Sandia National Laboratories/New Mexico
Environmental Restoration Project

CLASS 2 AMENDMENT TO THE CHEMICAL WASTE LANDFILL CLOSURE PLAN RATIONALE FOR DECOMMISSIONING MONITORING WELL CWL-MW2A AND PLUG AND ABANDONMENT PLAN

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Revision 1

United States Department of Energy
Sandia Site Office

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1.0 INTRODUCTION

The purpose of this Class 2 Amendment to the Closure Plan is to present the rationale for removing Well CWL-MW2A from the groundwater monitoring network for the Chemical Waste Landfill (CWL) at Sandia National Laboratories/New Mexico (SNL/NM) and plugging and abandoning this monitoring well. In December 2003, the upper 9 feet of the CWL-MW2A well riser pipe became separated such that annular material (grout and soil) fell into the well. Based upon professional judgment, repairs are not feasible, and the collection of compliance groundwater samples is no longer possible. Plugging and abandonment of this well is necessary because of the potential for it to provide an artificial conduit for volatile organic compound (VOC) vapor transport to groundwater.

This amendment presents pertinent background information, documents observed damage, and provides information indicating the suspect integrity of CWL-MW2A. In addition, an evaluation of the sufficiency of the existing monitoring well network is included to provide justification for not replacing CWL-MW2A with a new monitoring well. The Plug and Abandonment Plan for Monitoring Well CWL-MW2A is attached to this amendment.

2.0 BACKGROUND

The CWL is located in the southeast corner of Technical Area (TA)-III, approximately 4.5 miles south of the nearest drinking-water supply well (Figure 1). Groundwater monitoring at the CWL was initiated in 1985, with the installation of the following five monitoring wells: CWL-MW1, CWL-MW2, CWL-MW3, CWL-BW1, and CWL-BW2 (Figure 2). The objective of installing these wells was to establish a groundwater monitoring well network around the CWL. These wells were completed at various depths, ranging from 445 to 980 feet below ground surface (fbgs). However, the New Mexico Environment Department (NMED) later determined that these wells were inadequate for groundwater monitoring, primarily due to well screen lengths that were determined to be too long. As a result, a Notice of Violation (NOV) was issued to SNL/NM and the U.S. Department of Energy in 1987 (SNL/NM December 1992). In response to the NOV, Monitoring Wells CWL-MW1A, CWL-MW2A, CWL-MW3A, and CWL-BW3 were installed in 1988 to replace the existing groundwater monitoring network (Figure 2). The sampling of CWL-MW1, CWL-MW2, CWL-MW3, CWL-BW1, and CWL-BW2 was discontinued, and the wells were plugged and abandoned in 1997 (CWL-MW1, CWL-MW2, CWL-MW3), and 2003 (CWL-BW1 and CWL-BW2).

Each replacement well was constructed with 20-foot-long screen intervals installed across the water table in the upper part of the regional aquifer as required by the NMED. In response to a second NOV issued by the NMED in 1989 that concluded the existing monitoring well network was inadequate, Monitoring Well CWL-MW4 was installed and added to the network (SNL/NM December 1992). All five wells (CWL-MW1A, CWL-MW2A, CWL-MW3A, CWL-MW4, and CWL-BW3) were approved for groundwater monitoring by the NMED. Initial monitoring of these wells was called detection monitoring and included laboratory analysis for total organic carbon and total organic halogens, as well as field measurements for pH and specific conductance.

In 1990, groundwater monitoring was changed to include water quality and Title 40 Code of Federal Regulations [CFR] 264, Appendix IX laboratory analyses to provide more definitive analytical results in anticipation of NMED closure requirements. This groundwater monitoring program was called assessment monitoring. Trichloroethene (TCE) was first detected in the groundwater sample collected from CWL-MW2A in March 1990 at 7.3 parts per billion (ppb) during the installation of CWL-MW4 (SNL/NM December 1992). In April 1990, a subsequent groundwater sample collected from CWL-MW2A confirmed the presence of TCE above the maximum contaminant level (MCL) of 5 ppb. All five wells were subsequently placed on an assessment monitoring program.

After TCE was detected in 1990, the NMED and SNL/NM continued to negotiate the approach to be used to characterize the CWL as part of the CWL Closure Plan. The NMED required the installation of eight additional monitoring wells to define the lateral and vertical extent of TCE in groundwater and the vertical groundwater gradient in the vicinity of CWL-MW2A as part of a Groundwater Assessment Plan (GAP). This requirement was documented in Section 7.0 of the CWL Closure Plan (SNL/NM December 1992), which also presented well locations and a schedule for completing the GAP. The NMED approved the CWL Closure Plan (SNL/NM December 1992) in February 1993 (Sisneros February 1993) and the GAP (SNL/NM October 1993) in November 1993 (Garcia November 1993).

The following additional monitoring wells were installed between January and June 1995: CWL-MW2BU, CWL-MW2BL, CWL-MW5U, CWL-MW5L, CWL-MW6U, CWL-MW6L, CWL-BW4, and CWL-BW4A (Figure 2). The "U," or "upper," designator is for wells completed across the top of the water table, and the "L," or "lower," designator is for wells completed below the water table. A Groundwater Assessment Report (GAR), submitted to the NMED as a Closure Plan requirement in October 1995, documented the results of the groundwater assessment program.

The GAR validated the conceptual model presented in the Closure Plan that a VOC vapor plume was the source of the elevated levels of TCE in the groundwater at the CWL (SNL/NM October 1995). The original waste in the landfill was the source for the VOC vapor plume. Therefore, two voluntary corrective measures (VCMs) were developed to address the two main sources of contamination and to mitigate the impact to groundwater beneath the CWL. The VCMs consisted of vapor extraction (VE) augmented with air injection, followed by landfill excavation. For more information, refer to the "Chemical Waste Landfill—Vapor Extraction Voluntary Corrective Measure Final Report" (SNL/NM May 2000) and "Chemical Waste Landfill—Landfill Excavation Voluntary Corrective Measure Final Report" (SNL/NM April 2003). The desired overall effect of both VCMs was the removal and/or control of the potential long-term sources of groundwater contamination, thereby reducing the potential for significant future degradation of groundwater quality. After approximately one year of operating the VE VCM system, TCE concentrations in groundwater declined below the MCL. The VE system operated for approximately two years.

The VE VCM occurred in an active phase from May 1997 to July 1998, followed by a passive phase that is still ongoing. The active phase used 11 extraction wells and 2 injection wells. Three existing groundwater wells (CWL-MW1A, CWL-MW2A, and CWL-MW3A) were integrated as part of the VE VCM extraction wells. Vadose zone and capillary fringe soil gas was extracted through their screen intervals at and above the water table and removed up through their casings. During the passive VE, these wells were initially fitted with BaroBalls™ that act as low-pressure relief valves (1 millibar), allowing soil gas to vent to the atmosphere during periods of low barometric pressure.

In June 1999, passive VE was discontinued at CWL-MW1A, CWL-MW2A, and CWL-MW3A to allow groundwater monitoring to resume at these wells. However, sediment had filled the screened interval of each well, and none of the wells contained sufficient water to allow sampling. After a few months, the sediment cleared from CWL-MW2A and sampling resumed as required by the NMED. Sufficient water was present to allow for bailer sampling in August and October 1999. Low-flow sampling was conducted in February 2000, January 2001, and August 2001. The sampling approach at CWL-MW2A was changed to the conventional method in February 2002 along with all of the other CWL monitoring wells containing sufficient water. CWL-MW1A and CWL-MW3A never recovered and have not been sampled since the VE VCM.

During March and April 2003, two deep-completion wells were installed adjacent to the landfill (CWL-MW7 and CWL-MW8). Table 1 summarizes all the wells in the current CWL monitoring network and their water levels as of June 2003.

3.0 TCE SAMPLE METHODS AND RESULTS

CWL-MW2A was sampled for VOCs 67 times before it was used as a VE well, and 10 times afterwards. The typical sampling method before VE was by using a Bennett™ pump. This method, referred to as the conventional method, is the only sampling method approved by the NMED for compliance groundwater monitoring at the CWL. After the VE VCM, a bladder pump (low-flow) was used for approximately two years. Sampling by bailer also occurred over the life of the well to gather additional information. CWL-MW2A sampling included a significant number of sample splits and sample duplicates to verify the sample results with detections of TCE. TCE data ranged from nondetections to 31 micrograms (μg)/liter (L), with most variability and the highest concentrations detected prior to the VE VCM. Figure 3 presents a graphic summary of the highest TCE concentration result for each main sampling event. Table 2 summarizes the number of VOC samples analyzed, the number of detections of TCE, the number of nondetections of TCE, and the number of TCE results that exceeded the MCL for each well. Table 3 lists all TCE sampling results summarized in Table 2 and Figure 3 for CWL-MW2A, along with additional information describing the sample collection method (conventional, low-flow, bailer) and the sample type (split sample, duplicate sample, or laboratory re-analysis).

3.1 CWL-MW2A TCE Sample Methods and Results Prior to VE VCM

Prior to the VE VCM, the conventional method (using a Bennett™ pump) was the primary sampling method. Figure 3 shows the results of bailer samples and the one low-flow sample collected prior to VE.

The data show two periods when TCE concentrations were above the MCL (1990 and 1995 to 1997) and one period (1991 to 1994) when TCE concentrations were at or below the MCL. When TCE concentrations were above the MCL, the results fluctuated by 7 to 16 μg/L between sampling events. The TCE results from the bladder pump and bailer samples were consistent with those obtained using the NMED-approved conventional method. The highest TCE concentration at the CWL was 31 μg/L from CWL-MW2A in November 1996 (conventional sampling method).

3.2 CWL-MW2A TCE Sample Methods and Results After VE VCM

After the VE VCM, a bailer had to be used to collect groundwater samples until the well had fully recovered. Samples were then collected with bladder pumps using a low-flow method. Conventional sample collection methods were resumed in February 2002 and continued until the final sampling event in June 2003.

All sampling results were below the MCL during the eight sampling events after the VE VCM until the final sample was collected in June 2003 (Figure 3). There appears to be an increasing trend from 1.2 J μg/L in August 1999 to 4.05 μg/L in January 2003. June 2003 results were above the MCL at 12.5 μg/L; therefore, SNL/NM installed a BaroBall™ in July 2003 to investigate whether the cause of TCE contamination levels in CWL-MW2A were the result of VOC vapors entering the well casing and being pushed downward to the groundwater via barometric pumping during high-pressure periods. Another groundwater sample was going to be collected to evaluate this concept in December 2003 when the upper casing came loose and annular materials fell into the well. Sampling of CWL-MW2A has not been possible since December 2003 due to lack of sufficient water and the presence of additional material in the well screen interval.

