5.0 Falls City, Texas, Disposal Site

5.1 Compliance Summary

The Falls City, Texas, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on January 21, 2014. The site was in excellent condition. There was no evidence that institutional controls or deed restrictions had been violated. An invasive-species tree was treated with herbicide. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

Annual groundwater monitoring is conducted as a best management practice. There were no unexpected changes in groundwater quality or water levels in 2014. Site-related contamination in the uppermost aquifer poses no risk to human health because groundwater from this aquifer is not used for human consumption and is designated as limited use.

5.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls City, Texas* (LTSP) (DOE-LM/1602-2008, U.S. Department of Energy [DOE], March 2008) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 5-1 lists these requirements.

Table 5-1. License Requirements for the Falls City Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 5.4
Follow-Up Inspections	Section 3.4	Section 5.5
Maintenance	Section 3.5	Section 5.6
Emergency Response	Section 3.6	Section 5.7
Environmental Monitoring	Section 3.7	Section 5.8

5.3 Institutional Controls

The 127-acre disposal site (Figure 5-1) is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: perimeter fence, perimeter warning signs, site markers, survey and boundary monuments, and locked gates.

An adjacent 513-acre offsite property was sold by the State of Texas to Alamo Funding Group in 2005. The State acquired this land as part of the designated processing site but this portion of the processing site was not incorporated into the final DOE-owned disposal site. DOE and the State complied with requirements for parcel transfers stipulated in UMTRCA. The warranty deed stipulates that the owners agree to not use any groundwater underlying the property for commercial or industrial uses. No human habitation structures shall be constructed on the property and nothing must be done to impact groundwater quality or interfere with UMTRCA

groundwater remediation activities. Permission must be obtained from the State and DOE (1) prior to constructing wells or otherwise exposing groundwater to the surface; (2) prior to performing construction, excavation, or soil removal of any kind; and (3) prior to sale of the property. Inspectors saw no evidence for violation of any of the above-stated deed restrictions during the site inspection.

5.4 Inspection Results

The site was inspected on January 21, 2014. The inspection was conducted by M. Miller, K. Broberg, and D. Traub of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. A. Kleinrath (DOE Site Manager), K. Tu (Uranium and Technical Assessments Section, Radioactive Materials Division, Texas Commission on Environmental Quality), and R. Lyssy (site maintenance subcontractor) attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that might affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring. Numbers in the left margin of this chapter refer to items summarized in Table ES-1 of the "Executive Summary."

5.4.1 Specific Site Surveillance Features

Figure 5-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 5-1 by photograph location (PL) numbers.

5.4.1.1 Fence and Gates

A 5-strand barbed wire fence is installed around the disposal site. The fence was in good condition.

Entrance to the site is directly off Farm to Market Road 1344. The main entrance gate near the east corner of the site and the vehicle gate at the north corner were found to be locked and functional.

5.4.1.2 Perimeter Signs

The entrance sign located next to the main entrance gate was in good condition. There are 64 perimeter signs installed along the perimeter fence. Although several signs are damaged or faded, all of them are legible and do not require repairs or replacement at this time.

5.4.1.3 Site Markers

There are two site markers. The marker on top of the disposal cell (SMK-2) was in excellent condition (PL-1). The marker at the main entrance gate (SMK-1) was also in excellent condition (PL-2), but the corners of the concrete base that the marker sits on are cracked. The cracks appear to be unchanged from last year, and repairs are not needed at this time.

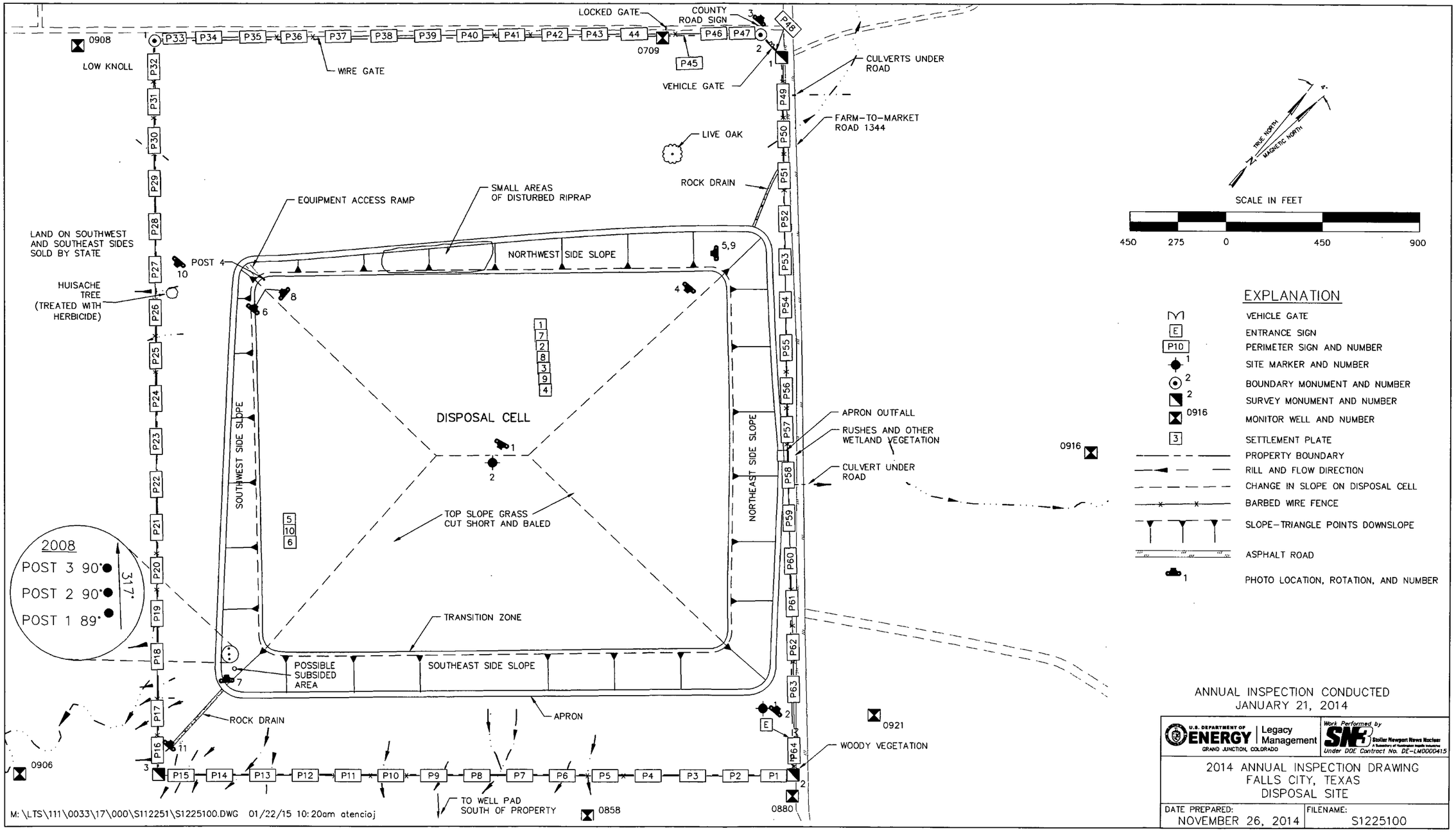

Figure 5-1. 2014 Annual Inspection Drawing for the Falls City Disposal Site

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5.4.1.4 Boundary and Survey Monuments

Three survey monuments and two boundary monuments situated at the corners of the site were undisturbed and in excellent condition (PL-3).

5.4.1.5 Monitoring Wells

The monitoring wells observed during the inspection were secure and in excellent condition. All of the wells in the monitoring network were inspected when they were sampled in February 2014 and were secure and in excellent condition.

5.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as "transects" in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are: (1) the top and side slopes of the disposal cell; (2) the site perimeter; and (3) the outlying area.

Within each area, inspectors examined specific site surveillance features. Inspectors also looked for evidence of erosion, settling, slumping, or other processes that might affect site integrity or the long-term performance of the site.

5.4.2.1 Top and Side Slopes of the Disposal Cell

The top of the disposal cell was in excellent condition (PL-4). The cell is covered with well-established coastal Bermuda grass. Kleingrass and other species are interspersed. The site maintenance subcontractor typically takes three cuttings of hay each year from the property, which includes the top of the disposal cell.

In past inspections small desiccation cracks were present in the surface of the soil on the top and upper edges of the disposal cell. Desiccation cracks near the surface of a soil profile are common, especially in clayey or loamy soils when soil conditions are dry. No desiccation cracks were observed during this year's inspection. No areas of ponded water were observed on top of the disposal cell, and no areas of settlement were observed.

The side slopes are covered with riprap and were in excellent condition (PL-5). A couple of small riprap disturbances (depressions) were observed on the northwest side slope of the disposal cell during the 2010 inspection. These depressions do not compromise the protectiveness of the riprap side slope and no changes have been observed since 2010.

Evidence for fractured riprap on the side slopes of the disposal cell was not observed during this year's inspection. Previous inspections noted minor amounts of fractured riprap along the side slopes but offered no evidence to suggest that the riprap degradation was pervasive or would diminish erosion resistance. During this year's inspection, photos were taken of riprap at the base of Post 4, near the access ramp on the west corner of the disposal cell (PL-6). Compared to photos taken in earlier years at this location, there is no indication that the riprap is degrading.

In 2007, inspectors noted a possible slight slumping of riprap at the toe of the south corner of the side slope. Three t-posts were installed in a straight line running at an orientation of 317 degrees in 2008. Each post was installed at a vertical pitch of 90 degrees. These three posts provide

reference points that are used to assess if the area is undergoing movement. Movement of a post out of line with the other two posts, or the change in pitch of an individual post will indicate possible movement in the area. The three posts remain in the same straight line at which they were installed (i.e., 317 degrees) and the vertical pitch of each post remains unchanged, indicating that no movement has occurred (PL-7).

An equipment access ramp to the top of the cell is located at the west corner of the side slope (PL-8). The ramp was installed in 2008 and constructed with clean angular riprap of progressively smaller sizes of rock to provide a free-draining and stable driving surface that does not encourage vegetation encroachment. Vehicle wear to the ramp has occurred, but the ramp remains serviceable.

Vegetation management on the cell and side slopes was excellent (PL-9). Much of the vegetation observed during the inspection on the side slopes was either dead or dormant grass. Deep roots of woody vegetation could penetrate the radon barrier, so the vegetation is controlled through cutting and applying herbicide.

5.4.2.2 Site Perimeter

The area between the fence and the toe of the disposal cell is covered with well-established grass, primarily Kleingrass with some coastal Bermuda grass. During most years these areas are cut and baled two or three times. Grass is usually left uncut along the fence, along rock drains, and around some of the surveillance features such as the site markers.

A Huisache tree was growing along the fence line near perimeter sign P27 (PL-10). Huisache trees aggressively invade south Texas rangelands, competing with other plants for water and nutrients. The tree was sprayed with herbicide in 2014.

Wild hogs burrow along the fence line in some areas. Their burrows are filled in by the maintenance contractor as they are located because they might compromise the integrity of the fence.

No water was flowing in the south rock drain during this year's inspection, but water was ponded at the end of the drain (PL-11). No water was observed in the north rock drain. Vegetation is left uncut at the outlets of the rock drains to assist in dissipating the energy of site runoff during storm events. Baffling the flow of water at the outlets helps to alleviate soil erosion near the outlet areas during large precipitation events. Tall thick grass at the drain outlets is therefore considered to be a desirable feature. Vegetation in the apron outfall, located midway along the northeast side slope, is being properly managed.

5.4.2.3 Outlying Area

The area outward from the disposal site for a distance of 0.25 mile was visually inspected, including land that was sold to Alamo Holdings in 2005. The Alamo Holdings parcel is used for occasional livestock grazing and is reverting to native brush land. No developments or disturbances that violate deed restrictions at the site were observed.

County Road 202 runs along the northwest side of the property boundary. Public access to the road was restricted by a locked gate prior to 2011. The road has been open since then but this has not lead to increased vandalism or trespassing at the site.

A significant increase in oil and gas industry activity continues in the surrounding area. This activity has not impacted the security of the site.

5.5 Follow-Up Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed. No need for a follow-up inspection was identified.

5.6 Maintenance

A Huisache tree located near perimeter sign P27 was treated with herbicide. Routine site vegetation management continued in 2014.

5.7 Emergency Response

Emergency response is action DOE will take in response to "unusual damage or disruption" that threatens or compromises site safety, security, or integrity in compliance with 10 CFR 40, Appendix A, Criterion 12. No need for an emergency response was identified.

5.8 Environmental Monitoring

5.8.1 Groundwater Monitoring

The compliance strategy for groundwater protection at the site is no further remediation and application of supplemental standards in accordance with 40 CFR 192.21(g). Although NRC does not require groundwater monitoring at the site, DOE conducts monitoring as a best
5A management practice. Annual groundwater sampling at the site occurred in February 2014. As prescribed in the LTSP, site groundwater monitoring has the following two components:

- Cell performance monitoring
- Groundwater compliance monitoring to demonstrate that potential users of groundwater downgradient of the site are not exposed to contamination related to the former processing site

Because supplemental standards apply to the uppermost aquifer at the site, no concentration limits or points of compliance have been established. Groundwater in the uppermost aquifer beneath the site has a U.S. Environmental Protection Agency designation of "limited use" (Class III) because it is not currently or potentially a source of drinking water due to widespread ambient contamination that cannot be cleaned up using methods reasonably employed by public water supply systems (40 CFR 192.11[e]). Background groundwater quality varies by orders of magnitude in the area because the uppermost aquifer is in a location of naturally occurring uranium mineralization.

Two hydraulically connected groundwater units comprise the uppermost aquifer beneath the site. The shallower of the two units is in sandstone units of the Deweesville Sandstone and Conquista Clay of the Whitsett Formation. The deeper unit is in the Dilworth Sandstone of the Whitsett Formation. The Dilworth Sandstone is underlain by the Manning Clay, a 300-foot-thick aquitard that isolates the uppermost aquifer from better-quality groundwater in deeper aquifers. Samples are collected from both the Deweesville/Conquista and the Dilworth groundwater units.

The disposal cell performance monitoring network consists of seven monitoring wells (0709, 0858, 0880, 0906, 0908, 0916, and 0921) that are near the disposal cell and are completed in the Deweesville/Conquista unit. The groundwater compliance monitoring network consists of five monitoring wells (0862, 0886, 0891, 0924, and 0963) that are downgradient of the site and completed in both the Deweesville/Conquista unit and the Dilworth unit. Figure 5-2 shows the monitoring well networks.

In accordance with the LTSP, groundwater is monitored annually for total uranium and field measurements of water level, temperature, pH, conductivity, turbidity, alkalinity, dissolved oxygen, and oxidation-reduction potential. Of particular interest are total uranium, pH, and water level. The LTSP identifies low pH levels in groundwater as an indicator of the extent and movement of the legacy groundwater plumes. Changes in geochemical conditions may also indicate leachate movement from the disposal cell into the uppermost aquifer.

Tailings pore fluids were lower in pH than background groundwater. However, because pH levels and other signature contaminants in tailings pore fluids are essentially indistinguishable from processing-related contamination, it is difficult to determine if contamination comes from the disposal cell or from legacy processing activities.

DOE has determined that pH and uranium concentrations do not co-vary. This is an indication that other factors contribute to uranium distribution in the uppermost aquifer, such as natural redistribution of uranium in this active ore-forming environment. Therefore, increasing uranium levels at a monitoring location without an attendant drop in pH probably does not indicate movement of processing-related contamination. Groundwater chemistry at monitoring locations near the formation subcrop may also be influenced by residence time as a response to precipitation or changes in oxidation state within the formation. If increases in uranium are sporadic and not accompanied by decreases in pH, DOE concludes that the elevated uranium is naturally occurring.

5.8.2 Groundwater Quality Monitoring Results

pH—At the cell performance monitoring wells, pH levels historically have been higher than the pH in tailings pore fluids (pH level of 2.93), with no significant upward or downward trends. In 2014, the pH levels for the cell performance wells remained within the historical range (Figure 5-3). Wells 0908 and 0916 are not shown in Figure 5-3 because these wells have been dry since 1996.

