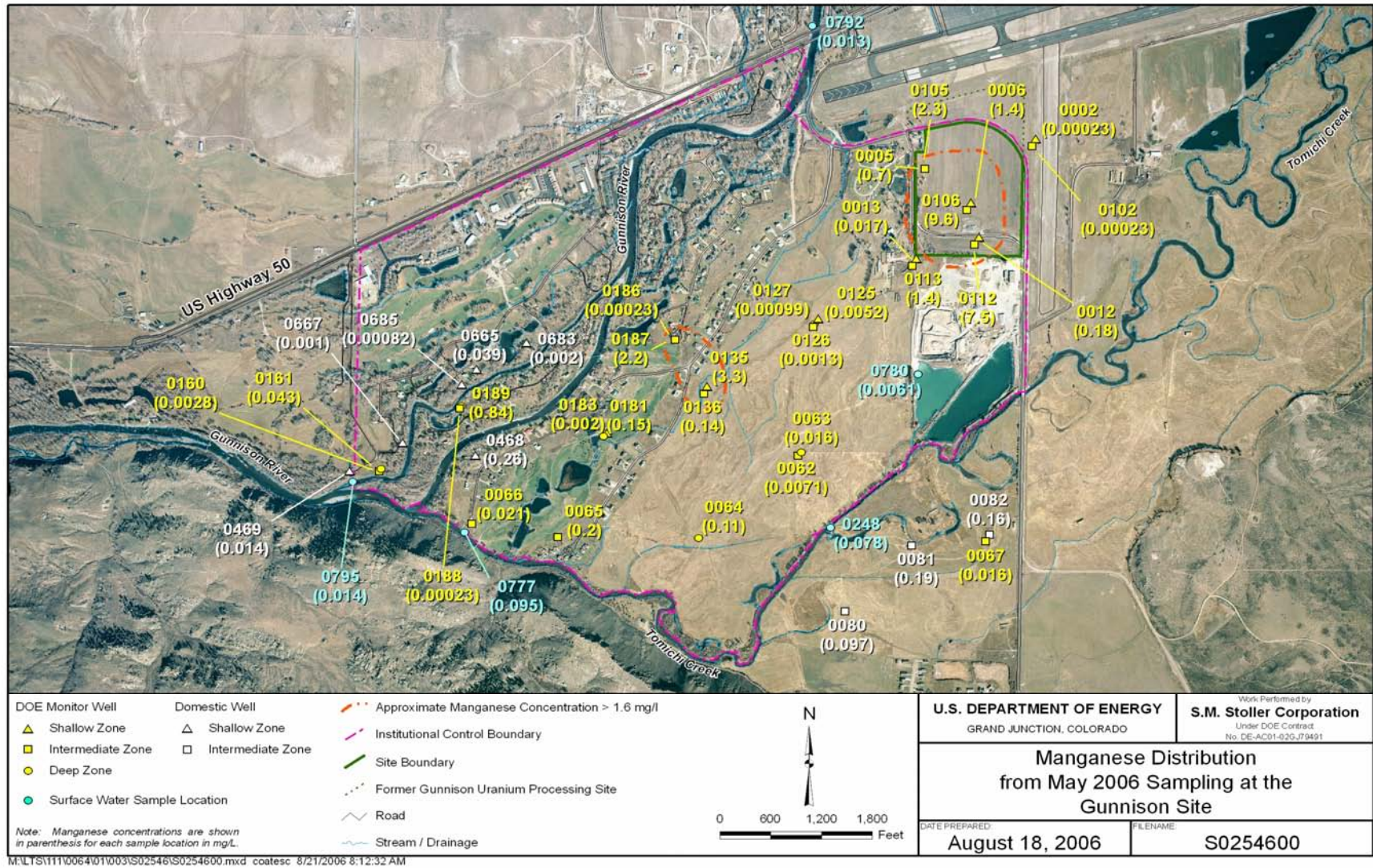


Figure 4. Distribution of Manganese at the Gunnison Site

Concentrations of uranium in ground water beneath the site are still at or above the MCL of 0.044 g/L in three wells in the shallow zone and two wells in the intermediate zone (Figure 5). Although the uranium concentration in well 0006 increased in 2006, the uranium concentration in wells 0012 and 0113 has generally decreased since 1997, and the overall trend indicates that natural flushing in ground water in the alluvial aquifer is progressing. Results from the 2006 sampling event indicate that uranium in ground water is migrating deeper in the alluvial sequence while progressing downgradient from the site, which is consistent with historical data and model predictions (Figure 6, Figure 7, and Figure 8). The MCL was not exceeded in any shallow- or intermediate-zone monitor well downgradient from the site. However, the MCL was exceeded in the deep zone (well 0183) 4,400 ft downgradient from the site (Figure 7).

Concentrations of uranium in some wells will periodically increase in certain areas of the alluvial aquifer as the contaminant plume migrates downgradient and deeper into the aquifer. This condition is expected and is the normal progression of the natural flushing process, and is evident in the concentration versus time plots for DOE monitor wells, 0160, 0161, and 0183 (Figure 7 and Figure 8). In wells furthest downgradient from the millsite and across the Gunnison River (0160 and 0161), uranium concentrations are slowly increasing to above the upper range of background (0.0085 mg/L) (DOE 1996) but still less than the MCL (Figure 8). The distribution of uranium throughout the alluvial aquifer in each of the three zones is summarized in Table 2.

Table 2. Summary of 2006 Uranium Distribution at the Gunnison Site

Area	Zone	Wells	Uranium Concentration ^a (mg/L)
Upgradient	Shallow	0002	0.003
	Intermediate	0102	0.003
On-site and Just Off-Site	Shallow	0005, 0006, 0012, 0013	0.419
	Intermediate	0105, 0106, 0112, 0113	0.044
Downgradient (Before Gunnison River)	Shallow	0125, 0135, 0181	0.008
	Intermediate	0062, 0065, 0066, 0126, 0136, 0186	0.020
	Deep	0063, 0064, 0127, 0183, 0187	0.034
Downgradient (Beyond Gunnison River)	Intermediate	0160, 0188	0.032
	Deep	0161, 0189	0.017

^aUranium concentrations from 2006 sampling event. If more than one well is listed, the concentration is the mean value.

Concentrations of manganese in ground water beneath the Gunnison site are above the DWEL of 1.6 mg/L in the three wells in the intermediate zone, with concentrations below the DWEL in the shallow zone (Figure 9). Manganese concentrations above the DWEL in on-site wells in the intermediate zone are generally decreasing over time. Downgradient from the site, the samples collected from well 0135 in the shallow zone and well 0187 in the deep zone had manganese concentrations that exceeded the DWEL (Figure 10 and Figure 11). Manganese does not appear to be widespread farther downgradient in the alluvial aquifer (Figure 12).

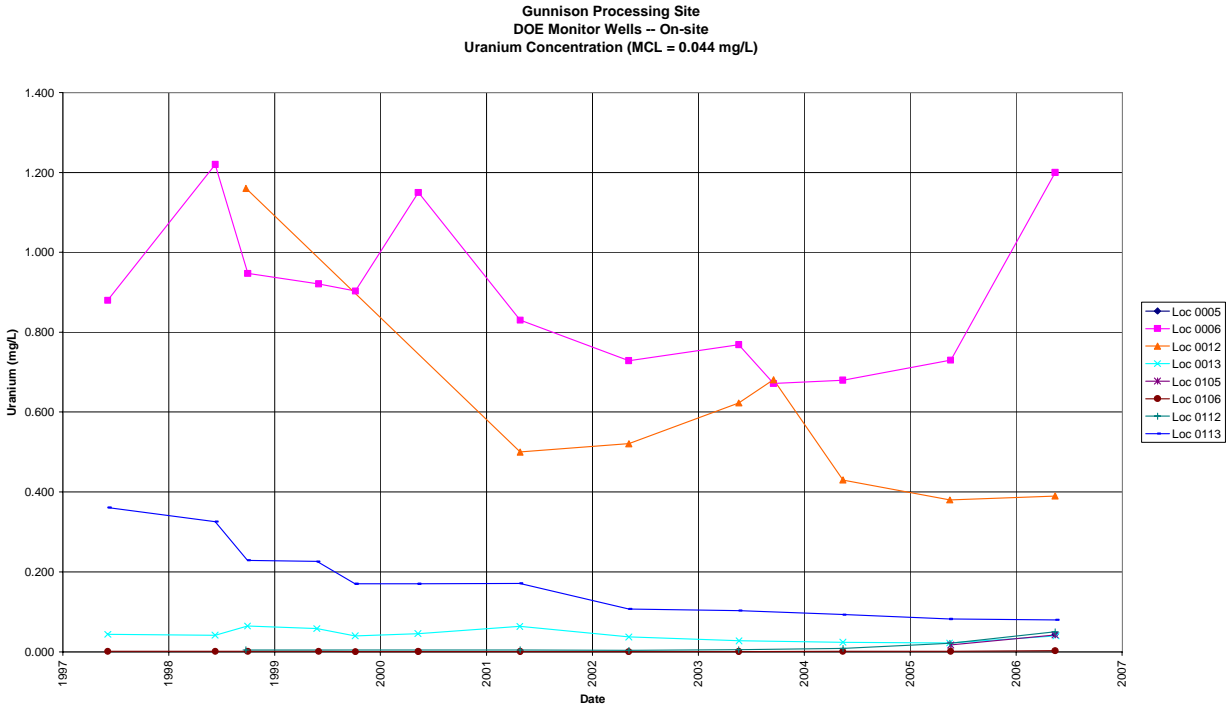


Figure 5. Uranium Concentrations in Ground Water – On-Site DOE Monitor Wells at the Gunnison Site

