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Sandia Corporation
Albuquerque, New Mexico
October 20, 2008

DOE/Sandia Responses to NMED "Notice of Disapproval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Well MWL-BW1 Installation of Groundwater Monitoring Well MWL-BW2, April, 2008 Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-08-015 " August 25, 2008

INTRODUCTION

This document responds to comments received in a letter from the New Mexico Environment Department (NMED) to the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) dated August 25, 2008 regarding the Mixed Waste Landfill (MWL) at Sandia National Laboratories (SNL). The letter is entitled "Notice of Disapproval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Well MWL-BW1 Installation of Groundwater Monitoring Well MWL-BW2, April, 2008 Sandia National Laboratories" [EPA ID NM5890110518, HWB-SNL-08-015].

This document lists each NMED comment, and the DOE/Sandia response to that comment. The NMED comment is listed in boldface, followed by the DOE/Sandia response, written in normal font under "Response".

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.

Comment 1: Section 2.4, Initial Ground Level and Well Construction, 4th paragraph states "A 30-ft volclay coarse chip plug was placed from 426 to 456 bgs. The first 18 ft of chips were hydrated and allowed to set overnight. The next day, chips were added to 426 ft bgs, hydrated, and allowed to set for approximately 2 hours." Apparently based on this information two separate lifts were placed, followed by hydration of the chips. However, the work plan calls for 5-ft lifts with hydration done between each lift, or placing 6 separate lifts. Clarify how many lifts were emplaced.

Also, associated with the above paragraph, the response of the SNL to item 8 in NMED's Notice of Deficiency dated June, 2007, includes "also, please note that the first sentence of the fourth paragraph in Section 5.2.2 of the plan has been changed from "A 30-ft thick layer of ¼-inch bentonite pellets or 3/8-inch bentonite chips will be placed above the filter pack…" to read "A 10-ft thick layer of ¼-inch bentonite pellets or 3/8-inch bentonite chips…". This change was made based on the consultations with experienced well drillers who pointed out that a 30-ft thick layer of bentonite pellets/chips would be difficult to confidently install inside drive casing." Clarify why SNL chose to stay with the 30-ft layer after requesting and getting approval for a 10-ft layer.

Response 1: As stated in the report, there was 18 feet of bentonite plug material that was placed in the borehole and then hydrated and allowed to set overnight. The next morning, another 12 feet of bentonite plug material was placed in the borehole, hydrated, and allowed to set for 2 hours. This would constitute 2 lifts of bentonite plug material for the 30-ft plug.

Following further discussion with the drilling contractor during the bentonite plug placement, DOE/Sandia made the decision to place a 30-feet plug and hydrate as stated in the report. Apparently, the earlier discussion was with a different drilling contractor. The contractor that installed MWL-BW2 (WDC Wells and Exploration) preferred to place a 30 foot plug to ensure a solid plug to hold the weight of the grout. DOE/Sandia will consider all such modifications to approved well construction details that are made during well installation to be variances and these will be listed as such in future reports.

Comment 2: The work plan calls for use of centralizers and has spacing specifications. Discuss the installation of centralizers and their spacing.

Response 2: A discussion of the placement of centralizers was inadvertently omitted from the summary report. PVC centralizers were placed below and above the screen section and then every 100 feet to the surface.

Comment 3: The work plan, Section 5.2.3, Well Development, states "representative water is assumed to be obtained when pH, temperature, turbidity, and specific conductivity readings stabilize (less than 10% variability over three consecutive well bore volumes) and the water is visually clear of suspended solids with a target turbidity of less than five Nephelometric Turbidity Units (NTUs)". The field data

submitted in the report shows that these conditions were met except for turbidity, which did not stabilized to within 10% variability. However, NMED does accept that the well was adequately developed and that the representative groundwater samples can be obtained. However, rewording of the above criteria should be considered in any future work plans to avoid confusion as to what situations are applicable for the two different criteria for turbidity.

Response 3: The turbidity measurements over the last 150 gallons (3.5 bore volumes) were within the target turbidity of less than five NTUs, but the last three measurements of 2.94, 2.89, and 3.39 where not within 10% variability. The other parameters of pH, temperature, and specific conductivity were within 10% variability. Specifically, the DOE/Sandia Field Operating Procedure (FOP) 94-41 "Well development" states:

> After the minimum well bore volumes have been removed, development should continue until representative water is obtained. Representative water is water that is free of drilling fluids, cuttings, or other materials introduced during well construction. Representative water is assumed to have been obtained when pH, temperature, turbidity, and specific conductivity readings stabilize (less than 10 % variability over 3 consecutive well bore volumes) and the water is visually clear of suspended solids. In addition to this criterion, it is generally agreed that the well should also be developed until the turbidity is less than five (5) NTUs. This limit is derived from water quality standards contained in the Environmental Protection Agency's (EPA) Safe Drinking Water Act (SDWA). Although monitoring wells are rarely used for purposes other than sampling and testing, the optimum sampling results appear to be obtained when the turbidity limit set forth in the SDWA is achieved.

DOE/Sandia will revise FOP 94-41 and set the primary goal for turbidity to be less than 5 NTUs, as recommended by the EPA. The primary goal for turbidity will be defined in future work plans and any deviation from that in the development activities will be considered a variance.

Comment 4: Section 5.0 Variances, states "there were no instances of variance from either Plan or the FOPS/AOPs during these activities". However, NMED notes at least two instances of variance. One state in Section 2.4, Initial Groundwater Level and Well Construction, 4th paragraph, where the use of #60 sand instead of #40-60 sand is acceptable for the reason stated, but such a change is a variance from the plan. Another example is that the plan calls for cutting off the casing at approximately 5 ft bgs. As discussed in Section 3.0, Plug and Abandonment, 2nd paragraph in the report, the casing was cut off at about 14 inches above ground. Again, this is acceptable for the reason stated, but it is still a variance. There may be other variances depending upon the answers to the above items. List and discuss each variance.

