



Department of Energy
Office of Legacy Management

June 13, 2011

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Deputy Director
Mail Stop T8F5
Washington, DC 20555-0001

Subject: Transmittal of Monitoring Assessment Report for the Canonsburg, Pennsylvania Uranium Mill Tailings Disposal Site, issued March 2011

Reference: Letter to Ted Carter, U.S. Nuclear Regulatory Commission, from Clifford Carpenter, U.S. Department of Energy, for transmittal of *Monitoring Assessment Report for the Canonsburg Pennsylvania, Uranium Mill Tailings Radiation Control Act, Disposal Site*, issued March 2011

To Whom It May Concern:

Enclosed is the groundwater and surface water monitoring assessment report for the Canonsburg Uranium Mill Tailings disposal site, issued March 2011. As you are aware, the *Long-Term Surveillance Plan for the U.S. Department of Energy Canonsburg Uranium Mill Tailings Disposal Site, Canonsburg, Pennsylvania (LTSP; DOE 2008)* Section 3.7 states that monitoring is to continue through 2010 then reevaluated.

The current LTSP combines requirements from the original LTSP (DOE 1995) and the site Groundwater Compliance Action Plan (GCAP) (DOE 2000). Monitoring requirements in the original LTSP were based on surface remedial action under Subpart A of Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192) and were approved as part of the U.S. Nuclear Regulatory Commission general licensing process for the site. Additional monitoring requirements were prescribed in the GCAP for the groundwater cleanup phase of remedial action under Subpart B of 40 CFR 192.

The protectiveness of the compliance strategy is assessed by tracking and comparing uranium concentrations at Point of Compliance wells (monitoring wells MW-0412, MW-0413, and MW-0414) and the Point of Exposure in Chartiers Creek (surface water location SW-0602) to site alternate control limits (ACLs) to determine if an exceedance has occurred. An ACL exceedance would trigger a reevaluation of the compliance strategy.

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In summary, the report concludes the site compliance strategy remains protective, and that a change to the strategy is not required. However, the low and slowly changing uranium concentrations in both groundwater and surface water warrant a change in monitoring. As such, DOE recommends that, following the collection of samples in 2011, the frequency of monitoring be reduced from annually to once every 5 years for cell performance monitoring purposes. Furthermore, the 5-year sampling schedules at the Canonsburg and Burrell, Pennsylvania sites; as well as the Parkersburg, West Virginia site, should be synchronized to reduce monitoring costs. With synchronization, all three sites would be sampled again in 2013 and every 5 years thereafter.

Upon review and U.S. Nuclear Regulatory Commission written concurrence that frequency of monitoring can be reduced from annually to every five years, DOE will then amend the Canonsburg site LTSP using this approval to proceed with issuing the revision.

Please contact me at 304-413-0807 if you have any questions.

Sincerely,

 2011.06.08
14:00:37 -04'00'

Clifford Carpenter
Site Manager

Enclosure

cc w/enclosure:

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File: CAN 410.02(A) (rc grand junction)

**Monitoring Assessment
Canonsburg, Pennsylvania,
Uranium Mill Tailings
Disposal Site**

March 2011



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ENERGY**

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LMS/CAN/S07467

**Monitoring Assessment
Canonsburg, Pennsylvania, Uranium Mill Tailings Disposal Site**

March 2011

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Abbreviations

ACL	alternate concentration limit
BMP	best management practice
CFR	<i>Code of Federal Regulations</i>
COC	contaminant of concern
DOE	U.S. Department of Energy
GCAP	Ground Water Compliance Action Plan
LTSP	Long-Term Surveillance Plan
MCL	maximum concentration limit
mg/L	milligram per liter
NRC	U.S. Nuclear Regulatory Commission
POC	point of compliance
POE	point of exposure

Executive Summary

The compliance strategy for groundwater cleanup at the Canonsburg, Pennsylvania, Disposal Site is no further remediation in conjunction with the application of alternate concentration limits (ACLs) for uranium, the only remaining contaminant of concern for the site (DOE 2000). Five years of additional monitoring data (2006 through 2010) were added to the previous data set (1986 through 2005). An assessment of the combined data set indicates that:

- Groundwater and surface water uranium concentrations remain well below site ACLs, resulting in no adverse impact at the point of exposure (POE) in Chartiers Creek.
- Water levels measured at the site are steady and within the historical range.

Given that uranium concentrations are well below Site ACLs and no adverse impact has been seen at the POE in Chartiers Creek, the U.S. Department of Energy (DOE) concludes that a change to the site compliance strategy is not required.

The protectiveness of the compliance strategy, coupled with the low and slowly changing concentrations of uranium in both groundwater and surface water, warrants a monitoring change. DOE recommends that following the collection of samples in 2011 the frequency of monitoring at the Canonsburg Site be reduced from annual to once every 5 years for cell performance monitoring purposes. In order to minimize monitoring costs, the 5-year sampling schedules at both Canonsburg and Burrell, Pennsylvania Sites, as well as the Parkersburg, West Virginia Site, should be synchronized. With synchronization, all three Sites would be sampled again in 2013 and every 5 years thereafter.

