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FEB 18 2015

Mr. John E. Kieling
Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Dr. East, Bldg. 1
Santa Fe, NM 87505

Subject: Department of Energy/National Nuclear Security Administration Sandia National Laboratories Environmental Restoration Operations Mixed Waste Landfill Groundwater Monitoring Report – Monitoring Well MWL-MW4 Metals Data – September 2014 Pumping and Sampling, January 2015

Dear Mr. Kieling:

The Department of Energy/National Nuclear Security Administration (DOE/NNSA) and Sandia Corporation (Sandia) are submitting a groundwater monitoring report to the New Mexico Environment Department (NMED). This report documents the pumping/purging and sampling work completed at the Mixed Waste Landfill (MWL) groundwater monitoring well MWL-MW4 from September 8 through 29, 2014, consistent with the recommendations provided by NMED (letter from John Kieling dated July 24, 2014). The removal and inspection of the inflatable packer and dedicated sampling equipment performed in December 2014 is also addressed in the enclosed report.

The September 2014 pumping/purging and sampling results indicate this work effectively removed loose sediment and corrosion particles from monitoring well MWL-MW4 and the dedicated sampling equipment, as evidenced by the overall decreasing trend of field turbidity measurements and unfiltered metals analytical results. The subsequent removal and inspection of the dedicated stainless steel pump on December 16, 2014 provided conclusive evidence of substantial corrosion capable of causing elevated, anomalous metals results in groundwater samples. Together this documentation confirms the February 2013 unfiltered metals results for MWL-MW4 groundwater samples presented to the NMED in May 2014 are anomalous and related to corrosion of the dedicated stainless steel pump. The video log of monitoring well MWL-MW4 that was performed while the dedicated equipment was out of the well documents that MWL-MW4 is in reasonable condition.

Based on these results, only the inflatable packer was reinstalled in monitoring well MWL-MW4 after it was cleaned and verified to be in good condition.

FEB 18 2015

This well will continue to be used to monitor the elevation of the upper surface of the regional aquifer beneath the MWL consistent with the requirements of the NMED-approved Long-Term Monitoring and Maintenance Plan for the MWL. DOE/NNSA and Sandia are available to provide additional information as needed.

If you have questions regarding this submittal, please contact me at (505) 284-6668 or John Weckerle at (505) 845-6026.

Sincerely,

James W. Todd
Assistant Manager for Engineering

Enclosure and cc: See Page 3

2 Enclosures:
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Sandia National Laboratories, New Mexico
Environmental Restoration Operations

Mixed Waste Landfill Groundwater Monitoring Report
Monitoring Well MWL-MW4 Metals Data
September 2014 Pumping and Sampling

January 2015

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

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1/15/15
Date signed

ACTING

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2/18/2015
Date signed

Sandia National Laboratories

Sandia National Laboratories, New Mexico

Environmental Restoration Operations

A U.S. Department of Energy Environmental Cleanup Program

MIXED WASTE LANDFILL

GROUNDWATER MONITORING REPORT

MONITORING WELL MWL-MW4 METALS DATA

SEPTEMBER 2014 PUMPING AND SAMPLING

JANUARY 2015

U.S. DEPARTMENT OF ENERGY

United States Department of Energy
Sandia Field Office

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1.0 Introduction

The Mixed Waste Landfill (MWL) is a 2.6-acre Solid Waste Management Unit (SWMU 76) in the north-central portion of Technical Area III at Sandia National Laboratories/New Mexico (SNL/NM) (Figure 1). This report summarizes field activities and presents analytical results from the September 2014 groundwater pumping/purging and metals sampling event conducted for monitoring well MWL-MW4 located at the MWL. This report also discusses December 2014 activities related to the removal and replacement of dedicated sampling equipment from monitoring well MWL-MW4.

1.1 Groundwater Monitoring Network and History

Groundwater monitoring has been conducted at the MWL since 1990. The original groundwater monitoring well network at the MWL (monitoring wells MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1988 and 1989. In 1993, monitoring well MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals, 20 feet apart, to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. The well is constructed with schedule 80 polyvinyl chloride (PVC) casing and screens. Because of the two screens and orientation, MWL-MW4 is equipped with an inflatable packer (pressurized by nitrogen-gas) separating the two screens and a dedicated sampling system (Bennett™ stainless steel sampling pump, connecting rods, mounting bracket, lifting cable, and tubing). Machined stainless steel pipe connects the bottom of the sampling pump to the packer, and the entire assembly is held in the well by one-inch diameter metal rods. MWL-MW4 is the only MWL monitoring well that contains a packer and dedicated stainless steel sampling equipment. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 feet west of the MWL, respectively, with the screens placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande deposits.

The MWL groundwater monitoring network was modified in 2008. Due to the declining water table and corrosion of stainless-steel well screens, four monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) and four new monitoring wells constructed of PVC well casing and screen were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) (SNL/NM April 2008 and September 2008). The four wells installed in 2008 comprise the MWL compliance groundwater monitoring network for the uppermost part of the regional aquifer (Bearzi October 2008 and January 2009). In accordance with the MWL Long-Term Monitoring and Maintenance Plan (SNL/NM March 2012) that was approved by the New Mexico Environment Department (NMED) (Blaine January 2014) and became effective on January 8, 2014, sampling and analysis of these four wells is required for all future MWL groundwater monitoring. Sampling and analysis of MWL monitoring wells MWL-MW4, MWL-MW5, and MWL-MW6 are not required but they are being retained for other information (i.e., groundwater elevation data). Existing groundwater monitoring wells at the MWL are shown in Figure 2 along with the localized potentiometric surface of the regional aquifer and the generalized groundwater flow direction. More information on the MWL conceptual site model is included in the Annual Groundwater Monitoring Report – Calendar Year 2013 (SNL/NM June 2014a).

1.2 Background

On May 20, 2014, the Department of Energy/National Nuclear Security Administration and Sandia Corporation submitted a report titled "Mixed Waste Landfill Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, Calendar Year 2013" to the NMED that presented filtered and unfiltered metals results for annual groundwater samples collected in January-February 2013 from monitoring well MWL-MW4 (SNL/NM May 2014). This report also presented historic filtered and unfiltered metals results from monitoring well MWL-MW4 samples.