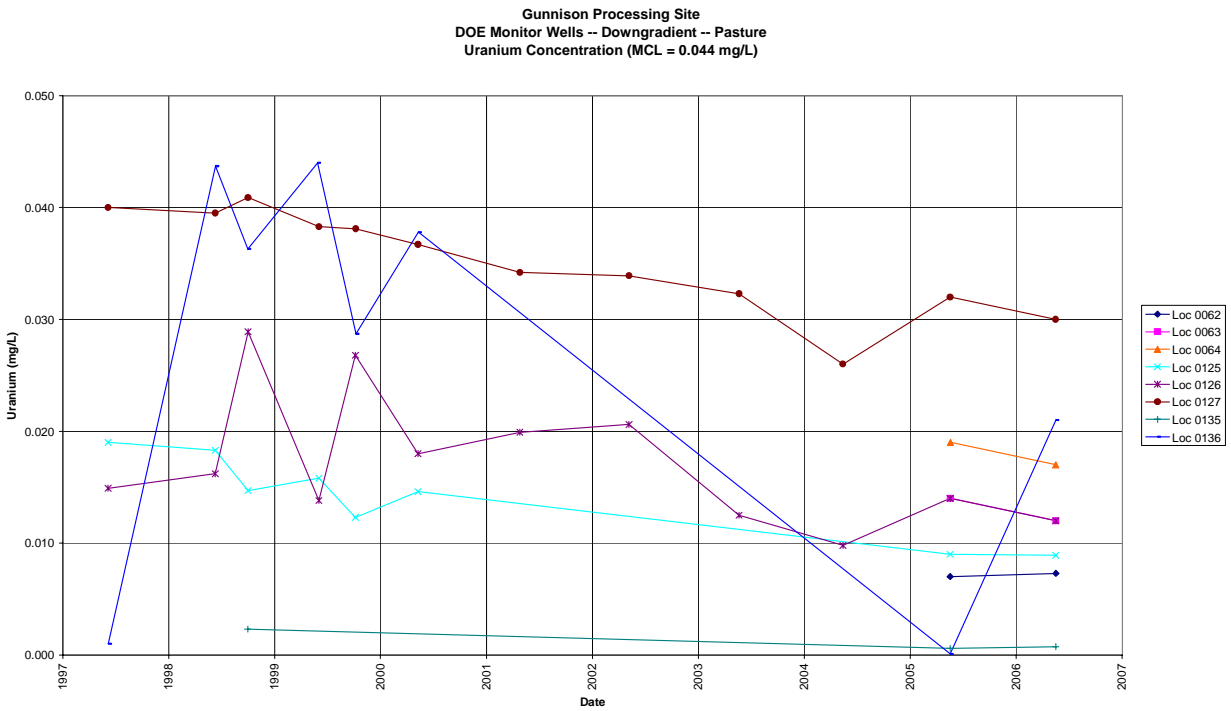


Figure 6. Uranium Concentrations in Ground Water – Downgradient DOE Monitor Wells – Pasture, Near the Gunnison Site

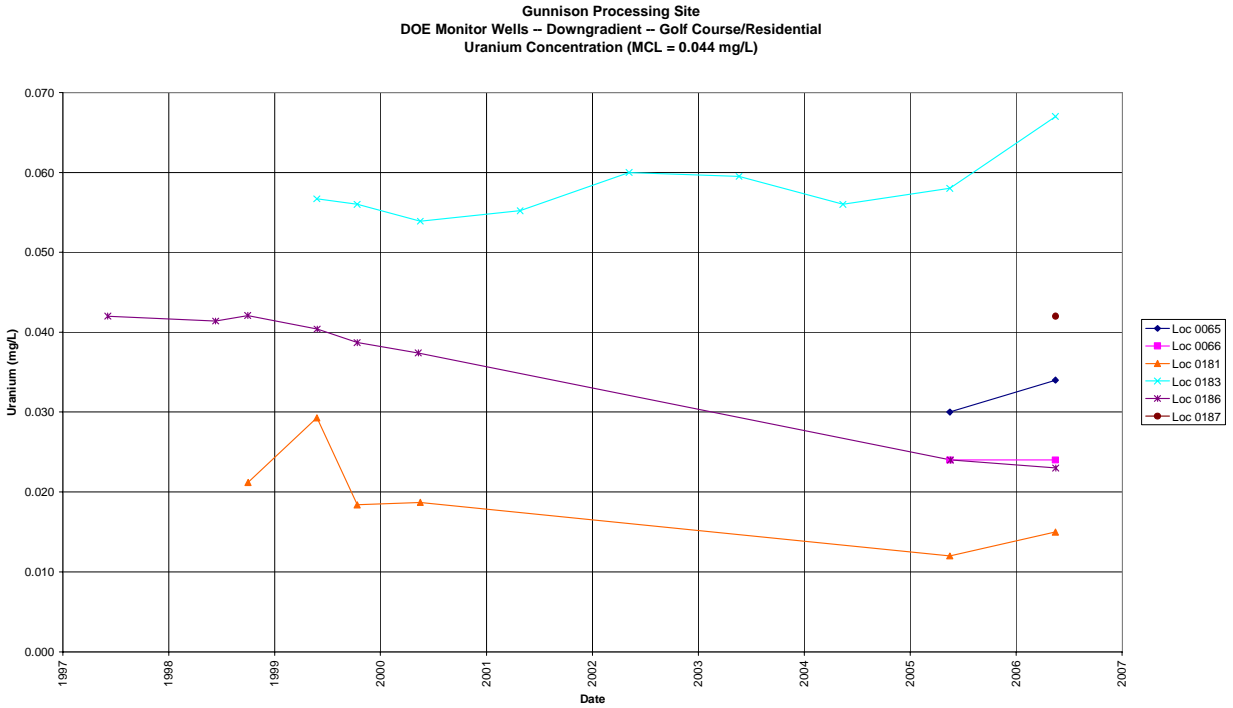


Figure 7. Uranium Concentrations in Ground Water – Downgradient DOE Monitor Wells – Golf Course and Residential, Near the Gunnison Site