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1.0 Background

Groundwater and surface water monitoring are the only environmental monitoring requirements at the Canonsburg Site. The controlling document for comprehensive site-wide monitoring is the Canonsburg Long-Term Surveillance Plan (LTSP) for the U.S. Department of Energy (DOE) Canonsburg Uranium Mill Tailings Disposal Site, Canonsburg, Pennsylvania (DOE 2008).

The current LTSP combines requirements from the original LTSP (DOE 1995) and the site Ground Water Compliance Action Plan (GCAP) (DOE 2000). Monitoring requirements in the original LTSP were based on surface remedial action under Subpart A of Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192) and were approved as part of the U.S. Nuclear Regulatory Commission (NRC) general licensing process for the site. Additional monitoring requirements were prescribed in the GCAP for the groundwater cleanup phase of remedial action under Subpart B of 40 CFR 192.

1.1 Monitoring Under the Original LTSP

The original LTSP specified annual monitoring of groundwater and surface water as a best management practice (BMP) for a period of 2 years following the licensing of the site. Because the site was included under the general license in 1996, DOE made that year the first of the 2-year monitoring period. The sample locations listed in Table 1 for the original LTSP were sampled annually in the fall for standard water quality indicators, field measurements, and two specific analytes (uranium and molybdenum). Table 2 identifies water quality indicators. Monitoring continued annually in 1998 (beyond the required 2-year period), as a BMP, because uranium concentrations at monitoring wells MW-0412 and MW-0413 were above the maximum concentration limit (MCL) of 0.044 milligram per liter (mg/L) and because it was anticipated that monitoring under the GCAP would include some of the same sampling locations.

Table 1. Groundwater and Surface Water Sampling Locations—Canonsburg, Pennsylvania, Disposal Site

Sample Locations Original LTSP (DOE 1995)	Sample Locations GCAP (DOE 2000)	Current Sample Locations Current LTSP (DOE 2008)
Monitoring wells: MW-0410 Upgradient MW-0406 Downgradient ^a MW-0412 Downgradient MW-0413 Downgradient MW-0424 Downgradient MW-0414 Crossgradient ^b Surface water locations: SW-0601 Upstream SW-0602 Adjacent to Area C SW-0603 Downstream	Monitoring wells: MW-0406 Downgradient MW-0412 Downgradient (POC) MW-0413 Downgradient (POC) MW-0414 Crossgradient (POC) Surface water location: SW-0602 Adjacent to Area C	Monitoring wells: MW-0406 Downgradient (BMP) MW-0412 Downgradient (POC) MW-0413 Downgradient (POC) MW-0414 Crossgradient (POC) MW-0424 Downgradient (BMP) Surface water location: SW-0602 Adjacent to Area C (POE)

^a Well MW-0406 was destroyed during a sanitary sewer construction project in 2001 and replaced. The current designation is MW-0406A.

^b Well MW-0414 has been replaced twice because of damage during construction. The current designation is MW-0414B.

BMP = best management practice

POC = point of compliance

POE = point of exposure

Table 2. Analytes for Surface Water and Groundwater—Canonsburg, Pennsylvania, Disposal Site

Field Measurements	Original LTSP		GCAP	Current LTSP
	Water Quality Indicators	Specific Analytes	Specific Analytes	All Analytes ^a
Alkalinity Dissolved oxygen pH Specific conductance Temperature Turbidity	Calcium Chloride Magnesium Potassium Sodium Sulfate	Uranium Manganese Molybdenum	Uranium Manganese Molybdenum	Uranium

^a Per an NRC request, manganese was sampled for in monitoring well MW-0412 and at surface water location SW-0602 through 2008.

1.2 Monitoring Under the GCAP

The compliance strategy for groundwater cleanup at the Canonsburg Site is no further remediation in conjunction with the application of an alternate concentration limit (ACL) for uranium in groundwater (1.0 mg/L) and surface water (0.01 mg/L). Uranium is the only remaining contaminant of concern (COC) for the site (DOE 2000). In addition to groundwater monitoring, the compliance strategy includes institutional controls to ensure that the application of the ACL will continue to protect public health and the environment.

Historical data and computer modeling predict that natural groundwater movement and geochemical attenuation processes will reduce uranium concentrations in groundwater to concentrations less than the MCL within 30 years (DOE 2000). Table 1 identifies monitoring locations specified in the GCAP. The locations listed in Table 1 were sampled each fall for standard water quality indicators, field measurements, and three specific analytes (uranium, molybdenum, and manganese).

Sampling was to continue for 5 years, beginning in 2000, and be conducted, if necessary, for a maximum of 30 years (through 2029). The GCAP monitoring objective was to demonstrate that the ACL for uranium is not exceeded at point of compliance (POC) wells or at points of exposure (POE) in Chartiers Creek. Monitoring results are also used to evaluate the progress of uranium flushing and attenuation in groundwater. The GCAP states that the need to continue or change the frequency of monitoring would be evaluated every 5 years. The first 5-year review (2005) resulted in a revision to the original LTSP, which is discussed below.

