From: David McCoy [mailto:dave@radfreenm.org]
Sent: Monday, February 11, 2013 4:46 PM
To: Kieling, John, NMENV
Cc: Marlene Quintana; Janet Greenwald/CARD; Lesley Weinstock; Robert H Gilkeson, registered geologist; Amigos Bravos/Michael Jensen (mjensen@amigosbravos.org); Brian Shields/Amigos Bravos (bshields@amigosbravos.org); CARD; CCNS/Joni Arends; CCNS/Sadaf Cameron; Meiklejohn, Doug; Jay Coghlan; John Witham/NukeWatch (john@nukewatch.org); Nuclear Watch/Scott Kovac; Sylvia Ledesma (Izkalli@comcast.net); Penny McMullen; Sheri Kotowski (serit@cybermesa.com); sricdon@earthlink.net (sricdon@earthlink.net); Bob Aly; Willard Hunter; Marlagayle@aol.com (Marlagayle@aol.com); Paul Robinson; stephanie hiller; darobe3@centurylink.com; Sue Dayton
Subject: Supplemental Comments LTMMP

Dear Mr. Kieling,

Please see the attached comments for the LTMMP and documents attached to this email from Citizen Action, Citizens for Alternatives to Radioactive Dumping, Albuquerque's Endangered Aquifer Group, and Agua es Vida Action Group. That the Senator Bingaman, the media, the EPA Region 6 and EPA Office of Inspector General and ABC Water Utility Authority have followed this matter is indication that a public hearing is required.

Sincerely,

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withindexing requirements. For more information on staffing associated with this assignment, please see workpapers C.1.PS.8 and C.1.PS.7.

Source:
October 15, 2008 meeting in OIG conference room, Dallas Texas. Individuals at the meeting were:

Larry Dare, Project Manager, EPA OIG, Washington, DC Edward Baldinger, Auditor, EPA OIG, Chicago, IL (b)(6) (b)(6) Hyrdologist, EPA Region 6, Federal Facilities, Dallas, Texas

Kathrn Hess OIG Questions -- Kathryn Hess, EPA OIG, Boston Ma (B.4.8) **B.4.8**

Scope/Methodology:
Discuss with (b)(6) his observation, thoughts, and comments as to the response to CANM's 22 questions and obtain his opinion on certain matters related the MWL monitoring system..

Details/Summary:
ELL 12/14/2009 We provide more substantive conclusions in wps prepared by CEZ

(b)(6) stated that he did not have any prior connection with the site. In fact he does not report to (b)(6) He also stated that Region 6 had its results preconcieved. Region 6 management did not want to NMED doing anything wrong. Therefore, management created a structure to ensure the appropriate outcome would result. Furhtermore, as the writing and draft comments progressed to a final letter, the team was pushed more and more to agree with NMED's position. He also stated that the teams' initial evaluation would have changed the soultion at Sandia MWL. NMED pushed exremely hard for EPA Region 6 not to even question the past results or the viability of past test results. Finally ,he stated that CANM got short changed by Region 6.

(b)(6) stated that EPA Region 6's December 13, 2007, 6 letter (**A.2.2** A.2.2) to CANM and Mr. Gilkerson did not answer their questions or included (b)(6) and his analysis because they did not entirely agree with NMED's position. He also believed that CANM's and Mr. Gilkerson's analysis of MWL's groundwater flow and groundwater monitoring well network was through, well documented, and included some stretchs but none-the-less thorough.

(b)(6) **stated that the old wells, prior to the new installation of 3 wells, were located in the wrong location, wrong depths, stainless steel well screens were corroded, and several had problems with obtaining sufficient water [gone dry] to collect samples. He also stated that the corrision to the stainless steel screens within some of the MWL monitoring wells and factors such as the well going dry may have may have skewed the sample results for some of the monitoring wells. Thus,**
the stated that the data is questionable from the 2 improperly screened and located wells. He strongly believed that the new wells should be located at the north end of the landfill because of dispersion and to compensate for the possibility that the flow direction could be slightly off

Bentonite in Wells

Procedure Standard Report

(b)(6) **stated that the issue CANM raised about bentonite being in the wells was not as big a deal as CANM has described**. Because of the geogology in that part of the state, the driller has to do something to keep the hole opened in order to put in the casementand screeneing.

EPA OIG list of questions anbout Moats Report and CANM's July 4, 2008 letter to NMED

OIG asked (b)(6) if he believed the questions prepared by the OIG Hydrologist would address the inconsistencies between the reports. (b)(6) looked at the questions and stated that conceptually and intellectually he agreed with the questions.

Moats Report

(b)(6) **stated that he did not evaluate the Moats report**. He believed that the EPA Laboratory is capable of the review but USGS would be better for questions regarding drilling methods and the EPA Laboratory in Las Vegas regrding corrosion issues.

Conclusion:

[OIG Second Team Note: The conclusions below in red were added by the second team, drawing exclusively on the information in the Details/Summary section of this workpaper. The conclusions below the blue line were found and documented by the initial research team. No conclusions from this section have been used in the draft or final reports for this project, although the content of the Details/Summary has.]

(b)(6) **reports that in his opinion the Region 6 team asked to investigate the CANM claims of mismanagement at Sandia were pushed to agree with NMED in their findings. He also notes that in his opinion, the information provided by Region 6 to CANM in its letter (see workpaper A.2.PS.6 A.2.PS) did not fully respond to CANM's questions.**

ELL 1/11//2010 the former team's analysis fails to capture the concerns offerd by (b)(6) The issue of oversight is not moot according to this testimony. Disciplinary action were taken to ensure this error is not repeated.

Regional technical staff determined that several old monitoring wells at MWL, prior to the new installation of 3 new wells, were located in the wrong location and not functioning because the wells had gone dry and the wells screens were corroded.

LD, 2009-05-28: (b)(6) also noted that Sandia has installed three new wells and the issue is not moot.