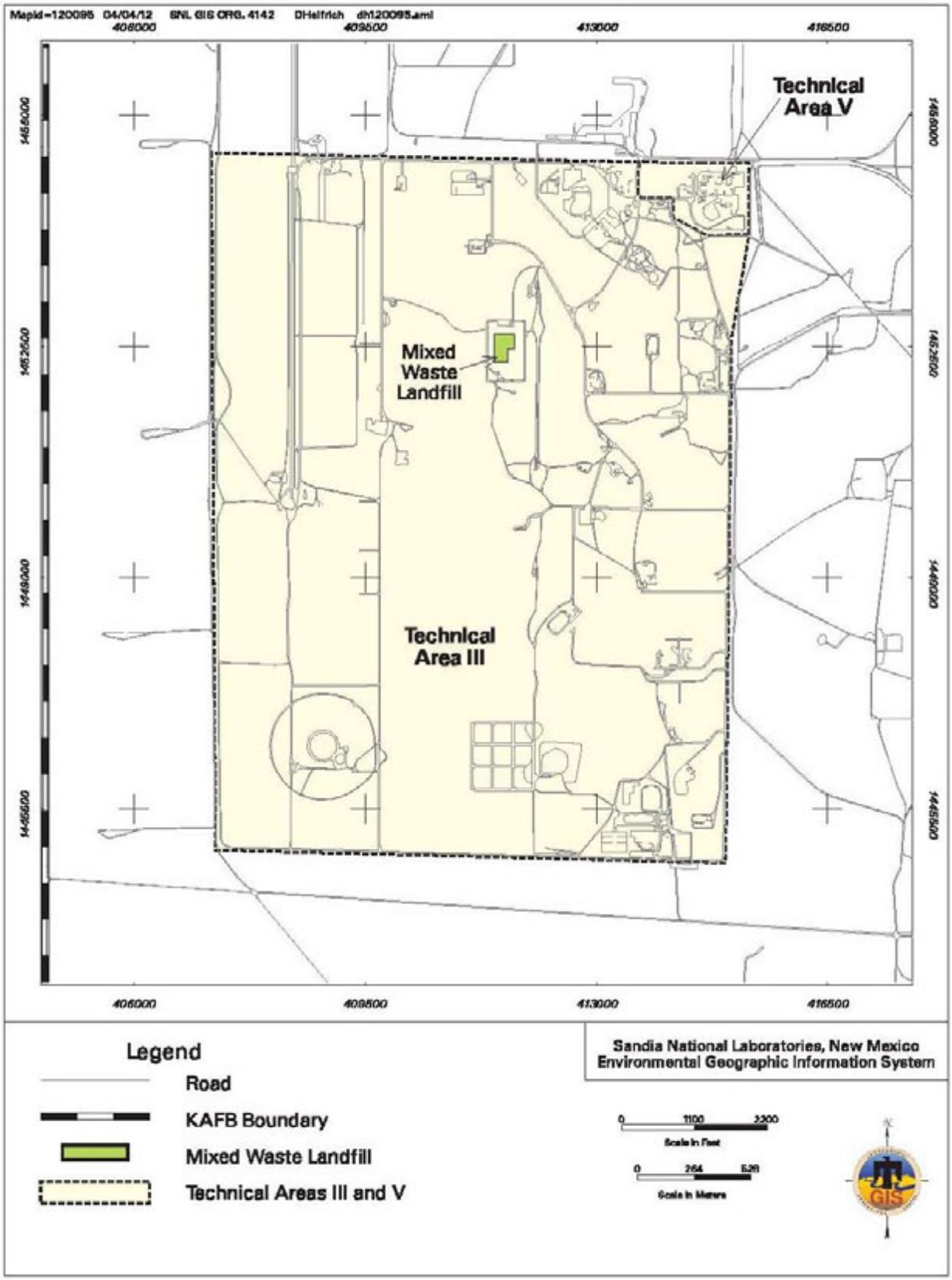

Figure 1. Location of the Mixed Waste Landfill within Technical Area III

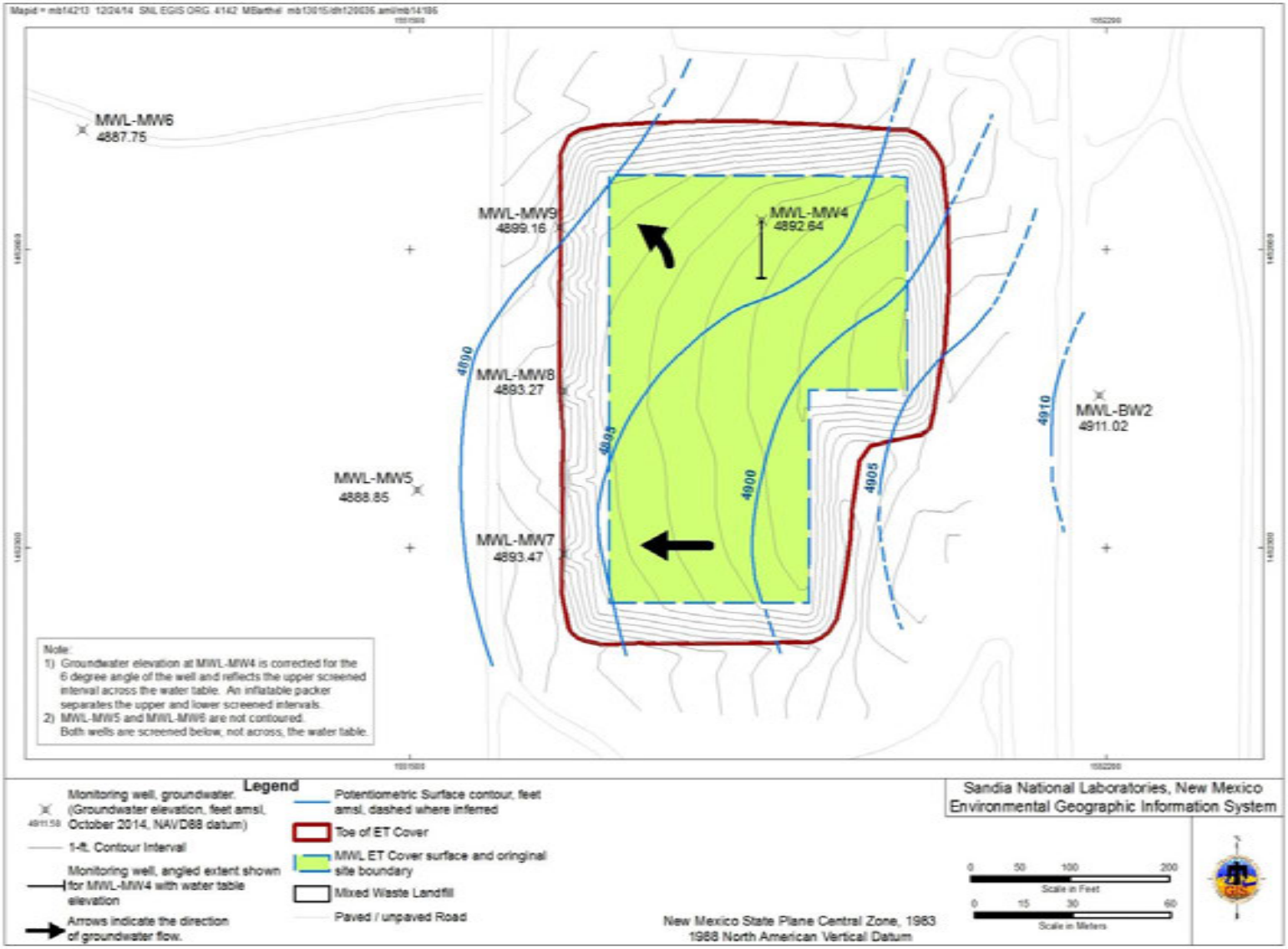

Figure 2. Location of Groundwater Monitoring Wells and the Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2014

In 2013, MWL-MW4 unfiltered groundwater sample results for chromium, cobalt, copper, iron, and nickel showed a sharp and significant increase in concentrations. For all of these metal constituents, the 2013 unfiltered sample results were the highest concentrations detected from MWL-MW4 groundwater samples. A trend plot showing MWL-MW4 unfiltered chromium results from April 1997 through September 2014 is provided in Figure 3. Chromium was detected above the maximum contaminant level (MCL) of 0.10 milligrams per liter (mg/L) in the 2013 unfiltered sample at a concentration of 0.112 mg/L. Previous unfiltered chromium results were below 0.01 mg/L. In the 2013 filtered sample, chromium was not detected above the laboratory method detection limit (MDL) of 0.002 mg/L. Similar to the chromium filtered versus unfiltered results, the 2013 filtered sample concentrations for cobalt, copper, and iron were much lower than the unfiltered results, and were consistent with historical results. The April 1997 through September 2014 unfiltered nickel results for MWL-MW4 samples are shown in Figure 4. Unfiltered and filtered nickel concentrations in the MWL-MW4 samples collected in 2011 and 2012 showed higher concentrations relative to prior years, with maximum concentrations in the 2013 samples.