1.3 Monitoring Under the Current LTSP

The original LTSP was revised following a monitoring evaluation in 2005. The revised LTSP (DOE 2008) combines monitoring efforts from the original LTSP and GCAP.

The current monitoring program includes 5 groundwater wells and one surface water location (Table 1). Locations are sampled each fall for field measurements and uranium (Table 2). Figure 1 is a monitoring location map. This map contains not only the six locations currently sampled under the LTSP (MW-0412, MW-0413, MW-0406A, MW-0424, MW-0414B, and SW-0601) but also surface water locations SW-0601 and SW-0603, and monitoring well MW-0410. These additional three monitoring locations are included in the figure because data from these locations are presented in this assessment on concentration plots.

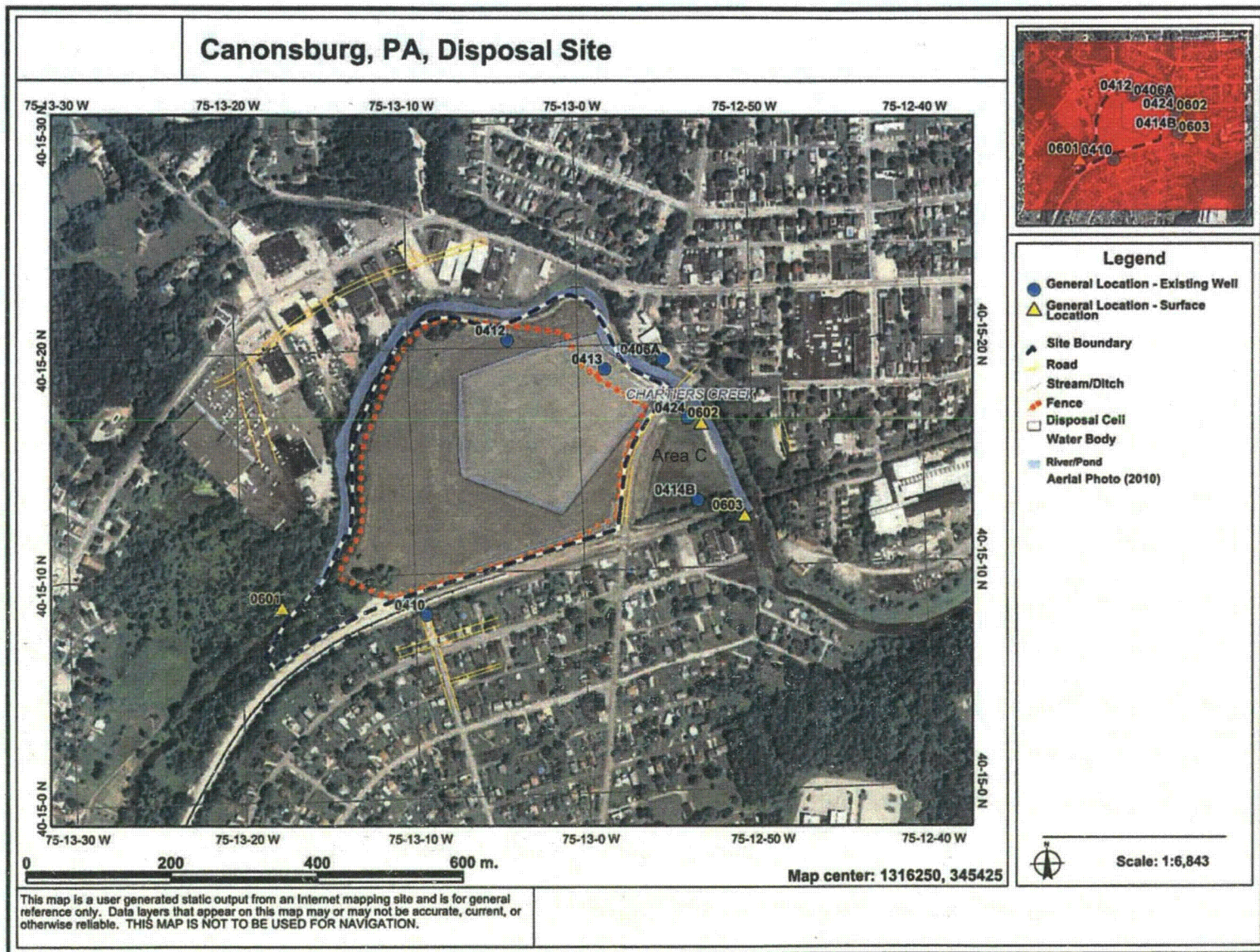


Figure 1. Monitoring Location Map

As shown in Table 1, the current monitoring program includes two wells being monitored as a BMP (monitoring wells MW-0414B and MW-0424). In 2003, NRC concurred in removing groundwater use restrictions for Area C. In response, DOE agreed to continue to monitor wells near Area C (monitoring wells MW-0414B and MW-0424) as a BMP. DOE also agreed to sample monitoring well MW-0412 and surface water location SW-602 for manganese through 2008.