Citizen Action Supplemental Comments to Sandia National Laboratories (SNL) Long-Term Monitoring and Maintenance Plan (LTMMP) for the Mixed Waste Landfill (MWL), an Unlined Radioactive and Hazardous Waste Dump
February 11, 2013

Citizen Action New Mexico ("Citizen Action") is a 501 (c)(3) non-profit public interest organization located in Albuquerque, New Mexico that has participated in proceedings for the Sandia MWL since 1999. Citizens for Alternatives to Radioactive Dumping (CARD), Albuquerque's Endangered Aquifer Group, and Agua es Vida Action Team (AVAT) join in the comments herein.

As part of these supplemental comments, the full report, executive summary and attachments of Registered Geologist Robert Gilkeson and Citizen Action **Defective Groundwater Protection Practices at the Sandia National Laboratories' Mixed Waste Landfill – The Sandia MWL dump- Version January 22, 2011** is included herein by reference thereto. The report can be found at www.radfreenm.org by clicking on the link entitled Ground Water Contamination at Sandia's Mixed Waste Dump.

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SNL operated the MWL from 1959 to December 1988 for receiving RCRA hazardous and mixed hazardous waste without obtaining a hazardous waste permit as required by the Resource Conservation and Recovery Act. The five year review requirement of the2005 Final Order has not been met for the MWL.

Appropriate RCRA decision making procedures (public participation) for the LTMMP have not been followed because of the exclusion of the public from material information to which the public was entitled during hearings for the Final Order (2005 Curry) and subsequent proceedings under the Final Order and Corrective Action process that led to the LTMMP.

While the thoroughness and completeness of the MWL inventory may be in question, the administrative record reveals that the inventory in the MWL includes depleted uranium; uranium; approximately 270,000 gallons of reactor coolant water; liquid wastes; radioactive metals; low-level fission products; high efficiency particulate air (HEPA) filters; liquid scintillation cocktail (LSC) vials; plutonium; tritium; contaminated oils and other liquids; and explosives (AR 002689); Cobalt 60; 20,000 lbs. of Cesium contaminated soil; 360,000 pounds of contaminated equipment; and Polaris missile sections contaminated with Thorium (AR 004498). Soil samples collected from beneath the MWL show the presence of listed hazardous wastes and chemicals including, but not limited to, cyanide, arsenic, beryllium, cadmium, chromium, lead, ***nickel***, trichloroethane, toluene, and xylene. (AR 002901-002929). (See 40 CFR Part 261 Appendix VIII). The unclassified area trenches (A-G) MWL contained RCRA regulated heavy metal contamination, including cadmium-115, chromium-51, and silver-110. Unknown quantities of wastes containing lead have been disposed of in Trenches A, B, and C. (AR 006341).

The 2008 soil gas analysis shows release of soil gas from the MWL increasing in some instances to the 50 ft level. Deeper soil gas testing was not performed.

Risk analyses performed for the MWL do not take into consideration the full release of the contents of the MWL over time.

The placement of a dirt cover over the transuranics, Greater than Class C radionuclides, low level radioactive waste, VOCs, SVOCs, and heavy metals constitutes an illegal disposal of these materials with great potential for migration into the air and water. No liners, no leachate collection. No reliable RCRA conforming well monitoring network exists to monitor this disposal.

According to the 2006 TechLaw, Inc. report, the dirt cover cannot demonstrate ongoing integrity during the 1000-year performance period. There is possibility for erosion and flooding of the cover and MWL during the performance period. According to TechLaw, Inc. (2006):

> **"It is unlikely that the United States federal government can or will maintain the integrity of the cover, as stated for the entire 1,000-year performance period."**

There is no continuous monitoring of releases to the unsaturated strata known as the vadose zone at the MWL as required by RCRA 264 Subpart F. (See also Subpart M 40 CFR 264.278—Unsaturated zone monitoring). RCRA hazardous wastes including solvents and heavy metals have left the point of compliance of the bottoms and vertical sides of the pits and trenches of the MWL. SNL has not remediated the RCRA releases and NMED has failed to order remediation for the releases under corrective action. Instead NMED has set up a scheme for only monitoring and "trigger" requirements. This impermissible scheme would allow RCRA contaminants to contaminate the vadose zone and the groundwater beneath the MWL

The fact that the NMED is willing to allow these dangerous wastes to remain in place above drinking water in unlined pits and trenches at the MWL is indicative of little respect for hazardous waste management law, human life and the environment in the decision making process. Similar wastes to those at the MWL have reached the groundwater at several SNL sites- Tijeras Arroyo Groundwater, Technical Area V, the Chemical Waste Landfill and numerous Solid Waste Management Units ("SWMUs").

NMED decision making for the MWL is characterized by: violation of state and federal hazardous waste management law (RCRA), violation of the Public Records Act, the Open Meetings Act, furnishing and approving false and/or incomplete information, and denial of public participation rights in the decision making process.

NMED has known since at least 1994, that "The monitoring system is inadequate." (Administrative Record ("AR") 006227, at 45.) See also, AR 004829-004833; AR 006224). Despite knowing the deficiencies of the well monitoring network at the MWL since the early 1990s, NMED and SNL/DOE falsely represented the data and information

from the well monitoring network and the wells as true and correct to the public and regulatory bodies, including but not limited to, the WERC, the EPA, the DOE, NMED, the City of Albuquerque and other local, state and federal agencies that made recommendations and/or regulatory decisions about the MWL.

RCRA groundwater monitoring requirements are flouted. It is known that the groundwater flow beneath the MWL at the water table is toward the south/southwest. No monitoring wells are placed to the south of the MWL even though there is a former acid pit on the southern boundary of the dump near the classified section.

SNL represents that the flow of groundwater at the water table is to the northwest in its 2011 groundwater map. If that is so, there also are no monitoring wells to the north of the MWL especially in the area north of the classified area.

The Fate and Transport Model that currently relies on assumed values rather than hard data from vadose zone and other characterization should be abandoned. NMED should reject the approval of the SNL Fate and Transport Model that is not based on reliable and representative groundwater monitoring. SNL/DOE admits the computer models lack of quality assurance: "We agree, however, that additional work and materials are needed to provide quality assurance for the models and software used in this particular study." (MWL CMI Plan NOD Comment Response Set 2, p.14). NMED has not ordered the update to the F&TM report as required by the Final Order (paragraph #5). EPA Region 6 disputes AF and ARG flow velocities.