3.3 TCE Sample Results at all CWL Wells

As summarized in Table 2, before VE, there were 465 sample results for VOCs at wells downgradient of the CWL. Since VE has been conducted, there have been 129 VOC sample results. There was a similar percentage of nondetections before and after VE. However, only one detection of TCE above the MCL has been reported since completion of the VE VCM. This detection of 12.5 μg/L was from CWL-MW2A in June 2003 and may be the result of poor well integrity.

The only well with TCE concentration trends similar to the one depicted by CWL-MW2A was CWL-MW2BU (Figure 4). CWL-MW2BU was completed in May 1997 approximately 70 feet south of CWL-MW2A. It consists of two wells (CWL-MW2BU and CWL-MW2BL) with 20-foot screens in a single borehole. CWL-MW2BU is screened 3 feet deeper than

CWL-MW2A. However, CWL-MW2BU is a 2-inch well that cannot provide compliance data according to NMED requirements (conventional method). The performance data obtained by bailer and bladder pump sampling are shown in Figure 4. Performance data from CWL-MW2BU ranged from nondetected to 23 µg/L, similar to the data ranges of CWL-MW2A prior to the VE VCM. Peak concentrations in CWL-MW2A and CWL-MW2BU occurred at approximately the same time; however, the increasing TCE concentrations observed in CWL-MW2A since August 1999 (post-VE VCM) are not present in CWL-MW2BU. Table 4 lists all TCE sampling results summarized in Table 2 and Figure 4 for CWL-MW2BU, along with additional information describing the sample collection method (conventional, low-flow, bailer) and the sample type (split sample, duplicate sample, or laboratory re-analysis).

4.0 EVIDENCE OF DECLINING WATER LEVELS IN CWL-MW2A

Historically, water levels were measured quarterly at all CWL wells. However, during the past two-and-a-half years, only Wells CWL-MW2A, CWL-MW2BL, CWL-MW5U, CWL-MW5L, CWL-MW6U, and CWL-MW6L have been measured quarterly; the other wells are measured prior to sampling (typically semiannually). Water levels at the CWL have been declining at an approximate rate of 0.65 feet/year. Detailed hydrographs are presented in the Fiscal Year 2001 Annual Groundwater Monitoring Report, (SNL/NM March 2002).

The average water level decline is approximately 0.6 feet/year in CWL-MW2A (Figure 5) Over the past 15 years, the water level has fallen 9 feet in CWL-MW2A. The well is expected to stop providing adequate samples between 2006 and 2007 when less than 3 to 4 feet of water is predicted to remain in the screened interval. Sampling crews confirm that 3 to 4 feet of water, at a minimum, is required to collect a sample using the conventional method required by the NMED.

Potentiometric surface maps of the CWL (Figure 6) are consistent with the hydrogeologic conceptual model for the Kirtland Air Force Base (KAFB) area, which shows that the local groundwater flow direction is to the northwest due to the influence of groundwater withdrawals by the City of Albuquerque and KAFB water supply wells.

5.0 EVIDENCE OF CWL-MW2A CONSTRUCTION DEFECTS

Over the life of CWL-MW2A, there has been evidence of construction defects that may allow soil gases associated with the VOC vapor plume to leak into the well and/or its annulus. These defects include possible gaps in the annular fill, borehole deviations (bends), and suspected leaking unions or joints between casing pieces. This is of particular concern because the VOC vapor plume appears to be present in the vadose zone at a depth of 200 to 300 feet above the water table in the vicinity of CWL-MW2A (SNL/NM May 2000).

5.1 Annular Material Issues

On December 16, 2003, after six months of operation, the BaroBall™ was to be removed from CWL-MW2A so that groundwater sampling could be performed. During the manual removal of the BaroBall™, the top 9 feet of casing (polyvinyl chloride well riser) became detached instead. Because the casing protruded nearly 2 feet above the ground surface, its union or joint with the next piece was approximately 7 feet below the local ground surface. In Figure 7A, the top piece of casing is shown behind the well pad.

When the top casing piece separated, annular material above the joint fell into the well (Figure 7B). The annular material that fell into the well included grout and soil. The amount and type of material that fell in, the appearance of the annulus afterwards, and the fact that the casing could be pulled off by hand confirmed that the annular space had gaps. Previous concerns regarding the integrity of the CWL-MW2A well annulus, as well as the suspicion that the annulus could provide a potential VOC vapor conduit to the groundwater, were further supported.

5.2 Casing Deviation Issues

Groundwater sampling crews have consistently reported that the Bennett™ pump gets stuck in two locations in CWL-MW2A, approximately 225 and 470 fbgs. The Bennett™ pump is only slightly wider (0.22 inches) than the bladder pump, and the Bennett™ pump is shorter. The pump size doesn't cause the sticking; instead it is pump rigidity that makes the difference. The Bennett™ pump is rigid stainless steel, whereas the bladder pump has flexibility, allowing it to get through the bends with less difficulty. It takes the crew several tries to get the Bennett™ pump past each sticking point. A well video log done on December 19, 2003, documented the two sticking points had significant scratches. However, no breaches were visible.

5.3 Casing Joint Issues

The well video also showed evidence of casing joint problems. The casing joint at 118 fbgs had a dark smear mark approximately 1 foot long. At 423 fbgs, there is a coupling joint where extensive deposits and/or smearing are visible. These deposits and smears may be a result of leakage at the joints.

5.4 Evidence from CWL-MW2BL

A well integrity test done at CWL-MW2BL prior to the VE VCM determined that vapor-phase TCE does leak from the vadose zone into the well casing (Ardito et. al. 1997). Given the issues presented earlier on substandard annular space completion, casing bends, and casing joints in CWL-MW2A, it is reasonable to expect similar or more significant leakage at CWL-MW2A.

6.0 WELL REHABILITATION ISSUES

On December 18, 2003, an attempt was made to capture a groundwater sample with a small bailer, but the well was dry. Since that attempt, the well recovered and stabilized with only 1 foot of water. This amount of water is insufficient to sample using the conventional method.

If an attempt were made to rehabilitate CWL-MW2A, it is likely that the top joint of CWL-MW2A could be reattached. However, the casing deviations would continue to be problematic. There is a very high risk that the casing deviations will prevent tools, such as bailers and brushes, from being lowered to the bottom of the well. The tools could get stuck or punch a hole through the well casing. A total depth measurement taken on December 18, 2003, estimated that the well was filled with material to at least 492 fbgs (top of casing is the datum from which depths are calculated). The measuring tape had soil on it from 485.5 to 492 fbgs. The well video revealed that the screen, with the exception of the lower 2 feet, is severely clogged as a result of biofouling or hard water deposits. This material would need to be removed prior to resuming compliance sampling.

Furthermore, should rehabilitation be successful, the remaining life of the well would be approximately two to three years based upon water level data (Section 4.0 and Figure 5) . Well construction professionals indicated that the high risk of losing the well during rehabilitation outweighs the potential benefit of having it for another two years, especially as the well itself could be a conduit for TCE soil gas to reach groundwater. Therefore, the attached Plug and Abandonment Plan includes provisions for drilling out the well casing and annulus to allow for the open borehole to be thoroughly sealed, rather than using more typical methods that would involve cementing the well casing in place.

7.0 DATA IN SUPPORT OF THE SUFFICIENCY OF THE EXISTING MONITORING WELL NETWORK

In this section, the adequacy of the existing monitoring well network is evaluated with respect to CWL-MW2A.

7.1 Existing Groundwater Monitoring Network

As shown in Table 1 and Figure 2, the existing groundwater monitoring network at the CWL includes two upgradient wells and nine downgradient wells in addition to CWL-MW2A. These wells were determined to have adequately defined both the horizontal and vertical extent of the groundwater contaminant plume at the site. The loss of CWL-MW2A will not jeopardize the integrity of the groundwater monitoring program for the following reasons. The remaining downgradient wells include four that are screened at the water table and five with a deeper completion. The water table wells include CWL-MW2BU, CWL-MW4, CWL-MW5U, and CWL-MW6U, which are all screened in a similar hydrostragraphic package (SNL/NM October

1995), have similar water levels, and are screened at a similar elevation as CWL-MW2A (Table 1). The amount and placement of these wells meet the post-closure groundwater monitoring requirements under the New Mexico Hazardous Waste Management Regulations, 20.4.1.600 New Mexico Administrative Code [NMAC] incorporating 40 CFR 265.118 and 40 CFR 265.91, which require at least three monitoring wells to be hydraulically downgradient of the waste management unit in locations that ensure they immediately detect contamination that may migrate from the waste management unit into the uppermost aquifer.

7.2 Compliance Network

CWL- MW6U is an existing water table well that can provide adequate compliance monitoring coverage for CWL-MW2A. CWL-MW6U was installed in 1995 to define the lateral and vertical extent of the TCE contamination in the vicinity of MW2A. CWL-MW6U is located approximately 150 feet downgradient of CWL-MW2A (Figure 6) and is a 5-inch-diameter well that is suitable for sampling with a Bennett™ pump to provide compliance data as required by the NMED. Additionally, CWL-MW6U has an extra 6 feet of screen depth relative to CWL-MW2A. Given the steadily-declining groundwater rates, the extra six feet of depth will be enough to allow sampling from CWL-MW6U for approximately10 more years. TCE concentrations at CWL-MW6U have ranged from nondetections to 0.72 J μg/L, indicating that if TCE groundwater contamination above the MCL does exist at CWL-MW2A, it has not reached or migrated past CWL-MW6U (Figure 8). Thus, CWL-MW6U provides a downgradient monitoring location that is protective of potential receptors. Table 5 lists all TCE sampling results summarized in Table 2 and depicted on Figure 8 for CWL-MW6U, along with additional information describing the sample collection method (conventional, low-flow, bailer) and the sample type (split sample, duplicate sample, or laboratory re-analysis).

7.3 Performance Network

CWL-MW2BU is an existing monitoring well that can provide data to indicate if groundwater changes are occurring at the CWL boundary where CWL-MW2A is located. As described in Section 3.3, CWL-MW2BU is approximately 70 feet south of CWL-MW2A and is screened three feet deeper. CWL-MW2BU was completed as a two-inch well and cannot be used for compliance sampling per NMED requirements. However, CWL-MW2BU can be used for performance monitoring to provide information characterizing changes in groundwater conditions at the CWL boundary, and for establishing contaminant trends upgradient of the compliance monitoring point. Historical trends of TCE concentrations at CWL-MW2BU have been similar to those at CWL-MW2A (Figures 3 and 4). CWL-MW2BL and CWL-MW8 cannot be used in place of CWL-MW2A to monitor the current contamination conditions because they are screened 59.5 feet and 139 feet deeper than CWL-MW2A, respectively.