At the groundwater compliance monitoring wells, pH levels have historically been higher than the pH in groundwater contaminated by processing activities, with no significant upward or downward trends. The pH levels for these wells remained within the historical range (Figure 5-4). The pH in well 0963 historically has been lower than at the other locations but, at a 2014 level of 3.24, remains higher than the pH in the tailings pore fluids.

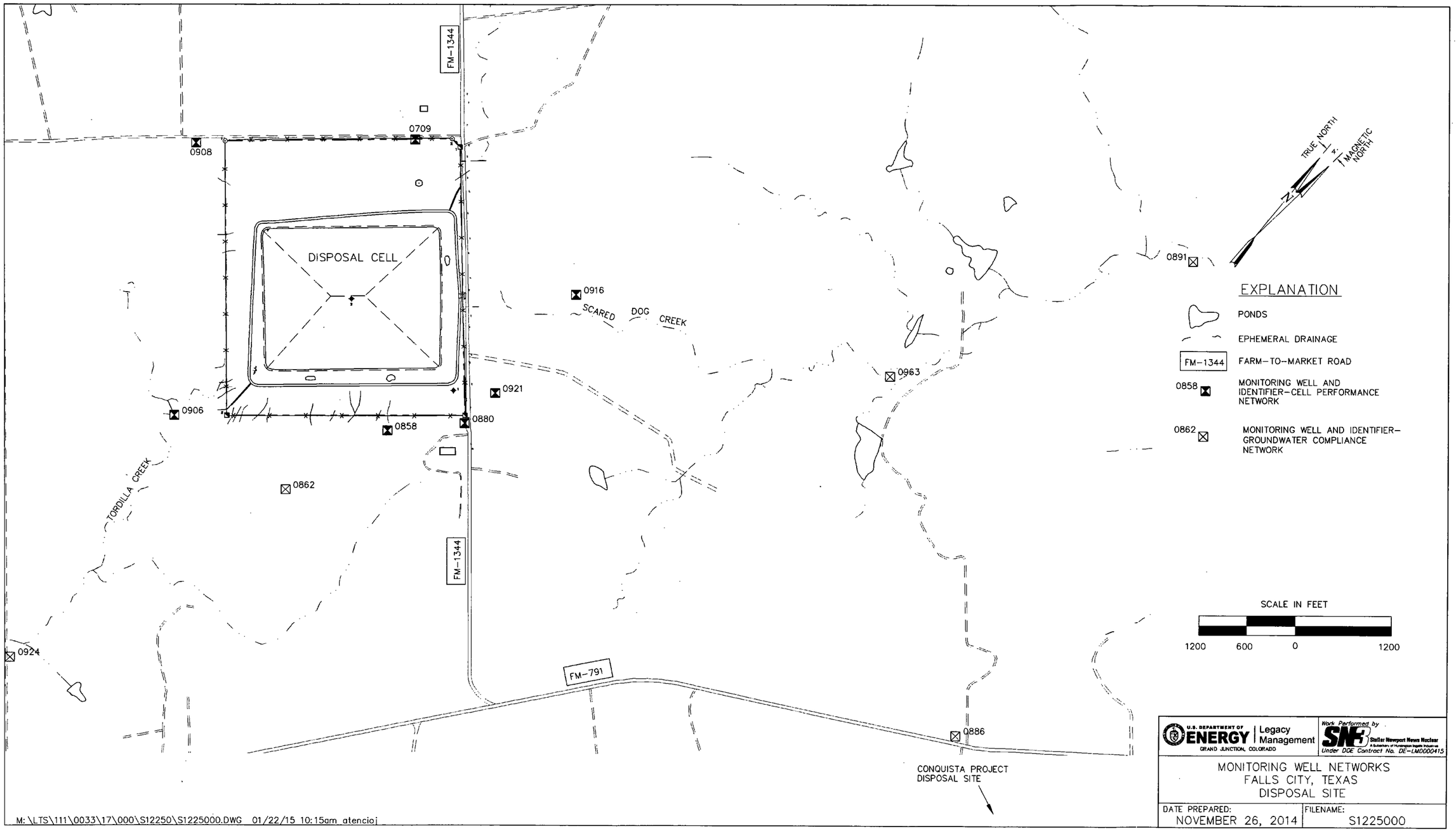

Figure 5-2. Combined Monitoring Well Network at the Falls City Disposal Site

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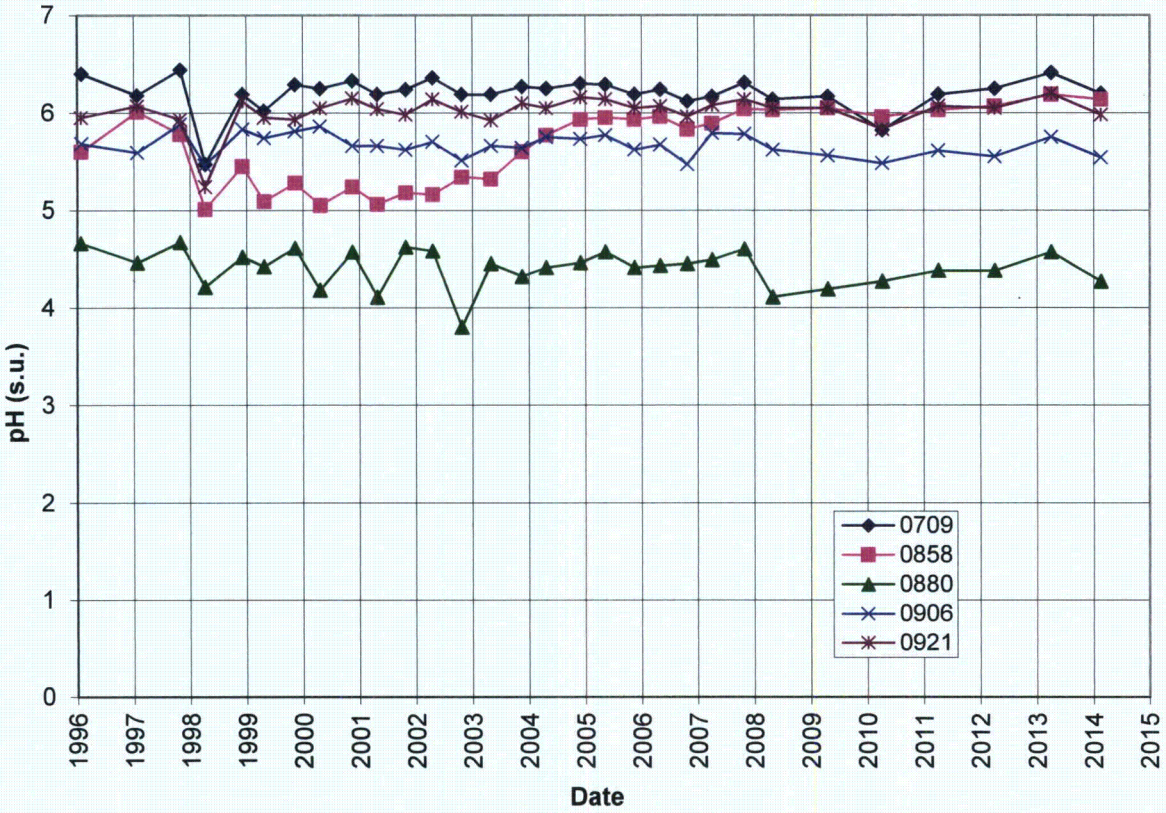


Figure 5-3. pH in Groundwater at Cell Performance Monitoring Locations at the Falls City Disposal Site

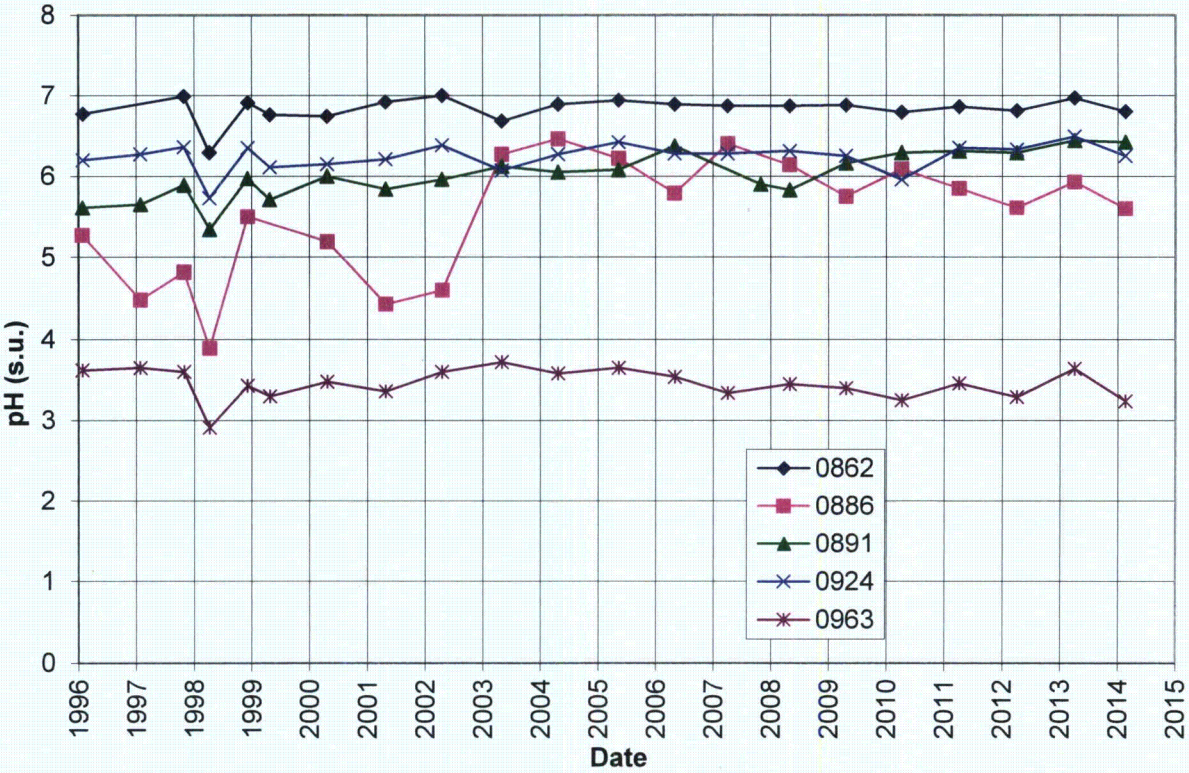


Figure 5-4. pH in Groundwater at Compliance Monitoring Locations at the Falls City Disposal Site

Uranium—Uranium concentrations in the cell performance wells remained within the historical range (Figure 5-5). Though the concentration in well 0921 decreased from the 2013 result, an overall upward trend has occurred since 2002. A downward trend has occurred in well 0880 since 2004. At well 0880, uranium concentrations have varied considerably, ranging from a low of 1.38 milligrams per liter (mg/L) in 2008 to a high of 14 mg/L in 2004. Wells 0908 and 0916 are not shown in Figure 5-5 because these wells have been dry since 1996.

The concentration of uranium in groundwater within the compliance monitoring network shows that the uranium concentrations at monitoring wells 0862, 0886, and 0963 remain stable at low levels (<0.2 mg/L) (Figure 5-6). The uranium concentration in well 0924 has been relatively stable since 2004, fluctuating between 0.4 mg/L and 0.6 mg/L. Since 2008, the uranium concentrations measured at well 0891 have been significantly higher than the other wells. The 2014 result (3.0 mg/L) is the highest measured in the well to date and equals the maximum concentration reported for the aquifer, which is also the value used in the risk assessment for the Dilworth groundwater (3.04 mg/L).

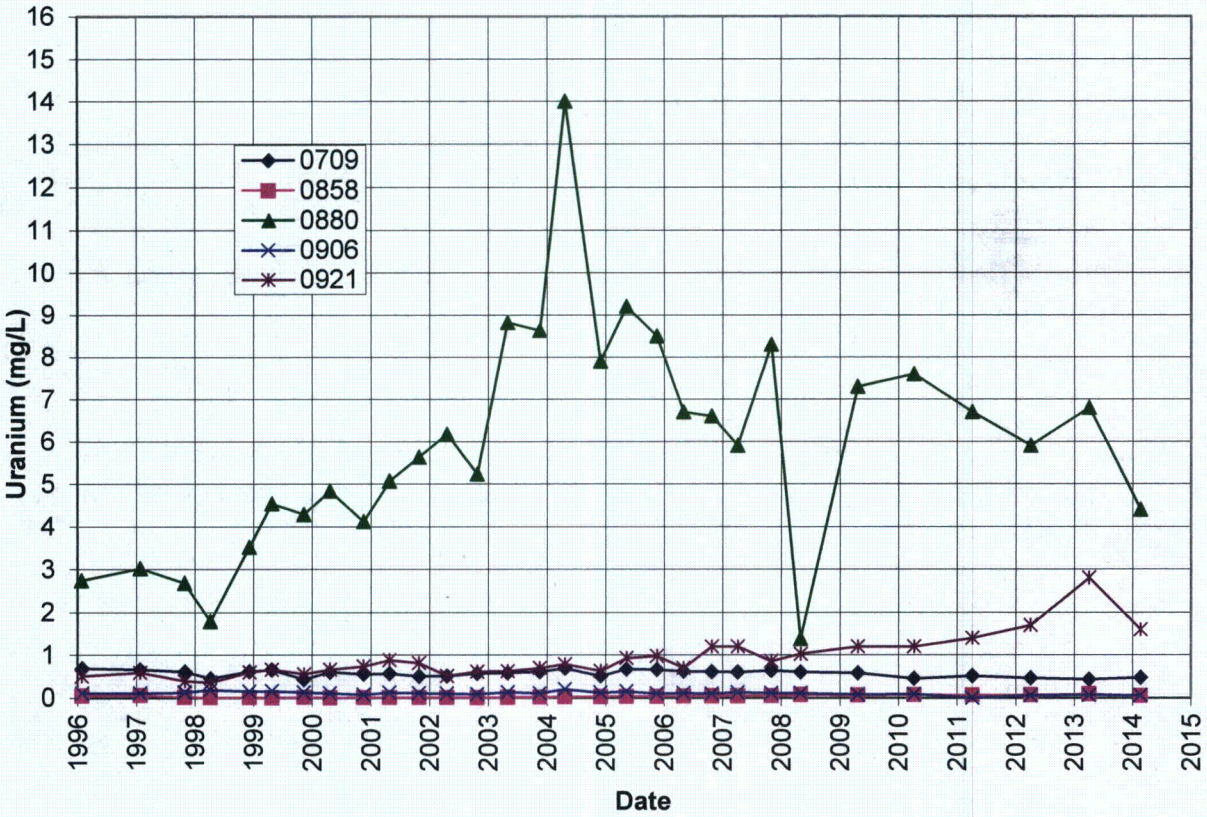


Figure 5-5. Uranium in Groundwater at Cell Performance Monitoring Locations at the Falls City Disposal Site