The LTMMP Executive Summary states (p.i):

> "DOE/Sandia will implement the LTMMP to determine whether the MWL ET Cover is performing as designed and confirm that site conditions remain protective of human health and the environment. The MWL monitoring program is based upon the results of the site investigation process (SNL/NM September 1990 and September 1996), probabilistic performance-assessment modeling presented in the MWL CMI Plan (Ho et al. January 2007), and input from NMED and the public. The MWL monitoring program is based upon the results of the site investigation process (SNL/NM September 1990 and September 1996), probabilistic performance-assessment modeling presented in the MWL CMI Plan (Ho et al. January 2007), and input from NMED and the public."

All of these processes have been flawed in the first place due to a defective groundwater monitoring network that provided incorrect monitoring data that was identified from the early 1990s to the present.

The May 26, 2005 Final Order (Curry) ("Final Order") provides for a separate 5-year review for the feasibility of excavation of the MWL and whether the dirt cover remains effective. That 5-year study has not been performed and the LTMMP does not satisfy the requirement.

The Final Order (p. 5) requires that each 5 year report "shall update the fate and transport model ("FTM") for the site with current data." The FTM should have been updated as of May 26, 2010 and presented to the public for review, comment and NMED response to comments. The updated FTM has not been provided and is now also 2½ years overdue.

The probabilistic performance-assessment modeling presented in the MWL CMI Plan (Ho et al. January 2007) was not provided to the public for comment and review when it was issued. Failure to present the Ho et al FTM violated conditions 3 and 4 of the Final Order for review and comment and response to comments.

The probabilistic performance-assessment modeling presented in the MWL CMI Plan (Ho et al. January 2007), upon which the LTMMP relies, was based on unreliable and non-representative data from a defective groundwater monitoring network that was installed at the MWL. Ho et al did not consider the incorrect nature of the data presented and still has not corrected that data. NMED has failed to re-evaluate the data.

The Ho et al FTM was criticized by the 2006 TechLaw, Inc. report as pasted below:

> TechLaw reviewed the probabilistic performance-assessment model as requested; however, we have reservations regarding the level of detail presented in the Assessment. Compared to typical reports for modeling studies, the Assessment is very brief, particularly when considering the complexity of using a Monte Carlo approach with multiple models, scenarios, and constituents of concern. In general, the Assessment provides a narrative report of a probabilistic model that is presented as a "black box." The Assessment discusses the input parameters and selectively presents output results, but we do not have adequate information to assess that the "black box" is operating satisfactorily. The Assessment does not present a discussion regarding software quality assurance – we do not know how well the various models work separately or together. Also, the Assessment does not provide a critique of the modeling runs, except for an occasional qualitative statement. In contrast, a typical modeling report is a detailed and exhaustive presentation that addresses the conceptual development and construction of the model (i.e., the data quality objectives, the software code, etc.), the software quality assurance performed (including software validation and verification) to assess model performance both separately and when working together, the details regarding specific inputs and outputs for all runs of every scenario, and a quantitative analysis of the sensitivities of the input parameters, including an assessment of the bias of the model toward specific outputs. The Assessment, however, does not provide this level of information and we caution its acceptance without a full understanding of the "black box."

The 1st District Court of Santa decided that the NMED wrongfully withheld the TechLaw document from the public. http://www.radfreenm.org/pages/Legal/lg-2008oct08a.pdf The NMED still has not posted the TechLaw, Inc. document on the website and should include it in the administrative record for this proceeding. The 2006 TechLaw, Inc. report is a major document that should have been available for public comment and review especially since it was pertinent to the Ho et al FTM. NMED withheld the document from the public based on a mistaken notion of "executive privilege" and directly interfered with public participation for the F&TM upon which the LTMMP is in part based. NMED has manipulated the decision-making process, shown bias toward approval of SNL plans and prevented public participation by denying

information, bringing a baseless lawsuit and co-operating with EPA Region 6 to hide documents (see below).

2002 report by Goering, T.J., G.M. Haggerty, D. Van Hart, and J.L. Peace, 2002. "*Mixed Waste Landfill Groundwater Report*, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico," SAND2002-4098, Sandia National Laboratories, Albuquerque, New Mexico. Goering presented incorrect information that
1). there was a reliable network of monitoring wells at the MWL and
2). there was no evidence of groundwater contamination from the MWL dump.
Goering ignored the large number of expert reports in the NMED Administrative Record (AR) that described the monitoring well network at the MWL dump as inadequate and all seven of the monitoring wells were defective and required replacement.

LTMMP 4-11: Update, if necessary, the fate and transport model for the MWL with current data. Current monitoring results will be compared to the modeling performed in 2005. If the results indicate current conditions are not significantly different from the conditions previously modeled in 2005, the fate and transport model will not be updated. If the monitoring results fall significantly outside the range of conditions previously modeled, the fate and transport model will be updated to determine the likelihood of contaminants reaching groundwater

In late 2012, as the result of a lawsuit, Citizen Action began receiving documents from EPA Region 6 that had been improperly withheld under the Freedom of Information Act. A technical document entitled Sandia Mixed Waste Landfill Groundwater Monitoring Well System and Program Oversight Review ("Oversight Review" 12/12/07) and several "drafts" were withheld from the public. NMED was informed but disavowed knowledge of the contents of the Oversight Review to the public. (OIG Hotline Report April 2010).

Given the data deficiencies recognized by EPA Region 6 in the Oversight Review for the AF facies and the ARG aquifer, the Fate and Transport Model ("F&TM") is obviously in need of an update given the EPA Region 6 disagreement with flow rates that SNL claims for the AF facies and the ARG.

NMED is allowing the violation of Condition #5 of the Final Order without a Class 3 modification of the Permit and the Final Order. The values for the F&TM as presented by SNL are nothing more than what was described by the TechLaw, Inc. report as a "Black Box" that should not be used or accepted by NMED.