7.4 Receptors

The need for a well located between CWL-MW2A and CWL-MW6U was considered, but such a well would not improve the technical knowledge regarding potential impacts to current receptor wells. The nearest downgradient receptor well is KAFB-4, which is located approximately 4 miles (21,120 feet) away, as shown in the regional groundwater map depicted in Figure 9.

Figure 9 also shows the northwesterly direction of groundwater flow based upon regional groundwater elevation data that provides context for the CWL-specific information shown in Figure 6. The most conservative (i.e., fastest) linear flow velocity calculated in TA-III was 17 feet/year; at the CWL, 2 feet/year was estimated (SNL/NM 1995). This converts to an estimated groundwater travel time of 9 - 75 years from CWL-MW2A to CWL-MW6U. Using the same linear velocity estimates, groundwater travel times between the CWL and the nearest receptor wells exceed a thousand years whether it is calculated as starting at CWL-MW6U or CWL-MW2A. Based on this information, a well network that includes CWL-MW6U will be sufficiently protective of modern potential receptors.

8.0 CONCLUSION

In conclusion, the CWL groundwater monitoring network without CWL-MW2A is adequate in terms of location and ability to produce compliance-quality data. The remaining groundwater monitoring network exceeds post-closure groundwater monitoring requirements for interim status landfills included in 20.4.1.600 NMAC, incorporating 40 CFR 265.118, and will continue to provide adequate assessment monitoring of groundwater conditions at the CWL.

9.0 REFERENCES

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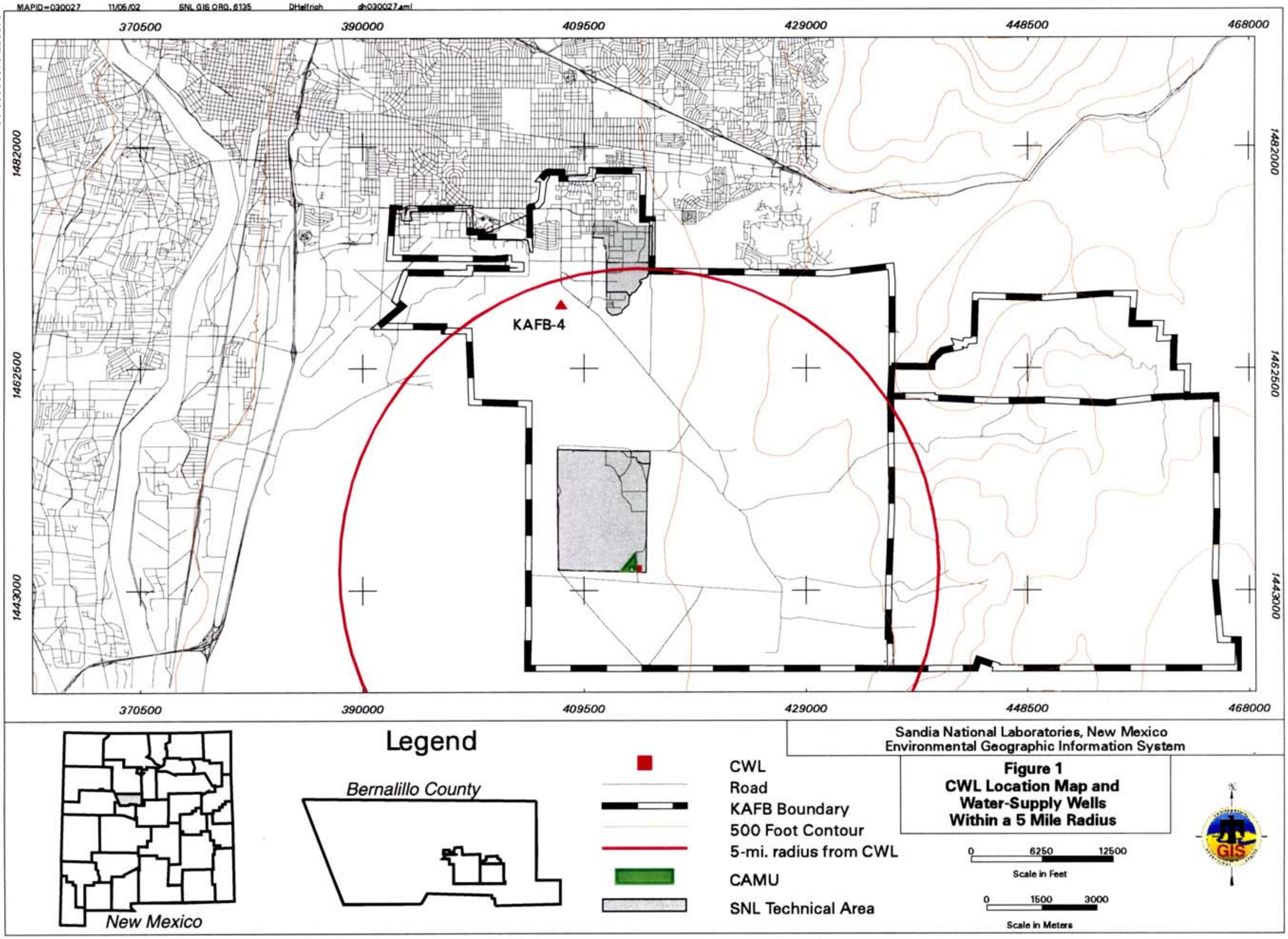
FIGURES



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 1
CWL Location Map and Water-Supply Wells Within a 5 Mile Radius

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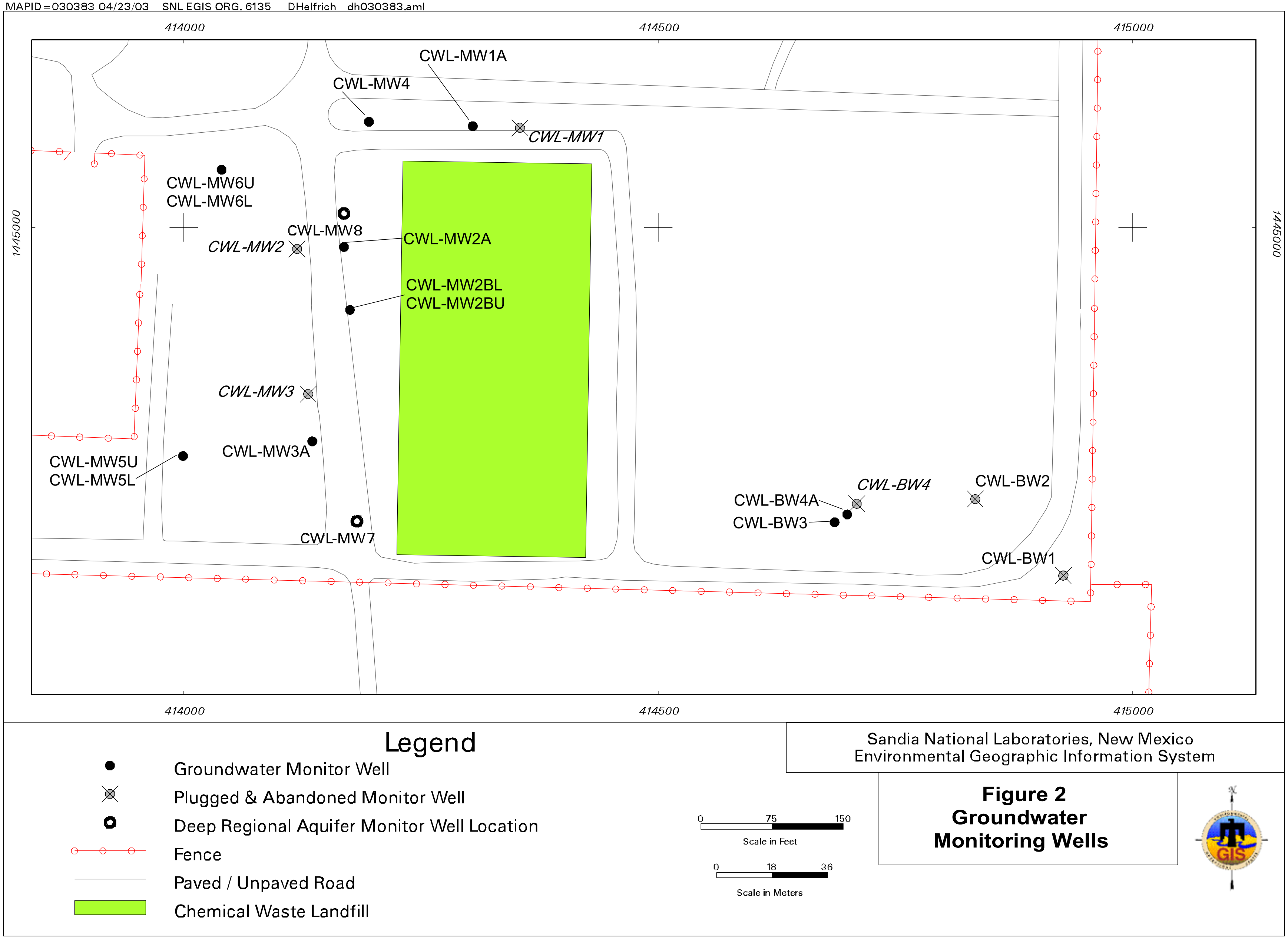

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 2
Groundwater
Monitoring Wells

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Figure 3 Summary of Maximum Detected TCE Concentrations in CWL-MW2A