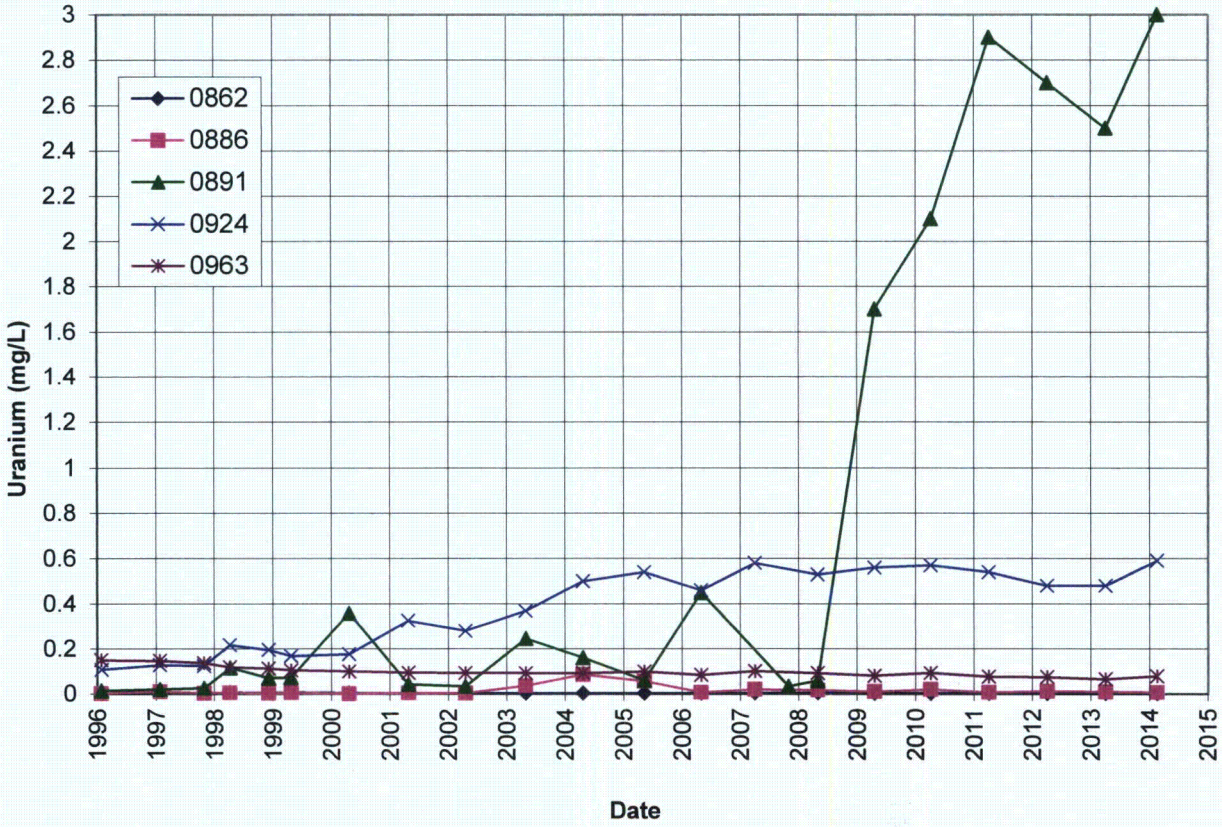


Figure 5-6. Uranium in Groundwater at Compliance Monitoring Locations at the Falls City Disposal Site

5.8.3 Groundwater Level Monitoring Results

Water levels measured in 2014 in the disposal cell performance network are new lows for each well (Figure 5-7). Since 1996, groundwater levels in the disposal cell performance network wells have all decreased, ranging from approximately 5 feet to 11 feet lower than 1996 levels. The water level in monitoring well 0906 has fluctuated more than levels in the other wells. This well is directly downslope of the disposal cell, and the historical fluctuation may be the result of the infiltration of water that is shed by and conveyed away from the disposal cell, reflecting variations in annual precipitation. Other contributors that may influence local groundwater levels include: (1) the dissipation of the processing-site-related groundwater mound beneath the disposal cell, and (2) the reduction of transient drainage from the disposal cell. Wells 0908 and 0916 are not shown in Figure 5-7 because these wells, completed in an unsaturated zone of the Conquista Sandstone, have been dry since 1996.

Water level trends vary in the groundwater compliance monitoring network wells (Figure 5-8). Levels show a slight upward trend in wells 0862 and 0886, increasing about 4 feet since 1996. Water levels have fluctuated in the other wells and are currently near their 1996 levels.

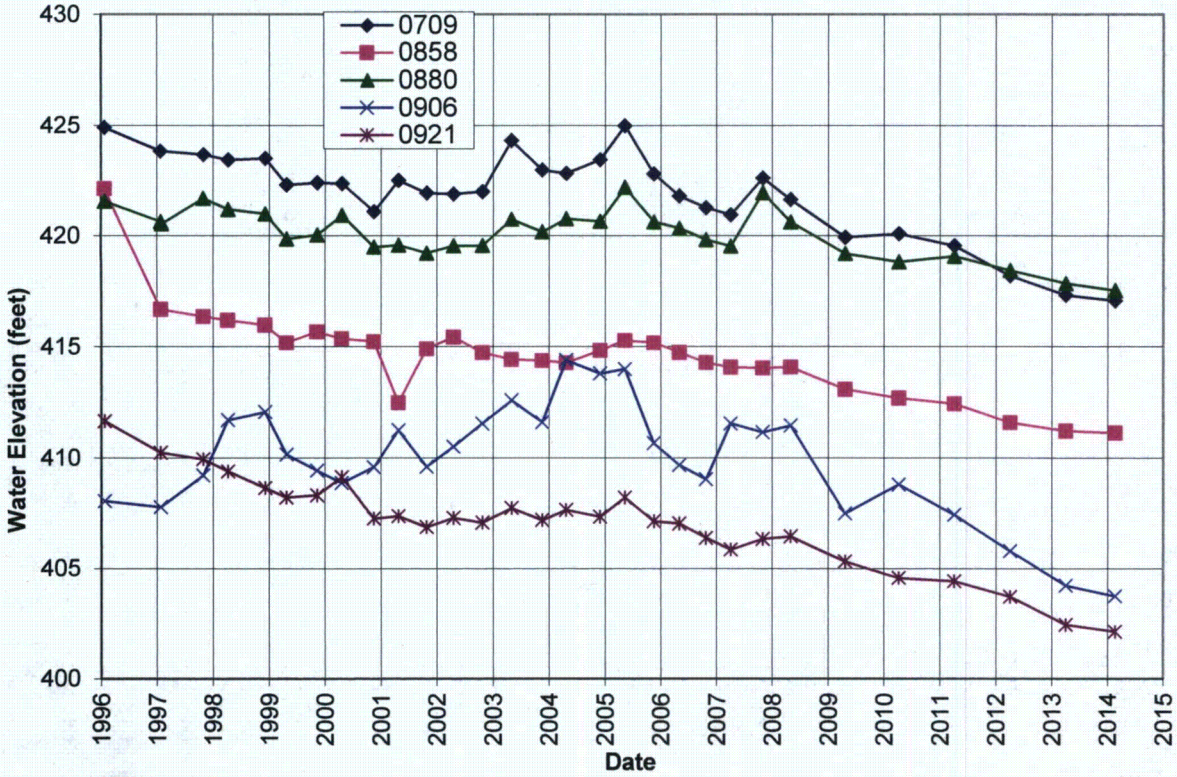


Figure 5-7. Water-Level Measurements at Cell Performance Monitoring Locations at the Falls City Disposal Site

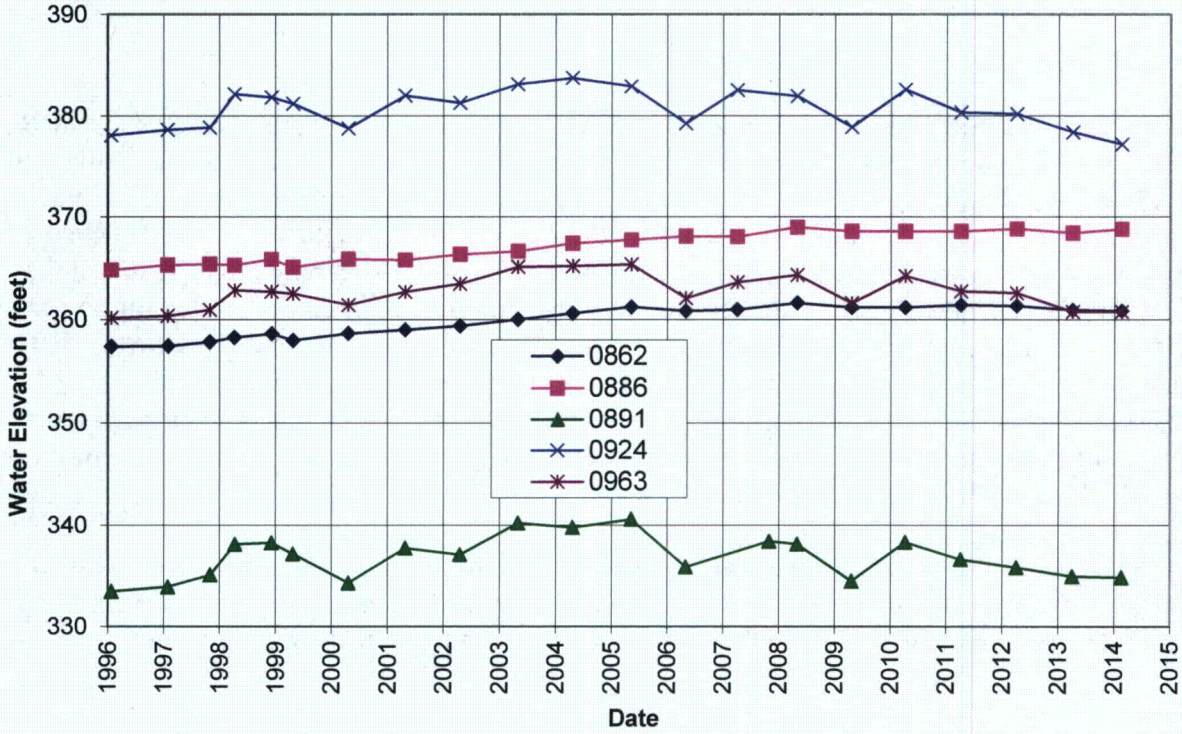


Figure 5-8. Water-Level Measurements at Compliance Monitoring Locations at the Falls City Disposal Site

5.8.4 Evaluation of Groundwater Monitoring

Uranium concentrations in cell performance well 0880 have varied considerably (Figure 5-5). The pH at this location is lower than at other locations in the cell performance monitoring network. Water levels are also declining at well 0880 (Figure 5-7). These results suggest that the interaction among the disposal cell, the legacy groundwater mound, and processing plumes is still equilibrating. However, monitoring results do not indicate that the disposal cell is contributing to the degradation of the uppermost aquifer. The cause of the anomalously high uranium concentrations in groundwater compliance well 0891 since 2008 (Figure 5-6) has not been determined.

Site-related contamination in the uppermost aquifer poses no risk to human health because groundwater from this aquifer is not used for human consumption and is designated as limited use. Potable water is produced locally from the Carrizo Sandstone that lies 2,000 feet below the surface near the site. Additionally, a 300-foot-thick aquitard isolates the uppermost aquifer from the better-quality groundwater in deeper aquifers.

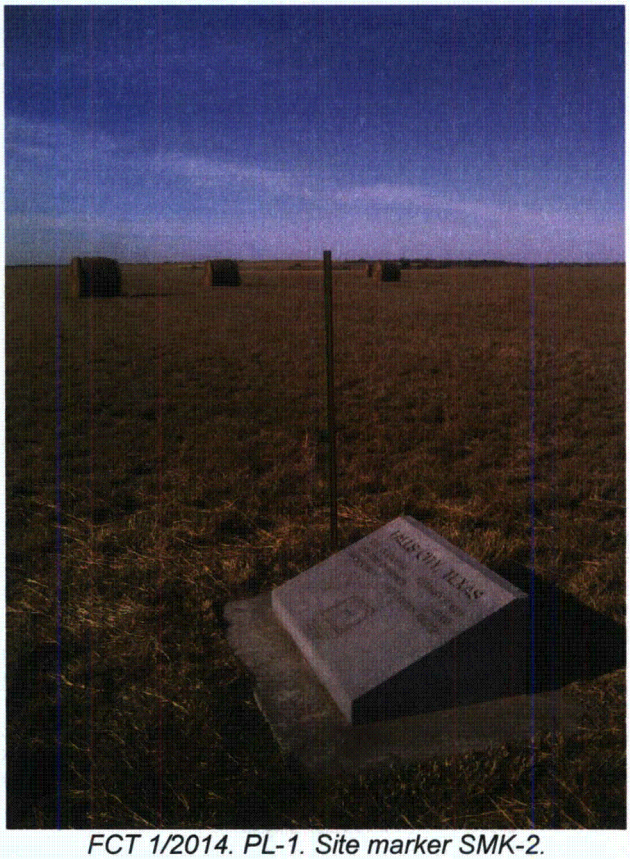
DOE evaluated the groundwater monitoring program at the site in 2010 as required by the LTSP. Groundwater monitoring data collected from 2006 through 2010 were compared to previous data (1996 through 2005). The comparison showed that contaminant concentrations continued to fluctuate in the uppermost aquifer, but the fluctuations were within the historical range reported for the aquifer in the area of the site. The comparison also showed no unexpected water level changes.

The 2010 evaluation recommended that, after the collection of samples in 2011, groundwater monitoring activities at the site be discontinued. It was proposed that DOE would not plug and abandon the 12 monitoring wells at the site until the nearby UMTRCA Title II Conquista site transfers to the DOE Office of Legacy Management. The Conquista site is just south of, and adjacent to, the Falls City site. Upon transfer of the Conquista site, DOE will assess whether a joint monitoring approach is warranted (either as a one-time event or as periodic monitoring). Once NRC accepts the monitoring strategy for the Conquista site, Falls City site wells no longer deemed necessary to a Conquista monitoring effort would be decommissioned.

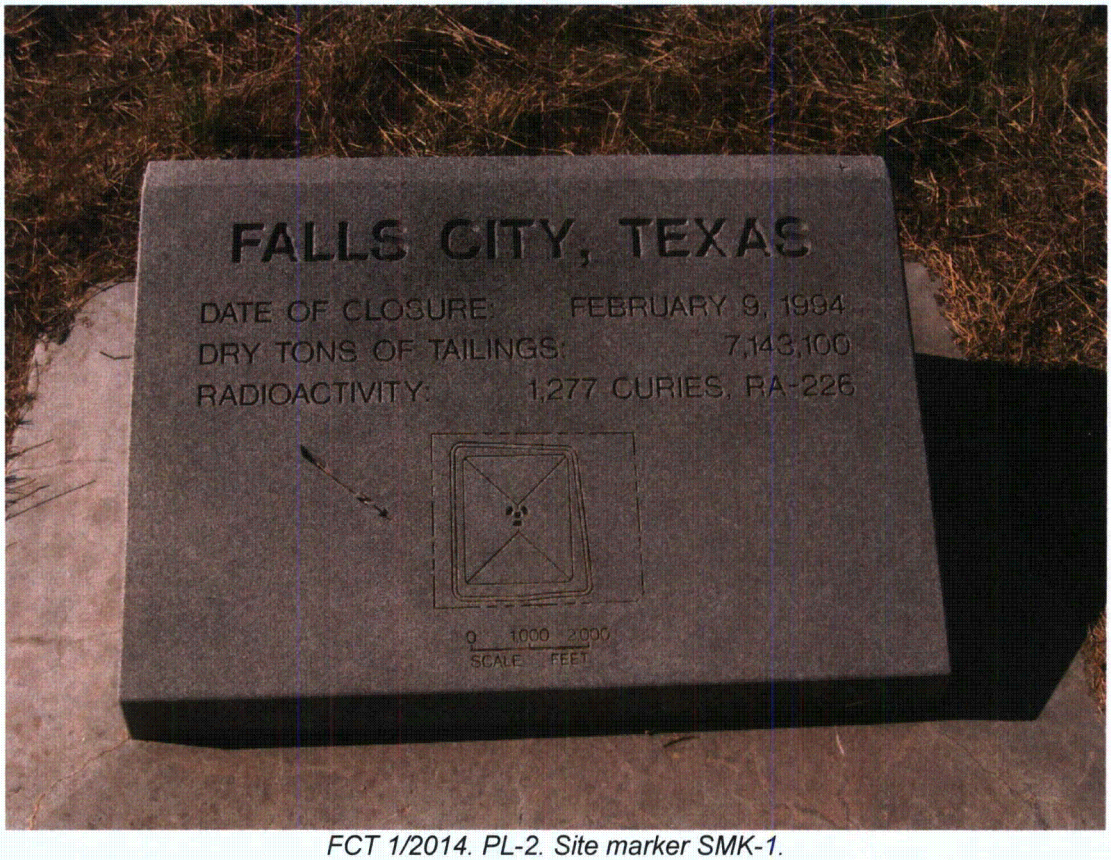
Recommendations made in the 2010 evaluation continue to undergo NRC review. In the meantime, annual monitoring continues in accordance with the LTSP.

5.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	170	Site marker SMK-2.
PL-2	0	Site marker SMK-1.
PL-3	0	Boundary monument BM-2.
PL–4	180	Hay bales on top of cell.
PL–5	230	Northwest side slope.
PL–6	0	Riprap at base of Post 4.
PL–7	317	Line of slope stability indicator posts at south corner of cell.
PL-8	270	Equipment access ramp at west corner of cell.
PL-9	230	Northwest side slope.
PL-10	180	Huisache tree.
PL-11	0	Water ponded at outlet of south rock drain.