Based on the evaluation presented in the May 2014 report (SNL/NM May 2014), the most likely source of the sharp increases in 2013 of unfiltered concentrations of chromium, cobalt, copper, iron, and nickel was corrosion of the dedicated stainless steel sampling pump in monitoring well MWL-MW4. This interpretation (i.e., corrosion particles from the pump getting into the groundwater samples and causing high concentrations of metals in the unfiltered sample) is supported by unfiltered and filtered metals data from previous MWL monitoring wells that had corroded stainless steel well screens (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3). Because monitoring well MWL-MW4 was being sampled annually, the pump remained inactive for long periods between sampling events. Corrosion of the dedicated sampling pump was evident when it was removed and replaced during cover construction in 2009 (Figure 5). The visible corrosion, or rust, shown in Figure 5 is on the intake screen of the sampling pump. The MWL inventory (Peace et al. September 2002), fate and transport modeling (SNL/NM November 2005), mobility of metals in general, the rapid and sharp increase in concentrations in the 2013 unfiltered results versus the filtered results, and the very thick vadose zone beneath the MWL (approximately 500 feet thick) are all factors that support this conclusion (SNL/NM May 2014).

Recommendations included in the May 2014 report included removal, inspection, cleaning/replacement of the pump and any equipment showing evidence of corrosion, and additional sampling to confirm the source. In a letter dated July 24, 2014, the NMED provided recommendations that included pumping/purging the well prior to the removal of the packer and dedicated sampling equipment to remove sediment and corrosion particles that may have accumulated in the well between annual sampling events (Kieling July 2014). The NMED also recommended sampling for unfiltered and filtered metals during this process to determine if the pumping/purging was effective. The sampling results would help determine if the process was successful in clearing corrosion particles and sediment from the well. In addition, the sampling would provide results over a period of pumping that could help determine the source of the 2013 elevated unfiltered concentrations. If unfiltered metals concentrations decrease to concentrations close to or consistent with historic concentrations, this would indicate the source is the corroding sampling pump in the well and that loose corrosion particles on the pump and in the well have been largely removed by consistent pumping. If unfiltered metals concentrations remain elevated over time, this would suggest the source is in the local regional aquifer.

1.3 September 2014 MWL-MW4 Groundwater Sampling Activities

From September 8 through September 29, 2014, pumping/purging and sampling of MWL-MW4 was conducted to remove sediment and corrosion particles from the well in accordance with the NMED July 24, 2014 recommendations (Kieling July 2014). These activities were conducted in conformance with procedures outlined in the MWL-MW4 Sampling and Analysis Plan (SNL/NM August 2014) and