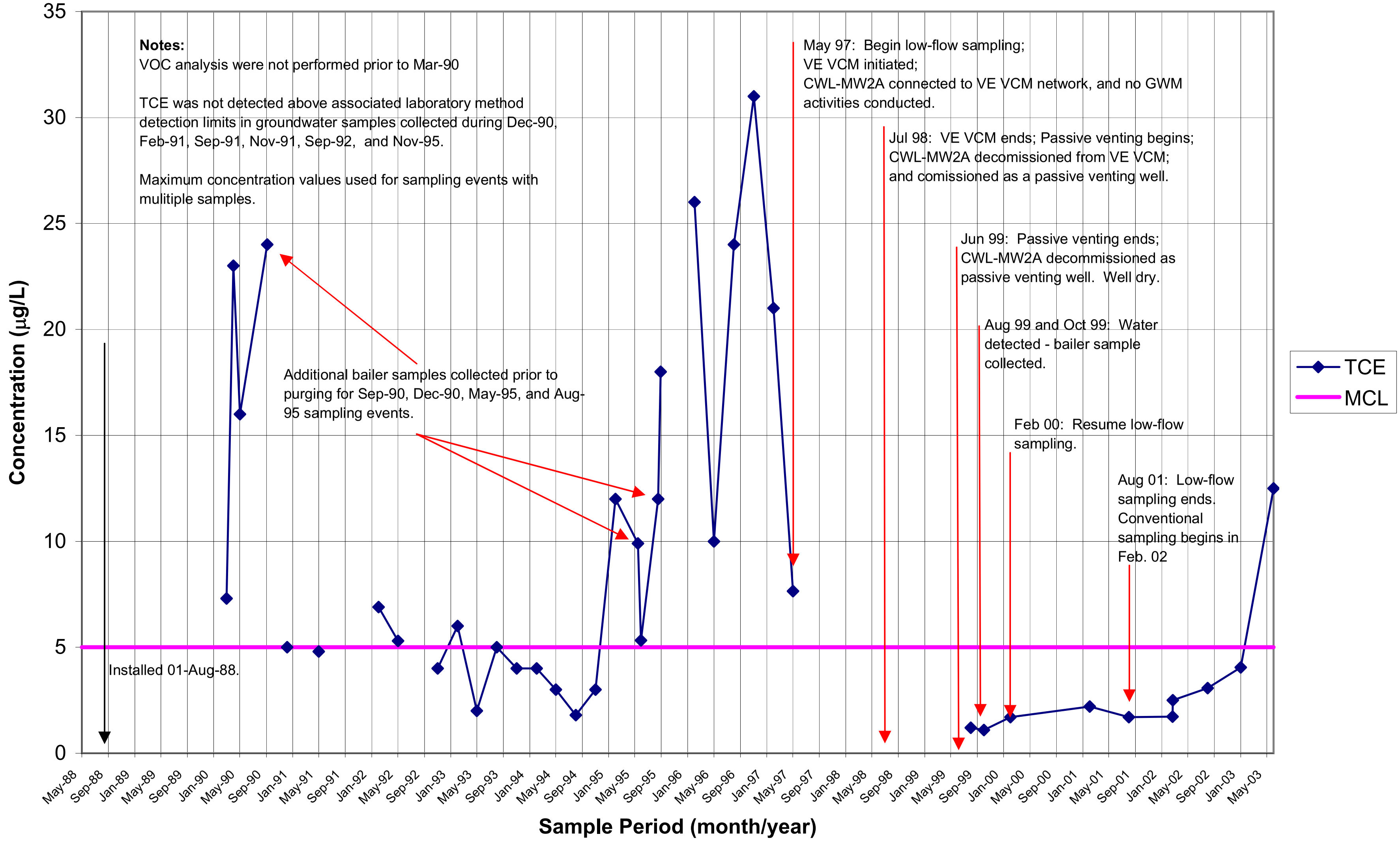


Figure 4 Summary of Maximum Detected TCE Concentrations in CWL-MW2BU

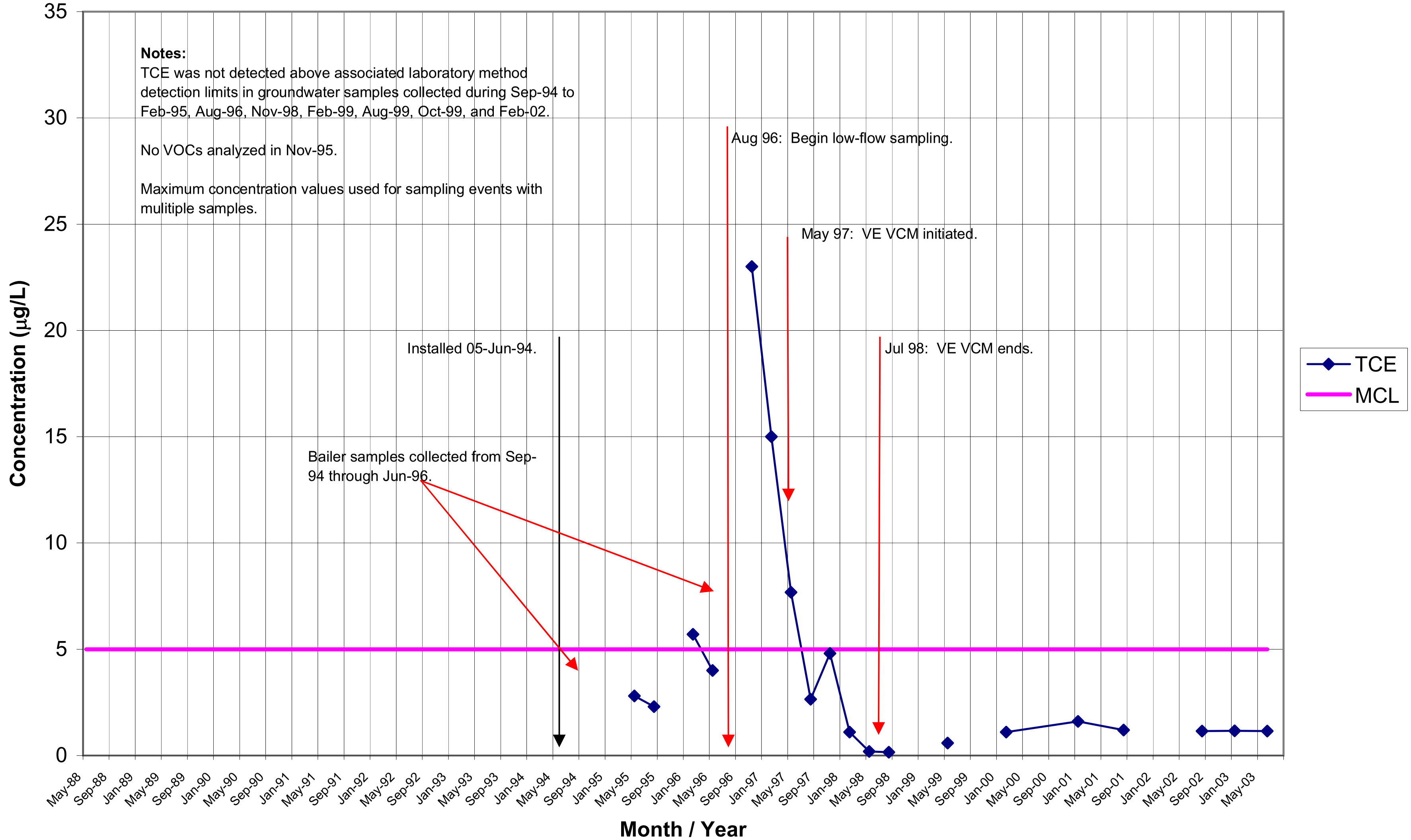
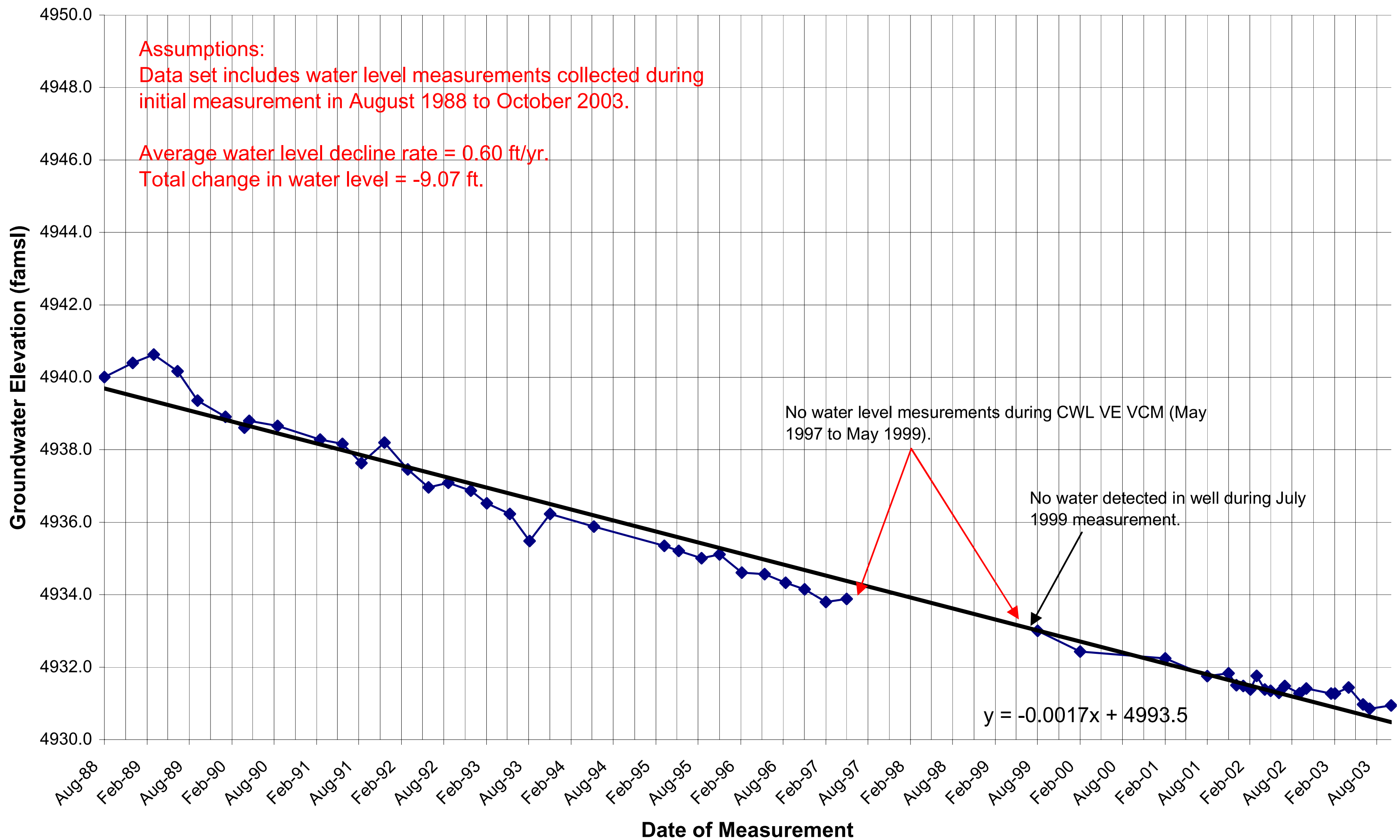