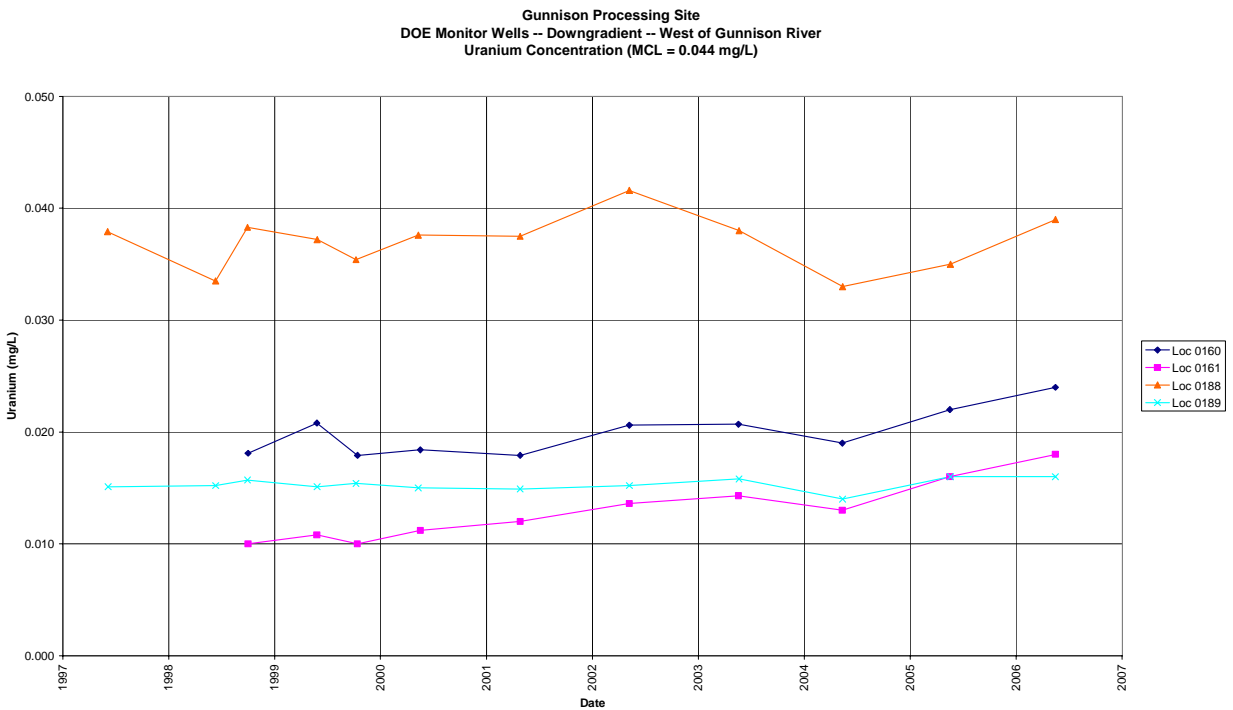


Figure 8. Uranium Concentrations in Ground Water – Downgradient DOE Monitor Wells – West of the Gunnison River, Near the Gunnison Site

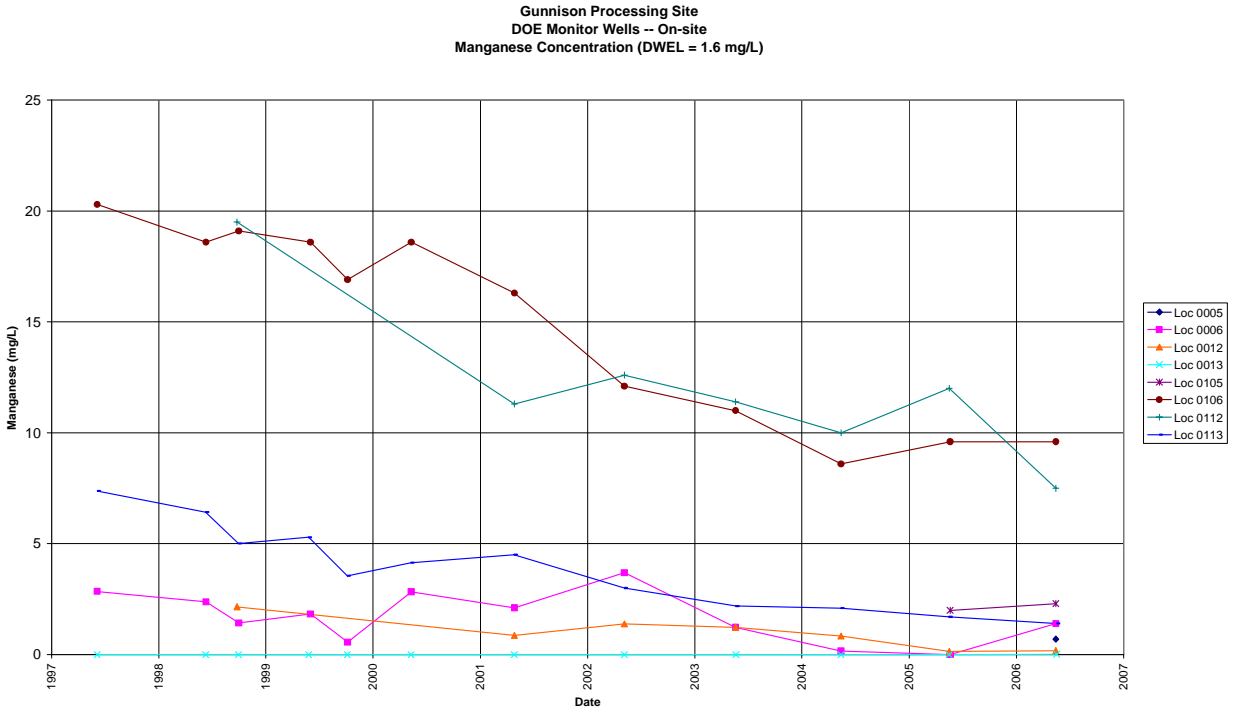


Figure 9. Manganese Concentrations in Ground Water – On-Site DOE Monitor Wells at the Gunnison Site

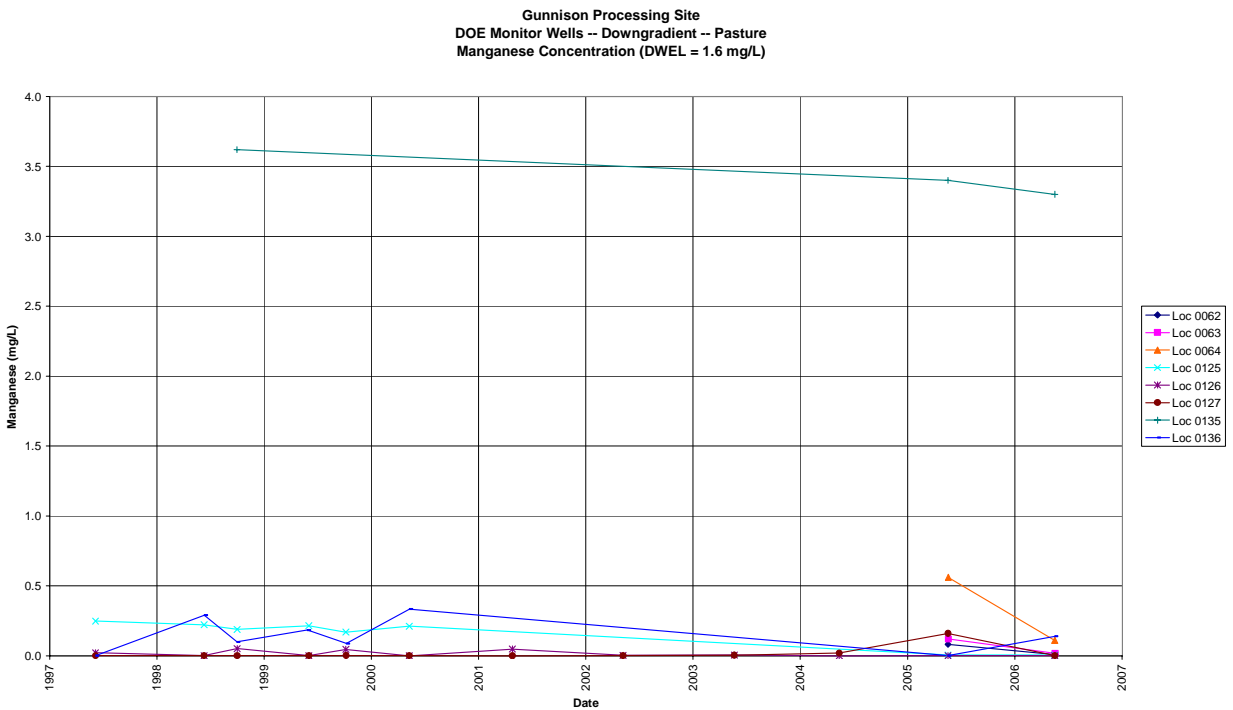


Figure 10. Manganese Concentrations in Ground Water – Downgradient DOE Monitor Wells –Pasture, Near the Gunnison Site

Gunnison Processing Site
DOE Monitor Wells – Downgradient – Golf Course/Residential
Manganese Concentration (DWEL = 1.6 mg/L)