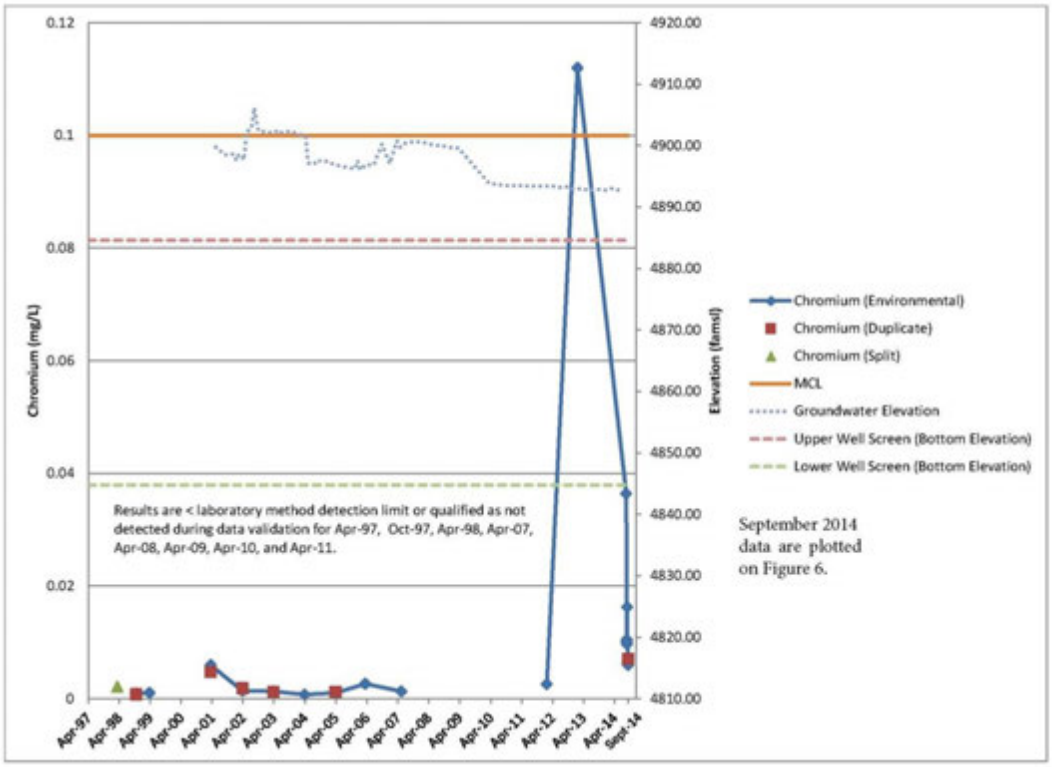

Figure 3. Unfiltered Chromium Concentrations, MWL-MW4 Groundwater Samples

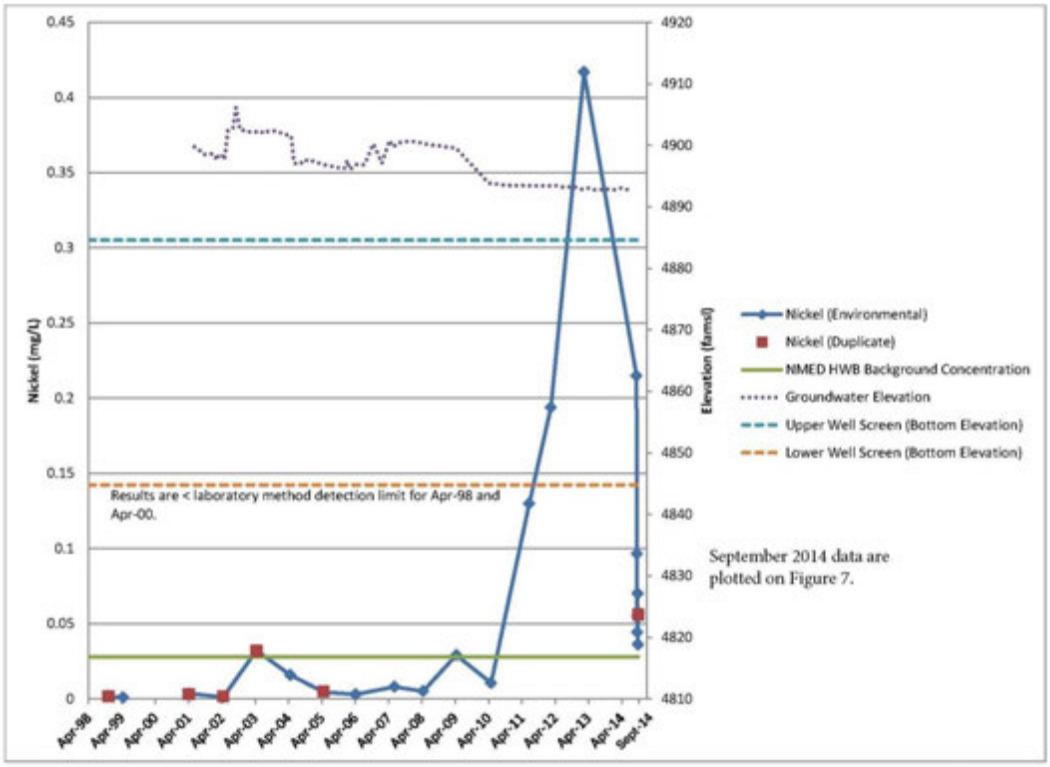

Figure 4. Unfiltered Nickel Concentrations, MWL-MW4 Groundwater Samples

Figure 5. May 2009 Photograph of the MWL-MW4 Sampling Pump and Inflatable Packer

included seven groundwater sampling events spaced throughout the pumping/purging process. The well was pumped/purged a total of 15 times, and a total of seven environmental samples and one duplicate sample were collected throughout the three-week pumping/purging effort. A total of 233 gallons of groundwater were removed from the upper screen interval of MWL-MW4. The average flow rate during the pumping/purging events ranged from approximately 0.55 gallons per minute (gpm) to 0.78 gpm. The well was purged dry (typically about 16 gallons) and allowed to recover between each pumping/purging event. Field measurements for water quality parameters were collected during the entire pumping/purging process.

Prior to each of the seven sample collection events, six gallons of groundwater were removed from the well and sampling system to ensure that any stagnant water in the pump and tubing was completely removed prior to the sample being collected (sampling system holds approximately five gallons). Filtered and unfiltered groundwater samples were collected for metals analysis. Filtered samples were passed through a 0.45 micron pore size in-line filter in the field prior to collection. A duplicate sample set was collected during the final sampling event. The NMED Department of Energy Oversight Bureau (NMED OB) was on-site and collected split samples during six of the seven sampling events.

SNL/NM groundwater samples were submitted to GEL Laboratories in Charleston, South Carolina for chemical analyses. Samples submitted to GEL were analyzed in accordance with applicable U.S. Environmental Protection Agency (EPA) analytical methods. All analytical data was reviewed and qualified in accordance with Administrative Operating Procedure AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM June 2014b). Samples were prepared and analyzed following approved procedures using methods EPA 6010B, EPA 6020, and EPA 7470A. Analytical reports, including certificates of analyses, analytical methods, MDLs, practical quantitation limits, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center.

Field measurements for water quality parameters were collected using an YSI™ Model EXO 1 Water Quality Meter, and a HACH™ Model 2100Q portable turbidity meter. Field water quality measurements included temperature, specific conductance, pH, turbidity, oxidation-reduction potential, and dissolved oxygen.

1.4 September 2014 Metals Analytical Results

Table 1 presents a summary of the seven September 2014 groundwater sampling results for unfiltered metals. For comparison, the February 2013 unfiltered sample results are also included along with the MCLs (if established) and the NMED-approved background concentrations (Dinwiddie September 1997). All of the September 2014 unfiltered metals concentrations were significantly lower than the February 2013 results, including the initial sample results collected on September 9, 2014. The September 2014 unfiltered results show an overall decreasing trend, with all chromium, copper, cobalt, iron, and nickel results for the final two sampling events within or close to historic concentration ranges.

Table 1. MWL-MW4 Unfiltered Metals Results Summary for September 2014

Metal	MCL (mg/L)	NMED Bkgrd[a] (mg/L)	February 2013 (mg/L)	Sept. 9 (mg/L)	Sept. 15 (mg/L)	Sept. 16 (mg/L)	Sept. 18 (mg/L)	Sept. 22 (mg/L)	Sept. 25 (mg/L)	Sept. 29[b] (mg/L)
Chromium	0.100	0.043	0.112	0.0364	0.0101	0.0105	0.00969	0.0163	0.00621	0.00595 0.00705
Cobalt	NE	0.0025	0.00229	0.00084	0.000243	0.000187	0.000275	0.000235	0.000179	0.000211 0.000209
Copper	NE	<0.050	0.0335	< 0.0056	0.00149	0.00143	0.00141	0.00231	0.00134	< 0.0040 < 0.0040
Iron	NE	NE	2.92	0.558	0.120	0.113	0.148	0.157	0.106	0.104 0.0997
Nickel	NE	0.028	0.417	0.215	0.0965	0.0553	0.0443	0.0701	0.0362	0.0574 0.056

[a] New Mexico Environment Department-approved background concentration (Dinwiddie September 1997).
[b] Duplicate sample results included.
MCL = maximum contaminant level.
mg/L=milligrams per liter.
NE = not established.

Attachment A, Tables A-1 and A-2 summarize the September 2014 unfiltered and filtered Target Analyte List metals analytical results, respectively. All September 2014 unfiltered and filtered chromium, cobalt, and copper results for all seven sampling events were below background concentrations. Nickel exceeded the background concentration of 0.028 mg/L in all groundwater samples, but showed an overall decreasing trend with concentrations generally an order of magnitude lower that the February 2013 results. Unfiltered nickel concentrations ranged from 0.215 mg/L (September 9th sample) to 0.0362 mg/L (September 25th sample). Seven of eight September 2014 filtered chromium results were less than the MDL of 0.002 mg/L (one detection of 0.00362 mg/L in the September 29th sample; the duplicate sample results was a non-detect).

Attachment A, Table A-3 summarizes field water quality measurements collected immediately prior to sample collection. Turbidity readings decreased from 5.95 nephelometric turbidity units (NTUs) on September 9th to 0.63 NTUs on September 29th. Consistent with turbidity measurements, the oxidation reduction potential increased from 21.5 millivolts (mV) on September 9th to 319 mV on September 29th.

1.4.1 Field and Laboratory Quality Control Sample Results

Field QC samples associated with the September 2014 metals sampling included one environmental duplicate sample, one field blank sample, and three equipment blank samples. All QC samples were collected during the September 29th sample event (final sampling event) except for two equipment blank

samples that were collected just prior to the September 9th and 22nd sampling events. The field QC samples were submitted for analysis along with the groundwater samples.

The Relative Percent Difference (RPD) was calculated for all metals parameters that were detected above the laboratory practical quantitation limit in both the environmental and duplicate sample. RPD results show good agreement (i.e., are less than 35%); all unfiltered RPDs were less than 20, and all filtered RPDs were less than 25.

Field blank results included zinc detected above the MDL. No corrective action was necessary for zinc since this metal was detected in associated environmental samples at a concentration greater than five times the reported field blank value.