Figure 5   CWL-MW2A Water Level Summary



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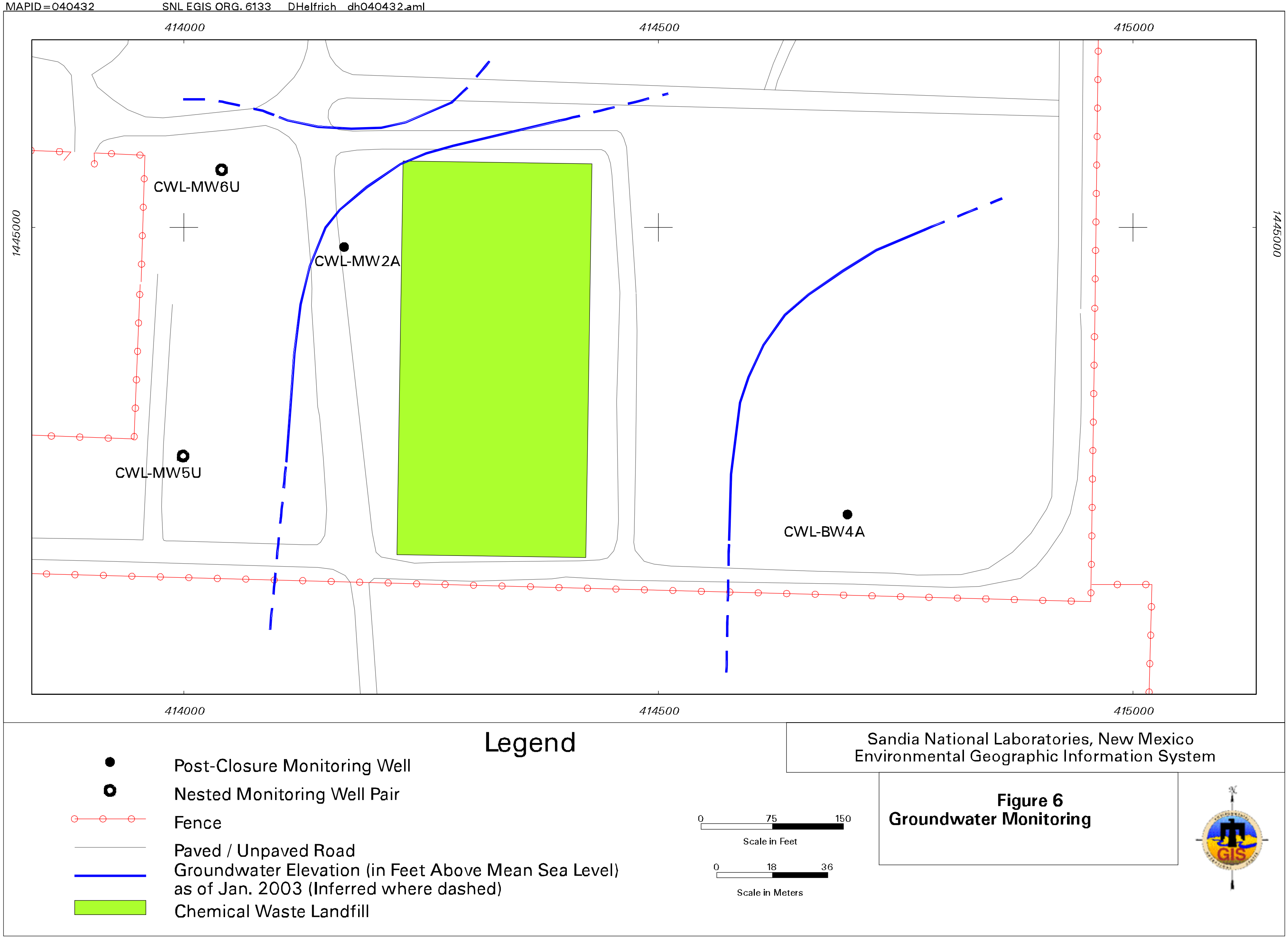

Figure 6
Groundwater Monitoring

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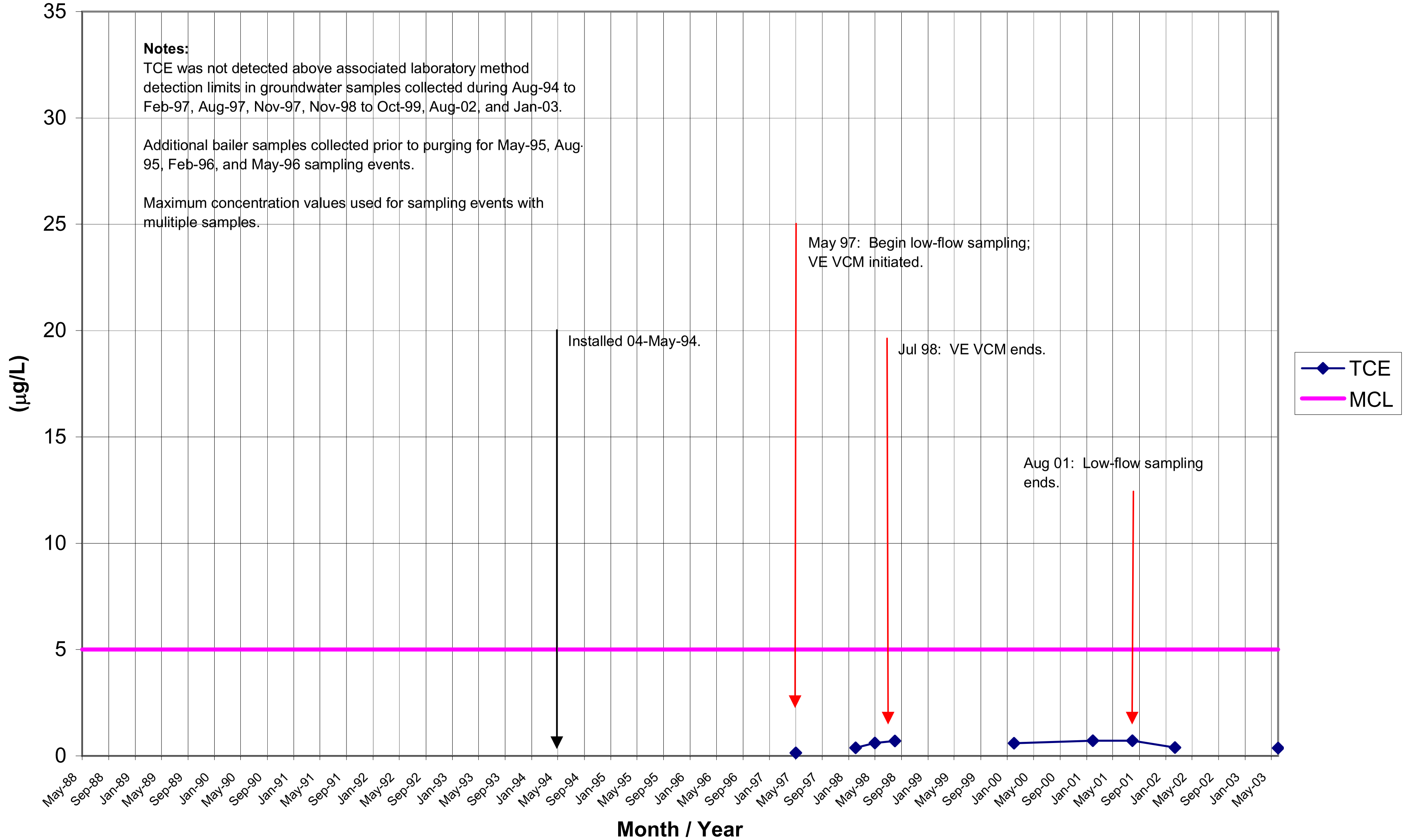
Figure 7 Photographs of CWL-MW2A after the upper section of well riser was inadvertently pulled off.

A. Upper casing laying adjacent to MW2A.

B. View looking down into the CWL-MW2A annular space with upper well riser removed.

Figure 8 Summary of Maximum Detected TCE Concentrations in CWL-MW6U



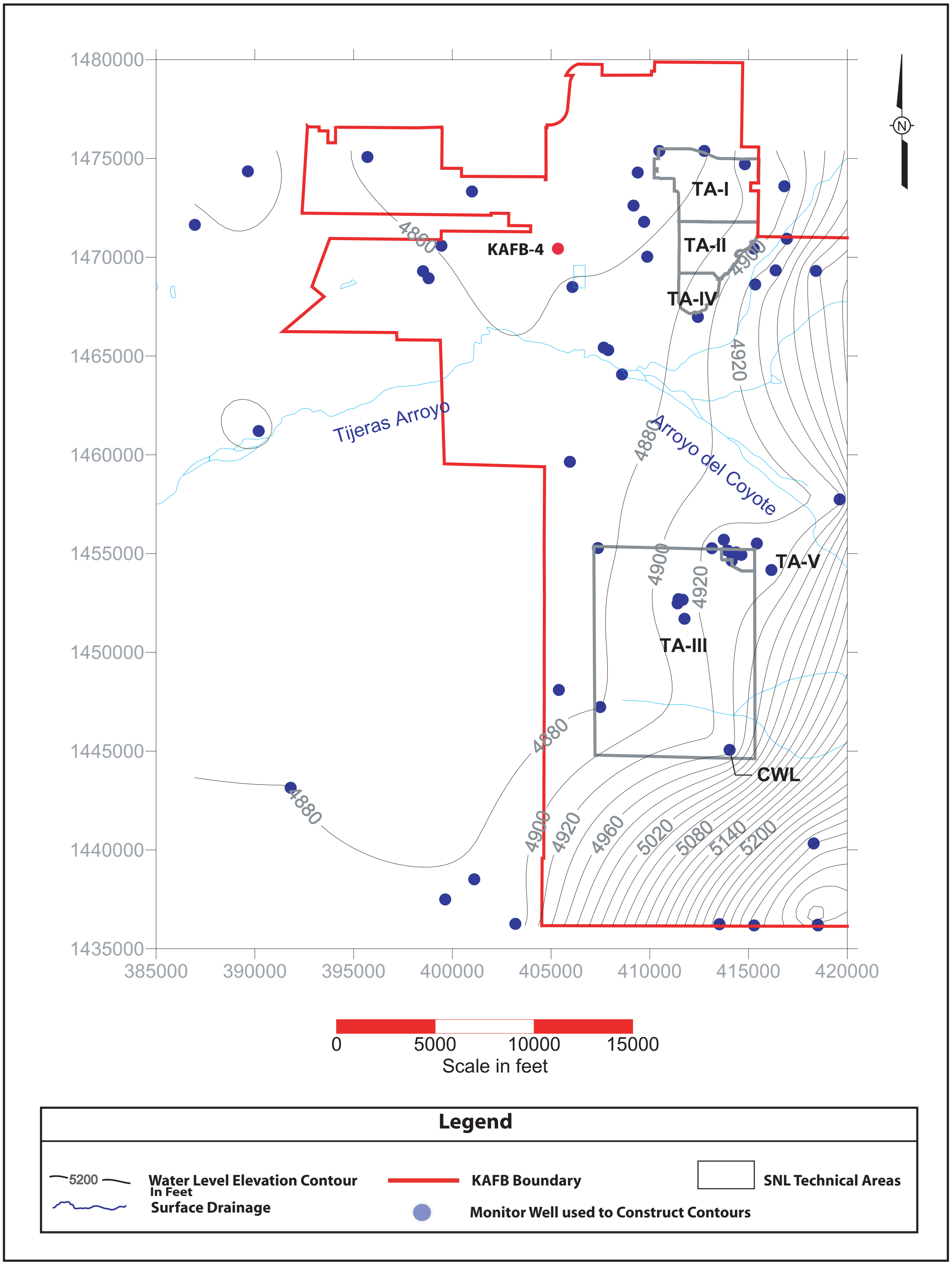


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Figure 9

Regional Groundwater Elevation Contour Map - Fiscal Year 2003 (SNL/NM April 2004)