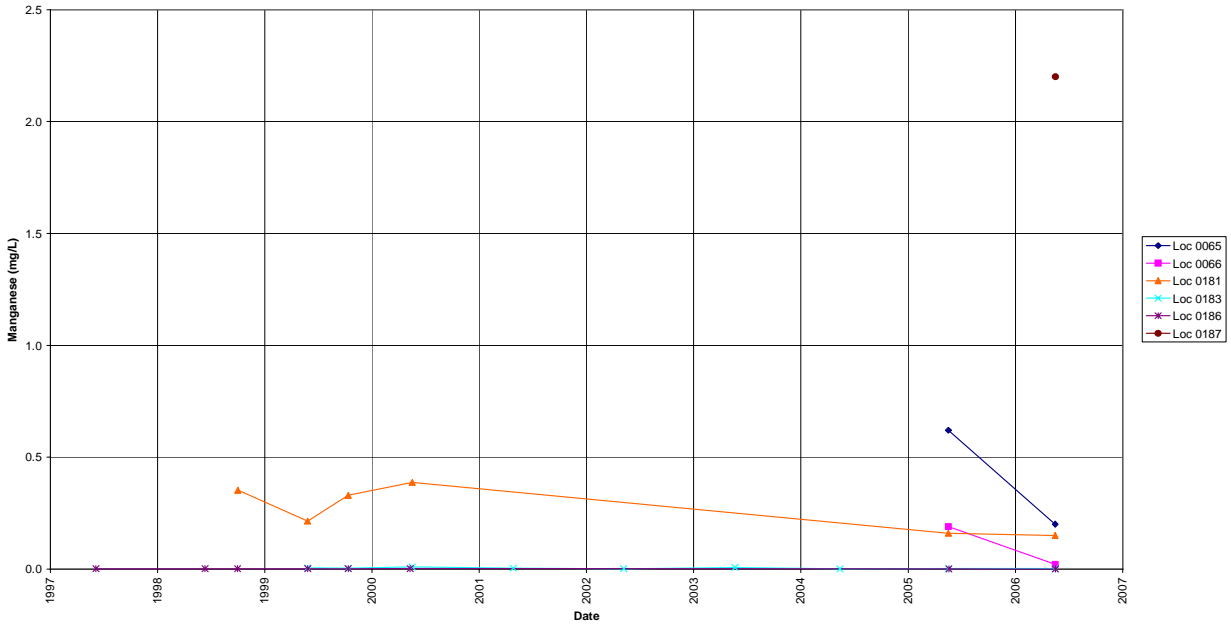


Figure 11. Manganese Concentrations in Ground Water – Downgradient DOE Monitor Wells – Golf Course and Residential, Near the Gunnison Site

Gunnison Processing Site
DOE Monitor Wells – Downgradient – West of Gunnison River
Manganese Concentration (DWEL = 1.6 mg/L)

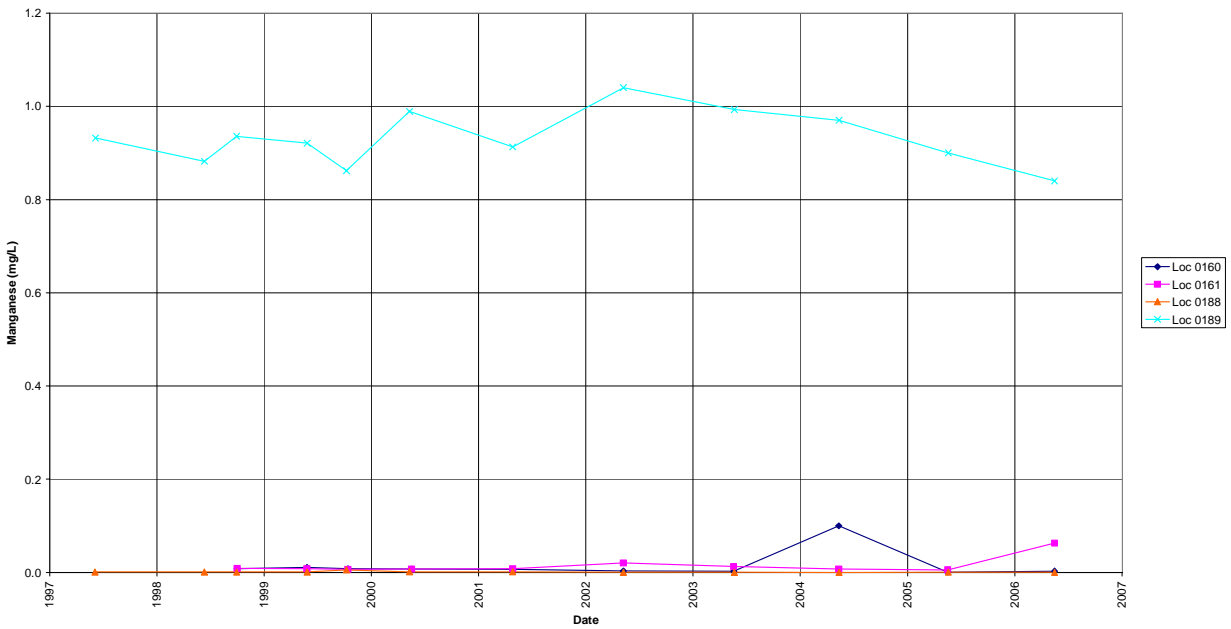


Figure 12. Manganese Concentrations in Ground Water – Downgradient DOE Monitor Wells – West of the Gunnison River, Near the Gunnison Site

4.2 Domestic Wells

Concentrations of uranium in ground water in the domestic buffer zone wells (northwest of the Gunnison River) downgradient from the site are well below the MCL of 0.044 mg/L and below the action level set by CDPHE of 0.020 mg/L (Figure 13). The concentration of uranium (0.029 mg/L) in the sample collected from domestic well 0468 (southeast of the Gunnison River and not in the buffer zone) is below the CDPHE agricultural action level of 0.200 mg/L. This well was historically used for lawn irrigation but is no longer in use because the homeowner obtains water out of the Gunnison River for irrigation. This residence is connected to the domestic water supply system.

Concentrations of uranium in ground water in three domestic wells (0080, 0081, and 0082), installed in 2002 south of Tomichi Creek, are also well below the MCL of 0.044 mg/L and below the action level set by CDPHE of 0.020 mg/L (Figure 14). Because uranium concentrations in ground water in domestic well 0082 exceeded the upper range of background (0.0085 mg/L) (DOE 1996) in 2003 (to a level of 0.0155 mg/L), DOE installed monitor well 0067 adjacent to domestic well in order to obtain data from this portion of the aquifer from a well designed for collecting water quality samples. Results from DOE monitor well 0067 are shown in Figure 14 for comparison with the domestic wells. Migration of significant concentration of uranium in ground water is not expected south of Tomichi Creek. However, the domestic wells are relatively close to the preexisting channel of Tomichi Creek which may have been subject to elevated uranium concentrations in the past.

Concentrations of manganese in ground water in the domestic wells are well below the DWEL of 1.6 mg/L (Figure 15 and Figure 16).

4.3 Surface Water

Concentrations of uranium in surface water in the Gunnison River during 2006 were very low (below 0.0006 mg/L) and indicative of runoff conditions from the melting of the mountain snow pack. The concentration of uranium in surface water in the Valco, Inc., pond (0780) remained at the historical low of 0.021 mg/L (Figure 17). However, variable concentrations of uranium in surface water in the pit are expected because it is recharged by contaminated ground water and concentrations vary depending on the area and depth of pumping, the rate of discharge, and seasonal interactions between ground water and surface water. The concentration of uranium in the sample collected from Tomichi Creek, approximately 1,500 ft downstream from the Valco, Inc., pond discharge point (0248), was elevated (0.019 mg/L) and essentially the same as the uranium concentration measured in the Valco, Inc., pond. The similar concentrations between locations 0780 and 0248 are expected because Tomichi Creek was rerouted to the original channel, and the main component of stream flow at location 0248 is attributed to discharge from the Valco, Inc., pond. The uranium concentration in the sample collected farther downstream on Tomichi Creek (0777) was lower (0.004 mg/L) as dilution occurs farther from the Valco, Inc., discharge point.

Concentrations of manganese in surface water are well below the DWEL of 1.6 mg/L and comparable to background (Figure 18).