LTMMP states p 2-6:"Groundwater flows westward at an average velocity of 0.17 feet per year (ft/yr) in the alluvial fan deposits and 18.5 ft/yr in the Ancestral Rio Grande deposits."
According to EPA Region 6: "Sandia calculated the average linear flow velocity for the alluvial fan facies at 0.17 ft/year." EPA Region 6 does not agree with that value (12/12/07 Oversight Report, p. 4):

> **"For example, when reviewing the historical nitrate contamination found in the AF aquifer wells (BW1, MW1, MW2, MW3) we note that the actual flow**

velocity must be greater than the calculated value , otherwise the elevated nitrate would not be found in all the AF wells. Note that this assumes the source for the nitrate is to the east-northeast of the MWL, as claimed by Sandia."

EPA also disputes the flow velocity for the ARG aquifer at MWL(Id., p.4):

However concerning the ARG aquifer at the MWL, the flow velocity is less certain due to the fact that there is only one well screened solely in that aquifer, MW6."

The LTMMP also improperly describes the groundwater flow in the AF facies as being to the west. EPA stated (Oversight Review, p.7).

"The AF aquifer flow direction is to the west-southwest (based on our review of over 15 years of data), while the ARG aquifer flow direction is to the west-northwest (based on USGS information and the Sandia 1990 to 2001 Groundwater Reports).

The Moats Evaluation (2006) uses the same unverifiable and doubtful calculations of Goering (identified by EPA Region 6) and states (p.2/90):

"The AF Facies is characterized by low saturated hydraulic conductivity (10^{-7} cm/s), especially in its lower parts (Goering et al., 12/2002).
Underlying the AF Facies are somewhat coarser-grained fluvial sediments believed to have been deposited by an ancestral Rio Grande. This lower unit, the Ancestral Rio Grande (ARG) Facies, is characterized by saturated strata having a larger degree of lateral continuity and having hydraulic conductivities about two orders of magnitude higher than those of the AF Facies (Goering et al., 12/2002)."

Since the fate and transport modeling results are not based on verifiable results of groundwater monitoring or an adequate determination of the speed of groundwater flow, or the direction, there is no certainty that the 3-ft MWL cover will meet the EPA-prescribed technical equivalency criteria for RCRA landfills under both present and future conditions that is set forth in 40 CFR 264.301. Additionally, the value of hydraulic conductivity of no more than 10-7 cm/s is set for when a liner system is present and there is a closure and post-closure period, both of which are absent for the MWL. Rather than give an actual flow value for the AF Facies, Moats appears to pluck the value required for liner design and uses it for the flow velocity in the AF Facies.

Sandia provided false data to a congressionally appointed WERC committee on March 22, 2001, to the public, and to an administrative law judge at public hearings in December 2004. WERC was informed by DOE/SNL that there were 5 downgradient wells and an upgradient background monitoring well all of which was untrue. (See ATTACHMENT 1). The WERC was not provided information regarding the out of place, defective groundwater monitoring network at the MWL.

NMED failed to provide notice and opportunity for comment prior to the groundwater monitoring well replacements that were made at the MWL. The

replacement of a background well at another location requires a class 2 permit modification.

EPA recommended that NMED consider using low-flow pumping for well purging at the MWL to obtain reliable volatile organic samples. (EPA Oversight Report p.3-4). NMED has allowed inaccurate sampling for VOCs in the MWL for decades.

EPA recommended use of low level tritium analysis. (Oversight Report at p.5).

James Bearzi, John Kieling and William Moats were all in contact with the EPA Region 6 in 2007 regarding Citizen Action and Robert Gilkeson's complaint regarding defective groundwater monitoring wells at SNL and knew that the EPA Inspector General was auditing the situation. (Email Bearzi to Troy Hill 03//29/2007 FOIA #26). Bearzi, Kieling and Moats have never provided or demanded that SNL provide any correction of the record for the unreliable and unrepresentative sampling data furnished for the decision to leave the wastes under a dirt cover. NMED is required to order correction of the record by its own RCRA program but fails to comply with federal law.

NMED has deliberately omitted substantive technical information from presentation to the public to interfere with public participation in the decision making process leading up to the MWL LTMMP. In 2007 the NMED went so far as to sue Citizen Action to keep the information in a 2006 TechLaw, Inc. report secret from the public for three years in violation of the NM Public Records Act and RCRA public participation requirements. NMED still has not posted the 2006 TechLaw, Inc. on its website. (The report is Attachment 2).

NMED refuses to comply with the terms set forth in the NMED's Final Order for the MWL (May 26, 2005 Curry). A five year review for the MWL has been postponed for nearly three years without any legal justification.

NMED has a pattern and practice of writing technically false responses to citizen comments at every turn of the corrective actions process leading up to the LTMMP submittal. When public comments are written that challenge the objectivity of NMED, issuance of false and misleading information, or omission of substantive information, NMED dismisses the comments as "not relevant" or bases the NMED answer on documents known to contain false and misleading information. NMED and DOE/SNL pretend that the dirt cover is a "final remedy." The fact that a 5 year review requirement to consider excavation of the dump is in the Final Order argues to the contrary.

Nor has the NMED been alone in its effort to force an unwanted and non-protective dirt cover decision and LTMMP report on the public. The Environmental Protection Agency Office of Inspector General (*Region 6 Needs to Improve Oversight Practices* April 14, 2010) described EPA Region 6 management's and NMED's mutual co-operation to keep information from the public. The duty and policies of the EPA to provide relevant, correct and available information to the public were not carried

out by EPA Region 6 as is described in detail by an EPA OIG April 14, 2010 Hotline Report. The EPA OIG determined that EPA Region 6 was engaged in preventing technical information about the defective groundwater monitoring network and failed oversight from being provided to the Plaintiff and the public. The EPA OIG Hotline Report stated (http://www.epa.gov/oig/reports/2010/20100414-10-P-0100.pdf p. At a Glance):

> "Specifically, Region 6 staff (1) took inappropriate steps to keep the details of the MWL monitoring wells assessment from the public, (2) decided not to provide documentation or sometimes not to document their concerns about the MWL monitoring wells, (3) provided a letter to CANM that did not note the specific details of the assessment, or (4) improperly placed a national security marking (Confidential) on the assessment. The Region's actions are a violation of EPA's Public Involvement Policy and EPA's Records Management Policy."