Both unfiltered and filtered fractions of cobalt, copper, and zinc were detected above laboratory MDLs in equipment blank results. No corrective action was necessary for zinc, since zinc was detected in associated environmental samples at concentrations greater than five times the reported equipment blank sample concentrations. Filtered cobalt in the September 22nd environmental sample was qualified as not detected during data validation. Unfiltered copper in the September 9th and 27th samples, and filtered copper in the September 9th and 22nd samples, were qualified as not detected during data validation (environmental samples concentrations were less than five times the reported equipment blank sample concentrations).

QC analytical laboratory blank and spike samples were prepared and analyzed by the laboratory to determine potential contamination associated with laboratory processes and methodologies and to determine the accuracy and precision of the analytical methods. All data were determined to be defensible and reported QC measures were adequate during the data validation review.

1.5 Discussion of MWL-MW4 Sampling Results and Field Turbidity Measurements

The September 2014 sampling results from groundwater monitoring well MWL-MW4 indicate the pumping/purging effort was successful in removing loose sediment and corrosion particles from the well and dedicated sampling pump. This conclusion is based on the decreasing trends in turbidity (i.e., suspended particulates in the groundwater), and filtered and unfiltered chromium, cobalt, copper, iron, and nickel analytical results. Analyses of concentration trends of filtered and unfiltered chromium and nickel, and turbidity are described below.

The September 2014 chromium results are shown in Figure 3 (trend plot of unfiltered chromium results over historical events) and Figure 6 (trend plot of unfiltered chromium results and turbidity measurements over the September 2014 events). The following points are based on an analysis of these two figures.

- Prior to 2013, the unfiltered data set for chromium is dominated by very low detections and non-detections, with all results below the background concentration of 0.043 mg/L.
- The September 2014 unfiltered sample results were all below the background concentration, show an overall decreasing trend, correlate to the turbidity measurements, and are all one to two orders of magnitude lower than the February 2013 concentration of 0.112 mg/L.
- The February 2013 sample result appears to be anomalous - the unfiltered sample result of 0.112 mg/L represents an unusually large increase in chromium concentration (i.e., approximately 2 orders of magnitude), which is 18.7 times higher than the February 2012 result.

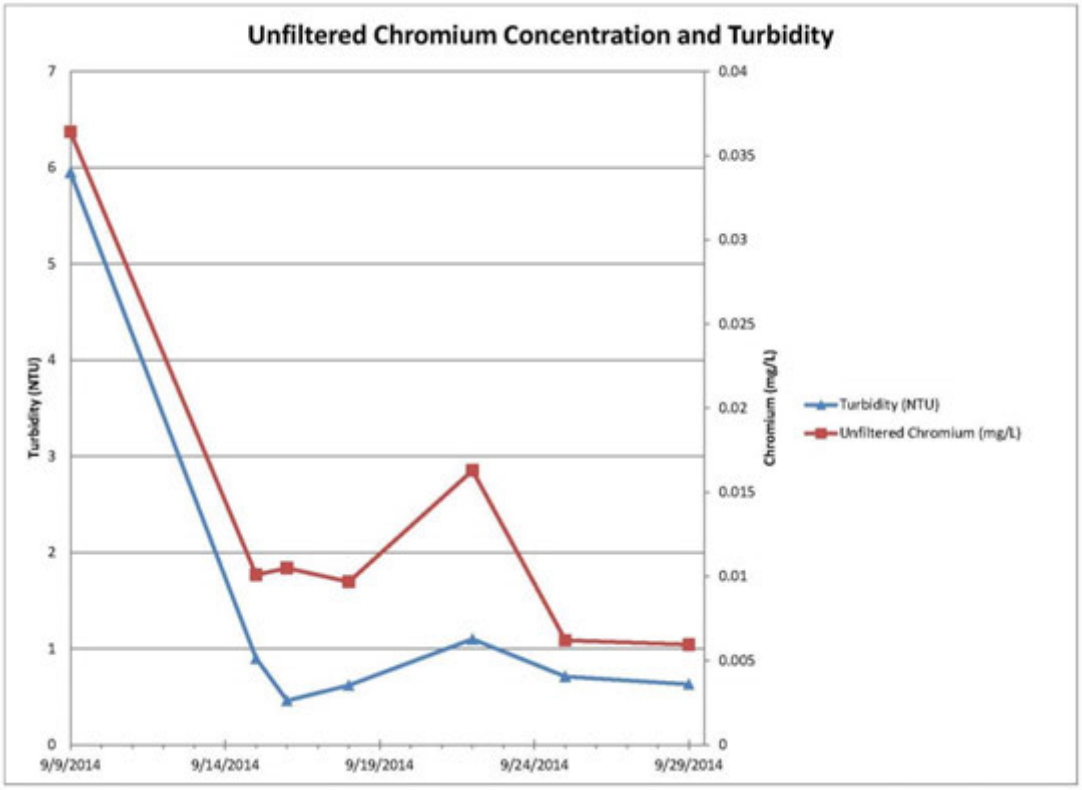

Figure 6. September 2014 Unfiltered Chromium Concentrations and Turbidity Measurements

Nickel results are shown in Figure 4 (trend plot of unfiltered nickel results over historical events) and Figure 7 (trend plot of unfiltered nickel results over the September 2014 events). The following points are based on an analysis of these two figures.

- Nickel concentrations follow the same general trend as the chromium plots.
- Prior to 2011, the unfiltered nickel results were all below or near the background concentration of 0.028 mg/L.
- Beginning in April 2011 and continuing through April 2013, the unfiltered nickel concentrations exceeded the background concentration of 0.028 mg/L, reaching a maximum concentration of 0.417 mg/L in April 2013.
- All of the September 2014 unfiltered nickel results were significantly less than the February 2013 result, with six of the seven September 2014 sample results an order of magnitude lower than the February 2013 result.
- Although the September 2014 sample concentrations were greater than the background concentration, they correlate to the turbidity measurements and show an overall decreasing trend with four of the seven results at or less than two times the background concentration.
- Consistent with the unfiltered chromium results, the unfiltered nickel result of 0.417 mg/L from the February 2013 sample appears to be anomalous.

Along with Figures 6 and 7, field turbidity measurements for the September 9th through 29th pumping and purging effort are presented in Figure 8, which shows turbidity measurements against both time (top axis