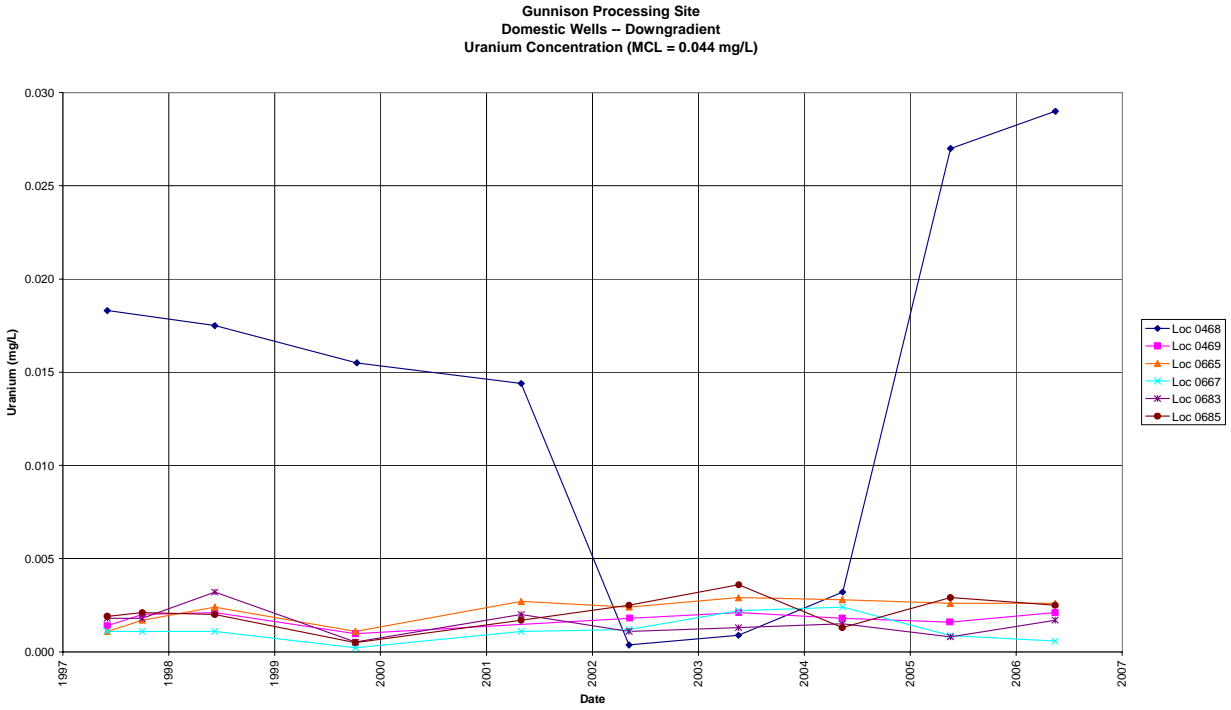


Figure 13. Uranium Concentrations in Ground Water – Domestic Wells Downgradient from the Gunnison Site

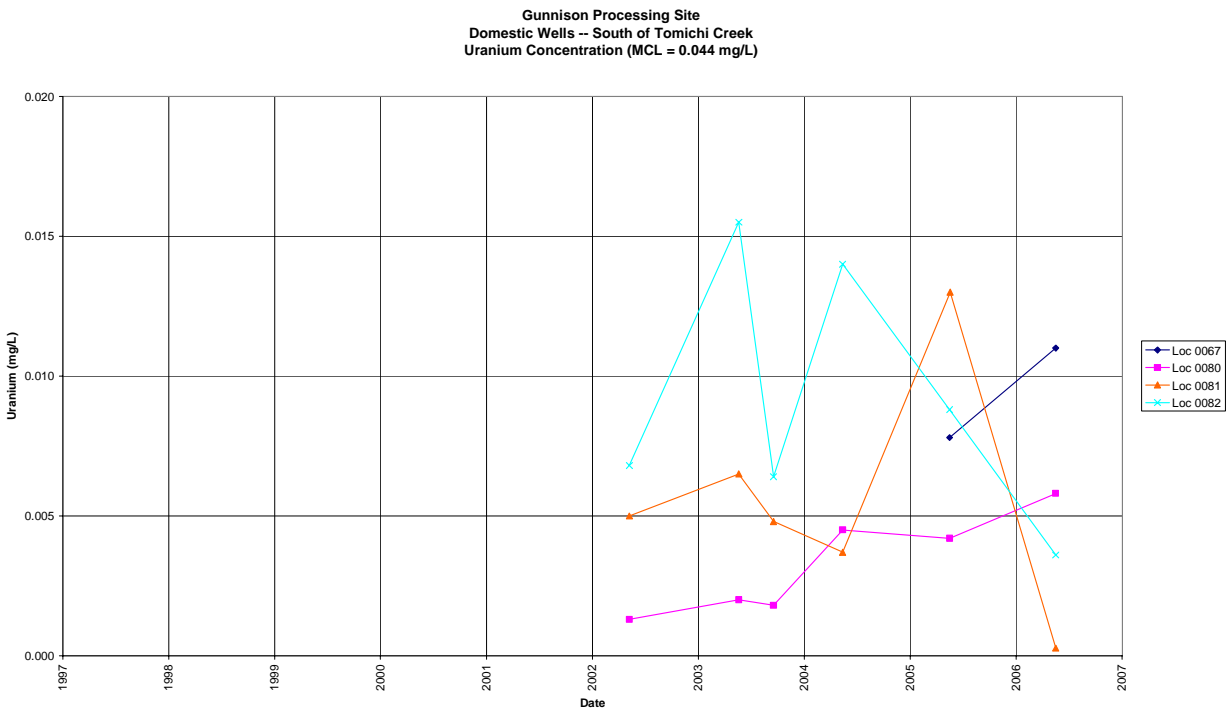


Figure 14. Uranium Concentrations in Ground Water – Domestic Wells South of Tomichi Creek

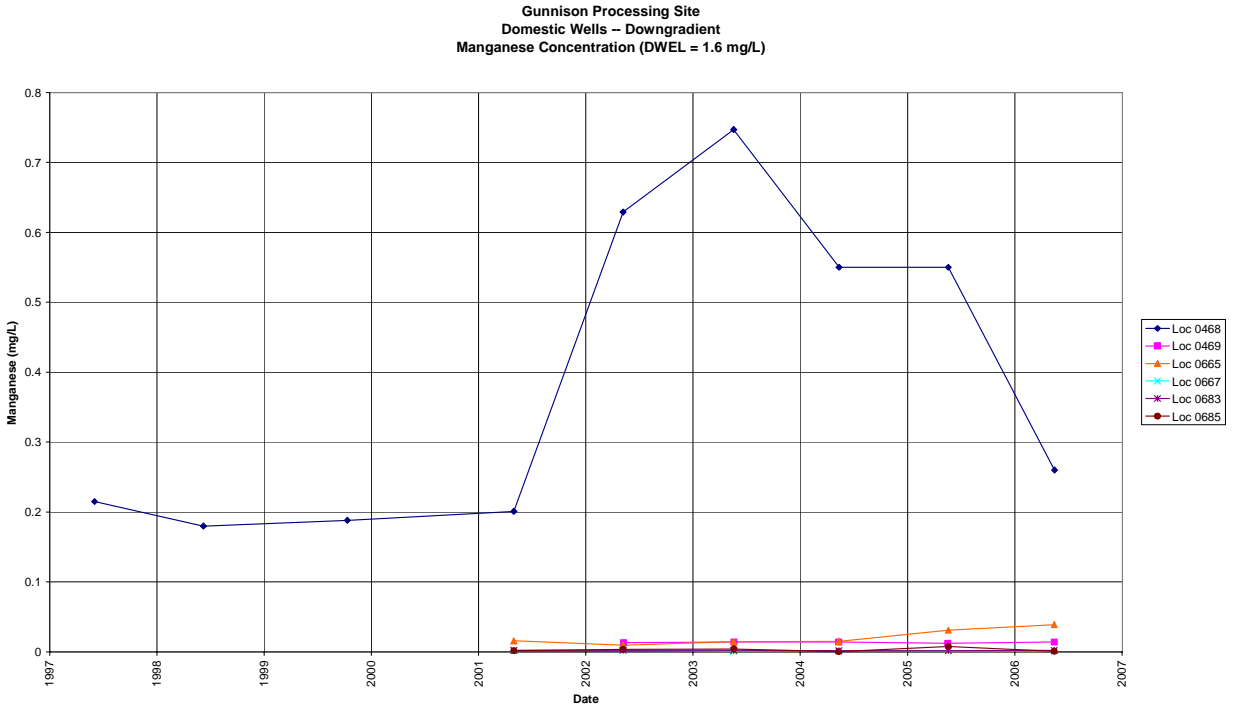


Figure 15. Manganese Concentrations in Ground Water – Domestic Wells Downgradient from the Gunnison Site