2.0 Assessment Results

Monitoring results are used to assess the protectiveness of the compliance strategy and to assess progress in reducing groundwater uranium concentrations. The focus of the assessment is therefore on uranium (the remaining site COC). Manganese monitoring results are also presented to close out a commitment in the current LTSP, and water levels are presented to illustrate the stability of the system.

2.1 Protectiveness of the Compliance Strategy

The protectiveness of the compliance strategy is assessed by tracking and comparing uranium concentrations at POC wells (monitoring wells MW-0412, MW-0413, and MW-0414) and the POE in Chartiers Creek (surface water location SW-0602) to site ACLs to determine if an exceedance has occurred. An ACL exceedance would trigger a reevaluation of the compliance strategy (DOE 2000).

Figure 2 is a concentration plot (uranium) for three surface water locations (SW-0601, SW-602 [POE], and SW-0603.) Surface water location SW-0602 (the POE in Chartiers Creek) is the only surface water location being monitored under the current LTSP. The plot shows that uranium concentrations at all surface water locations have been below the surface water ACL of 0.01 mg/L with the exception of a brief period in 1993 and 1994.

Figure 3 plots uranium concentrations versus time for six groundwater monitoring wells (the five wells monitored under the current LTSP and monitoring well MW-0410). As shown in Figure 3, uranium concentrations at all six monitoring wells are below the groundwater ACL of 1.0 mg/L.

The data shown in Figures 2 and 3 indicate that groundwater and surface water uranium concentrations remain well below site ACLs, and no adverse impact has been detected at the POE in Chartiers Creek. Therefore, DOE concludes that the site compliance strategy remains protective and that a change to the strategy is not required.

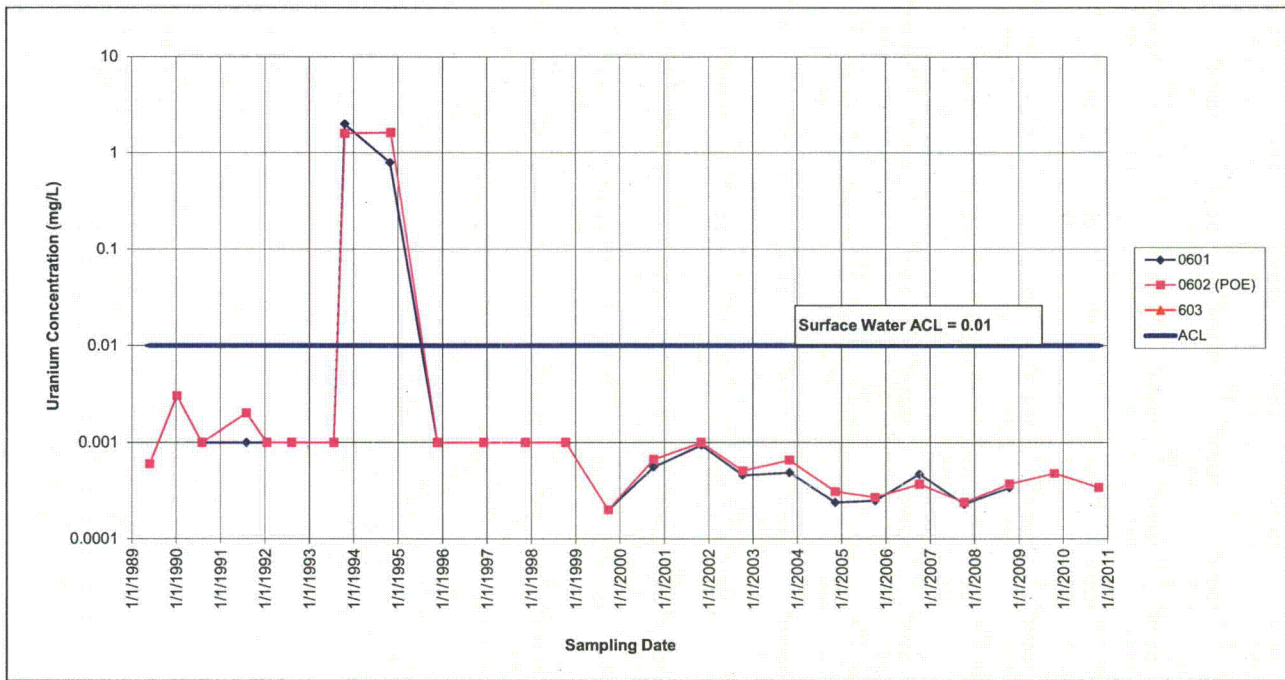


Figure 2. Surface Water Monitoring Uranium Concentrations (mg/L)—5/25/1989–10/20/2010