FCT 1/2014. PL-1. Site marker SMK-2.



FCT 1/2014. PL-2. Site marker SMK-1.

FCT 1/2014. PL-3. Boundary monument BM-2.

FCT 1/2014. PL-4. Hay bales on top of cell.

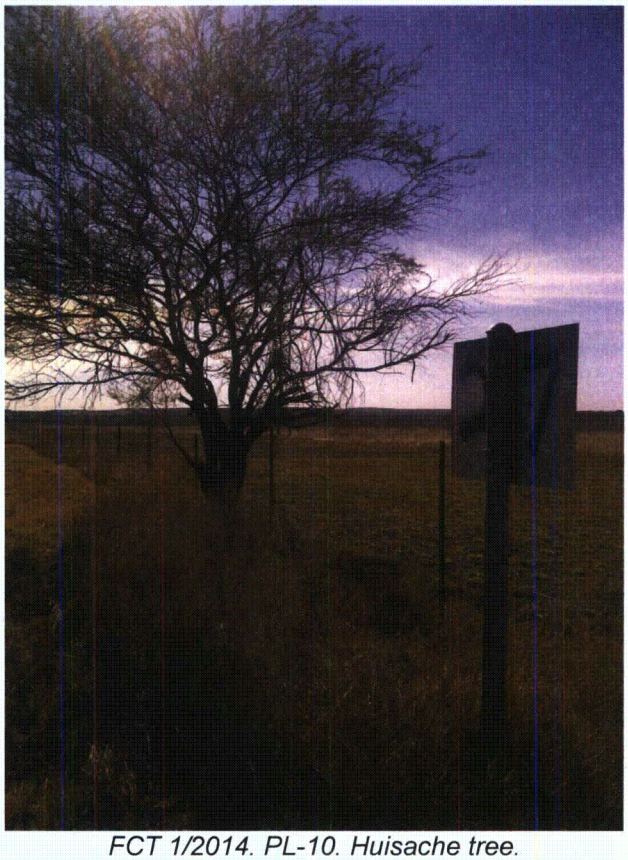
FCT 1/2014. PL-5. Northwest side slope.

FCT 1/2014. PL-6. Riprap at base of Post 4.

FCT 1/2014. PL-7. Line of slope stability indicator posts at south corner of cell.

FCT 1/2014. PL-8. Equipment access ramp at west corner of cell.

FCT 1/2014. PL-9. Northwest side slope.



FCT 1/2014. PL-10. Huisache tree.

FCT 1/2014. PL-11. Water ponded at outlet of south rock drain.

6.0 Grand Junction, Colorado, Disposal Site

6.1 Compliance Summary

The Grand Junction, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on December 9, 2014. A portion of the disposal cell remains open to receive low-level radioactive materials from various sources, and the open cell and its supporting structures and facilities are not included in the annual inspection. Ongoing cell cover study areas, which include a lysimeter facility adjacent to the disposal cell, are also not inspected. The annual inspection includes the completed portion of the disposal cell and the remaining portions of the disposal site.

The disposal cell and all associated surface water diversion and drainage structures were in good condition and functioning as designed. Damaged perimeter sign P17 was replaced. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

Annual groundwater monitoring is conducted as a best management practice to verify that groundwater in buried paleochannels adjacent to the disposal cell is not impacted if seepage (transient drainage) occurs from the disposal cell. The groundwater in the paleochannels continues to be unaffected by potential transient drainage from the disposal cell.

6.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Interim Long-Term Surveillance Plan for the Cheney Disposal Site Near Grand Junction, Colorado* (LTSP) (DOE/AL/62350-243, Rev. 1, U.S. Department of Energy [DOE], April 1998) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 6-1 lists these requirements.

Table 6-1. License Requirements for the Grand Junction Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.0 and 6.2	Section 6.4
Follow-Up Inspections	Section 3.4	Section 6.5
Maintenance and Repairs	Sections 2.7.3 and 4.0	Section 6.6
Groundwater Monitoring	Section 2.6	Section 6.7
Corrective Action	Section 5.0	Section 6.8

6.3 Institutional Controls

The United States of America owns the 360-acre site (Figure 6-1). The open portion of the disposal cell is projected to remain open until 2023 or until filled to its design capacity. DOE's Office of Legacy Management (LM) operates the site under authority of U.S. House Rule 2967 Section 2(a)(1)(B). Until the disposal cell is closed, it will not be accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27). Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: boundary monuments, a perimeter fence and gates, and perimeter warning signs placed along the property boundary.

6.4 Inspection Results

The site, located southeast of Grand Junction, Colorado, was inspected on December 9, 2014. The inspection was conducted by L. Sheader, S. Woods, D. Johnson, and P. Wetherstein of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. W. Dam (DOE Site Manager) and M. Cosby of the Colorado Department of Public Health and Environment attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect site integrity, and determine the need, if any, for maintenance or additional inspections and monitoring. Numbers in the left margin of this chapter refer to items summarized in Table ES-1 of the "Executive Summary."

6.4.1 Site Surveillance Features

Figure 6-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 6-1 by photograph location (PL) numbers.

6.4.1.1 Access Road, Entrance Gates, and Entrance Sign

Access to the site is off of U.S. Highway 50, approximately 18 miles southeast of Grand Junction, Colorado. A right-of-way grant on federal land, administered by the U.S. Bureau of Land Management (BLM), extends approximately 1.7 miles between Highway 50 and the site's entrance gate. DOE maintains this right-of-way, including a two-lane asphalt access road. The access road was in good condition. A steel double-swing tube gate secured by a lock and chain is located along the highway right-of-way fence. The access gate was locked and in good condition. The fence along the right-of-way was also in good condition. The site entrance gate is a double-swing chain link gate. It is secured by a DOE lock and was in good condition. The entrance sign was in good condition.

6.4.1.2 Perimeter Fence and Perimeter Signs

Livestock fence, consisting of a standard four-strand barbed-wire fence in some areas and a woven wire fence topped with barbed wire in others, surrounds the disposal cell features and operations areas. The fence was in good condition.

A total of 29 perimeter signs are at regular intervals along the DOE property boundary. The signs
6A are installed on galvanized steel posts set in concrete. Damaged perimeter sign P17 was replaced prior to the inspection. Signs P4 and P16 were slightly bent but legible. All of the other signs were in good condition (PL-1).

6.4.1.3 Site Markers

Granite site markers similar to those at other UMTRCA sites will not be installed until the disposal cell is closed.

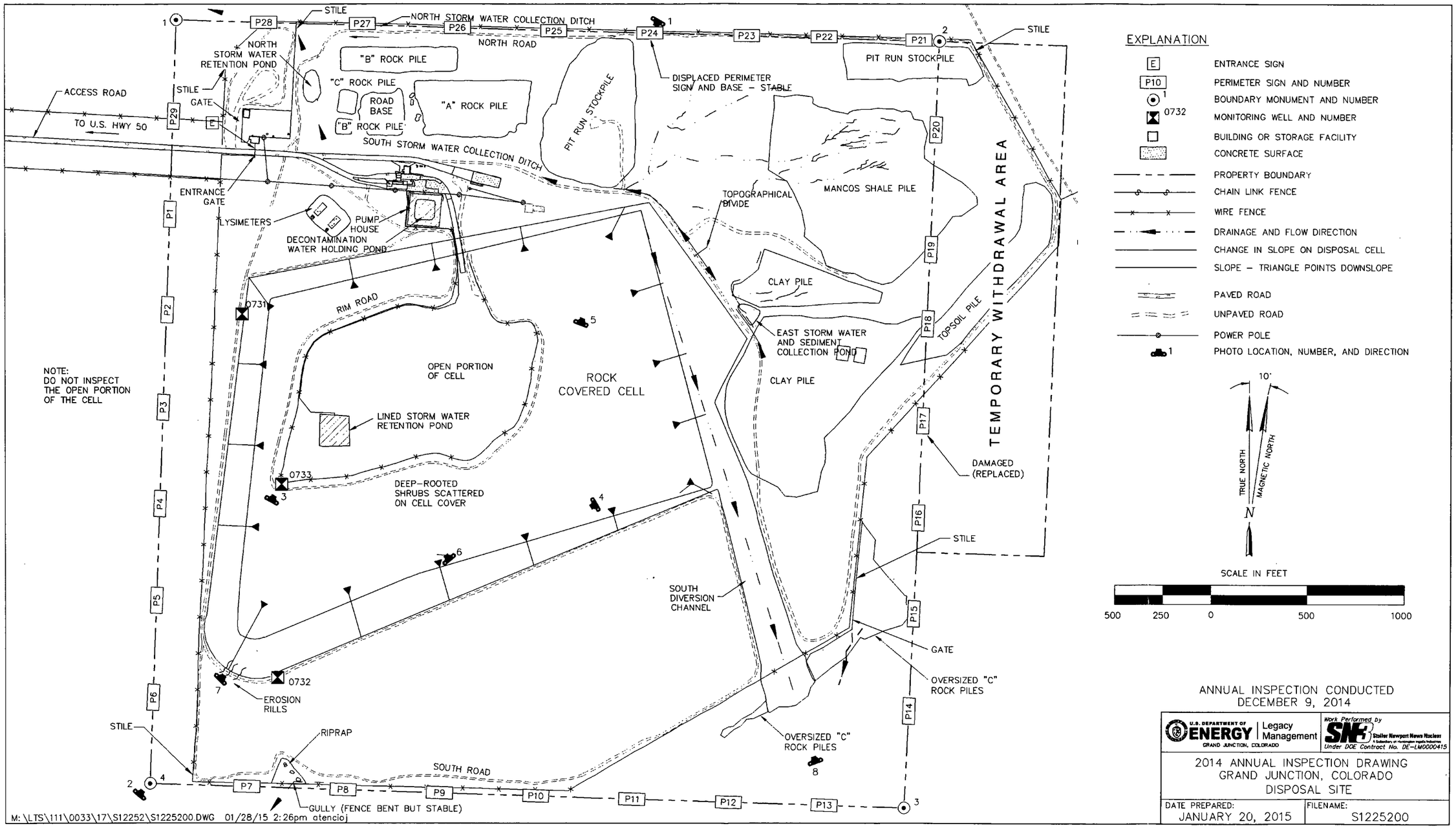


Figure 6-1. 2014 Annual Inspection Drawing for the Grand Junction Disposal Site

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6.4.1.4 Survey Monuments and Boundary Monuments

The site has four permanent boundary monuments, one at each of the four corners. All of the boundary monuments were present and in good condition (PL-2).

6.4.1.5 Monitoring Wells

The groundwater monitoring network consists of three monitoring wells. All three are inside the site boundary. The well protective casings were locked and in good condition (PL-3).

6.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas to ensure a thorough and efficient inspection. The inspection areas are: (1) the closed portion of the disposal cell, (2) diversion structures and drainage channels, (3) the area between the disposal cell and the site boundary, and (4) the outlying area.

Within each area, inspectors examined specific site surveillance features. Inspectors also looked for evidence of erosion, settling, slumping, or other disturbance that might affect the site's integrity, protectiveness, or long-term performance.

6.4.2.1 Closed Portion of the Disposal Cell

Basalt riprap covers the top and side slopes of the disposal cell. The rock was in good condition with no significant weathering. The disposal cell top and side slopes showed no evidence of settling, slumping, cracking, erosion, or slope instability (PL-4 and PL-5).

On the disposal cell cover, numerous areas with alkali deposits have been reported during previous inspections. The deposits are thought to be evaporite minerals, and there is no indication that the alkali areas degrade the performance of the disposal cell. No significant change to the alkali areas was noted in 2014 (PL-6).

Grasses and weeds were growing on most of the cell cover, and scattered deep-rooted shrubs were also present. Historically, shrubs have been periodically treated with herbicide on the cell top. Although treatment is not required by the interim LTSP, DOE plans to continue periodic treatment of the shrubs as needed until more is known about the potential effects of vegetation on the cover.

Several small erosion rills were observed in soils at the base of the cell's southwestern corner (PL-7). Recent road grading activities slightly lowered the elevation of the access road in that area, causing the development of rills when runoff water discharged from the apron at the corner of the cell. The rills do not threaten the integrity of the cell or the rock apron.

6.4.2.2 Diversion Structures and Drainage Channels

The south diversion channel is a large, riprap-armored structure that conveys runoff from the disposal cell into a natural drainage that flows away from the site to the southwest. The diversion channel was in good condition (PL-8). Some plants, including grasses, weeds, and shrubs, grow within the channel. However, the presence of vegetation is not expected to degrade the channel's

performance. The discharge area of the channel is armored with large-diameter basalt riprap and was also in good condition.

Other drainage features at the site include north and south storm-water collection ditches, the north storm-water retention pond, and the east storm-water and sediment collection. These small drainage features control storm-water runoff primarily from the various cover materials stockpiled on the northern and eastern portions of the disposal site property. The storm-water collection ditches also capture storm-water run-on from offsite locations. The ditches and ponds were functioning as designed.

6.4.2.3 Area Between the Disposal Cell and the Site Boundary

There are 12 discrete stockpiles of rock and soil between the disposal cell and the perimeter fence on the north and east sides of the site. These materials eventually will be used to cover and close the open cell. Vegetation and surface rocks generally protect the stockpiles from significant erosion.

Most of the flat areas between the disposal cell and the site boundary are vegetated with native shrubs, scant perennial grasses, and annual weeds. Some localized erosion has occurred along the perimeter road, but there are no areas of significant erosion that could threaten the integrity of the disposal cell or site features.

The site boundary lies along the perimeter fence on the north border of the site and outside the perimeter fence on the west, south, and southeast borders of the site. Vegetation outside the fence is similar to vegetation inside the fence, but it is occasionally grazed by livestock.

6.4.2.4 Outlying Areas

The area outward from the site for a distance of 0.25 mile was inspected from the site perimeter. No development or disturbance that could affect the site was observed. A land use change is proposed on private property immediately west of the site that would involve installing large evaporation ponds to treat contaminated water from regional drilling operations. Most of the remaining land surrounding the site is rangeland administered by BLM and used primarily for cattle grazing.

Outside the site's eastern boundary is a 40-acre temporary withdrawal area of federal land administered by BLM. Some of the withdrawal area is included within the perimeter fence and contains materials stockpiles. This area is not included in the interim LTSP and therefore is inspected as an offsite area.

6.5 Follow-Up Inspections

DOE will conduct follow-up inspections if (1) the annual inspection or other site visit reveals a condition that requires a return to the site to further evaluate the condition, or (2) a citizen or outside agency notifies DOE that conditions at the site or in the vicinity of the site are substantially changed. No need for a follow-up inspection was identified.

6.6 Maintenance and Repairs

Perimeter sign P17 was replaced prior to the inspection. No maintenance needs were identified during the inspection.

6.7 Groundwater Monitoring

Because total dissolved solids in the uppermost aquifer (Dakota Sandstone) beneath the site exceeds 10,000 milligrams per liter (mg/L), the groundwater is designated as "limited use" and supplemental standards apply (40 CFR 192.21[g]). Under this designation, groundwater monitoring is not required. Confined groundwater in the uppermost aquifer lies approximately 750 feet below ground surface and is geologically isolated from the tailings material by low-permeability mudstones and shales of the Mancos Shale.

6B In lieu of monitoring groundwater in the uppermost aquifer, as a best management practice DOE monitors groundwater from three monitoring wells. Two wells (0731 and 0732) are completed in (or very near) buried alluvial paleochannels adjacent to the disposal cell, and one monitoring well (0733) is in the disposal cell (Table 6-2). This best-management-practice monitoring is done to assess the disposal cell's performance and to verify that groundwater that may be present in the paleochannels is not impacted if seepage (transient drainage) occurs from the disposal cell. The paleochannel monitoring wells are along the west (downgradient) edge of the disposal cell and are screened at the interface between the alluvium and shallow Mancos Shale. The third well is in the southwest corner of the open portion of the disposal cell and is used primarily for the measurement of water levels in the deepest part of the disposal cell to demonstrate that the groundwater elevation directly beneath the cell has not risen enough to move laterally into the paleochannels.