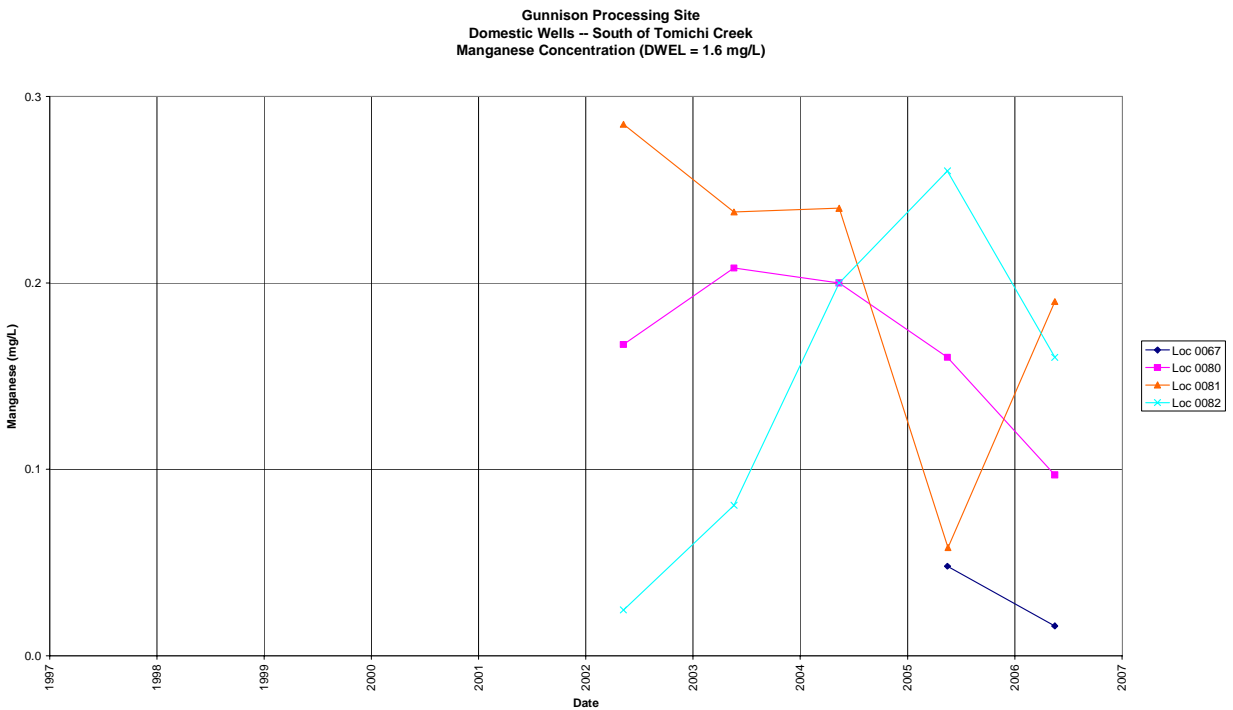


Figure 16. Manganese Concentrations in Ground Water – Domestic Wells South of Tomichi Creek

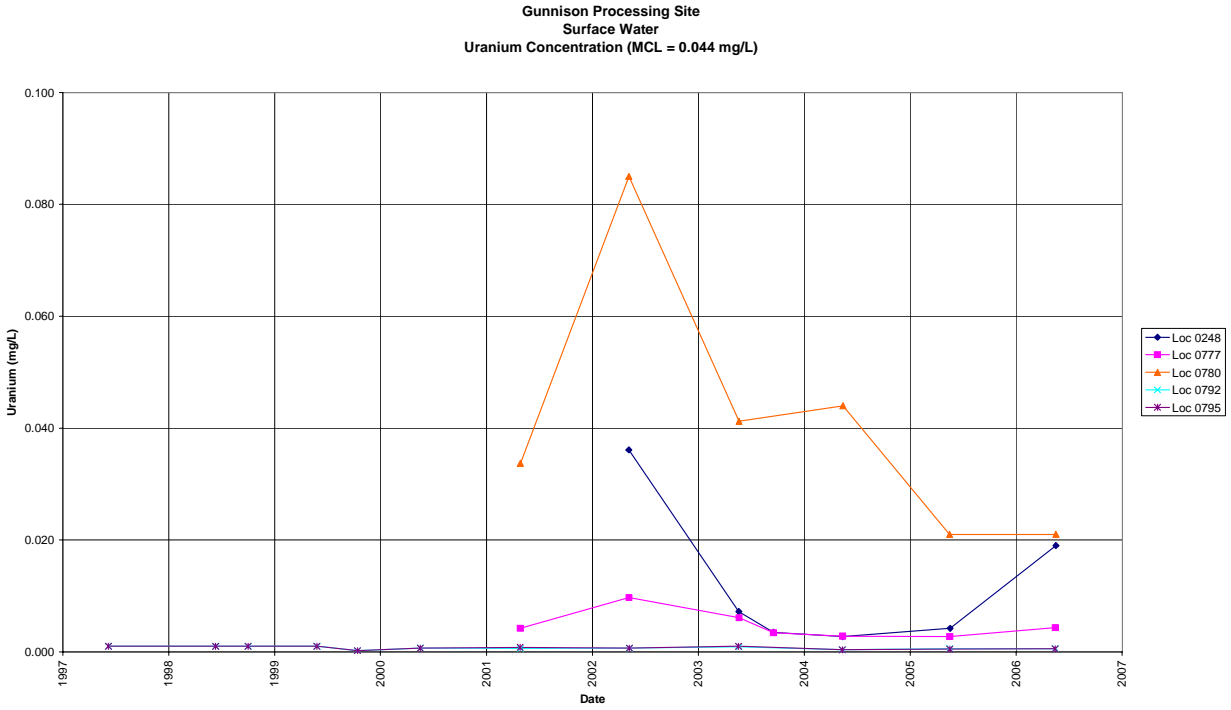


Figure 17. Uranium Concentrations in Surface Water Near the Gunnison Site

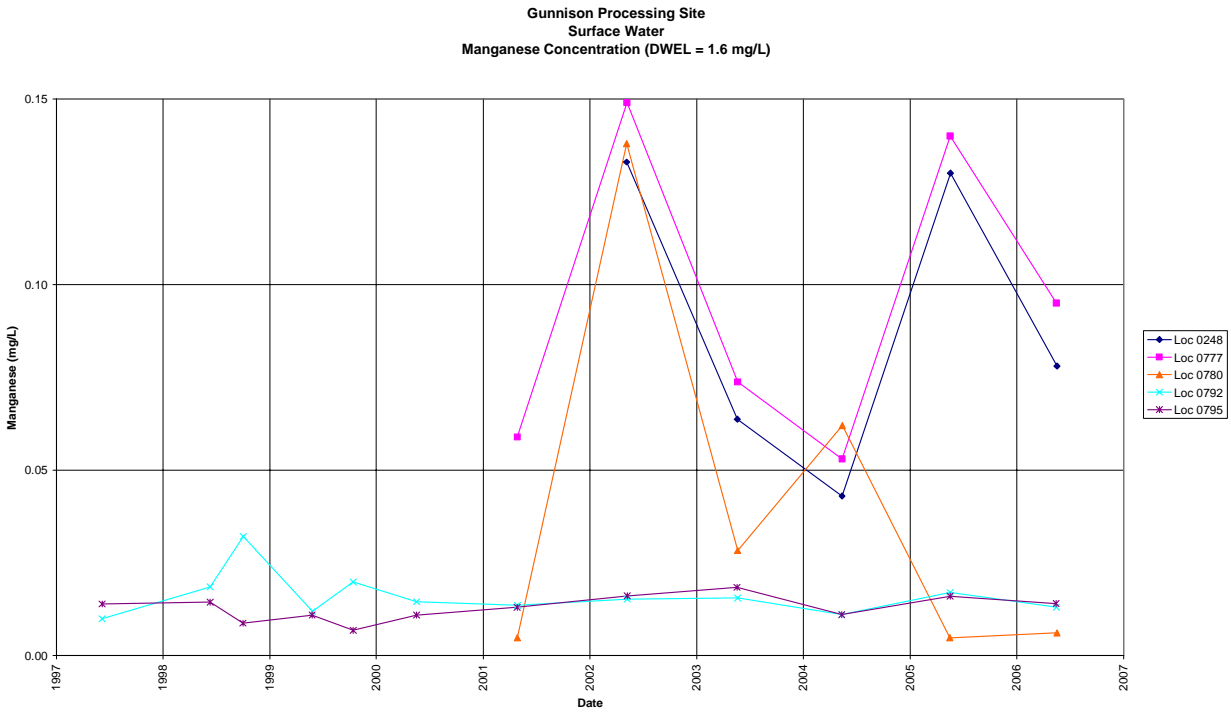


Figure 18. Manganese Concentrations in Surface Water Near the Gunnison Site

5.0 Natural Flushing Assessment

Ground water flow and transport modeling has predicted that uranium concentrations in ground water will decrease to below the EPA ground water standard within 100 years. An assessment of the accuracy of ground water model predictions is preliminary because of the limited timeframe over which data have been collected. Uranium concentrations in the most contaminated portion of the aquifer, on and just downgradient from the millsite, are generally declining, with the exception of an increase in monitor well 0006 in the shallow zone. The variability of uranium concentrations in this well may reflect ground water in intermittent contact with residual soil contamination in the area as water levels fluctuate and flow through the well screen varies. The high uranium concentration, however, appears to be isolated and well specific and does not affect ground water in the intermediate zone in the adjacent monitor well (0106). The ground water flow and transport model accounted for the residual soil contamination by simulating a recharge zone with an area corresponding to the area that supplemental standards was applied and with a uranium value of 1.2709 mg/L as the recharge concentration (DOE 2001).