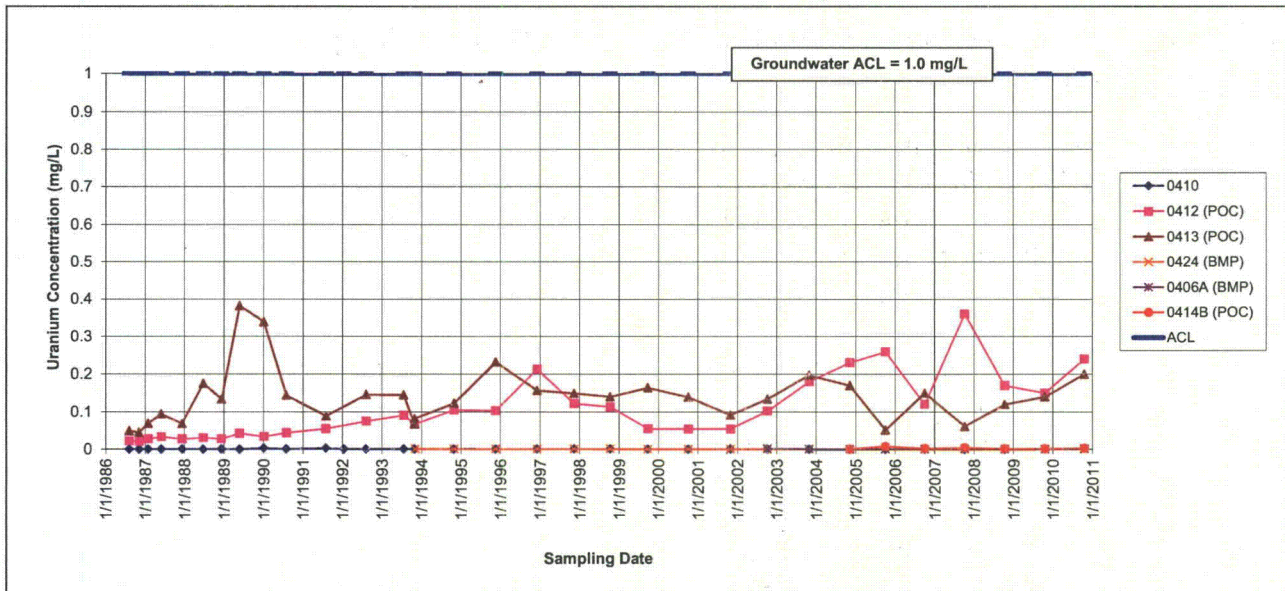


Figure 3. Groundwater Monitoring Uranium Concentrations (mg/L)—8/16/1986–10/20/2010

2.2 Progress in Reducing Groundwater Uranium Concentrations

Progress in reducing groundwater uranium concentrations is assessed by comparing uranium concentrations in POC wells with the groundwater MCL concentration of 0.044 mg/L. As shown in Figure 3, uranium concentrations are below the groundwater MCL of 0.044 mg/L, with the exception of two POC wells (MW-0412 and MW-0413).

Predicted uranium concentration ranges for POC wells MW-0412 and MW-0413 are presented in the GCAP, and as Figures 4 and 5 in this assessment. Figures 4 and 5 show the predicted decreasing concentration trend for monitoring wells MW-0412 and MW-0413, respectively. Uranium concentrations that fall within the defined concentration ranges are decreasing toward the MCL, as predicted. Uranium concentrations above the defined range are not decreasing toward the MCL as predicted (DOE 2000).

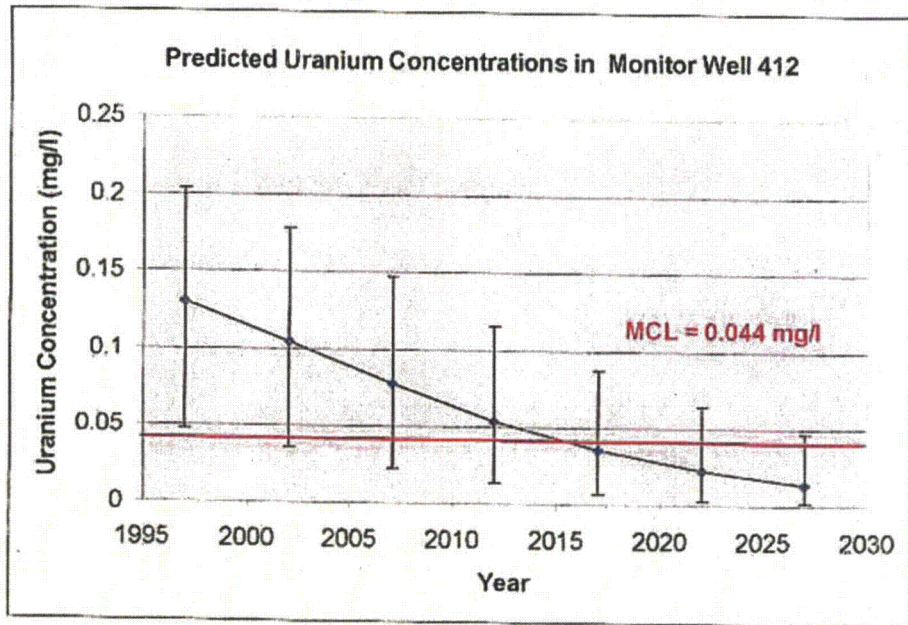


Figure 4. Uranium Concentration versus Time for Verification Monitoring in Well MW-0412