Table 6-2. Groundwater Monitoring Network at the Grand Junction Disposal Site

Monitoring Well	Hydrologic Relationship
0731	Paleochannel, downgradient, edge of cell, north side
0732	Paleochannel, downgradient, edge of cell, south side
0733	Disposal cell, deepest location, downgradient, center

6.7.1 Groundwater-Level Monitoring

Static water level measurements are obtained from each well before water quality samples are collected (Figure 6-2). In September 2006, a datalogger was installed in each well to obtain water level measurements at 4-hour intervals continuously.

Since 1998, the water level in disposal cell well 0733 has apparently stabilized over the last few years and has remained substantially lower than the water levels in paleochannel monitoring wells 0731 and 0732 (Figure 6-2). Water levels within the two paleochannel monitoring wells continue to fluctuate and are currently near 1998 levels. The water levels verify that groundwater at the base of the disposal cell at well 0733 has not risen to an elevation where it could potentially migrate into paleochannel groundwater at wells 0731 and 0732.

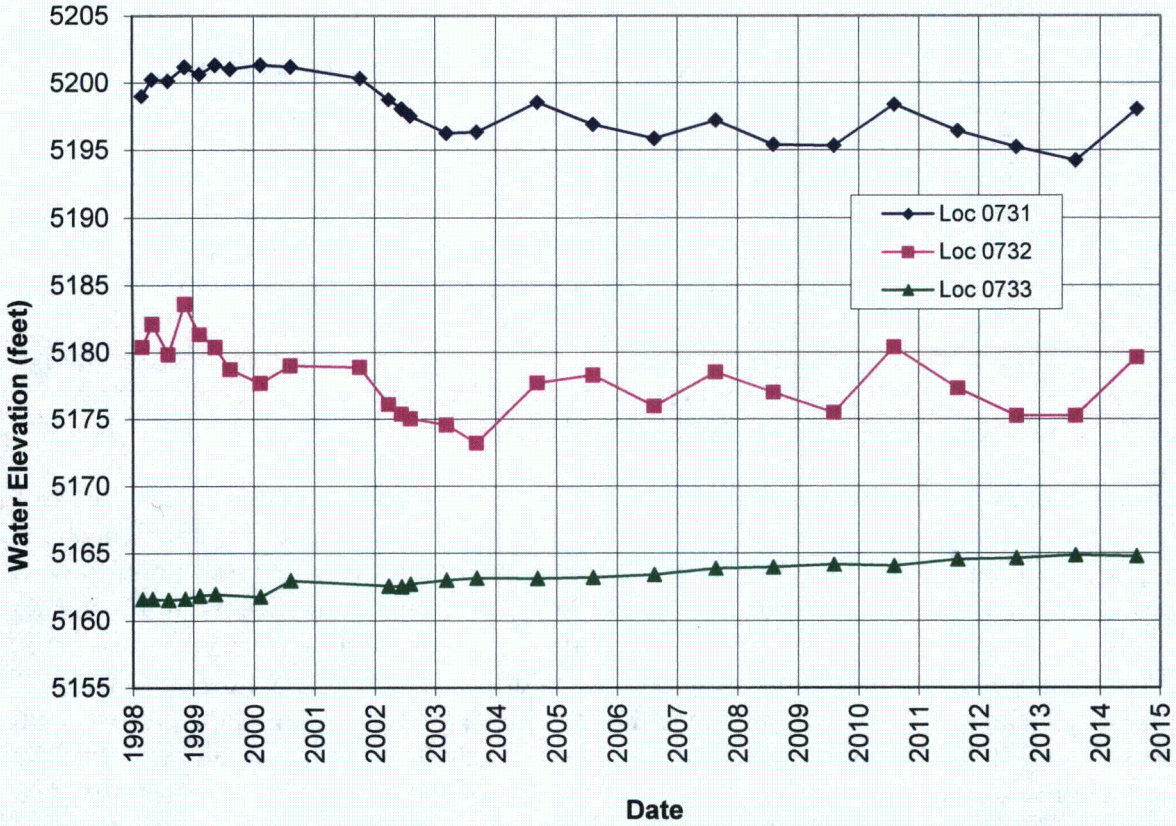


Figure 6-2. Water Level Measurements at the Grand Junction Disposal Site

6.7.2 Groundwater Quality Monitoring

Groundwater samples are analyzed for standard field parameters and the following indicator analytes: molybdenum, nitrate, selenium, sulfate, total dissolved solids, uranium, vanadium, and polychlorinated biphenyls. Key indicator analytes are molybdenum, nitrate, selenium, and uranium. In Table 1 to Subpart A of 40 CFR 192, the U.S. Environmental Protection Agency (EPA) has established maximum concentration limits (MCLs) for these analytes in groundwater (Table 6-3). Monitoring results are compared to the MCLs for evaluation only and not for compliance purposes.

Molybdenum concentrations in all three wells have remained steady since 1998; 2014 concentrations were less than 0.003 mg/L. Time-concentration plots from 1998 through 2014 for the other key indicator analytes—nitrate (as nitrogen), selenium, and uranium—are shown on Figures 6-3 through 6-5.

Table 6-3. Maximum Concentration Limits for Groundwater at the Grand Junction Disposal Site

Constituent	MCL[a] (mg/L)
Molybdenum	0.1
Nitrate (as Nitrogen)	10
Selenium	0.01
Uranium	0.044

[a] EPA MCLs as listed in 40 CFR 192, Subpart A, Table 1

Nitrate (as nitrogen) concentrations in groundwater continued to exceed the MCL of 10 mg/L in the paleochannel monitoring wells (0731 and 0732) in 2014 (Figure 6-3). Concentrations in these wells have varied substantially since 1998 with no overall trend. Nitrate concentrations in disposal cell well 0733 have shown a continuous downward trend since 1999 and reached a low of 1.9 mg/L in 2014. There is no apparent correlation of nitrate concentrations between the paleochannel wells and the disposal cell well.

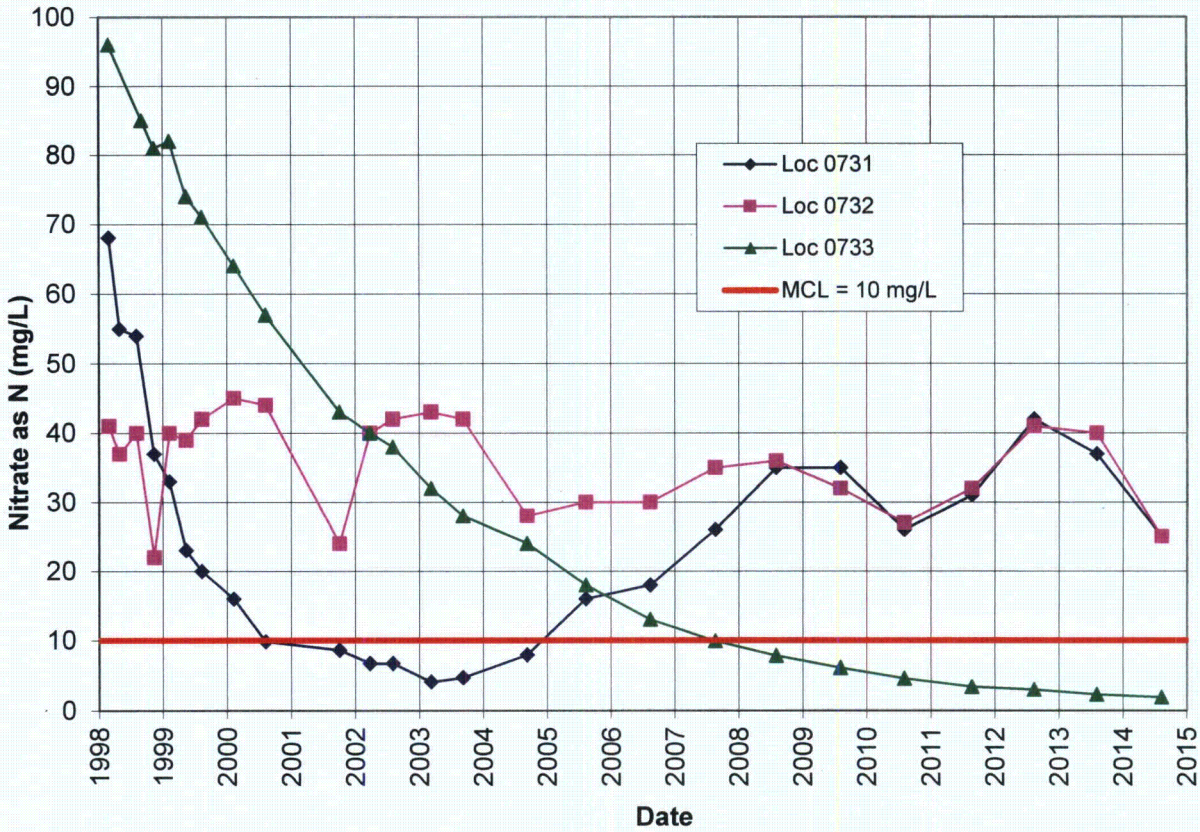


Figure 6-3. Time-Concentration Plots of Nitrate (as Nitrogen) in Groundwater at the Grand Junction Disposal Site

Selenium concentrations continued to exceed the MCL of 0.01 mg/L in the paleochannel monitoring wells (0731 and 0732), with no apparent trend in either well since 2001 (Figure 6-4). Selenium occurs naturally in the Mancos Shale deposits that underlie the disposal cell, and it

may be the cause of the elevated concentrations reported in both paleochannel monitoring wells. In well 0733, the selenium concentration of 0.0038 mg/L remained well below the MCL, with no trend evident. There is no apparent correlation of selenium concentrations between the paleochannel wells and the disposal cell well.

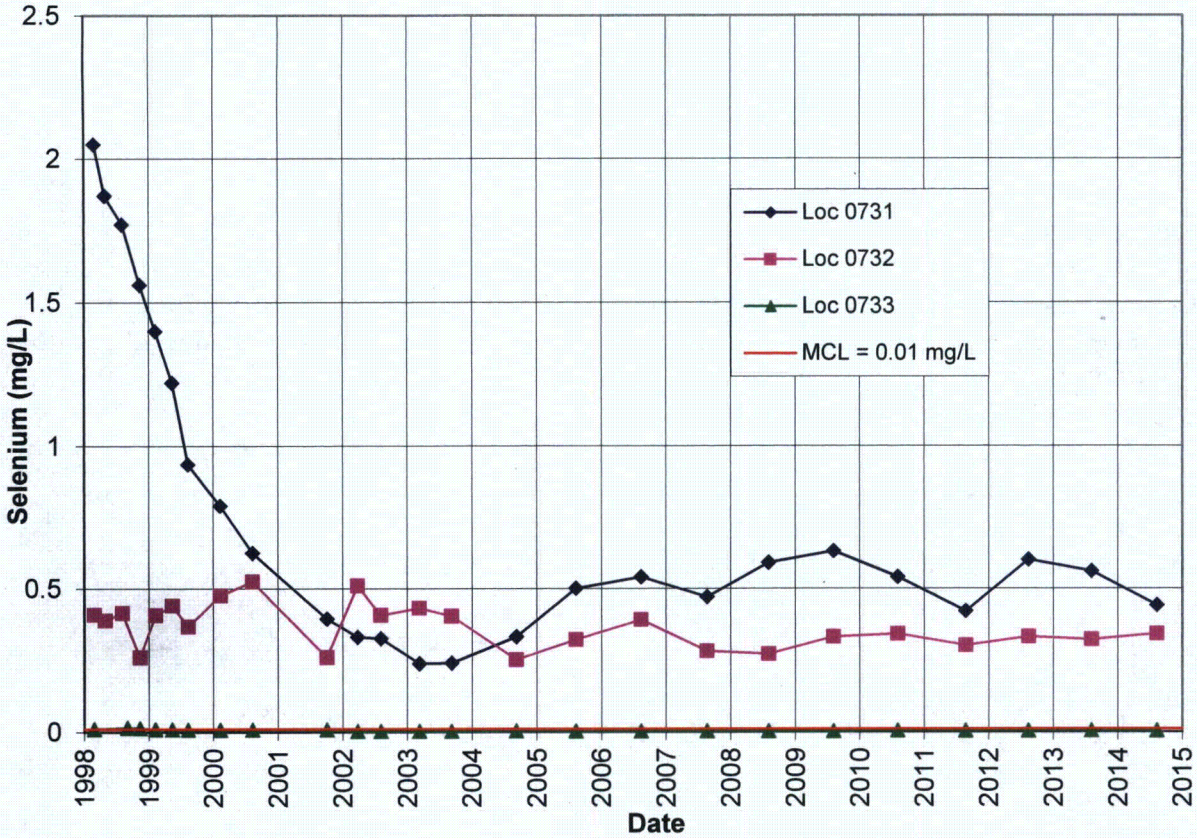


Figure 6-4. Time-Concentration Plots of Selenium in Groundwater at the Grand Junction Disposal Site

Uranium concentrations in groundwater continued to be below the MCL of 0.044 mg/L in wells 0731 and 0732, showing no apparent trend since 2007 (Figure 6-5). The uranium concentration in well 0733 continued to be above the MCL and continued an upward trend; the 2014 concentration was 0.17 mg/L. There is no apparent correlation of uranium concentrations between the paleochannel wells and the disposal cell well.

The groundwater level and contaminant concentration measurement results combine to verify that the groundwater in the paleochannels continues to be unaffected by potential transient drainage from the disposal cell.

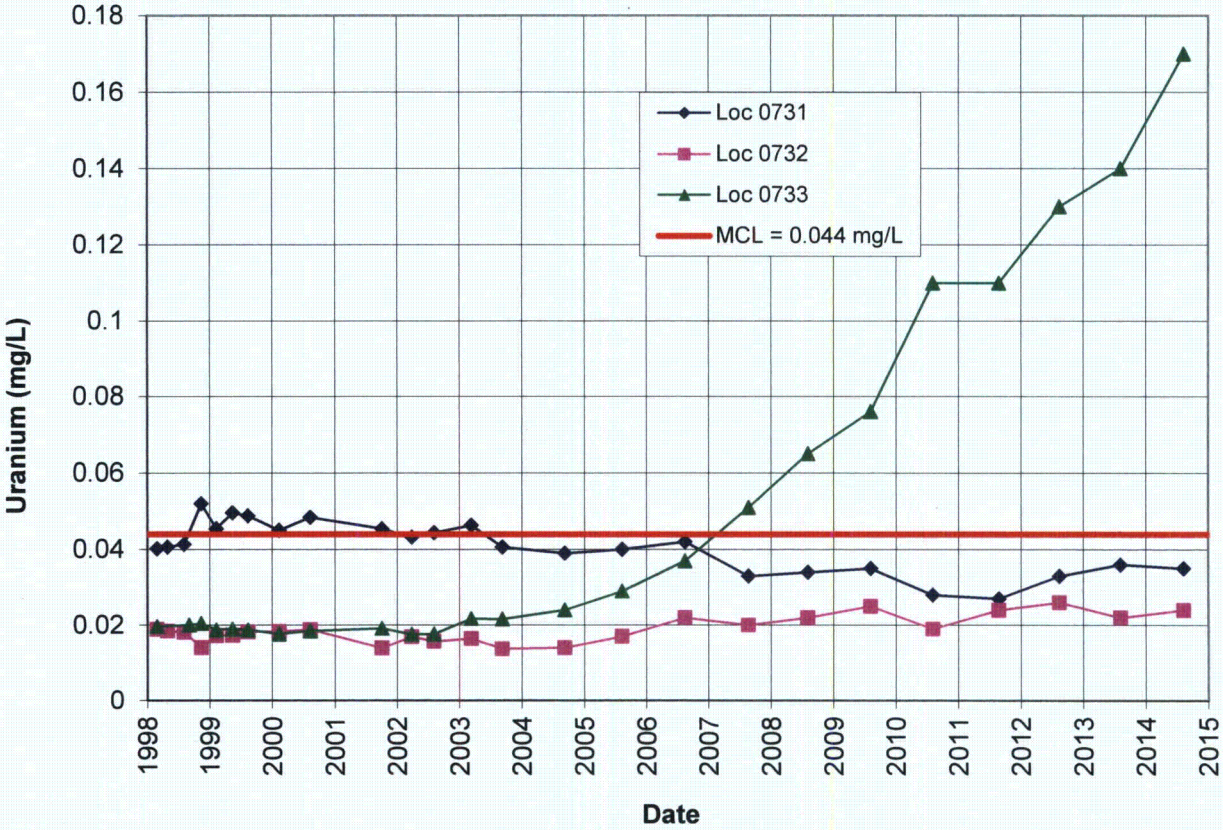


Figure 6-5. Time-Concentration Plots of Uranium in Groundwater at the Grand Junction Disposal Site