Figure 19 compares uranium concentrations predicted by ground water flow and transport modeling in ground water just off the southwest corner of the site to actual concentrations determined by analysis of ground water samples from intermediate zone monitor well 0113. As shown in this figure, recent concentrations are lower than concentrations predicted by the ground water model, along with a downward trend, which indicates that natural flushing processes have been effective to date in this area of the alluvial aquifer.

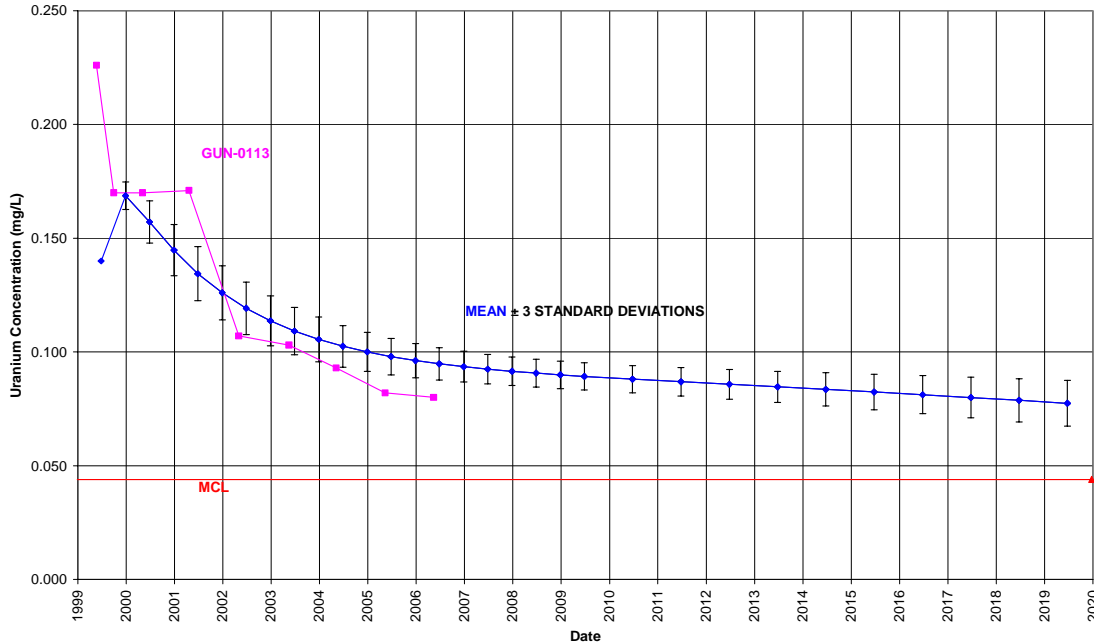


Figure 19. Uranium Concentration – Predicted and Actual – in DOE Monitor Well 0113 at the Gunnison Site

Trend analysis of uranium concentrations in ground water using the Mann-Kendall test (Gilbert 1987) was performed to assess the temporal behavior of uranium concentrations. This test determines if an upward trend, downward trend, or no trend exists. As shown in Table 3, trends of uranium concentration in monitor wells are generally indicative of conditions in the aquifer relative to depth and the distance downgradient from the site and show that contamination is migrating through the aquifer and natural flushing is progressing as predicted.

Table 3. Assessment of Uranium Concentration Trends at the Gunnison Site

Location	No. of Samples	Trend	Historical Maximum	Result 2006
0006	13	Down	1.220	1.200
0012	8	None	1.160	0.390
0013	12	Down	0.065	0.040
0106	12	None	0.003	0.003
0112	7	Up	0.050	0.050
0113	12	Down	0.361	0.080
0125	8	Down	0.018	0.009
0126	12	None	0.029	0.012
0127	12	Down	0.041	0.030
0136	8	None	0.044	0.021
0160	10	Up	0.024	0.024
0161	10	Up	0.018	0.018
0181	6	None	0.029	0.015
0183	9	None	0.067	0.067
0186	8	Down	0.042	0.023
0188	12	None	0.042	0.039
0189	12	None	0.016	0.016

6.0 Conclusions

Concentrations of uranium and manganese in ground water beneath the Gunnison site are still above their relevant MCL and DWEL, respectively, but are generally decreasing with time, indicating that natural flushing is progressing in the alluvial aquifer. Concentrations of uranium in ground water downgradient from the site and deeper in the alluvial aquifer in some areas are still elevated and rising, as expected, as the plume migrates downgradient.

Uranium concentrations in the nine domestic wells sampled near the processing site were all below the MCL and the CDPHE action level. Manganese concentrations in these wells were all below the DWEL.

Surface water uranium concentrations are compared to an estimated background value of 0.0015 mg/L from location 0792, which is located on the Gunnison River upstream from the site. The uranium concentration at the Gunnison River downstream location 0795 was less than the background value, indicating minimal impact to the Gunnison River from site activities. Uranium concentration at the Valco, Inc., gravel pit pond (0780) is elevated when compared to the background, which is expected because the gravel pit is recharged by contaminated ground water from the site. Uranium concentrations at Tomichi Creek locations (0248 and 0777) are elevated when compared to the background, which is expected because Tomichi Creek receives discharge from the Valco, Inc., pond.

Verification monitoring of COPCs in ground water in the alluvial aquifer and surface water in the vicinity of the Gunnison site will continue on an annual basis to assess the progress of natural flushing. The next update to this report will be compiled after ground water and surface water monitoring in April 2007.

7.0 References

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End of current text

Appendix A

Ground Water Quality Data by Parameter for DOE Monitor Wells

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 8/3/2006 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Manganese	mg/L	0002	WL	05/16/2006	0001	AL	U	0.00023	U FJ #	0.00023	-
	mg/L	0005	WL	05/15/2006	0001	AL	O	0.700	F #	0.00023	-
	mg/L	0006	WL	05/15/2006	0001	AL	O	1.400	F #	0.00023	-
	mg/L	0012	WL	05/15/2006	0001	AL	O	0.180	FQ #	0.00023	-
	mg/L	0013	WL	05/18/2006	0001	AL	D	0.017	FQ #	0.00023	-
	mg/L	0062	WL	05/18/2006	0001	AL	O	0.0071	F #	0.00023	-
	mg/L	0063	WL	05/18/2006	0001	AL	O	0.016	F #	0.00023	-
	mg/L	0064	WL	05/17/2006	0001	AL	O	0.110	F #	0.00023	-
	mg/L	0065	WL	05/16/2006	0001	AL	O	0.200	F #	0.00023	-
	mg/L	0066	WL	05/16/2006	0001	AL	O	0.021	F #	0.00023	-
	mg/L	0067	WL	05/17/2006	0001	AL	O	0.016	F #	0.00023	-
	mg/L	0102	WL	05/16/2006	0001	AL	U	0.00023	U FJ #	0.00023	-
	mg/L	0105	WL	05/15/2006	0001	AL	O	2.300	F #	0.00023	-
	mg/L	0106	WL	05/15/2006	0001	AL	O	9.600	F #	0.00023	-
	mg/L	0112	WL	05/15/2006	0001	AL	O	7.500	F #	0.00023	-
	mg/L	0113	WL	05/18/2006	0001	AL	D	1.400	F #	0.00023	-
	mg/L	0125	WL	05/17/2006	0001	AL	D	0.0052	F #	0.00023	-
	mg/L	0126	WL	05/17/2006	0001	AL	D	0.0013	B F #	0.00023	-
	mg/L	0127	WL	05/17/2006	0001	AL	D	0.00099	B FJ #	0.00023	-
	mg/L	0135	WL	05/17/2006	0001	AL	D	3.300	F #	0.00023	-
	mg/L	0136	WL	05/17/2006	0001	AL	D	0.140	F #	0.00023	-
	mg/L	0160	WL	05/16/2006	0001	AL	D	0.0028	B F #	0.00023	-
	mg/L	0161	WL	05/16/2006	0001	AL	D	0.043	F #	0.00023	-
	mg/L	0161	WL	05/16/2006	0002	AL	D	0.063	F #	0.00023	-
	mg/L	0181	WL	05/16/2006	0001	AL	D	0.150	F #	0.00023	-
	mg/L	0183	WL	05/16/2006	0001	AL	D	0.002	B F #	0.00023	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 8/3/2006 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Manganese	mg/L	0186	WL	05/17/2006	0001	AL	D	0.00023	U FJ #	0.00023	-
	mg/L	0186	WL	05/17/2006	0002	AL	D	0.00023	U FJ #	0.00023	-
	mg/L	0187	WL	05/17/2006	0001	AL	D	2.200	FQ #	0.00023	-
	mg/L	0188	WL	05/16/2006	0001	AL	D	0.00023	U FJ #	0.00023	-
	mg/L	0189	WL	05/16/2006	0001	AL	D	0.840	F #	0.00023	-
Uranium	mg/L	0002	WL	05/16/2006	0001	AL	U	0.0026	F #	3.4E-06	-
	mg/L	0005	WL	05/15/2006	0001	AL	O	0.044	F #	3.4E-06	-
	mg/L	0006	WL	05/15/2006	0001	AL	O	1.200	F #	6.8E-05	-
	mg/L	0012	WL	05/15/2006	0001	AL	O	0.390	FQ #	3.4E-05	-
	mg/L	0013	WL	05/18/2006	0001	AL	D	0.040	FQ #	3.4E-06	-
	mg/L	0062	WL	05/18/2006	0001	AL	O	0.0073	F #	3.4E-06	-
	mg/L	0063	WL	05/18/2006	0001	AL	O	0.012	F #	3.4E-06	-
	mg/L	0064	WL	05/17/2006	0001	AL	O	0.017	F #	3.4E-06	-
	mg/L	0065	WL	05/16/2006	0001	AL	O	0.034	F #	3.4E-06	-
	mg/L	0066	WL	05/16/2006	0001	AL	O	0.024	F #	3.4E-06	-
	mg/L	0067	WL	05/17/2006	0001	AL	O	0.011	F #	3.4E-06	-
	mg/L	0102	WL	05/16/2006	0001	AL	U	0.0033	F #	3.4E-06	-
	mg/L	0105	WL	05/15/2006	0001	AL	O	0.042	F #	3.4E-06	-
	mg/L	0106	WL	05/15/2006	0001	AL	O	0.0029	F #	3.4E-06	-
	mg/L	0112	WL	05/15/2006	0001	AL	O	0.050	F #	3.4E-06	-
	mg/L	0113	WL	05/18/2006	0001	AL	D	0.080	F #	3.4E-06	-
	mg/L	0125	WL	05/17/2006	0001	AL	D	0.0089	F #	3.4E-06	-
	mg/L	0126	WL	05/17/2006	0001	AL	D	0.012	F #	3.4E-06	-
	mg/L	0127	WL	05/17/2006	0001	AL	D	0.030	F #	3.4E-06	-
	mg/L	0135	WL	05/17/2006	0001	AL	D	0.00074	F #	3.4E-06	-
mg/L	0136	WL	05/17/2006	0001	AL	D	0.021	F #	3.4E-06	-	