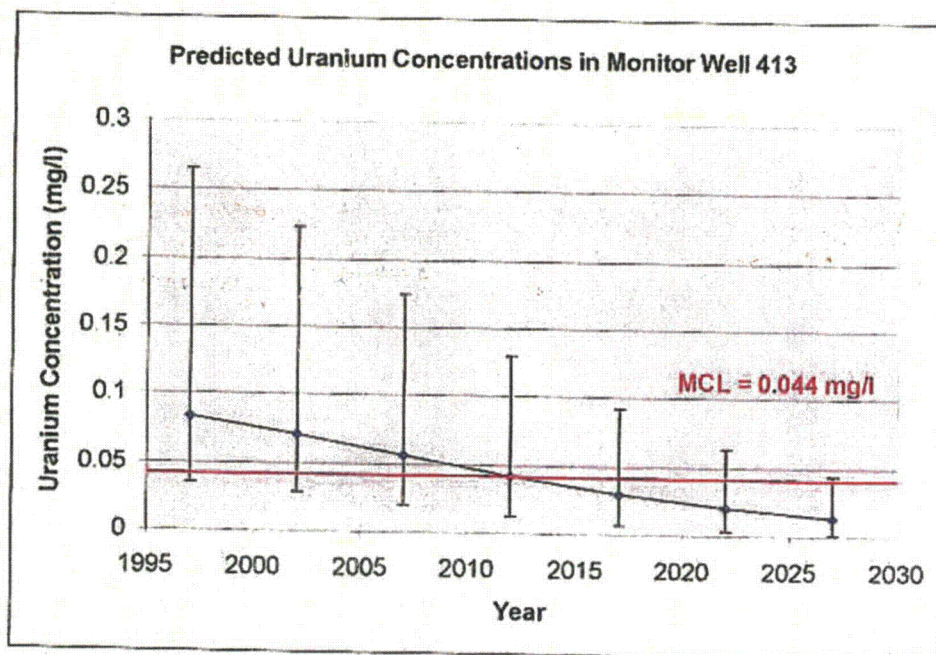


Figure 5. Uranium Concentration versus Time for Verification Monitoring in Well MW-0413

A visual comparison of Figure 3 to Figures 4 and 5 indicates that uranium concentrations at monitoring wells MW-0412 and MW-0413 are falling above the defined range and are not decreasing as predicted. Mann-Kendall statistical trend tests (95 percent confidence interval) were run on the uranium concentration data sets of both wells using ChemStat software (Version 6.2). The results indicate that the uranium concentrations at monitoring well MW-0412 exhibit an upward trend and uranium concentrations at monitoring well MW-0413 exhibit no trend.

According to the GCAP, if the observed concentrations are above the predicted ranges, the site will need to be reassessed (DOE 2000). DOE has concluded that although the uranium concentrations at monitoring wells MW-0412 and MW-0413 are above the predicted concentration ranges, no adverse effect has been seen at the POE. As long as concentrations remain below the groundwater ACL (1.0 mg/L), the compliance strategy remains effective and protective. Monitoring will continue at these wells as the remedy strives to move uranium concentrations toward the MCL.

2.3 Manganese

As stated in the LTSP, monitoring for manganese continued at monitoring well MW-0412 and surface water location SW-0602 as a BMP. The sample in 2009 was missed, but a sample at both locations was collected in 2010. Figure 6 is a manganese concentration plot for groundwater monitoring wells. Since 2007, manganese concentrations at monitoring well MW-0412 have continued to decline.