6.8 Corrective Action

Corrective action is taken to correct a condition that may affect the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

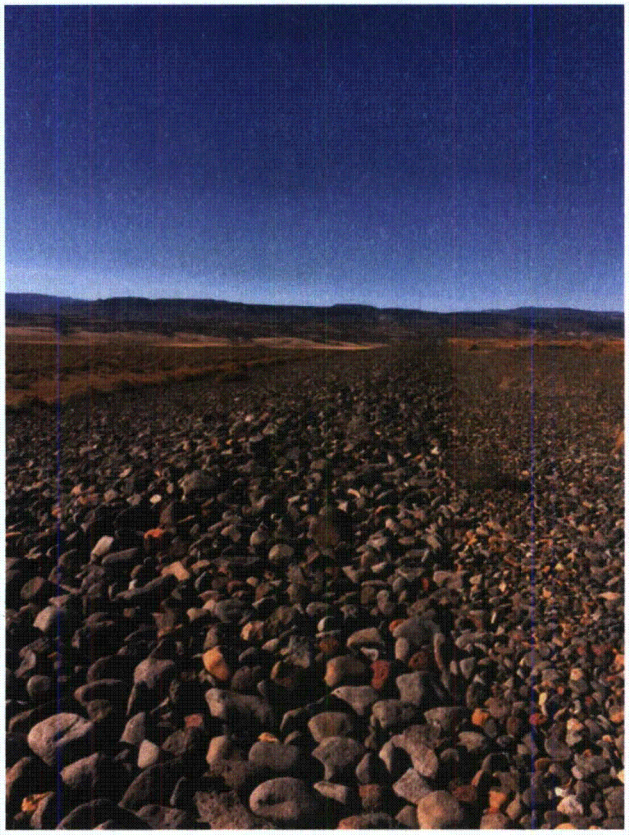
6.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	210	Perimeter sign P24.
PL-2	40	Boundary monument BM-4.
PL-3	30	Monitoring well 0733 and open portion of cell.
PL-4	240	View southwest of top and side slope from south edge of disposal cell.
PL-5	20	Northeast portion of disposal cell top slope.
PL-6	320	Alkali area on top of disposal cell.
PL-7	45	Erosion rills at toe of disposal cell.
PL-8	340	Outlet of south diversion channel.

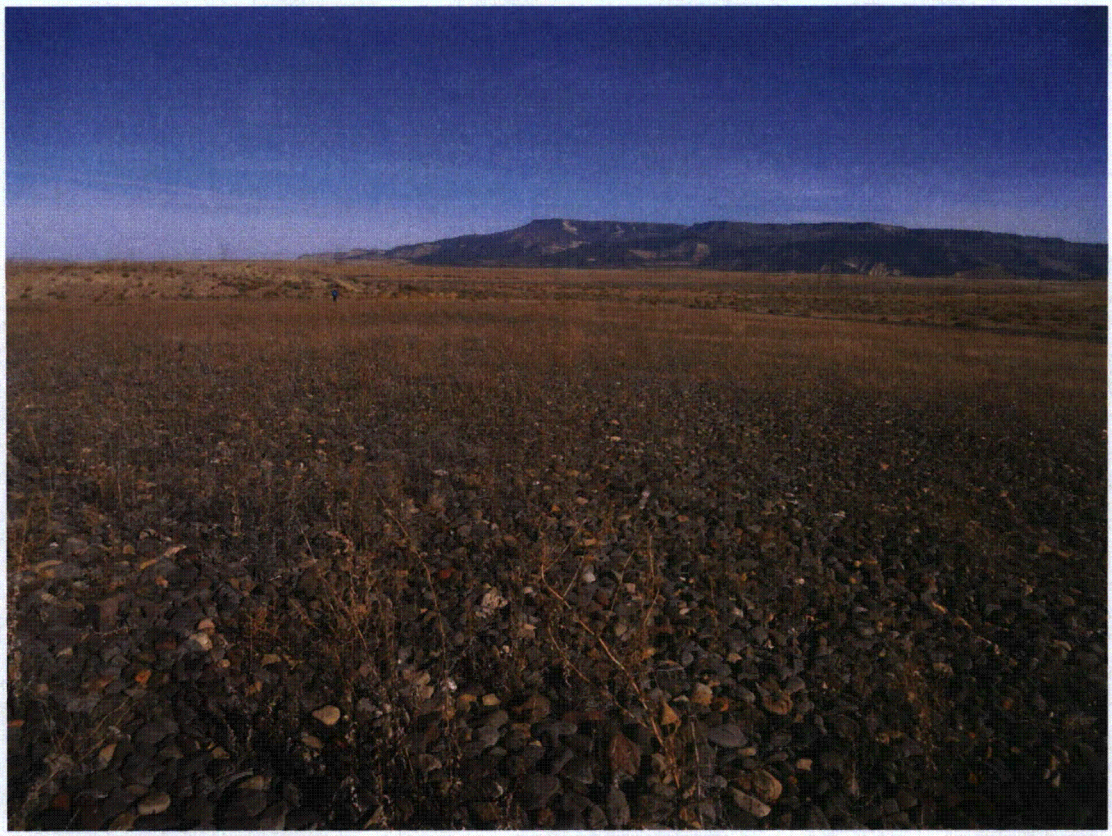
GRJ 12/2014. PL-1. Perimeter sign P24.

GRJ 12/2014. PL-2. Boundary monument BM-4.

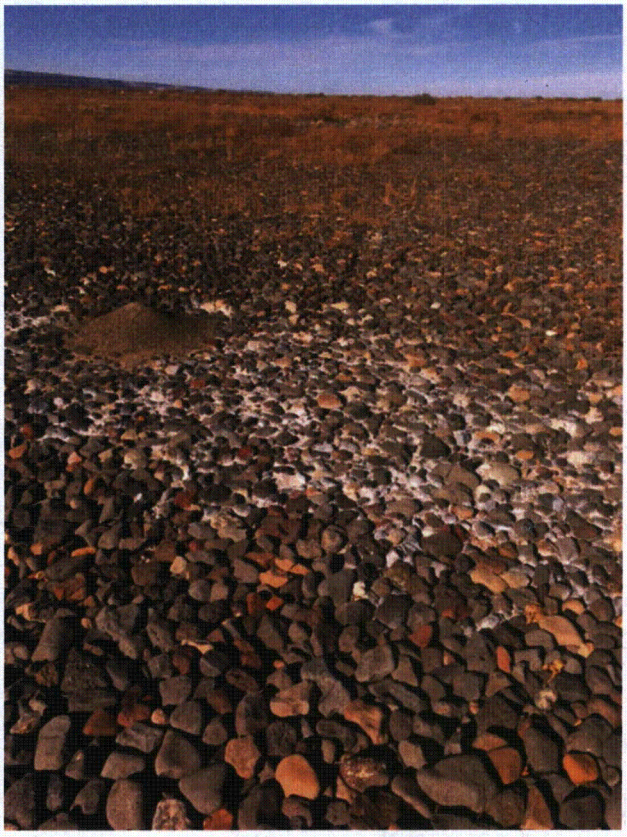
GRJ 12/2014. PL-3. Monitoring well 0733 and open portion of cell.



GRJ 12/2014. PL-4. View southwest of top and side slope from south edge of disposal cell.

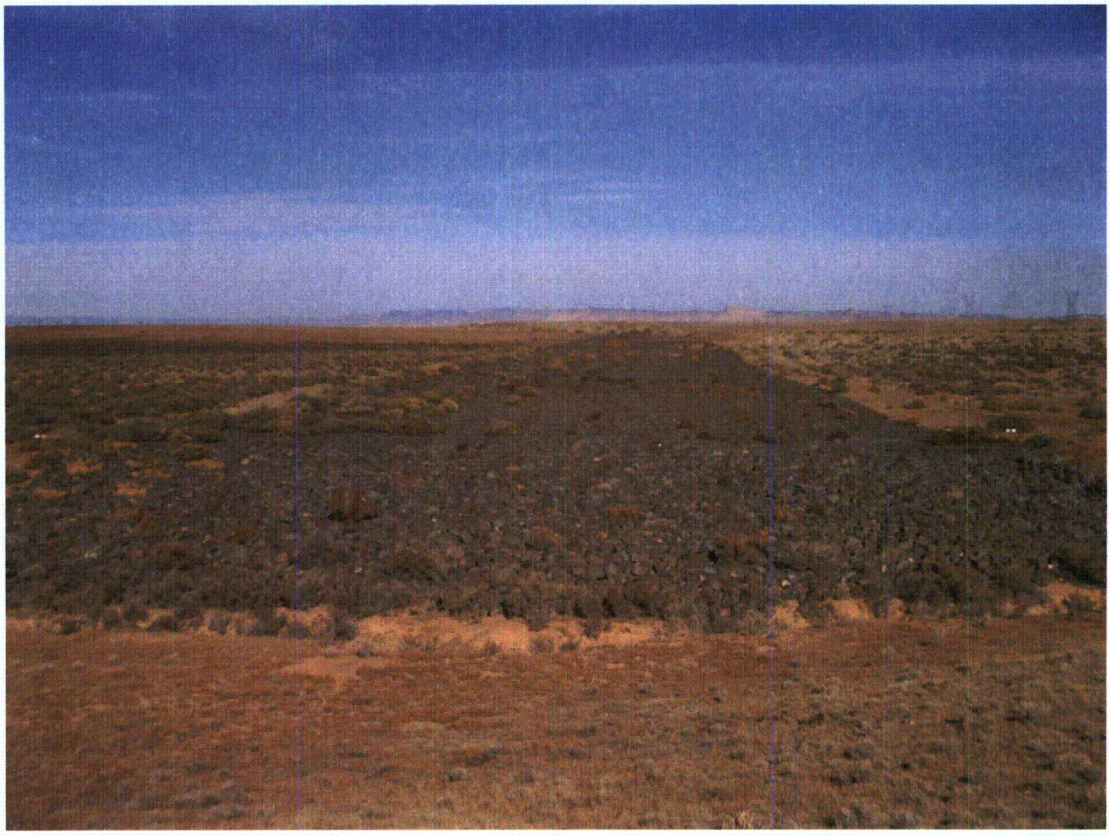


GRJ 12/2014. PL-5. Northeast portion of disposal cell top slope.



GRJ 12/2014. PL-6. Alkali area on top of disposal cell.

GRJ 12/2014. PL-7. Erosion rills at toe of disposal cell.



GRJ 12/2014. PL-8. Outlet of south diversion channel.

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7.0 Green River, Utah, Disposal Site

7.1 Compliance Summary

The Green River, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on March 26, 2014. The disposal cell was in excellent condition. Three missing perimeter signs and a faded perimeter sign, as well as a damaged electrical access box on a monitoring well, were replaced the week following the inspection. Inspectors identified no other maintenance needs or cause for a follow-up or contingency inspection.

Groundwater is monitored in accordance with the site Long-Term Surveillance Plan (LTSP). The disposal cell performance monitoring results from the uppermost aquifer were similar to results and trends in recent years and do not indicate degradation of cell performance.

7.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Green River, Utah, Disposal Site* (DOE/AL/62350-89, Rev. 2, U.S. Department of Energy [DOE], July 1998) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 7-1 lists these requirements.

Table 7-1. License Requirements for the Green River Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 7.4
Follow-Up or Contingency Inspections	Section 7.0	Section 7.5
Maintenance and Repairs	Section 8.0	Section 7.6
Groundwater Monitoring	Section 5.2	Section 7.7
Corrective Action	Section 9.0	Section 7.9

7.3 Institutional Controls

The 25-acre site (Figure 7-1) is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, perimeter warning signs, and a site security fence.

7.4 Inspection Results

The site, southeast of Green River, Utah, was inspected on March 26, 2014. The inspection was conducted by R. Johnson and D. DePinho of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. R. Topham of the Utah Department of Environmental Quality and D. Ravelojaona (SN3) also attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that might affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring. Numbers in the left margin of this chapter refer to items summarized in Table ES-1 of the "Executive Summary."

7.4.1 Site Surveillance Features

Figure 7-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 7-1 by photograph location (PL) numbers.

7.4.1.1 Access Road, Entrance Gate, and Entrance Sign

The site can be accessed either from the town of Green River or from U.S. Interstate Highway 70 via a paved road. The access route crosses State land and U.S. Army property. Access has been granted to DOE through right-of-way agreements with both agencies.

Entrance to the site is through a locked steel gate in the access road right-of-way fence; DOE does not own the gate. Past this gate, a dirt access road leads across State land to the disposal site. The access road divides at the disposal cell security fence, with one branch entering the enclosure and providing access to the disposal cell and several monitoring wells, and the other providing access around the outside of the security fence. The access road was in good condition, and no maintenance needs were identified.

The site entrance sign is positioned on the site property boundary (PL-1) where the access road enters the south vehicle access gate of the disposal site. The sign was in excellent condition.

7.4.1.2 Security Fence and Perimeter Signs

The disposal cell is enclosed within a chain-link security fence (PL-2). Two vehicle access gates are at the south and east corners of the fence line, and a personnel gate is at the north corner of the fence line. The security fence and gates were in excellent condition.

Seventeen perimeter signs are positioned on steel posts set in concrete along the unfenced site
7A boundary. Perimeter signs P7, P8, and P9 were missing (PL-3). These signs and perimeter sign P10, which was faded to the point of being barely legible, were replaced the following week. Perimeter sign P12 has a bullet dent, but is legible. The other perimeter signs were in excellent condition.

7.4.1.3 Site Markers

Two granite markers are on the site. Site marker SMK-1 (PL-4) is on the ground inside the southwest security fence line. Its concrete base has several minor cracks, but the marker is stable and repairs are not needed at this time. Site marker SMK-2, located on the crest of the disposal cell (PL-5), was in excellent condition.

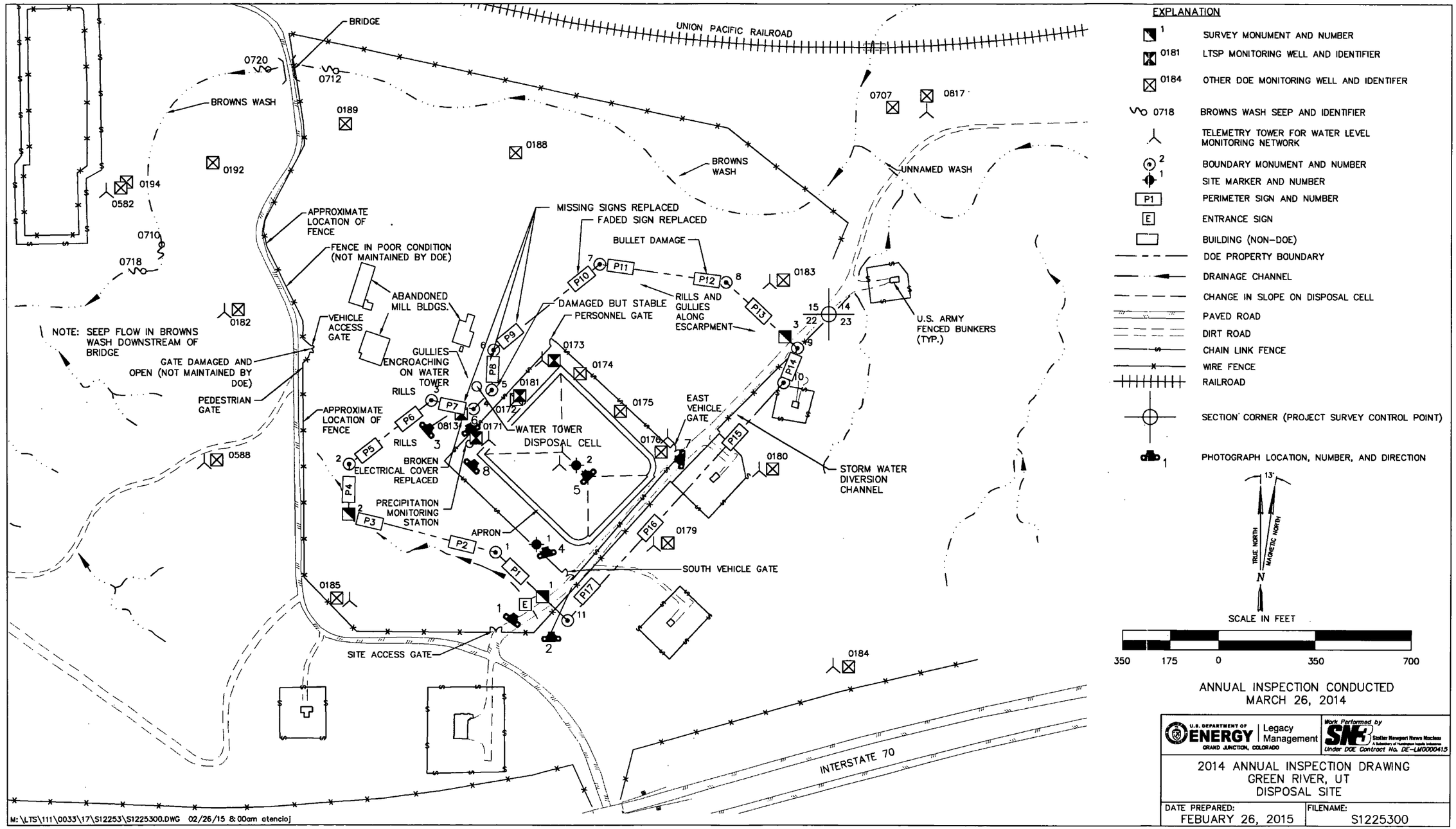

Figure 7-1. 2014 Annual Inspection Drawing for the Green River Disposal Site

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7.4.1.4 Survey Monuments and Boundary Monuments

Eleven boundary monuments and three survey monuments are along the site perimeter. The monuments were in excellent condition with the exception of boundary monument BM-5, which was bent but remains stable.