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 8/3/2006 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE:		ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY
				DATE	ID				LAB	DATA	QA		
Uranium	mg/L	0160	WL	05/16/2006	0001	AL	D	0.024	F	#	3.4E-06	-	
	mg/L	0161	WL	05/16/2006	0001	AL	D	0.018	F	#	3.4E-06	-	
	mg/L	0161	WL	05/16/2006	0002	AL	D	0.018	F	#	3.4E-06	-	
	mg/L	0181	WL	05/16/2006	0001	AL	D	0.015	F	#	3.4E-06	-	
	mg/L	0183	WL	05/16/2006	0001	AL	D	0.067	F	#	1.7E-05	-	
	mg/L	0186	WL	05/17/2006	0001	AL	D	0.023	F	#	3.4E-06	-	
	mg/L	0186	WL	05/17/2006	0002	AL	D	0.023	F	#	3.4E-06	-	
	mg/L	0187	WL	05/17/2006	0001	AL	D	0.042	FQ	#	3.4E-06	-	
	mg/L	0188	WL	05/16/2006	0001	AL	D	0.039	F	#	3.4E-06	-	
	mg/L	0189	WL	05/16/2006	0001	AL	D	0.016	F	#	3.4E-06	-	

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 8/3/2006 1:32 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
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RECORDS: SELECTED FROM USEE200 WHERE site_code='GUN01' AND location_code in('0002','0005','0006','0012','0013','0062','0063','0064','0065','0066','0067','0102','0105','0106','0112','0113','0125','0126','0127','0135','0136','0160','0161','0181','0183','0186','0187','0188','0189') AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND cas in('07439-96-5','07440-61-1') AND DATE_SAMPLED between #1/1/2006# and #1/1/2007#

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 U UPGRADIENT

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 & Radiochemistry: 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 compound (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

Ground Water Quality Data by Parameter for Domestic Wells

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 7/31/2006 1:23 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE:		ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY
				DATE	ID				LAB	DATA	QA		
Manganese	mg/L	0080	WL	05/17/2006	N001	AL		0.097			#	0.00023	-
	mg/L	0081	WL	05/17/2006	N001	AL		0.190			#	0.00023	-
	mg/L	0082	WL	05/17/2006	N001	AL		0.160			#	0.00023	-
	mg/L	0468	WL	05/16/2006	N001	AL	D	0.260			#	0.00023	-
	mg/L	0469	WL	05/15/2006	N001	AL	D	0.014			#	0.00023	-
	mg/L	0665	WL	05/15/2006	N001	AL	C	0.039			#	0.00023	-
	mg/L	0667	WL	05/15/2006	N001	AL	N	0.001	B	J	#	0.00023	-
	mg/L	0683	WL	05/15/2006	N001	AL	N	0.002	B		#	0.00023	-
	mg/L	0685	WL	05/15/2006	N001	AL	N	0.00082	B	J	#	0.00023	-
Uranium	mg/L	0080	WL	05/17/2006	N001	AL		0.0058			#	3.4E-06	-
	mg/L	0081	WL	05/17/2006	N001	AL		0.00027			#	3.4E-06	-
	mg/L	0082	WL	05/17/2006	N001	AL		0.0036			#	3.4E-06	-
	mg/L	0468	WL	05/16/2006	N001	AL	D	0.029			#	3.4E-06	-
	mg/L	0469	WL	05/15/2006	N001	AL	D	0.0021			#	3.4E-06	-
	mg/L	0665	WL	05/15/2006	N001	AL	C	0.0026			#	3.4E-06	-
	mg/L	0667	WL	05/15/2006	N001	AL	N	0.00057			#	3.4E-06	-
	mg/L	0683	WL	05/15/2006	N001	AL	N	0.0017			#	3.4E-06	-
	mg/L	0685	WL	05/15/2006	N001	AL	N	0.0025			#	3.4E-06	-

CLASSIC GROUND WATER QUALITY DATA BY PARAMETER WITH ZONE (USEE201) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 7/31/2006 1:23 pm

PARAMETER	UNITS	LOCATION ID	LOCATION TYPE	SAMPLE: DATE	ID	ZONE COMPL	FLOW REL.	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
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RECORDS: SELECTED FROM USEE200 WHERE site_code='GUN01' AND location_code in('0080','0081','0082','0468','0469','0665','0667','0683','0685') AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND cas in('07439-96-5','07440-61-1') AND DATE_SAMPLED between #1/1/2006# and #1/1/2007#

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: C CROSS GRADIENT D DOWN GRADIENT N UNKNOWN

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 & Radiochemistry: 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 compound (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.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.
- G Possible grout contamination, pH > 9.
- Q Qualitative result due to sampling technique.
- X Location is undefined.
- J Estimated value.
- R Unusable result.

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

Appendix C

Surface Water Quality Data by Parameter

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE GUN01, Gunnison Processing Site
 REPORT DATE: 7/31/2006 1:07 pm

PARAMETER	UNITS	LOCATION ID	SAMPLE:		RESULT	QUALIFIERS:			UN-CERTAINTY
			DATE	ID		LAB	DATA	QA	
Manganese	mg/L	0248	05/18/2006	0001	0.078	#		0.00023	-
	mg/L	0777	05/16/2006	0001	0.095	#		0.00023	-
	mg/L	0780	05/18/2006	0001	0.0061	#		0.00023	-
	mg/L	0792	05/16/2006	0001	0.013	#		0.00023	-
	mg/L	0795	05/15/2006	0001	0.014	#		0.00023	-
Uranium	mg/L	0248	05/18/2006	0001	0.019	#		3.4E-06	-
	mg/L	0777	05/16/2006	0001	0.0043	#		3.4E-06	-
	mg/L	0780	05/18/2006	0001	0.021	#		3.4E-06	-
	mg/L	0792	05/16/2006	0001	0.0005	#		3.4E-06	-
	mg/L	0795	05/15/2006	0001	0.0005	#		3.4E-06	-

RECORDS: SELECTED FROM USEE800 WHERE site_code='GUN01' AND location_code in('0248','0777','0780','0792','0795') AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND cas in('07439-96-5','07440-61-1') AND DATE_SAMPLED between #1/1/2006# and #1/1/2007#

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 & Radiochemistry: 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 compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

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

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