Reponses 4: DOE/Sandia did not consider the use of #60 sand to be a variance from the stated use of the sand mixture containing #40 and #60 sand. DOE/Sandia will consider

this a variance in any future work.

During the P&A of MWL-BW1 it was not possible to cut the well casing off 5 feet bgs, as was stated in the work plan. A 20-foot length of conductor casing left in place during the mud-rotary installation was firmly cemented in place with the well casing, preventing access to cut the well casing.

DOE/Sandia will consider these occurrences and all future deviations in P&A and installation activities of groundwater monitoring wells from the stated work plan as a variance.

Comment 5: Much of the Combination Lithologic and Geophysical Logs with Well Construction Details for the MWL-BW2 submitted in Attachment C is difficult to read, submit a readable version. Also, submit an electronic version of the geophysical log data, preferably in depth/value spreadsheet format.

Response 5: The lithologic log has been prepared in a different format and is provided as Attachment A. An electronic version of the geophysical data has been provided to the NMED under separate cover.

ATTACHMENT A
LITHOLOGIC LOG

Sandia National Laboratories

Visual Classification of Soils

WELL NAME: MWL-BW2	PROJECT NAME: SNL/NM MIXED WASTE LANDFILL/TA-III	
WELL DEPTH: 502.0 FT (FBGS)	OWNER NAME: US DOE	DATE STARTED: 1/14/08
ELEVATION: 5386.00 FT	GWL: 4915.85 FT (FAMSL) on 1/18/08	DATE COMPLETED: 1/15/08
BOREHOLE DEPTH: 519.0 FT (FBGS)	DTW: 472.5 FT (FBGS) on 1/18/08	WELL INSTALLATION: 1/22/08
CASING DEPTH: 502.0 FT (FBGS)	ENGINEER/GEOLOGIST: Stacy Griffith	PAGE: 1 of 5
DRILLING METHOD: Air Rotary Casing Hammer		

DEPTH (feet) bgs	MWL-BW2 DESCRIPTION	LITHOLOGIC SYMBOL	USCS SYMBOL	REMARKS
0	0-80, light brown (5YR 6/4), unconsolidated, dry, fine to medium grained sand, some gravel. Gravel is subangular fine to medium grained. Various composition		GM	
80	80-100, silty sand, light brown (5YR 6/4), unconsolidated, dry, fine grained sand, trace medium grained gravel		SM	
100	100-120, no sample collected, cuttings as above		SM	
110				

NOTES:

Drilling Contractor: WDC Exploration and Wells
Drilling Method: Air Rotary Casing Hammer
Completion Zone: Alluvial Fan Facies
Completion Formation: Santa Fe Group

Borehole diameter is 11.75 in. to 300 FBGS and 9.625 in. from 300 FBGS to 519.0 FBGS

Elevation: Referenced to Ground, ft amsl
Coordinate System: SPC NM Central, NAD 83
Easting: 411947.89/Northing: 1452389.85

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DRILLING METHOD: Air Rotary Casing Hammer		

DEPTH (feet) bgs	MWL-BW2 DESCRIPTION	LITHOLOGIC SYMBOL	USCS SYMBOL	REMARKS
110			SM	
120	120-155, silty sand, light brown (5YR 6/4), unconsolidated, dry, fine grained sand, trace medium grained gravel		SM	
160	155-180, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, fine to medium grained sand and gravel. Gravel subangular, fine to medium grained. Various composition		GM	
180	180-200, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, fine to medium grained sand and gravel. Gravel fine to coarse grained		GM	
200	200-220, no sample collected, cuttings as above		GM	
220				

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DRILLING METHOD: Air Rotary Casing Hammer		

DEPTH (feet) bgs	MWL-BW2 DESCRIPTION	LITHOLOGIC SYMBOL	USCS SYMBOL	REMARKS
220	220-260, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, fine to medium grained sand and gravel. Gravel medium to coarse grained		GM	
260	260-285, no sample collected, cuttings as above		GM	
290	285-420, silty sand, light brown (5YR 6/4), unconsolidated, moist silt and fine grained sand. Slight plasticity. Trace gravel		SM	Reduction in borehole diameter at 300 FBGS
330				

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DRILLING METHOD: Air Rotary Casing Hammer		

DEPTH (feet) bgs	MWL-BW2 DESCRIPTION	LITHOLOGIC SYMBOL	USCS SYMBOL	REMARKS
330				
340				
350				
360				
370			SM	
380				
390				
400				
410				
420				
	420-435, clayey silts, light brown (5YR 6/4), clay, silt and fine grained sand. Medium stiff		ML	
430				
	435-460, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, medium grained sand and gravel. Gravel medium to coarse grained		SP	
440				

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CASING DEPTH: 502.0 FT (FBGS)	ENGINEER/GEOLOGIST: Stacy Griffith	PAGE: 5 of 5
DRILLING METHOD: Air Rotary Casing Hammer		

DEPTH (feet) bgs	MWL-BW2 DESCRIPTION	LITHOLOGIC SYMBOL	USCS SYMBOL	REMARKS
440				
450			SP	
460	460-470, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, fine to coarse grained sand and gravel		SW	
470 ▽	470-472, sand and gravel, light brown (5YR 6/4), unconsolidated, dry, fine to coarse grained sand and gravel. Trace silt and clay		SW	
480	472-519, Cuttings return poor below water level. According to geophysical log, formation consists of saturated, interbedded sands with silts and clay		SM/ML	
490				
500				
510				
520				
530				
540				
550				

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