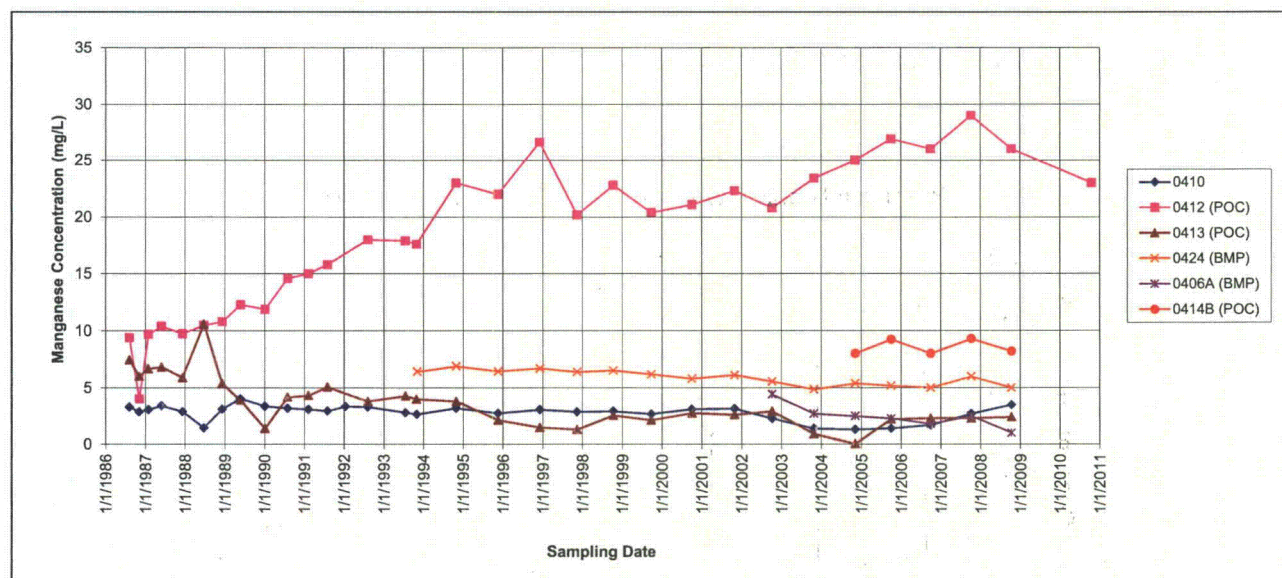


Figure 6. Groundwater Monitoring Manganese Concentrations (mg/L)—8/6/1986–10/20/2010

Figure 7 is a manganese concentration plot for surface water locations. Manganese concentrations at the POE (surface water location SW-0602) have remained stable.

With the reporting of this data, manganese will no longer be monitored for at the Canonsburg Site.

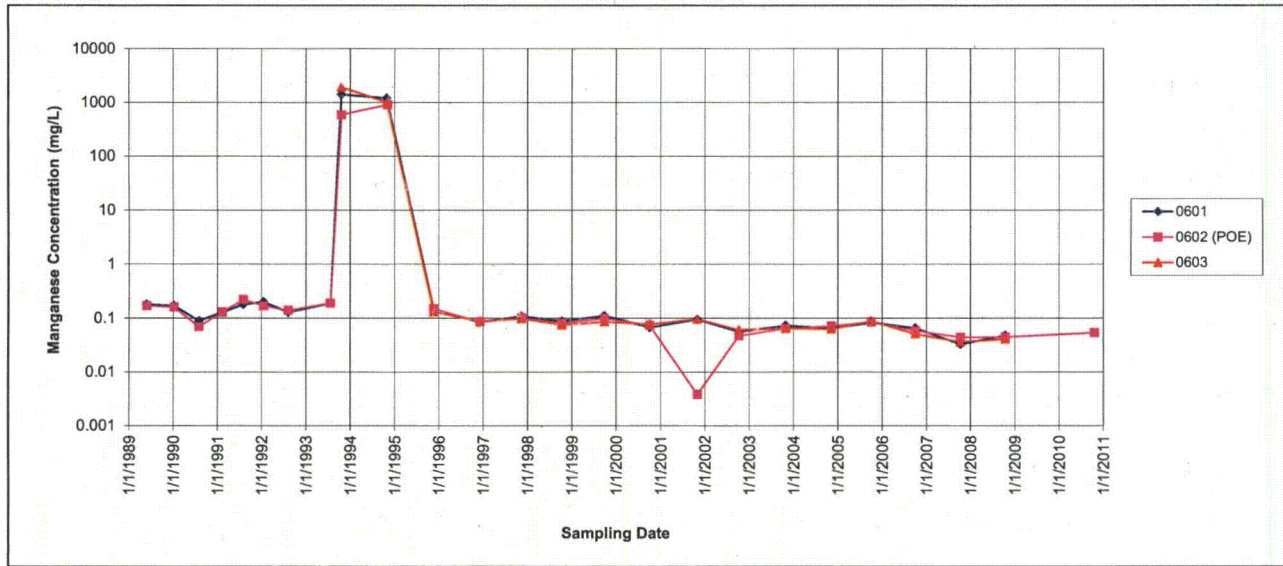


Figure 7. Surface Water Monitoring Manganese (mg/L)—5/25/1989–10/20/2010

2.4 Water Levels

Figure 8 is a water level plot for the Canonsburg Site. The plot illustrates that water levels have remained relatively steady since 1998.