The OIG further stated (p.15):

> **"OIG Response. The conclusion provided to CANM was that overall actions and decisions for administration of the authorized program were consistent with applicable RCRA requirements. That conclusion left unanswered some specific concerns Region 6 expressed in the Oversight Review with NMED's management of the MWL monitoring wells. However, the Region has no documentation to show what steps taken, if any, to resolve their specific concerns or how the overall conclusion was reached in spite of their concerns." (Original in bold).**

The OIG stated (p. 3) Region 6 withheld information from the public regarding the MWL monitoring wells through:

- discontinuation of record keeping,
- misleading communications, and
- inappropriate classification

OIG stated (p. 4) "The Project Engineer for Sandia intentionally did not document concerns with NMED's management of the MWL monitoring wells specifically to withhold the information from the public. Therefore, the Chief of Federal Facilities Branch has no documentation to support the Region's acceptance of the NMED's recommendations."

The OIG "found that "one Oversight Review team member felt the team was pushed to agree with NMED's position regarding the MWL monitoring wells." This bad faith process is described in an EPA OIG interview with a member of the EPA Region 6 team that was furnished in response to this lawsuit as Procedures Interviews (B.4.PS at p.10):

> "(b)(6) [name deleted] stated that he did not have any prior connection with the site. In fact he does not report to (b)(6). He also stated that Region 6 had its results preconceived. Region 6 management did not want to [sic] NMED doing anything wrong. Therefore, management created a structure to ensure the appropriate outcome would result. Furhtermore [sic], as the writing and draft comments progressed to a final letter, the team was pushed more and more to agree with NMED's position. He also stated that the team's initial evaluation would have changed the solution at Sandia MWL. NMED pushed extremely hard

> for EPA Region 6 not to even question the past results or the viability of past test results. Finally he stated that CANM got short changed by Region 6."

EPA IG interview with another Region 6 staff in 2007 indicate that the problems with the groundwater monitoring network were known for at least ten years.

The LTMMP Executive Summary states (p. ii):

> "Although monitoring is planned for radionuclides in various media at the MWL, the information related to radionuclides is provided voluntarily to NMED by DOE/Sandia."

The fact is that the radioactive waste is mixed waste that is not segregated from hazardous waste placed in the MWL. The fact that radioactive materials such as 119 barrels of plutonium and americium wastes are being left in place violates DOE Orders for protection of the public from radioactivity. The NMED cannot approve plans under RCRA when it knows that other statutes and regulations are being violated.

Presidential Executive Order 12898 for low income and minority populations is not considered by the LTMMP.

Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks is not considered by the LTMMP in leaving the MWL wastes one mile from a children's park at Mesa del Sol.

Sandia operated the MWL from 1959 to December 1988 for receiving RCRA hazardous and mixed hazardous waste without obtaining a hazardous waste permit as required by the Resource Conservation and Recovery Act. During the period of operation, Sandia was required to obtain a RCRA permit. 40 CFR 270.1(b). SNL failed to obtain the required RCRA permit and operated illegally without a RCRA permit. The MWL was not on a Part A application or a Part B permit application. The MWL lost interim status for its operations. Loss of interim status required closure of the MWL SNL failed to obtain a closure permit and was required by law to either show closure by removal or decontamination of the wastes or obtain an enforceable document in lieu of a post-closure permit. 40 CFR 270.1(c). Sandia failed to show removal and failed to obtain a post closure permit for the MWL. NMED has been complicit in failing to require SNL to clean close or obtain a post-closure permit.

The MWL is by legal definition under RCRA a regulated unit. 40 CFR 264.90 (2) states in pertinent part that "A ... landfill that receives hazardous waste after July 26, 1982 (hereinafter referred to as a "**regulated unit**") must comply with the requirements of Sections 264.91 through 264.100 ***in lieu of*** section 264.101 for purposes of detecting, characterizing and responding to releases to the uppermost aquifer..." (Emphasis added). Therefore, as a matter of law, the requirements of 40 CFR 264.91- .100 were applicable to the MWL because it received hazardous waste after July 26, 1982. (See also, 40 CFR 270.1).

Instead of the treating the MWL as a regulated unit the NMED has allowed the misclassification of the MWL to be a Solid Waste Management Unit (SWMU). NMED has thereby allowed a lesser standard of protection at the MWL for protection of public health and the environment. The fact that the MWL did not receive a permit does not change its status as a "regulated unit" under RCRA. The test for whether the MWL is subject to the post-closure and groundwater monitoring requirements of 264.91-.100 is not whether or not the unit is "permitted" by being on a Part A application or Part B Application; the MWL is a regulated unit by legal definition in 40 CFR 270.1 (c) and 40 CFR 264.90 because it received waste after July 26, 1982. The fact that the MWL did not apply for or receive a RCRA permit does not alter its status as a regulated unit.

The NMED and SNL have knowingly and willfully failed to install a RCRA compliant well monitoring system for detection of contamination of the groundwater at the MWL as a regulated unit..

The NMED failed as a regulator to require, and SNL/DOE failed as an owner/operator of a landfill to perform, the maintenance of records of hazardous waste and the manner and location in which the hazardous and radioactive wastes were treated, stored or disposed of at the MWL. NMED and EPA failed to impose a manifest system (42 USC 6922) as required by 42 USC 6924 during the years that RCRA was applicable to operation of the MWL.

The MWL wastes were buried in unlined trenches and pits that were dug to a depth of up to 30 feet below the ground surface. The trenches and pits at the MWL are unlined and do not contain any engineered features for the detection and/or capture of liquids or vapors that are released from the pits or trenches to the underlying strata, and to the groundwater.

NMED and EPA allowed lateral expansion and use of trenches at the MWL during the applicability of RCRA to the MWL without requiring that DOE/Sandia to meet the minimum technological requirements such as installation of two or more liners and a leachate collection system and ground water monitoring. (42 USC 6924 (o)).