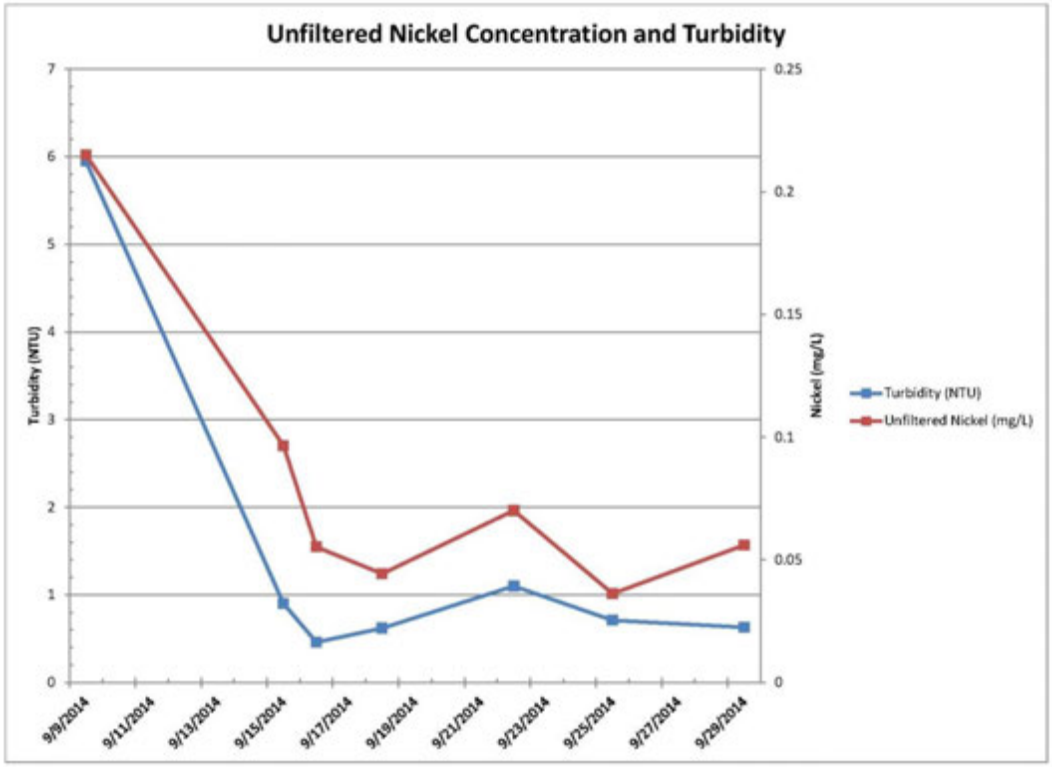

Figure 7. September 2014 Unfiltered Nickel Concentrations and Turbidity Measurements

of chart) and volume of groundwater purged (bottom axis of chart). The following points are based on an analysis of these three figures.

- There is a consistent correlation between turbidity and metals concentrations trends; in general, decreasing turbidity measurements correlate to decreasing unfiltered chromium and nickel concentrations.
- Increases or "spikes" in the groundwater turbidity measurements occurred throughout the pumping/purging and sampling effort, and correspond to periods after MWL-MW4 was allowed to recover.
- The overall decreasing trends in turbidity and unfiltered metals concentrations indicate the removal of loose sediment and corrosion particles from the well and sampling pump was successful.

The slight increases in the September 22nd unfiltered chromium and nickel concentrations (Figures 6 and 7), and the slight increase in the September 29th unfiltered nickel concentration (Figure 7) indicate that all sediment and corrosion particles were not removed. However, the significant drop in both unfiltered chromium and nickel concentrations, along with the decrease in turbidity indicates the pumping/purging approach was effective in removing most of the loose sediment and corrosion particles from the well and sampling equipment.

Another indicator of corrosion particles in the groundwater from MWL-MW4 came from field observations of the groundwater. Figure 9 shows the reddish-brown discoloration of purge water that was initially pumped. The subsequent decrease in discoloration throughout the 3-week pumping/purging and sampling effort was observed by field personnel and reflected in the turbidity measurements.

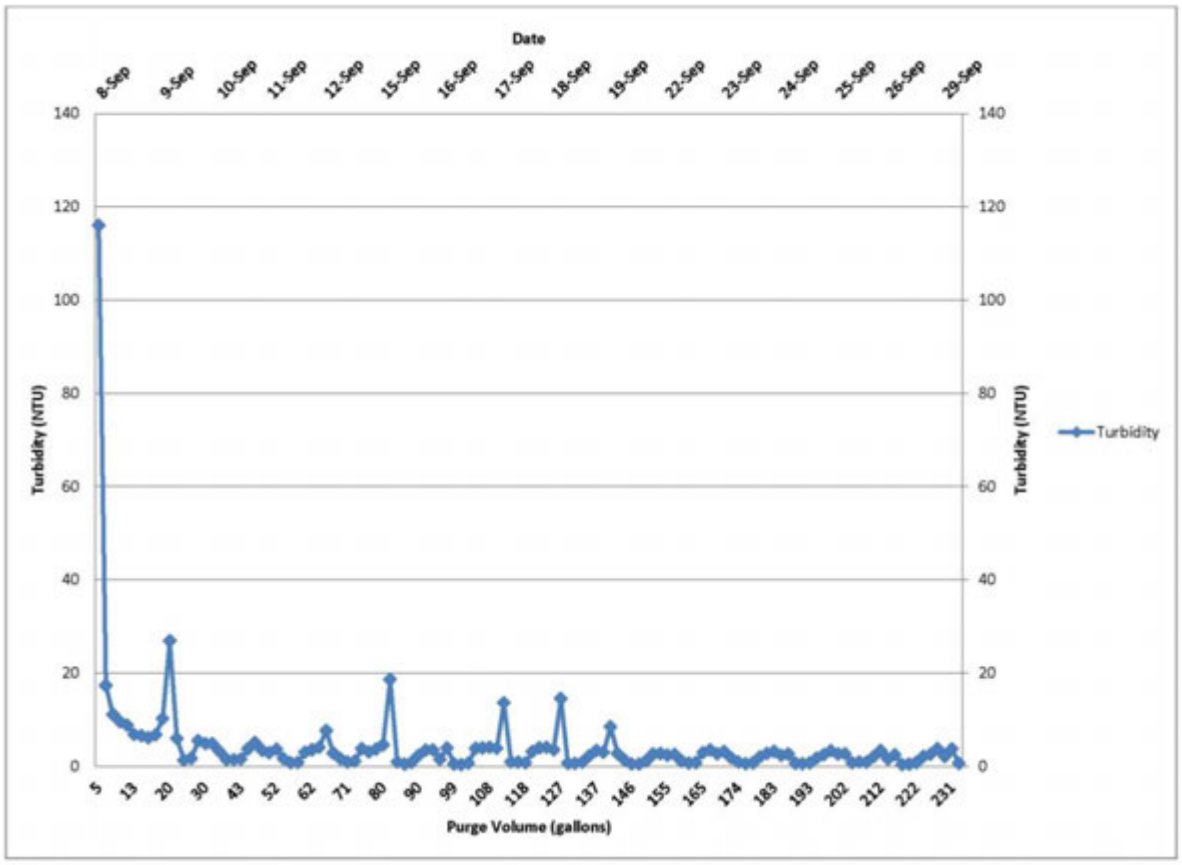

Figure 8. September 2014 Field Turbidity Measurements

Figure 9. Discolored Purge Water During Early Pumping in September 2014

The NMED OB collected split samples during six of the seven sampling events and sent these samples to an independent analytical laboratory under contract to NMED. Based on a preliminary review of the NMED OB results (NMED OB October 2014), they were similar to the results presented in this report, showing overall decreasing trends.

In summary, the September 2014 pumping/purging and sampling effort was effective at removing loose sediment and corrosion particles from the well and sampling equipment. Based on these results, the February 2013 unfiltered metal analytical results are anomalous and are related to corrosion of the stainless steel pump. This is evidenced by:

- Decreasing concentrations of unfiltered chromium, nickel, and other metals.
- Decreasing field turbidity measurements.
- Decreasing discoloration of the groundwater.

This conclusion is also consistent with previous metals results for MWL monitoring wells that had corroding stainless steel screens (SNL/NM May 2014).