7.4.1.5 Monitoring Wells

Four wells are monitored in accordance with the LTSP (0171, 0173, 0181, and 0813). The other DOE wells shown on Figure 7-1 are monitored in accordance with a draft groundwater compliance action plan associated with the former processing site.

The wells were secure at the time of the inspection and the visible portions of the wells were in good condition except for monitoring well 0813. The electrical access box cap mounted on
7B the outside of the well casing of well 0813 was broken (PL-6). The cap was replaced the following week.

7.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas to ensure a thorough and efficient inspection. The inspection areas are: (1) the disposal cell and adjacent area inside the security fence, (2) the site perimeter between the security fence and the site boundary, and (3) the outlying area.

Within each inspection area, inspectors examined specific site surveillance features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

7.4.2.1 Disposal Cell and Adjacent Area Inside the Security Fence

The 6-acre disposal cell was completed in 1989. The slopes of the disposal cell cover are armored with basalt rock (PL-7). The quality of the rock is excellent, and the disposal cell cover was in excellent condition. No evidence of settling, slumping, erosion, or any other disturbance of the cell surfaces was observed. No vegetation was present on the cell. A basalt-boulder-filled trench, called an apron, surrounds the disposal cell (PL-8). The apron was in excellent condition.

The area between the disposal cell and the security fence consists of the cell perimeter dirt road, several monitoring wells and telemetry towers, and open space. This area was in good condition. A few small areas of erosion were apparent between wells 0174 and 0176 from storm-water runoff along the road; the runoff water drains into the cell apron. These areas are not a concern because the erosion is minor and sedimentation in the apron is insignificant. In the areas surrounding the disposal cell the vegetation appeared to be stressed from lack of water.

7.4.2.2 Site Perimeter Between the Security Fence and the Site Boundary

Rills and gullies are present on the west side of the property but do not encroach on disposal cell structures and currently are not affecting any site surveillance features. Rills and gullies are also present along the escarpment northeast of the disposal cell in the area between boundary monument BM-7 and survey monument SM-3. Maximum gully depth in this area is

approximately 3 feet. The rill and gully erosion could eventually damage perimeter signs and boundary monuments and will continue to be monitored.

Trespassing can occur on the site from several access points through State land. The barbed-wire stock fence on the surrounding State-owned property provides only minimal security; the fence west of the site is in poor condition, and a gate providing access to the former mill buildings and the DOE site is broken off its hinges. The site is also accessible through remote open access points north and east of the property. DOE property will continue to be monitored for adverse public use indicated by trash, tire ruts, and vandalism. Missing perimeter signs were the only indication of vandalism at the site.

7.4.2.3 Outlying Area

The area extending outward from the site for a distance of 0.25 mile was checked for signs of erosion, development, or other disturbance that might affect site security or integrity. Areas of erosion noted during previous inspections include the natural drainage southwest of the site, and rills and gullies northwest of the water tower. Minor erosion continues but currently does not threaten the integrity of the disposal cell or site surveillance features.

Abandoned buildings and a water tower associated with the former milling activities at the site are northwest of the DOE property. The buildings are in a severe state of disrepair, and debris (e.g., roofing materials, siding, trash) tends to be blown from the buildings onto the DOE property. Accumulation of materials blown onto DOE property was not significant but will continue to be monitored; debris will be removed as necessary.

7.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up or contingency inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed. No need for a follow-up or contingency inspection was identified.

7.6 Maintenance and Repairs

The three missing perimeter signs and the faded perimeter sign, as well as the electrical access box on monitoring well 0813, were replaced the week following the inspection. No other maintenance needs were identified.

7.7 Groundwater Monitoring

7C In compliance with 40 CFR 192, Subpart A, and as stipulated in the LTSP, the groundwater monitoring network consists of four point-of-compliance (POC) wells northwest of the disposal cell (0171, 0173, 0181, and 0813). These wells are completed in the middle sandstone unit of the Cedar Mountain Formation, which contains the uppermost aquifer. The LTSP included POC well 0172. However, its construction integrity was suspect, so well 0181 was installed next to it in 2001; well 0181 has been monitored as the replacement POC well since then. The purpose of the monitoring is to evaluate the performance of the disposal cell.

In accordance with the LTSP, groundwater levels in the POC wells were initially monitored to evaluate the relationship between precipitation in the cell watershed and aquifer water levels. Water levels continue to be measured in wells 0171, 0173, 0176, 0179, 0183, 0813, and 0817 to monitor aquifer flow in the contaminated middle sandstone unit of the Cedar Mountain Formation, and are continuously measured in wells 0182, 0184, 0185, 0582, and 0588 to monitor aquifer flow in the formation's uncontaminated basal sandstone unit. A telemetry system sends data to the DOE office in Grand Junction.

7.7.1 Cell Performance Monitoring

The LTSP proposed well-specific concentration limits for nitrate and uranium that were equal to or greater than the U.S. Environmental Protection Agency (EPA) maximum concentration limits (MCLs) provided in 40 CFR 192, Table 1. Sulfate, which does not have an MCL, also had proposed well-specific concentration limits. Table 7-2 lists the LTSP-proposed limits for the POC wells. Risk-based alternate concentration limits (ACLs) are proposed for nitrate and uranium in the draft groundwater compliance action plan under review by NRC; no concentration limit is proposed for sulfate. Table 7-3 provides the analytical results for the June 2014 sampling event at the POC wells.

Table 7-2. LTSP-Proposed Concentration Limits for Point-of-Compliance Wells at the Green River Disposal Site

Monitoring Well	Nitrate (mg/L)	Sulfate (mg/L)	Uranium (mg/L)
0171	10[a]	3334	0.044[a]
0173	10[a]	4000	0.044[a]
0181	102	4985	0.067
0813	10[a]	4440	0.069

mg/L = milligrams per liter
[a] EPA MCL (40 CFR 192, Table 1)

Table 7-3. 2014 Analytical Results for Point-of-Compliance Wells at the Green River Disposal Site

Monitoring Well	Nitrate[a] (mg/L)	Sulfate (mg/L)	Uranium (mg/L)
0171	30	4000	0.061
0173	88	5700	0.011
0181	63	6200	0.022
0813	0.020	3700	0.034

[a] Nitrate = nitrate plus nitrite as nitrogen

Nitrate concentrations have been measured as nitrate plus nitrite reported as nitrogen since early 2004 (before then, nitrate was reported as NO_3). Concentrations continued to exceed the LTSP limits in wells 0171 and 0173, but they are considerably below the proposed ACL of 1,000 mg/L. 2014 nitrate concentrations in the wells are similar to previous measurements, with an overall decreasing trend in well 0173 (Figure 7-2).

Sulfate concentrations continue to exceed the LTSP limits in all POC wells except 0813. The 2014 concentrations were within historical results, showing a downward trend in well 0173 since 2004 and an upward trend in well 0181 since 2006 (Figure 7-3).

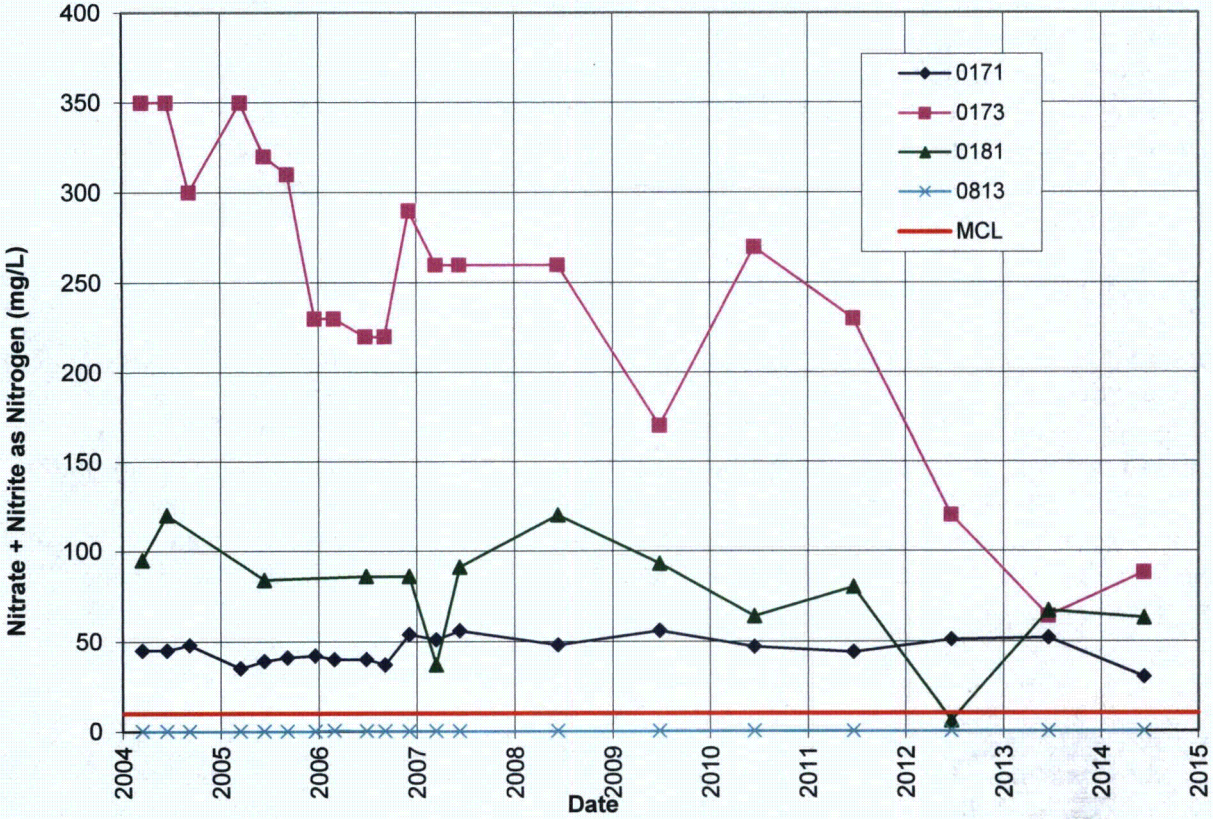


Figure 7-2. Time-Concentration Plots of Nitrate in Groundwater at the Green River Disposal Site

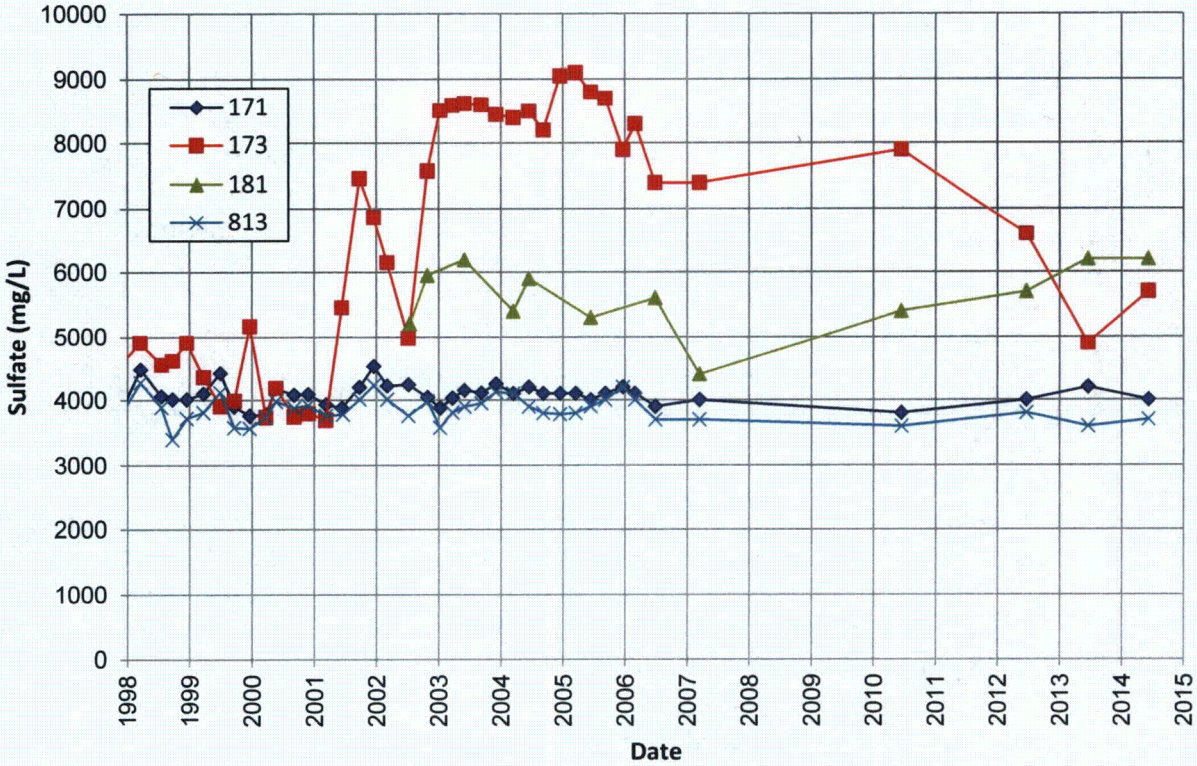


Figure 7-3. Time-Concentration Plot of Sulfate in Groundwater at the Green River Disposal Site

Uranium concentrations in groundwater remain below the LTSP limits in all POC wells except well 0171, and remain considerably below the proposed ACL of 4.4 mg/L in all POC wells (Figure 7-4). Uranium concentrations at well 0171 have varied considerably, ranging from a low of 0.0184 mg/L in 1999 to a high of 0.13 mg/L in 2006 and again in 2008. Concentrations have steadily decreased since 2008 to a 2014 concentration of 0.061 mg/L. No conclusions regarding the variability of uranium concentrations in well 0171 have been reached.

The cell performance monitoring results were similar to results and trends in recent years. The results do not indicate degradation of cell performance but will continue to be evaluated.