TABLES

Table 1
CWL Monitoring Wells[a] and June 2003 Water Levels[b]

Well ID	Measuring Point Elevation (TOC) (famsl)	Ground Elevation (famsl)	Top of Well Screen (fbgs)	Bottom of Well Screen (fbgs)	Bottom of Well Screen (famsl)	Depth to Water (fbgs)	Depth to Water (famsl)
Background Water Table Monitoring Wells							
CWL-BW3	5430.23	5428.53	485	505	4923.53	498.50	4931.73
CWL-BW4A	5431.36	5429.24	485	505	4924.24	498.81	4932.55
Water Table Aquifer Wells							
CWL-MW1A[c]	5421.49	5420.41	474	494	4926.41	Dry	NC
CWL-MW2A	5418.58	5417.08	473	493	4924.08	487.61	4930.97
CWL-MW2BU	5419.42	5417.37	476	496	4921.37	489.25	4930.17
CWL-MW3A[c]	5417.78	5416.39	470	490	4926.39	Dry	NC
CWL-MW4	5420.33	5418.38	478	498	4920.38	492.52	4927.81
CWL-MW5U	5416.01	5414.02	477	497	4917.02	485.80	4930.21
CWL-MW6U	5416.78	5414.65	477	497	4917.65	486.48	4930.30
Regional Aquifer Wells							
CWL-MW2BL	5419.39	5417.37	532.5	552.5	4864.87	493.57	4925.82
CWL-MW5L	5415.80	5414.02	533	553	4861.02	490.36	4925.44
CWL-MW6L	5417.13	5414.65	539	559	4855.65	491.86	4925.27
CWL-MW7	5419.51	5416.79	618	638	4778.79	506.91	4912.60
CWL-MW8	5419.26	5416.92	612	632	4784.92	506.72	4912.54

[a]Monitoring well information obtained from well construction diagrams.
[b]All calculations are estimated using water level data measured during June 2003 activities.
[c]CWL-MW1A and CWL-MW3A are dry wells (sediment entered wells during VE VCM).

CWL = Chemical Waste Landfill.
famsl = Feet above mean sea level.
fbgs = Feet below ground surface.
ID = Identification.
NC = Not calculated.
TOC = Top of casing.
VCM = Voluntary corrective measure.
VE = Vapor extraction.

Table 2
Summary of TCE in Groundwater Monitoring Wells for the CWL

Well Name	Prior to/During VE VCM				After VE VCM Completion (July 1998)			
	VOC Samples Collected[a]	Number of Nondetects for TCE	TCE Results exceeding MCL[b]	Maximum TCE Concentration (ppb) and Date	VOC Samples Collected	Number of Nondetects for TCE	TCE Results exceeding MCL	Maximum TCE Concentration (ppb) and Date
Background Water Table Monitoring Wells								
CWL-BW3	46	45	0	0.71, May 1998	13	12	0	0.90, August 1998
CWL-BW4A	18	17	0	0.78, May 1998	13	12	0	0.58, August 1998
Water Table Aquifer Wells								
CWL-MW1A	39	24	3	7.0, August 1993 and November 1996	0	0	0	NA
CWL-MW2A	67	12	29	31.0, November 1996	10	0	1	12.5, June 2003
CWL-MW2BU	20	6	4	23.0, November 1996	14	5	0	1.6, January 2001
CWL-MW3A	46	18	4	32.0, December 1990	0	0	0	NA
CWL-MW4	44	35	1	7.0, November 1994	13	4	0	1.30, February 2000
CWL-MW5U	33	9	4	7.0, May 1996	28	7	0	2.44, January 2001
CWL-MW6U	24	21	0	0.61, May 1998	15	8	0	0.72, January 2001
Regional Aquifer Wells								
CWL-MW2BL	25	19	1	18.0, November 1994	18	16	0	0.38, August 1998
CWL-MW5L	19	1	5	16.0, November 1995	16	10	0	0.79, February 2000
CWL-MW6L	19	2	11	13.0, May and November 1995	13	4	0	1.50, November 1998
CWL-MW7	0	0	0	NA	1	0	0	NA
CWL-MW8	0	0	0	NA	1	0	0	NA

[a]Samples collected include environmental samples, duplicate samples, sample splits, and sample re-analysis.
[b]Established by the EPA Primary Water Regulations (40 CFR 141.11[b]) and subsequent amendments. The MCL for TCE is 5.0 μg/L.

BW = Background well.
CFR = Code of Federal Regulations.
CWL = Chemical Waste Landfill.
EPA = U.S. Environmental Protection Agency.
MCL = Maximum contaminant level.
μg/L = Microgram(s) per liter.
MW = Monitoring well.
NA = Not applicable.
ppb = Parts per billion.
TCE = Trichloroethylene.
VCM = Voluntary corrective measure.
VE = Vapor Extraction.
VOC = Volatile organic compound.

Table 3 Summary of TCE in CWL-MW2A Groundwater Samples

Sample Date	*TCE Concentration (µg/L)*	*Data Qualifier*	*Sample Type*	*Sample Method*	*Lab*	*Comments*
FY90						
29-Mar-90	**7.3**		Environmental	Bennett	Enseco	
29-Mar-90	**6.7**		re-analysis	re-analysis	Enseco	laboratory re-analysis
16-Apr-90	**23**		Environmental	Bennett	Enseco	
18-May-90	**15**		Environmental	Bennett	Enseco	
18-May-90	**16**		Environmental	Bennett	Enseco	
4-Sep-90	**24**		Environmental	Bailer	Enseco	Bailer sample collected at 481 fbtoc
4-Sep-90	**24**		Environmental	Bailer	Enseco	Bailer sample collected at 497 fbtoc
6-Sep-90	ND(50)	U	Environmental	Bennett	Enseco	
FY91						
4-Dec-90	ND(1)	U	Environmental	Bailer	Enseco	Bailer sample collected prior to purge.
6-Dec-90	5		Environmental	Bennett	Enseco	
6-Dec-90	5		Duplicate	Bennett	Enseco	
27-Feb-91	ND(5)	U	Environmental	Bennett	Enseco	
23-May-91	4.8		Environmental	Bennett	Enseco	
6-Sep-91	ND(5)	U	Environmental	Bennett	Enseco	
FY92						
26-Nov-91	ND(5)	U	Environmental	Bennett	Enseco	
26-Nov-91	ND(5)	U	Duplicate	Bennett	Enseco	
21-Feb-92	**6.9**		Environmental	Bennett	Enseco	
21-Feb-92	**6.4**		Duplicate	Bennett	Enseco	
21-May-92	**5.3**		Environmental	Bennett	Enseco	
21-May-92	ND(5)	U	Duplicate	Bennett	Enseco	
1-Sep-92	ND(5)	U	Environmental	Bennett	Enseco	
1-Sep-92	ND(5)	U	Duplicate	Bennett	Enseco	
FY93						
12-Nov-92	3		Environmental	Bennett	Encotec	
12-Nov-92	4		Duplicate	Bennett	Encotec	
11-Feb-93	5		Environmental	Bennett	Encotec	
11-Feb-93	**6**		Duplicate	Bennett	Encotec	
20-May-93	2		Environmental	Bennett	Encotec	
20-May-93	2		Duplicate	Bennett	Encotec	
26-Aug-93	4		Environmental	Bennett	Encotec	
26-Aug-93	5		Duplicate	Bennett	Encotec	
FY94						
19-Nov-93	3		Environmental	Bennett	Encotec	
19-Nov-93	4		Duplicate	Bennett	Encotec	
14-Feb-94	4		Environmental	Bennett	Encotec	
14-Feb-94	4		Duplicate	Bennett	Encotec	
20-May-94	3		Environmental	Bennett	Encotec	
20-May-94	3		Duplicate	Bennett	Encotec	
12-Aug-94	1		Environmental	Bennett	Encotec	
12-Aug-94	1		Duplicate	Bennett	Encotec	
12-Aug-94	1.8		Environmental	Bennett	Quanterra	
FY95						
14-Nov-94	3		Environmental	Bennett	Encotec	
14-Nov-94	3		Duplicate	Bennett	Encotec	
23-Feb-95	**11**		Environmental	Bennett	Encotec	
23-Feb-95	**12**		Duplicate	Bennett	Encotec	

Table 3 Summary of TCE in CWL-MW2A Groundwater Samples

Sample Date	TCE Concentration ($\mu g/L$)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
16-May-95	**9.9**		Environmental	Bailer	Quanterra	Bailer sample collected prior to purge.
30-May-95	5		Environmental	Bennett	Encotec	
30-May-95	5		Duplicate	Bennett	Encotec	
30-May-95	4.3		Sample split	Bennett	ERCL	
30-May-95	**5.3**		Sample split	Bennett	Quanterra	
30-May-95	**5.32**		Sample split	Bennett	GEL	
30-May-95	4.4		Sample split	Bennett	Lockheed	
30-May-95	5		Sample split	Bennett	Core	
17-Aug-95	**12**		Environmental	Bailer	ERCL	Bailer sample collected prior to purge.
29-Aug-95	**17**		Environmental	Bennett	Lockheed	
29-Aug-95	**18**		Duplicate	Bennett	Lockheed	
29-Aug-95	**13**		Sample split	Bennett	Core	
29-Aug-95	ND(2)	U	Sample split	Bennett	ERCL	
FY96						
16-Nov-95	ND(1)	U	Environmental	Bennett	Encotec	
16-Nov-95	ND(1)	U	Duplicate	Bennett	Encotec	
21-Feb-96	**26**		Environmental	Bennett	Encotec	
28-May-96	**10**		Environmental	Bennett	Encotec	
28-May-96	**10**		Sample split	Bennett	ERCL	
19-Aug-96	**24**		Environmental	Bennett	Encotec	
FY97						
14-Nov-96	**31**		Environmental	Bennett	Core	
14-Nov-96	**24**		Sample split	Bennett	ERCL	
24-Feb-97	**18**		Environmental	Bennett	ERCL	
24-Feb-97	**21**		Sample split	Bennett	Core	
16-May-97	**7.65**		Environmental	QED	GEL	
1-Aug-97		NA				CWL-MW2A used as vapor extraction well.
FY98						
1-Nov-97		NA				CWL-MW2A used as vapor extraction well.
1-Feb-98		NA				CWL-MW2A used as vapor extraction well.
1-May-98		NA				CWL-MW2A used as vapor extraction well.
July 1998 Actvie Vapor Extraction Voluntary Corrective Measure ends.						
1-Aug-98		NA				CWL-MW2A used as passive vapor extraction well.
FY99						
1-Nov-98		NA				CWL-MW2A used as passive vapor extraction well.
1-Feb-99		NA				CWL-MW2A used as passive vapor extraction well.
1-May-99		NA				CWL-MW2A used as passive vapor extraction well.
27-Aug-99	1.2	J	Environmental	Bailer	ERCL	Sample collected from top of water colunm.
FY00						
25-Oct-99	1.1	J	Environmental	Bailer	ERCL	Sample collected from top of water colunm.
3-Feb-00	1.7	J	Environmental	QED	ERCL	Sample collected from top of water colunm.