1. The New Mexico Environment Department (NMED), Department of Energy (DOE) and Sandia National Laboratories (SNL) have at all times known that the MWL requires a RCRA compliant well monitoring system as described under 40 C.F.R. 264 or 265 Subpart F to be in place for the MWL at SNL.
2. 40 CFR 264.90 (2) states in pertinent part that "A ... landfill that receives hazardous waste after July 26, 1982 (hereinafter referred to as a "regulated unit") must comply with the requirements of Sections 264.91 through 264.100 ***in lieu of*** section 264.101 for purposes of detecting, characterizing and responding to releases to the uppermost aquifer..." (Emphasis added). Therefore, as a matter of law, the requirements of 40 CFR 264.91- .100 were applicable to the MWL because it received hazardous waste after July 26, 1982. (See also, 40 CFR 270.1).
3. The NMED, SNL/DOE have at all times known that the wells of the monitoring well network do not comply with the requirements of the Resource Conservation and

Recovery Act (RCRA), the terms of an April 29, 2004 Consent Order (CO), the US Environmental Protection Agency (EPA) Reissued Module IV of RCRA Permit NM5890110518 (Module IV), all of which require a RCRA compliant well monitoring system.

4. The SNL and NMED knowingly and intentionally have failed to construct and locate wells for a well monitoring system at the MWL that complies with 40 C.F.R. 264 or 265 Subpart F for furnishing representative and reliable groundwater samples for early detection of contamination at the MWL.
5. NMED, SNL/DOE knew at all times that individually and collectively; the monitoring network of wells were inadequate and would hide or not reveal evidence of contamination:
    a. The use of the mud-rotary drilling method to invade the screened intervals with bentonite clay muds that have properties to mask the detection of contamination and to lower the permeability of the screened intervals. Two of the monitoring wells, MW2, MW3, and the background water quality well, BW1, were drilled with the mud rotary method. MW5 had large amounts of grout accidentally dumped into its well screen. The RCRA violations are 40 CFR §§ 264.95, 264.97(a)(3), 264.97(a)(4), and 264.98(a)(4), 264.98(b), 264.98(c), 264.98(d), and 264.98(e);

The November 2006 NMED Moats report shows evidence that the NMED knew that monitoring wells MW2, MW3 and MW5 were improperly developed to remove the bentonite clay and development was terminated with turbidity levels that exceed EPA requirements. (*Evaluation of the Representativeness and Reliability of Groundwater Monitoring Well Data, Mixed Waste Landfill, Sandia National Laboratories* (Moats Evaluation) New Mexico Environment Department/Hazardous Waste Bureau By: William P. Moats, David L. Mayerson1, and Brian L. Salem).

Robert Ford and Steven Acree reviewed documents concerning well construction practices and water quality evaluations at Los Alamos National Laboratories (LANL) at the US EPA National Risk Management Research Laboratory Memoranda (EPA Memoranda of February 10, and 16, 2006). The EPA Memoranda taken together present serious construction and sampling deficiencies at LANL. These same deficiencies, addressed in the EPA Memoranda, exist when the Moats Evaluation for SNL MWL monitoring wells is reviewed: the Moats Evaluation fails to cite the EPA Memoranda which critique the WSAR report on points which are comparable between LANL and the MWL at SNL.

NMED and SNL continue to misrepresent the water sampling data as reliable. Despite his own writings and evidence from other experts to the contrary, Moats nevertheless concluded (p. 11) that, "Evaluation of groundwater analytical data from MWL mud rotary well samples confirms that these data are not compromised."

> The Moats Evaluation on page 7 describes the grout contamination in well MW5 as follows:

> "As noted above, sodium-bentonite grout inadvertently infiltrated into the filter pack and screen of MW5 during well installation. Based on review of the field notes documenting well construction, it appears that much of the grout was removed prior to completing installation, and that all of the grout residing at the bottom of the well was removed prior to well development. Any remaining smaller amounts of grout within the filter pack should have been fairly easy to excavate during well development."

In fact, the field notes on file at the NMED clearly prove that a large amount of the bentonite clay grout remained in well MW5 after the well development was terminated. The screened interval in well MW5 is in the depth interval of 496.6 ft to 516.6 ft below ground surface (bgs). Below are excerpts from the field notes:

> "November 6, 2000. At 1:30 PM a 5-ft bailer followed by a 10-ft bailer were run in the well to the bottom of the screen and each came out filled with grout. The tagger could not go deeper that 512 ft in the well."

> "November 7, 2000. Tagged grout inside well at 514 ft. Ran 5-ft bailer and recovered 2.5 gal of "muddy" water with some grout on the very bottom lip of the bailer. Two more bailer runs had similar recoveries, and the next three runs had recoveries that were somewhat cleaner. Total bailer recovery = 15 gal. Ran tagger in well and could not go beyond 512 ft bgs, ie., 4 ft above the base of the screen. Ran bailer eight more times and recovered "less grouty" water as above. Ran tagger inside the well and stopped at 514 ft. Ran the 5-ft bailer three times and recovered grouty water."

> "November 14, 2000. Tagged bottom of well in PVC at 508 ft bgs. Made three runs with the 5-ft bailer and receive 7.5 gal of grouty water. Made nine runs with the 10-ft bailer and recovered about 34 gal of grouty water. Ran pump to 509 ft. Began pumping well @ 2:50 PM. In 3 minutes the well pumped dry."

> "November 15, 2000. Pumped well dry @ 8:20 AM. Pumped approx. 200 gal of water down the hole. DTW = 261 ft and fell slowly. Pumped dry @ 9:10 AM. Allowed to recover to 491 ft. Pumped dry four times and recovered from 509 to 491 ft (18ft). Recovery time dropped from 57.5 to 39 minutes. Pumped dry five more times and recovered from 514 to 491 ft (13 ft). Recovery time dropped from 39 to 34.5 minutes."

The field notes on file at the NMED are evidence of the large amount of bentonite clay grout that was allowed to invade the screened interval in well MW5. The large number of runs inside the well with a bailer are evidence of a great hydraulic force that caused an invasion of the bentonite grout outward through the filter pack and into the strata surrounding the well screen. Filling the well with water to a depth of 261 ft below

ground surface created a column of water with an additional hydraulic force for causing invasion of the bentonite clay grout outward into the zone surrounding the well screen.