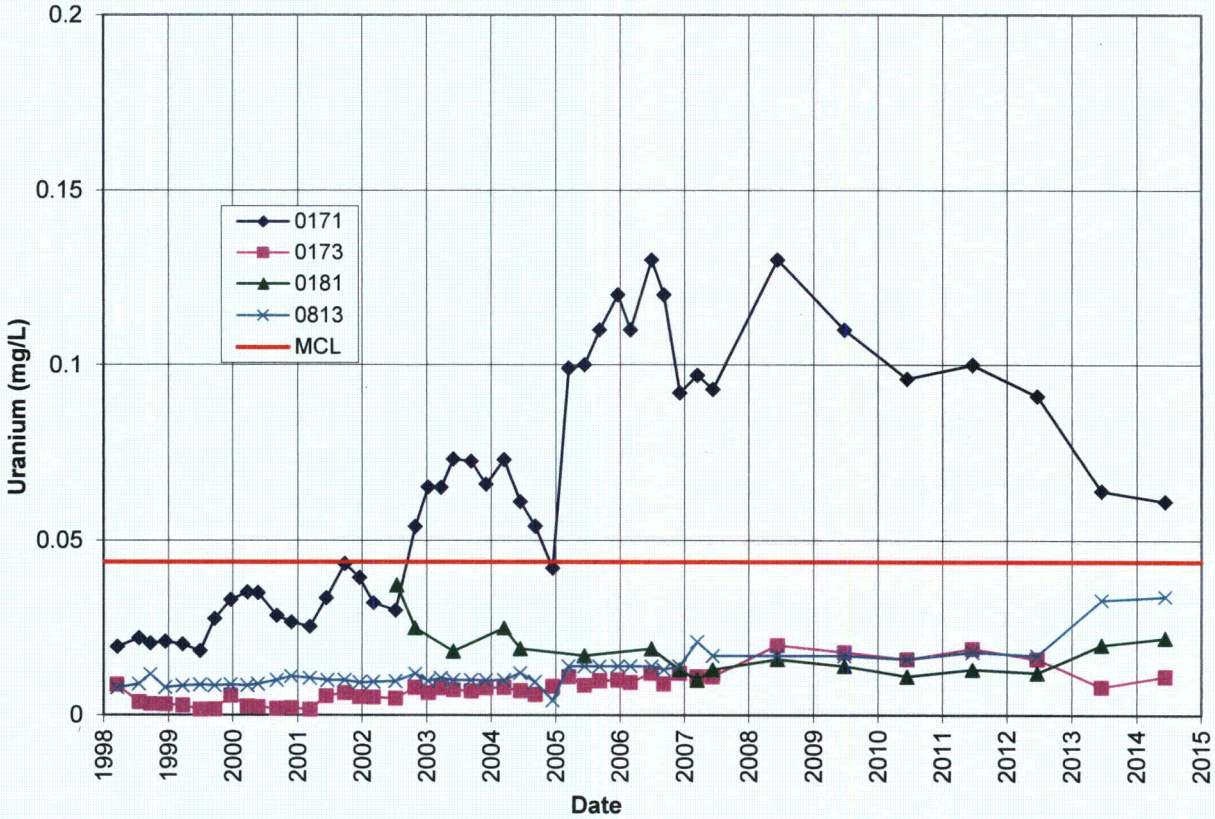


Figure 7-4. Time-Concentration Plot of Uranium in Groundwater at the Green River Disposal Site

7.7.2 Groundwater-Level Monitoring

Groundwater levels in several monitoring wells adjacent to the disposal cell have been measured manually since 1991, and continuously with down-hole dataloggers since 1999. Thirteen wells currently have dataloggers, and a telemetry system was installed in 2007 to transmit the continuous water level monitoring data to the DOE office in Grand Junction. The current purpose of the monitoring is to evaluate the hydraulic gradient and flow directions in the two Cedar Mountain Formation aquifers near the disposal cell.

Water level hydrographs of the POC wells, completed in the middle sandstone aquifer, indicate that the groundwater elevation decreased approximately 3 feet overall from 1998 through 2004, and then increased approximately 8 feet between 2004 and 2007. Water levels have decreased approximately 4 to 5 feet since 2007 (Figure 7-5). Historically, rainfall measurements recorded

at a precipitation gauge near well 0171 did not correlate with water level changes in the POC wells, so the uppermost aquifer is not being directly recharged by rainfall in the disposal cell watershed. Therefore, this relationship is no longer being evaluated.

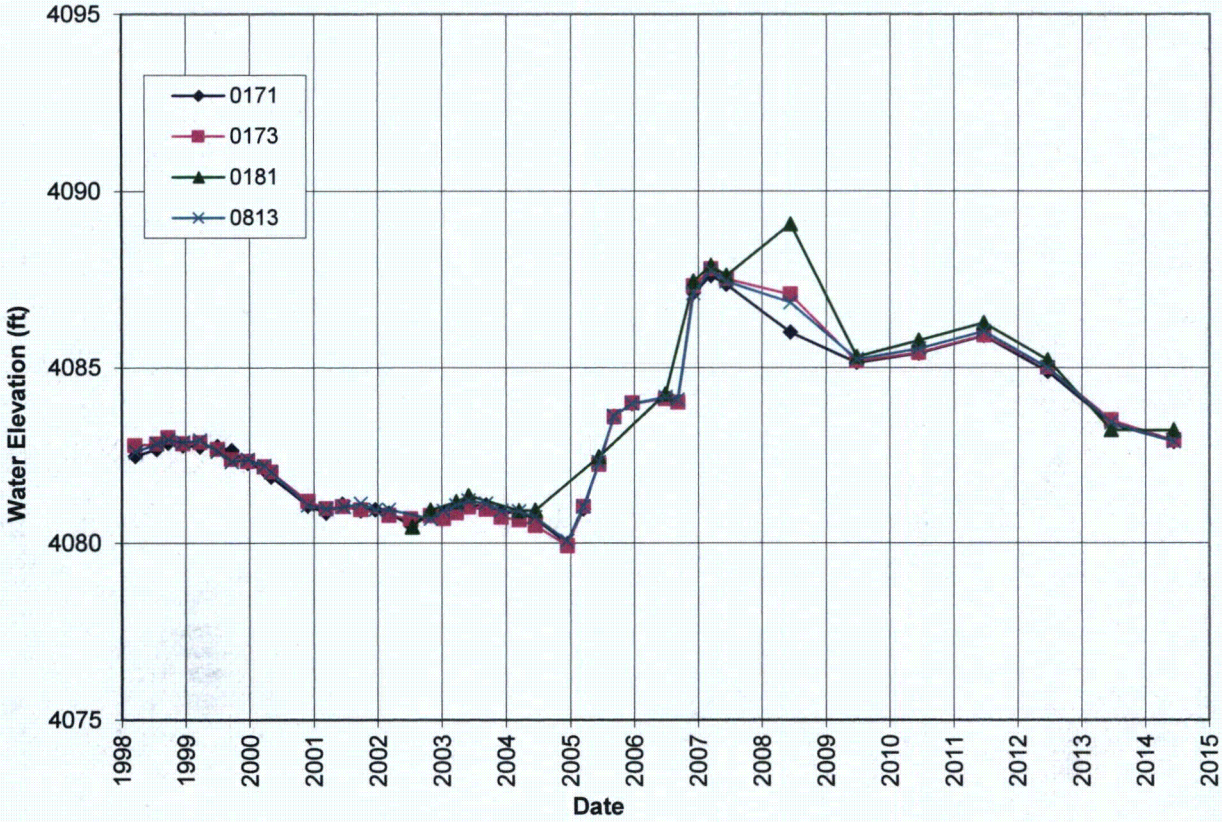


Figure 7-5. Groundwater Elevations at the Green River Disposal Site

The monitoring well locations in the two Cedar Mountain aquifers are not ideal (i.e., no nested well pairs in the upper and lower aquifers) to define both the groundwater flow directions and the hydraulic gradient between the aquifers. However, groundwater elevation data derived from the existing well network are adequate to determine that flow direction in the upper aquifer is toward the west-northwest, while flow direction in the lower aquifer is toward the southwest. The data also suggest that there is a neutral gradient between the two aquifers, therefore neither inducing nor retarding contaminant migration from the contaminated upper aquifer to the uncontaminated lower aquifer.

7.8 Corrective Action

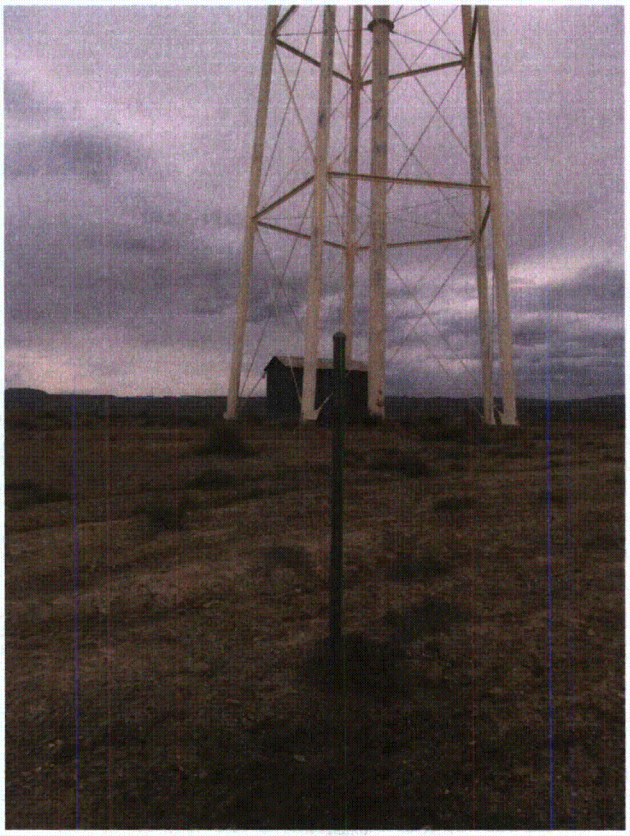
Corrective action is taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

7.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	35	Entrance sign at south vehicle gate.
PL-2	0	Entrance gate and southwest side of security fence.
PL-3	50	Missing perimeter sign P7.
PL-4	345	Site marker SMK-1.
PL-5	315	Site marker SMK-2.
PL-6	335	Monitoring well 0813 missing an electrical access box cover.
PL-7	275	Disposal cell viewed from east corner.
PL-8	45	Rock apron at west corner of disposal cell.

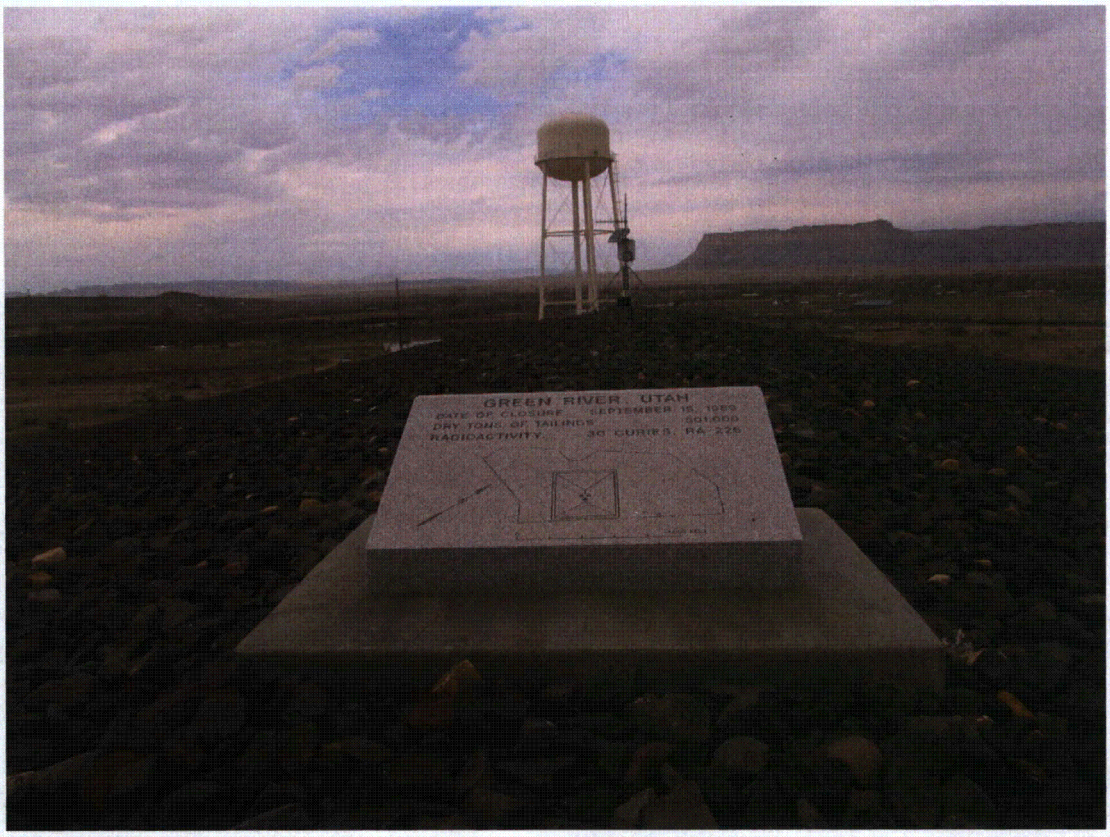
GRN 3/2014. PL-1. Entrance sign at south vehicle gate.

GRN 3/2014. PL-2. Entrance gate and southwest side of security fence.



GRN 3/2014. PL-3. Missing perimeter sign P7.

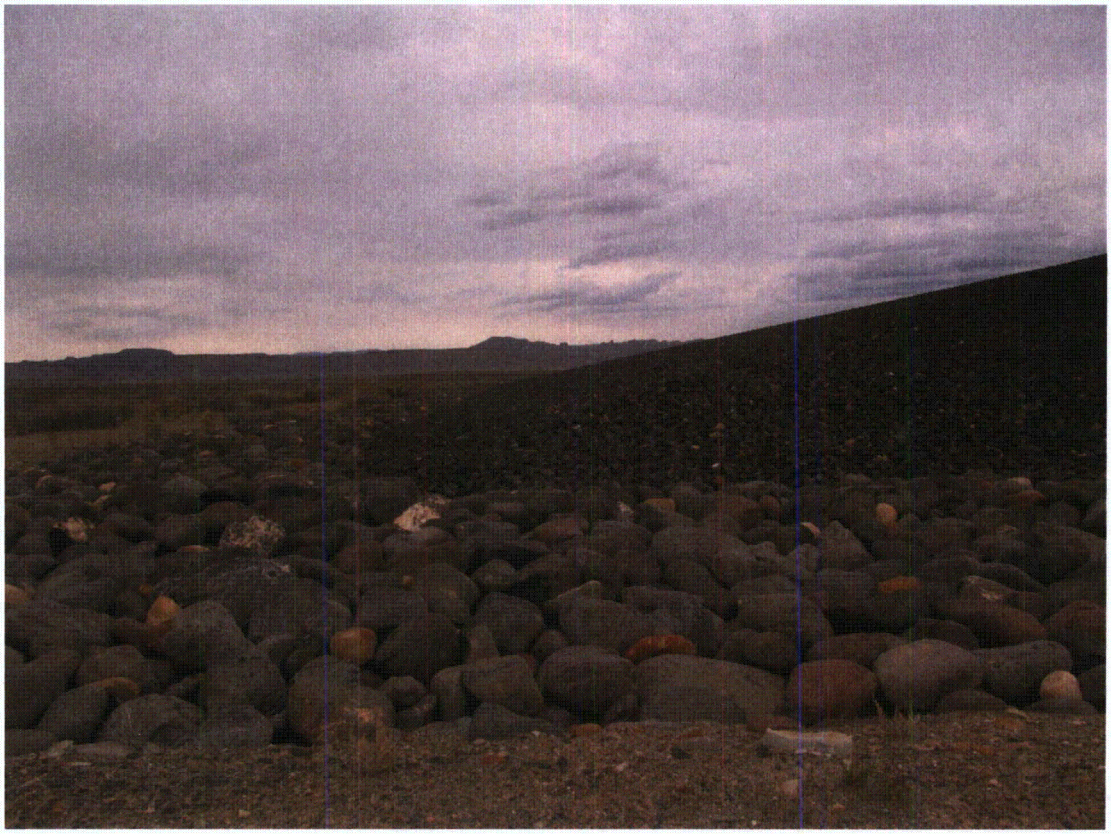
GRN 3/2014. PL-4. Site marker SMK-1.



GRN 3/2014. PL-5. Site marker SMK-2.

GRN 3/2014. PL-6. Monitoring well 0813 missing an electrical access box cover.

GRN 3/2014. PL-7. Disposal cell viewed from east corner.



GRN 3/2014. PL-8. Rock apron at west corner of disposal cell.

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