Table 3 Summary of TCE in CWL-MW2A Groundwater Samples

Sample Date	TCE Concentration (μg/L)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
FY01						
31-Jan-01	2.2		Environmental	QED	ERCL	Sample collected from top of water colunm.
6-Aug-01	1.7		Environmental	QED	ERCL	Sample collected from top of water colunm.
FY02						
19-Feb-02	1.73		Environmental	QED	GEL	
21-Feb-02	2.5		Environmental	Bennett	GEL	
22-Aug-02	3.07		Environmental	Bennett	GEL	
FY03						
16-Jan-03	4.05		Environmental	Bennett	GEL	
3-Jun-03	**12.5**	J	Environmental	Bennett	GEL	

Values in bold exceed MCL of 5.0 μg/L.

ERCL = Environmental Restoration Chemistry Laboratory.

GEL = General Engineering Laboratories.

J = Result detected below reporting limit or laboratory practical quantitation limit and / or is an estimated value.

ND = Not detected at reporting limit as indicated in parentheses. Where reporting limit may be either laboratory method detection limit or practical quantitation limit.

QED = QED Environmental Systems Inc.

U = Undetected.

Table 4 Summary of TCE in CWL-MW2BU Groundwater Samples

Sample Date	TCE Concentration (μg/L)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
FY94						
14-Sep-94	ND(1)	U	Environmental	Bailer	Encotec	Bailer sample collected at top of water column.
14-Sep-94	ND(1)	U	Duplicate	Bailer	Encotec	Bailer sample collected at top of water column.
FY95						
14-Dec-94	ND(1)	U	Environmental	Bailer	Encotec	Bailer sample collected at top of water column.
14-Dec-94	ND(1)	U	Sample split	Bailer	Quanterra	Bailer sample collected at top of water column.
15-Feb-95	ND(1)	U	Environmental	Bailer	Encotec	Bailer sample collected at top of water column.
17-May-95	2		Environmental	Bailer	Encotec	Bailer sample collected at top of water column.
17-May-95	2.8		Environmental	Bailer	ERCL	Bailer sample collected at top of water column.
17-Aug-95	2.3		Environmental	Bailer	Lockheed	Bailer sample collected at top of water column.
17-Aug-95	2.2		Sample split	Bailer	ERCL	Bailer sample collected at top of water column.
FY96						
6-Feb-96	4		Environmental	Bailer	Encotec	Bailer sample collected at top of water column.
6-Feb-96	**5.7**		Sample split	Bailer	ERCL	Bailer sample collected at top of water column.
14-May-96	4		Environmental	Bailer	ERCL	Bailer sample collected at top of water column.
15-Aug-96	ND(1)	U	Environmental	QED	Encotec	
FY97						
15-Nov-96	**23**		Environmental	QED	Core	
20-Feb-97	**15**		Environmental	QED	ERCL	
16-May-97	**7.68**		Environmental	QED	GEL	
25-Aug-97	2.65		Environmental	QED	GEL	Sample collected from top of water colunm.
FY98						
20-Nov-97	4.8		Environmental	QED	GEL	Sample collected from top of water colunm.
16-Feb-98	1.1	B1	Environmental	QED	GEL	
21-May-98	0.19	J	Environmental	QED	Quanterra	Sample collected from top of water colunm.
July 1998 Actvie Vapor Extraction Voluntary Corrective Measure ends.						
19-Aug-98	0.16	J	Environmental	QED	Quanterra	
FY99						
11-Nov-98	ND(1)	U	Environmental	QED	Quanterra	Sample collected at bottom of screen.
15-Feb-99	ND(1)	U	Environmental	QED	Quanterra	Sample collected from top of water colunm.
24-May-99	0.59	J	Environmental	QED	ERCL	Sample collected from top of water colunm.
26-Aug-99	ND(2)	U	Environmental	QED	ERCL	Sample collected from top of water colunm.
FY00						
22-Oct-99	ND(0.5)	U	Environmental	QED	ERCL	Sample collected from top of water colunm.
3-Feb-00	1.1	J	Environmental	QED	ERCL	Sample collected from top of water colunm.
FY01						
31-Jan-01	1.6	J	Environmental	QED	ERCL	Sample collected from top of water colunm.
31-Jan-01	1.1	J, HT	re-analysis	QED	ERCL	Sample collected from top of water colunm.
6-Aug-01	1.2		Environmental	QED	ERCL	Sample collected from top of water colunm.
FY02						
28-Feb-02	ND(1.35)	U	Environmental	QED	GEL	
26-Aug-02	1.15		Environmental	QED	GEL	

Table 4 Summary of TCE in CWL-MW2BU Groundwater Samples

Sample Date	TCE Concentration (µg/L)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
FY03						
23-Jan-03	1.16		Environmental	QED	GEL	
11-Jun-03	1.15	J	Environmental	QED	GEL	

Values in bold exceed MCL of 5.0 µg/L.

B1 = Analyte detected in the associated trip blank sample.

ERCL = Environmental Restoration Chemistry Laboratory.

GEL = General Engineering Laboratories.

HT = Analysis performed outside holding time requirements.

J = Result detected below reporting limit or laboratory practical quantitation limit and / or is an estimated value.

ND = Not detected at reporting limit as indicated in parentheses. Where reporting limit may be either laboratory method detection limit or practical quantitation limit.

QED = QED Environmental Systems Inc.

U = Undetected.

Table 5 Summary of TCE in CWL-MW6U Groundwater Samples

Sample Date	TCE Concentration (μg/L)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
FY94						
30-Aug-94	ND(1)	U	Environmental	Bennett	Encotec	
FY95						
7-Nov-94	ND(1)	U	Environmental	Bennett	Encotec	
13-Feb-95	ND(1)	U	Environmental	Bennett	Encotec	
15-May-95	ND(0.5)	U	Environmental	Bailer	Quanterra	Bailer sample collected prior to purge.
19-May-95	ND(2)	U	Environmental	Bailer	ERCL	Bailer sample collected prior to purge.
22-May-95	ND(1)	U	Environmental	Bennett	Encotec	
22-May-95	ND(2)	U	Sample split	Bennett	ERCL	
16-Aug-95	ND(0.5)	U	Environmental	Bailer	Lockheed	Bailer sample collected prior to purge.
16-Aug-95	ND(2)	U	Sample split	Bailer	ERCL	Bailer sample collected prior to purge.
21-Aug-95	ND(0.5)	U	Environmental	Bennett	Lockheed	
FY96						
13-Nov-95	ND(1)	U	Environmental	Bennett	Encotec	
13-Nov-95	ND(0.5)	U	Sample split	Bennett	ERCL	
6-Feb-96	ND(2)	U	Environmental	Bailer	ERCL	Bailer sample collected prior to purge.
15-Feb-96	ND(1)	U	Environmental	Bennett	Encotec	
14-May-96	ND(0.5)	U	Environmental	Bailer	ERCL	Bailer sample collected prior to purge.
29-May-96	ND(1)	U	Environmental	Bennett	Encotec	
15-Aug-96	ND(1)	U	Table	Bennett	Encotec	
FY97						
12-Nov-96	ND(1)	U	Environmental	Bennett	Core	
17-Feb-97	ND(0.5)	U	Environmental	Bennett	ERCL	
14-May-97	0.14	J	Environmental	QED	GEL	
22-Aug-97	ND(1)	U	Environmental	QED	GEL	Sample collected from top of water colunm.
FY98						
19-Nov-97	ND(1)	U	Environmental	QED	GEL	Sample collected from top of water colunm.
12-Feb-98	0.38	J	Environmental	QED	GEL	
21-May-98	0.61	J	Environmental	QED	Quanterra	Sample collected from top of water colunm.
July 1998 Actvie Vapor Extraction Voluntary Corrective Measure ends.						
14-Aug-98	0.7	J	Environmental	QED	Quanterra	
FY99						
11-Nov-98	ND(1)	U	Environmental	QED	Quanterra	Sample collected from top of water colunm.
10-Feb-99	ND(1)	U	Environmental	QED	Quanterra	Sample collected from top of water colunm.
19-May-99	ND(0.5)	U	Environmental	QED	ERCL	Sample collected from top of water colunm.
19-May-99	ND(1)	U	Sample split	QED	GEL	Sample collected from top of water colunm.
25-Aug-99	ND(2)	U	Environmental	QED	ERCL	Sample collected from top of water colunm.
FY00						
18-Oct-99	ND(0.5)	U	Environmental	QED	ERCL	Sample collected from top of water colunm.
9-Feb-00	0.59	J	Environmental	QED	ERCL	Sample collected from top of water colunm.
FY01						
29-Jan-01	0.72	J	Environmental	QED	ERCL	Sample collected from top of water colunm.
30-Jul-01	0.71		Environmental	QED	ERCL	Sample collected from top of water colunm.
FY02						
11-Feb-02	0.398	J, P2	Environmental	Bennett	GEL	
11-Feb-02	0.373	J, P2	Duplicate	Bennett	GEL	
16-Aug-02	ND(0.360)	U	Environmental	Bennett	GEL	

Table 5 Summary of TCE in CWL-MW6U Groundwater Samples

Sample Date	TCE Concentration (μg/L)	Data Qualifier	Sample Type	Sample Method	Lab	Comments
FY03						
14-Jan-03	ND(0.360)	U	Environmental	Bennett	GEL	
6-Jun-03	0.374	J	Environmental	Bennett	GEL	

ERCL = Environmental Restoration Chemistry Laboratory.