The NMED field notes showing that the water produced from well MWL-MW5 had a turbidity of 48.9 NTUs when the well development was terminated. The RCRA requirement and the Standard Industry Practice are to continue well development until the well produces water with a turbidity of not greater than 5 NTUs.

The field notes on file at the NMED are evidence of the large amount of bentonite clay grout that was allowed to remain in the screened interval in wells MW2 and MW3. The notes document that well development was terminated with water produced from the two wells having a turbidity of greater than 1000 NTUs .

RCRA requires replacement MW4 and MW5 which NMED has not required and SNL has not performed. The Standard Industry Practice is to immediately replace monitoring wells that are invaded with bentonite grout to the extent as occurred at the three wells.

The requirement for monitoring wells to produce water with low turbidity is described in the *EPA RCRA Manual* for Monitoring Wells – "RCRA GROUND-WATER MONITORING: DRAFT TECHNICAL GUIDANCE, OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, November 1992.

From page 6-48 of the *EPA RCRA Manual*:

> **"A well that cannot be developed to the point of producing low turbidity water (e.g., <5 NTU's) may be considered by the Agency to have been improperly completed (e.g., mismatched formation materials/filter pack/screen slot size) depending on the geologic materials in which the well is screened. If a well is not producing low turbidity ground-water samples, the owner/operator should demonstrate to the satisfaction of the appropriate regulatory agency that proper well completion and development measures have been employed, and that the turbidity is an artifact of the geologic materials in which the well is screened, and not the result of improper well construction or development. Failure to make such a demonstration could result in a determination by the Agency that the well must be redrilled."**

b. There was improper location of wells for downgradient and upgradient purposes;
c. There were not enough wells to monitor the poorly productive strata at the water table and the underlying uppermost aquifer;
d. There is failure to have a detection monitoring program for indicator parameters including tritium, PCE, and other constituents in the unsaturated strata beneath the MWL. Presently, there is no detection monitoring of indicator parameters in the unsaturated strata. The DOE scheme to permanently leave the buried waste at the MWL includes a proposal to monitor the unsaturated zone at only three point locations beneath the buried waste. The long-term monitoring scheme does not propose to monitor for

indicator parameters in the unsaturated strata. The RCRA violation is 40 CFR § 264.98(a)(2);

e. There is failure to install monitoring wells in the productive aquifer strata (the "uppermost aquifer" in RCRA terminology). Presently, there is only one monitoring well installed in the "uppermost aquifer". This is well MWL-MW6 located at a distance of 500 feet to the west of the MWL rather than at the "point of compliance" or boundary of the MWL. The RCRA violations are 40 CFR §§ 264.95, 264.97(a)(2), 264.97(a)(3) and 264.98(b);
f. Failure to install wells in the uppermost aquifer at the "point of compliance" – RCRA terminology for the hydraulically downgradient limit of the MWL (i.e., the western boundary of the disposal site). Presently, there are no monitoring wells installed in the uppermost aquifer at the point of compliance. The RCRA violations are 40 CFR §§ 264.95, 264.97(a)(2), and 264.98(b).
g. Failure to meet the mandatory requirement of RCRA for monitoring background groundwater quality at locations that are hydraulically upgradient of the MWL. There are no background water quality wells installed at locations that are hydraulically upgradient of the MWL. The background well MWL BW1 is cross-gradient to the MWL, but the data from BW1 is falsely presented as if it were from a background water monitoring well. ***In addition, the well MWL BW1 is installed in the poorly productive sediments and not in the uppermost aquifer as required under RCRA.*** The RCRA violations are 40 CFR §§ 264.97(a)(1) and 264.98(a)(4). As with well MW3, the water level in well BW1 is now too low to collect water samples (see section 7.0). This represents the ongoing failure to maintain a background well as required by RCRA.

The Sandia report (SAND 2002- 4098, p.18) acknowledges that well BW1 was not located hydraulically upgradient of the MWL, but the report makes the false material statement that the location of well BW1 meets the RCRA requirements for monitoring background water quality.

Sandia National Laboratories' further material misrepresentation of monitoring wells as, "background" or "downgradient" can be found in the "Mixed Waste Landfill Annual Groundwater Monitoring Report at http://www.sandia.gov/ltes/docs/MWLannGWmonRpt_April2005.pdf.

The Introduction to that report, at p. 13, first sentence, says:
"Annual groundwater sampling was conducted at the Mixed Waste Landfill (MWL) located in Technical Area 3 at Sandia National Laboratories/New Mexico (SNL/NM). Sampling was conducted by SNL/NM Department 6147 from April 4 through April 19, 2005. All seven monitoring wells at the MWL were sampled, including background monitoring well MWL-BW1, on-site monitoring well MWL-MW4, and downgradient monitoring wells MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW5, and MWL-MW6. Figure 1 shows the location of the MWL, and Figure 2 shows the locations of monitoring wells at the MWL."

Figure 2, at p. 30 of 58 is pasted below.