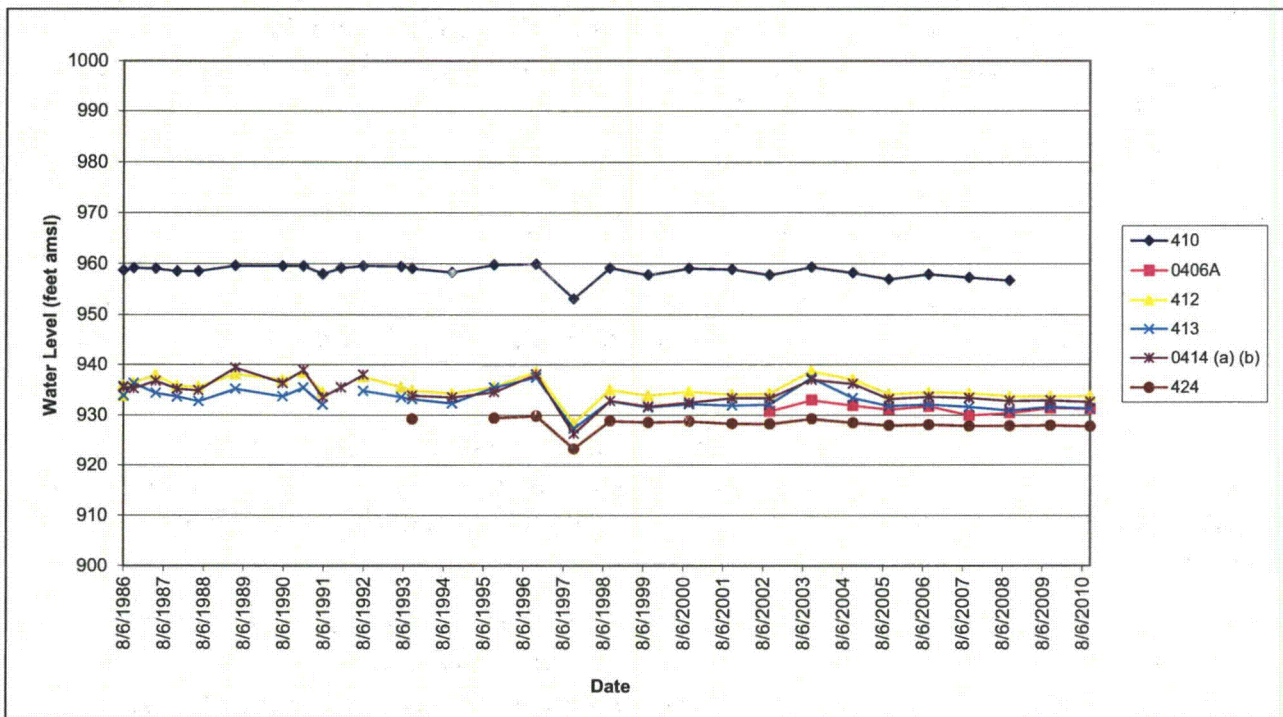


Figure 8. Water Levels at the Canonsburg Site—1986–2010

3.0 Summary

Five years of additional monitoring at the Canonsburg Site show that:

- Groundwater and surface water uranium concentrations continue to remain below site ACLs, and no adverse impact to the POE in Chartier's Creek has been detected.
- Uranium flushing at two POC wells is not proceeding as predicted. Instead of decreasing toward the groundwater MCL of 0.044 mg/L, concentrations are increasing slightly or holding steady.
- Water level data indicate that groundwater levels have remained relatively stable since 1998.
- Manganese concentrations at monitoring well MW-0412 continue to decrease, and concentrations at surface water location SW-0602 have remained steady. With the reporting of this data, manganese will no longer be monitored for at the Canonsburg Site.

DOE concludes that:

- The site compliance strategy remains protective, and that a change to the strategy is not required.
- Although uranium concentrations at two POC wells are above the predicted concentration range for the wells and are not decreasing as predicted toward the groundwater MCL concentration of 0.044 mg/L, no change to the compliance strategy is required at this time because no adverse impact has been seen at the POE in Chartiers Creek.
- Low and slowly changing uranium concentrations in both groundwater and surface water warrant a change in monitoring. DOE recommends that, following the collection of samples in 2011, the frequency of monitoring be reduced from annually to once every 5 years for cell performance monitoring purposes. The 5-year sampling schedules at both the Canonsburg; and Burrell, Pennsylvania Sites; as well as the Parkersburg, West Virginia Site, should be synchronized to reduce monitoring costs. With synchronization, all three sites would be sampled again in 2013 and every 5 years thereafter.

4.0 References

DOE (U.S. Department of Energy), 1995. *Long-Term Surveillance Plan for the Canonsburg, Disposal Site*, DOE/AL/62350-203, Rev 0, Albuquerque Operations Office, Albuquerque, New Mexico, October.

DOE (U.S. Department of Energy), 2000. *Ground Water Compliance Action Plan and Application for Alternate Concentration Limits for the Canonsburg, Pennsylvania, UMTRA Project Site*, U.S. Department of Energy, Grand Junction Office, Grand Junction Colorado, February.

DOE (U.S. Department of Energy), 2008. *Long-Term Surveillance Plan for the U.S. Department of Energy Canonsburg Uranium Mill Tailings Disposal Site Canonsburg, Pennsylvania*, LMS/CAN/500404-0.0, U.S. Department of Energy, Office of Legacy Management, Grand Junction Office, Grand Junction Colorado, September.

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