GEL = General Engineering Laboratories.

J = Result detected below reporting limit or laboratory practical quantitation limit and / or is an estimated value.

ND = Not detected at reporting limit as indicated in parentheses. Where reporting limit may be either laboratory method detection limit or practical quantitation limit.

P2 = Insufficient quality control data to determine laboratory precision.

QED = QED Environmental Systems Inc.

U = Undetected.

Attachment
Plug and Abandonment Plan
Monitoring Well CWL-MW2A

Table of Contents

1.0 INTRODUCTION

CWL-MW2A, a groundwater monitoring well, is part of the groundwater monitoring network at the Chemical Waste Landfill (CWL) and is proposed for plugging and abandonment.

2.0 BACKGROUND

CWL-MW2A was installed in 1988 and is located 70 feet west of the landfill boundary. This well will be abandoned for the following reasons:

- The upper 9 feet of well casing (polyvinyl chloride [PVC] well riser) became separated in December 2003, and annular material (soil and grout) fell into the well, which resulted in partial clogging of the screen.

- It is expected that the well cannot be rehabilitated because tools are likely to get stuck or be unable to pass the two documented bends in the well. Rehabilitation would require tools, such as bailers and brushes, to clean the screen and remove the sloughed material.

- If the well could be rehabilitated, it would have a useful life of two to three years because of the documented water level decline at the CWL. The water level is declining at a rate of approximately 0.6 feet/year at CWL-MW2A.

- Based upon the condition of the entire well casing, it is suspected that trichloroethene (TCE) vapors may be leaking through the annulus and into the well casing.

3.0 WELL CONSTRUCTION

The total depth (TD) of Monitoring Well CWL-MW2A is 495 feet below ground surface (fbgs) (Figure 1). The CWL-MW2A borehole was drilled in 1988 utilizing air rotary casing hammer to a TD of 527 fbgs. A 14-inch borehole was advanced to 200 fbgs and a 10-inch borehole was drilled from 200 fbgs to a TD of 527 fbgs. The well is a standard completion with volclay backfill, bentonite seal, and a sand pack. The monitoring well was installed to 495 fbgs with a screen from 473 to 493 fbgs. The borehole was backfilled with volclay from 495 to 527 fbgs. The blank casing is Schedule 80 threaded 4.8-inch inside diameter (ID) and 5.5-inch outside diameter PVC, the screen is 4.8-inch ID stainless steel with 0.010 slot. The sump material is unknown.

4.0 WATER LEVELS

The water level in CWL-MW2A was 487.61 fbgs in September 2003. Water levels have declined approximately 0.6 feet/year due to a regionally decreasing water table. Assuming a minimum of 3 to 4 feet of water is required in the screened interval for Bennett™ pump sampling, CWL-MW2A was predicted to not have sufficient water for New Mexico Environment Department (NMED)-approved compliance sampling by 2006 to 2007. However, the well suffered irreparable damage on December 16, 2003, and currently contains grout and soil in the screened interval. The current water level in CWL-MW2A is insufficient for sampling requirements.

5.0 PLUGGING AND ABANDONMENT

5.1 Objective

The objective is to plug and abandon Monitoring Well CWL-MW2A to eliminate the potential for migration of contamination from the vadose zone to the underlying regional groundwater. All grouting techniques and grout mixtures will minimize grout intrusion into the native formation in order to eliminate the possibility of contaminating nearby wells with grout.

5.2 Scope of Work

CWL-MW2A will be drilled out in order to remove the well and the annular backfill materials. The resulting borehole will be grouted to the surface. The drilling will be performed using mud rotary with a 14-inch-diameter bit (the diameter of the original borehole to 200 fbgs). The well blank is PVC and the screen is stainless steel. Therefore, it is anticipated drilling will stop at the stainless steel.

At this point, the drill string will be removed, and a tool will be lowered to attempt to the remove the screen and sump. If it is possible to extract the casing, drilling will resume to a TD of approximately 500 fbgs. In the event it is not possible to pull the screen, the borehole will be grouted with the screen in place.

The borehole will be grouted to the surface using cement grout slurry containing 3- to 5-percent bentonite with a grout weight of 13.5 to 14 pounds/gallon. The borehole may be grouted in a single day, allowed to set overnight, and topped off the following morning. A tremie pipe will be used to place the grout from the bottom up.

The existing well pads and stanchions will be removed. A concrete pad, 3 feet square and a inimum of 4 inches thick, will be constructed at the location. A brass marker, supplied by Sandia

National Laboratories/New Mexico, containing the well name, TD, and date of plugging and abandonment will be set in the concrete pad.

5.3 Additional Procedures

Applicable Field Operating Procedures and Administrative Operating Procedures are listed in Table 1. This site-specific plan will be used as the primary guidance in the field.

Table 1
Applicable Operating Procedures

Number of Procedure	Title/Date of Procedure
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings Rev. 1, 12/16/96
FOP 94-25	Documentation of Field Activities, Rev. 0, 11/4/94
FOP 94-26	General Equipment Decontamination, Rev. 1, 2/20/97
FOP 94-38	Drilling Methods and Drill Site Management, Rev. 0, 4/14/94
FOP 94-42	Integration of the Design, Installation, Rehabilitation, and Decommissioning of Environmental Restoration Wells, Rev. 1, 5/31/94
FOP 94-43	Decommissioning of Wells, Rev.0, 5/31/94
FOP 94-57	Decontaminating Drilling and Other Field Equipment, Rev. 0, 5/31/94
FOP 94-68	Field Change Control, Rev. 2 (in revision)
FOP 94-69	Personnel Decontamination (Level D, C, and B Protection), Rev. 1, 1/23/98
AOP 94-24	System and Performance Audits, Rev. 0, 1/12/95
AOP 94-25	Deficiency Reporting, Rev. 0, 1/12/95

5.4 Equipment Decontamination

The rig and related equipment will be pressure-washed prior to the beginning of plugging and abandonment operations. Decontamination of equipment will also be required after completing the abandonment. Decontamination waste must be kept to a minimum, containerized, and labeled in DOT 17-H, and placed on spill control pallets.

5.5 Health and Safety

Level D personal protective equipment is required for all operations. Health and safety records associated with site personnel must be maintained on site and be available at the commencement of activities. All personnel shall operate under the requirements of the Health and Safety Plan and shall have 40-Hour Occupational Safety and Health Administration HAZWOPER training and be current with standard annual refresher training requirements.

The proximity of the well to the CWL requires all personnel to be aware of activities at that site. Activities at the CWL will be discussed at the daily tailgate safety meeting.

6.0 PRE-FIELD ACTIVITIES

Pre-field activities that must be completed prior to commencement of abandonment include:

- Prepare the Statement of Work for abandonment
- Prepare the Health and Safety Plan
- Prepare the Waste Management Plan
- Complete field checklist for review and approval
- Obtain Excavation Permit
- Conduct readiness review meeting

7.0 POST-FIELD ACTIVITIES

Post-field activities that must be completed soon after the abandonment is completed include:

- Submit copies of the Field Notebook, completed field forms, and any other project documentation to the Records Center for inclusion into the well file.

- Submit information that the well has been abandoned to the Environmental Restoration Data Management System so the Well Database Summary Sheet is updated.

- Notify the NMED of the project completion.

FIGURE

WELL DATABASE SUMMARY SHEET

Project Name:	CHEM WASTE LANDFILL	**Geo Location:**	TA-III
ER ADS #:	1267	**Well Completion Date:**	01-AUG-1988
Well Name:	CWL-MW2A	**Completion Zone:**	SILTY SAND/CLAYEY GRAVEL
Owner Name:	SNL	**Formation of Completion:**	SANTA FE GROUP
Date Drilling Started:	01-AUG-1988	**Well Comment:**	WATER LEVEL MEASURED ON 10-OCT-88
Drilling Contractor:	WATER DEVELOPMENT CORPOI		
Drilling Method:	AIR ROTARY/CASING HAMMER		
Borehole Depth:	527		
Casing Depth:	495		

Survey Data

Survey Date: 01-JAN-1990

Surveyed By:

State Plane Coordinates

(X) Easting: 414168.84

(Y) Northing: 1444979.66

Surveyed Elevations (FAMSL)

Protective Casing:	5419.31
Top of Inner Well Casing:	5418.58
Concrete Pad:	5417.16
Ground Surface:	5417.08

Calculated Depths and Elevations

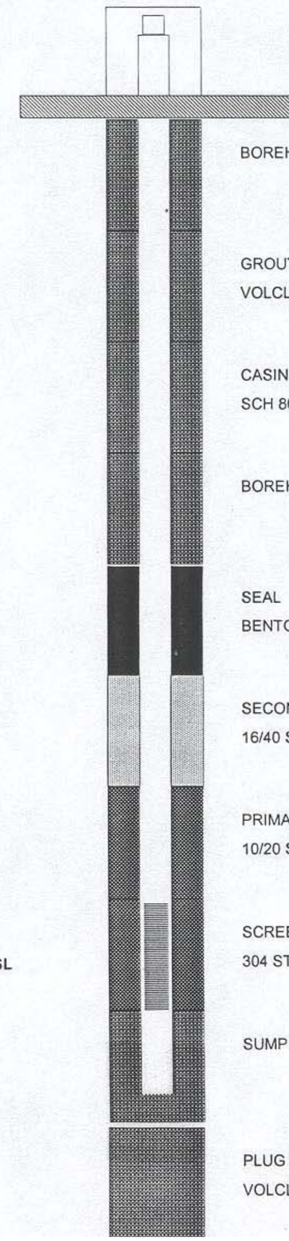
Initial Water Elevation: (FAMSL) 4940.01

Initial Depth To Water: (FBGS) 478.57

Last measured water level was 4934.3 **FASL**
measured on 02-AUG-1996

Date Updated: 14-MAR-00

Date Printed: 27-FEB-2004



Completion Data Measured Depths (FBGS)

Casing Stickup:

Interval		Start	Stop
BOREHOLE		0'	200'
	O.D.		14"
GROUT/BACKFILL VOLCLAY		0'	452'
CASING SCH 80 PVC	I.D. 5"	0'	495'
BOREHOLE		200'	527'
	O.D.		10"
SEAL BENTONITE		452'	461'
SECONDARY PACK 16/40 SILICA SAND		461'	466'
PRIMARY PACK 10/20 SAND		466'	495'
SCREEN 304 STAINLESS STEEL	Slot Size .01"	473'	493'
SUMP		493'	495'
PLUG BACK VOLCLAY/BENTONITE		495'	527'

Figure 1
Monitoring Well Completion Diagram