1.6 Removal of Dedicated Sampling Equipment from MWL-MW4

On December 16, 2014, SNL/NM and drilling subcontractor personnel removed the dedicated Bennett™ sampling pump, Baski™ packer, and associated tubing from MWL-MW4. A well development work-over rig was used to remove all equipment and related tubing and metal support rods. After removal of this equipment, a video log of the entire length of the well casing and well screen intervals was performed. The video was reviewed by SNL/NM personnel for defects and/or damage to the PVC well materials that could compromise the physical integrity of well. Inspection of the video log did not identify any significant problems related to the physical integrity of the well.

The Bennett™ pump was inspected and photographed to document corrosion (Figure 10). Corrosion of the entire pump was severe, including the pump intake screen, and confirmed it is the most likely source of the anomalous unfiltered metals results from the 2013 groundwater samples. All other equipment was inspected and cleaned to remove corrosion. The top end of the Baski™ packer and machined stainless steel connecting rod (between the packer and sampling pump) showed some corrosion, but not as severe as the pump. Following instructions and guidelines provided by Baski™ personnel, the packer was hand-cleaned using soft-bristle brushes and water. All visible corrosion was easily removed. Based on consultation with Baski™ personnel and an inspection of the cleaned packer by SNL/NM personnel, the packer was determined to be in good condition.

All supporting metal rods in contact with groundwater were inspected and cleaned prior to being reconnected to the packer, along with new plastic tubing used to pressurize the packer with nitrogen gas. The packer, supporting metal rods, and tubing were reinstalled in MWL-MW4 to the previous depth of approximately 517 feet below ground surface, corresponding to the halfway point between the upper and lower screen intervals. The packer was inflated to the pressure recommended by Baski™ (55 pounds per square inch) and returned to service on the same day it was removed (December 16, 2014).

Figure 10. Photograph of the stainless steel Bennett™ sampling pump after removal from MWL-MW4 on December 16, 2014 showing substantial corrosion

1.7 Summary and Conclusions

The overall decreasing trend of field turbidity measurements along with unfiltered metals analytical results demonstrate that the September 2014 pumping/purging effort was effective at removing loose sediment and corrosion particles from monitoring well MWL-MW4 and the dedicated sampling equipment. The subsequent removal and inspection of the stainless steel pump on December 16, 2014 provided conclusive evidence of substantial corrosion capable of causing elevated, anomalous metals results in groundwater samples (i.e., a source within the well).

Together these results confirm the February 2013 unfiltered metals results are anomalous and related to corrosion of the dedicated stainless steel pump. The video log, run while the dedicated equipment was out of the well, demonstrated MWL-MW4 is in reasonable condition.

Monitoring well MWL-MW4 will be used in the future to monitor the elevation of the upper surface of the regional aquifer beneath the MWL consistent with the requirements of the NMED-approved Long-Term Monitoring and Maintenance Plan for the MWL (SNL/NM March 2012).

1.8 References

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Attachment A

Summary of Unfiltered and Filtered Target Analyte List Metals Results, MWL-MW4 Groundwater Monitoring, September 2014

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
09-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00194	0.0017	0.005	0.010	0.014	J	--
	Barium	0.102	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	62.4	0.300	1.00	NE	NE	--	--
	Chromium	0.0364	0.002	0.010	0.100	0.043	--	--
	Cobalt	0.00084	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00518	0.00035	0.001	NE	< 0.050	--	0.0056U
	Iron	0.558	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	19.9	0.010	0.030	NE	NE	--	--
	Manganese	0.017	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.215**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.12	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	0.000341	0.0002	0.001	NE	< 0.010	J	--
	Sodium	47.4	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00794	0.001	0.005	NE	0.013	--	--
	Zinc	0.0522	0.0035	0.010	NE	0.260	--	--

. Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
15-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.105	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	60.7	0.300	1.00	NE	NE	--	--
	Chromium	0.0101	0.002	0.010	0.100	0.043	--	--
	Cobalt	0.000243	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00149	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.120	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.8	0.010	0.030	NE	NE	--	--
	Manganese	0.00806	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0965**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.11	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	47.7	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00836	0.001	0.005	NE	0.013	--	--
	Zinc	0.0372	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
16-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.002	0.0017	0.005	0.010	0.014	J	--
	Barium	0.104	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	61.7	0.300	1.00	NE	NE	--	--
	Chromium	0.0105	0.002	0.010	0.100	0.043	--	--
	Cobalt	0.000187	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00143	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.133	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.9	0.010	0.030	NE	NE	--	--
	Manganese	0.0112	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0553**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.13	0.080	0.300	NE	NE	--	--
	Selenium	0.0016	0.0015	0.005	0.050	0.005	J	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.5	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.0085	0.001	0.005	NE	0.013	--	--
	Zinc	0.0288	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
18-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.104	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	62.0	0.300	1.00	NE	NE	--	--
	Chromium	0.00969	0.002	0.010	0.100	0.043	J	--
	Cobalt	0.000275	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00141	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.148	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.6	0.010	0.030	NE	NE	--	--
	Manganese	0.0146	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0443**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.07	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	47.9	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00925	0.001	0.005	NE	0.013	--	--
	Zinc	0.0416	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
22-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00211	0.0017	0.005	0.010	0.014	J	--
	Barium	0.106	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	65.1	0.300	1.00	NE	NE	--	--
	Chromium	0.0163	0.002	0.010	0.100	0.043	--	--
	Cobalt	0.000235	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00231	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.157	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.3	0.010	0.030	NE	NE	--	--
	Manganese	0.00871	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0701**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.25	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	49.7	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00896	0.001	0.005	NE	0.013	--	--
	Zinc	0.0355	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
25-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00172	0.0017	0.005	0.010	0.014	J	--
	Barium	0.106	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	64.8	0.300	1.00	NE	NE	--	--
	Chromium	0.00621	0.002	0.010	0.100	0.043	J	--
	Cobalt	0.000179	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00134	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.106	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.6	0.010	0.030	NE	NE	--	--
	Manganese	0.0137	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0362**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.21	0.080	0.300	NE	NE	--	--
	Selenium	0.00163	0.0015	0.005	0.050	0.005	J	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	51.7	0.400	1.25	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00906	0.001	0.005	NE	0.013	--	--
	Zinc	0.0256	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
29-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.103	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	63.5	0.300	1.00	NE	NE	--	--
	Chromium	0.00595	0.002	0.010	0.100	0.043	J	--
	Cobalt	0.000211	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00157	0.00035	0.001	NE	< 0.050	--	0.0040U
	Iron	0.104	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.2	0.010	0.030	NE	NE	--	--
	Manganese	0.00804	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0574**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.13	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.9	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00876	0.001	0.005	NE	0.013	--	--
	Zinc	0.034	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-1
Summary of Target Analyte List Unfiltered Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4 (Duplicate)	Aluminum	ND	0.015	0.050	NE	NE	U	--
29-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.103	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	61.4	0.300	1.00	NE	NE	--	--
	Chromium	0.00705	0.002	0.010	0.100	0.043	J	--
	Cobalt	0.000209	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00119	0.00035	0.001	NE	< 0.050	--	0.0040U
	Iron	0.0997	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.7	0.010	0.030	NE	NE	--	--
	Manganese	0.0079	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.056**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.06	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.1	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.0088	0.001	0.005	NE	0.013	--	--
	Zinc	0.0328	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
09-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.0022	0.0017	0.005	0.010	0.014	J	0.016U
	Barium	0.0981	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	61.3	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000211	0.0001	0.001	NE	0.0025	J	0.0006U
	Copper	0.000901	0.00035	0.001	NE	< 0.050	J	0.0028U
	Iron	0.0637	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.4	0.010	0.030	NE	NE	--	--
	Manganese	0.00523	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.189**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.13	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.6	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00778	0.001	0.005	NE	0.013	--	--
	Zinc	0.0319	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED BackgroundHWBfc (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
15-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.105	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	63.1	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000202	0.0001	0.001	NE	0.0025	J	--
	Copper	0.00102	0.00035	0.001	NE	< 0.050	--	--
	Iron	0.0624	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.4	0.010	0.030	NE	NE	--	--
	Manganese	0.00714	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0948**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.20	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	49.5	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00832	0.001	0.005	NE	0.013	--	--
	Zinc	0.0345	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
16-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.103	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	60.8	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000176	0.0001	0.001	NE	0.0025	J	--
	Copper	0.000815	0.00035	0.001	NE	< 0.050	J	--
	Iron	0.0602	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.7	0.010	0.030	NE	NE	--	--
	Manganese	0.0107	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0517**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.07	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.6	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00872	0.001	0.005	NE	0.013	--	--
	Zinc	0.0262	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
18-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00195	0.0017	0.005	0.010	0.014	J	--
	Barium	0.102	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	66.4	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000172	0.0001	0.001	NE	0.0025	J	--
	Copper	0.000405	0.00035	0.001	NE	< 0.050	J	--
	Iron	0.0558	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	19.6	0.010	0.030	NE	NE	--	--
	Manganese	0.0127	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0407**	0.0005	0.002	NE	0.028	--	--
	Potassium	4.91	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	45.3	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.0086	0.001	0.005	NE	0.013	--	--
	Zinc	0.0236	0.0035	0.010	NE	0.260	B	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
22-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00224	0.0017	0.005	0.010	0.014	J	--
	Barium	0.102	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	62.2	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000209	0.0001	0.001	NE	0.0025	J	--
	Copper	0.000447	0.00035	0.001	NE	< 0.050	J	0.0022U
	Iron	0.0618	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	20.2	0.010	0.030	NE	NE	--	--
	Manganese	0.00799	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0669**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.04	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	46.7	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00766	0.001	0.005	NE	0.013	--	--
	Zinc	0.0329	0.0035	0.010	NE	0.260	B	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
25-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00189	0.0017	0.005	0.010	0.014	J	--
	Barium	0.100	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	60.1	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000155	0.0001	0.001	NE	0.0025	J	--
	Copper	ND	0.00035	0.001	NE	< 0.050	U	--
	Iron	0.0586	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	19.8	0.010	0.030	NE	NE	--	--
	Manganese	0.0127	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0327**	0.0005	0.002	NE	0.028	--	--
	Potassium	4.89	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	46.1	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00869	0.001	0.005	NE	0.013	--	--
	Zinc	0.021	0.0035	0.010	NE	0.260	B	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED 'Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	NE	U	--
29-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	ND	0.0017	0.005	0.010	0.014	U	--
	Barium	0.105	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	62.2	0.300	1.00	NE	NE	--	--
	Chromium	0.00362	0.002	0.010	0.100	0.043	J	--
	Cobalt	0.000205	0.0001	0.001	NE	0.0025	J	--
	Copper	0.000824	0.00035	0.001	NE	< 0.050	J	--
	Iron	0.165	0.033	0.100	NE	NE	--	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.5	0.010	0.030	NE	NE	--	--
	Manganese	0.00951	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0551**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.20	0.080	0.300	NE	NE	--	--
	Selenium	ND	0.0015	0.005	0.050	0.005	U	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	50.0	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00892	0.001	0.005	NE	0.013	--	--
	Zinc	0.0317	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Table A-2
Summary of Filtered Target Analyte List Metals Results[a]
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Analyte	Result[b] (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	NMED Background[c] (mg/L)	Laboratory Qualifier[d]	Validation Qualifier[d]
MWL-MW4 (Duplicate)	Aluminum	ND	0.015	0.050	NE	NE	U	--
29-Sep-14	Antimony	ND	0.001	0.003	0.006	0.006	U	--
	Arsenic	0.00215	0.0017	0.005	0.010	0.014	J	0.016U
	Barium	0.102	0.0006	0.002	2.00	0.120	--	--
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U	--
	Cadmium	ND	0.00011	0.001	0.005	0.00047	U	--
	Calcium	62.0	0.300	1.00	NE	NE	--	--
	Chromium	ND	0.002	0.010	0.100	0.043	U	--
	Cobalt	0.000207	0.0001	0.001	NE	0.0025	J	--
	Copper	0.000906	0.00035	0.001	NE	< 0.050	J	--
	Iron	0.0608	0.033	0.100	NE	NE	J	--
	Lead	ND	0.0005	0.002	NE	0.010	U	--
	Magnesium	21.1	0.010	0.030	NE	NE	--	--
	Manganese	0.00773	0.001	0.005	NE	NE	--	--
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	--
	Nickel	**0.0556**	0.0005	0.002	NE	0.028	--	--
	Potassium	5.08	0.080	0.300	NE	NE	--	--
	Selenium	0.00161	0.0015	0.005	0.050	0.005	J	--
	Silver	ND	0.0002	0.001	NE	< 0.010	U	--
	Sodium	48.9	0.080	0.250	NE	NE	--	--
	Thallium	ND	0.00045	0.002	0.002	0.002	U	--
	Vanadium	0.00876	0.001	0.005	NE	0.013	--	--
	Zinc	0.0304	0.0035	0.010	NE	0.260	--	--

Refer to footnotes on page 34.

Footnotes for Tables A-1 and A-2

[a]U.S. Environmental Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd Editon.
[b]Values in bold exceed the established MCL, MDL, or NMED-approved background level.
[c]Dinwiddie, September 1997.
[d]Laboratory/Validation Qualifier – If cell is blank (--), then all quality control samples met acceptance criteria with respect to submitted samples. See explanation below for "B" "J" "U" qualifiers.

B = Analyte is detected in associated laboratory method blank.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
J = Amount detected is below the PQL.
MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix-specific.
mg/L = Milligrams per liter.
ND = Not detected (at MDL).
NE = Not established.
NMED = New Mexico Environment Department.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
U = Analyte is absent or below the MDL. If a number is shown, units are mg/L.

Table A-3
Summary of Field Water Quality Measurements
Mixed Waste Landfill Monitoring Well MWL-MW4
September 2014

Well ID	Purge Volume (gallons)	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
MWL-MW4	22	09-Sep-14	19.89	600.2	21.5	7.51	5.95	59.1	5.38
	84	15-Sep-14	19.72	603.4	273.9	7.49	0.90	54.3	4.86
	99	16-Sep-14	19.48	597.6	326.6	7.41	0.46	48.7	4.41
	129	18-Sep-14	19.68	597.0	339.5	7.42	0.62	59.5	5.33
	159	22-Sep-14	19.78	599.0	298.6	7.44	1.10	50.3	4.51
	204	25-Sep-14	19.86	600.8	344.4	7.28	0.71	46.3	4.16
	233	29-Sep-14	19.68	598.4	319.7	7.44	0.63	50.0	4.59

Notes:
°C = Degrees Centigrade
% Sat = Percent saturation.
ID = Identifier.
µmho/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).


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