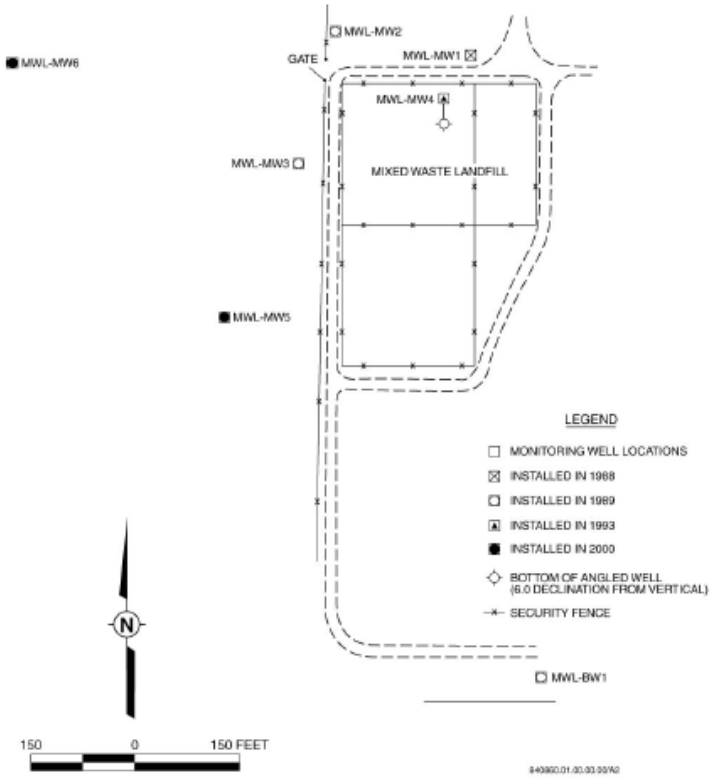

Figure 2 Mixed Waste Landfill Monitoring Well Locations

Groundwater flow direction at Sandia Mixed Landfill is shown as westerly on "Regional Groundwater Elevation map for SNL/KAFB, 2005" – Figure 7-4 - pasted below from "2005 Annual Site Environmental Report for Sandia National Laboratories, New Mexico," SAND2006-4509, September 2006, http://www.sandia.gov/news/publications/environmental/05nm.pdf.

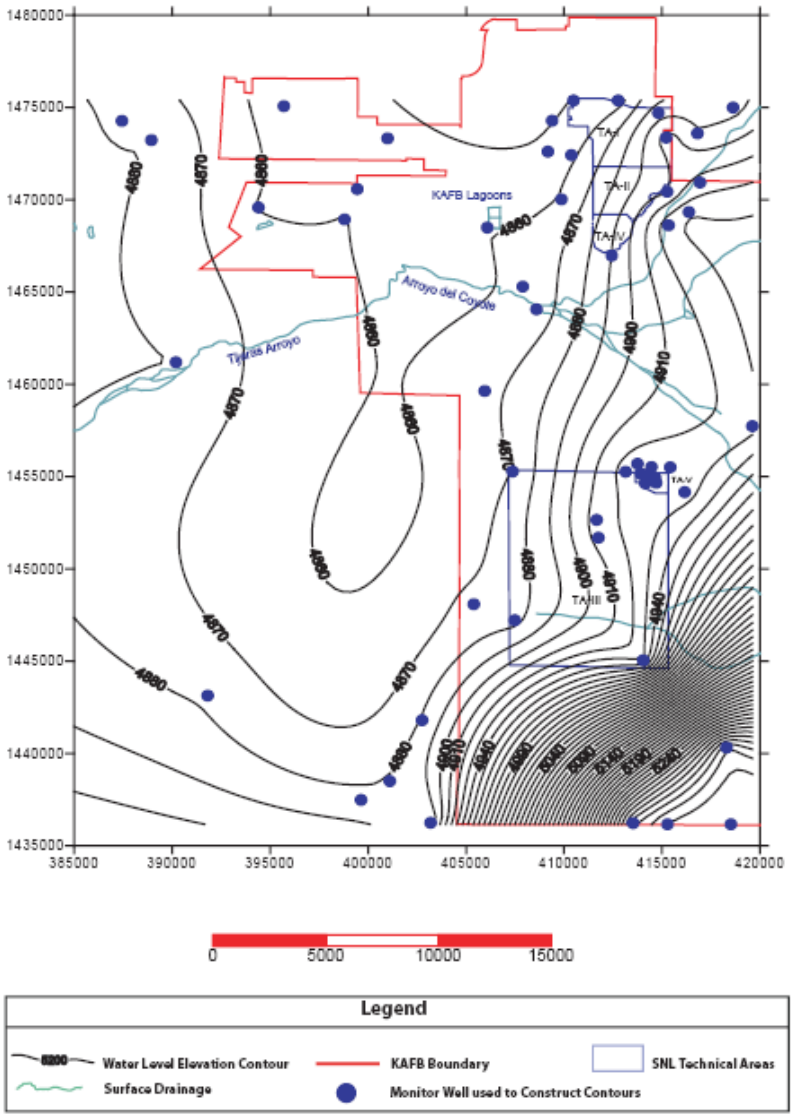

FIGURE 7-4. Regional Groundwater Elevation Map for SNL/KAFB, 2005

h. There is a failure to provide an adequate number of wells at appropriate locations to monitor both the layer of fine-grained sediments at the water table and the deeper strata in the uppermost aquifer. There are no monitoring wells installed at the "point of compliance" given the flow directions that are described as to the southwest or the northwest as required by RCRA 40 CFR §264.95;
i. There is failure to implement a sampling methodology that collects representative water samples. Instead, the sampling methodology is to purge the wells to dryness and collect water samples up to seven days later of the water that refills the wells. This sampling methodology strips volatile contaminants from the water and also changes the water chemistry through the introduction of air. The RCRA violations are 40 CFR §§ 264.97(a)(1), 264.97(a)(2), 264.97(a)(3), 264.97(d)(1) 264.97(e), 264.98(a)(3), 264.98(a)(4), 264.98(b), 264.98(c), 264.98(d), and 264.98(f);
j. There is failure to have a detection monitoring program to produce water quality data that meet the protocols for statistical tests to assess the presence or absence of hazardous constituents and indicator parameters in the groundwater beneath the MWL and at the point of compliance. The RCRA violations are 40 CFR §§ 264.97(g), 264.97(h), 264.97(i), 264.98(c), 264.98(d), 264.98(f), 264.98(f)(1), 264.98(f)(2), 264.98(g), 264.98(g)(1), 264.98(g)(2), 264.98(g)(3), 264.98(g)(4), 264.98(i)**;**
k. There is failure to have accurate knowledge of the ground-water flow rate and direction in either the AF facies or the ARG aquifer (the uppermost aquifer). The RCRA violation is 40 CFR § 264.98(e).

Groundwater flow direction. The only monitoring well in the vicinity of the MWL that is installed in the ARG uppermost aquifer is MWL-MW6. As shown on Figure 2, well MW6 is located 500 feet west of the western boundary of the MWL. Compliance with § 264.98(e) requires the installation of an appropriate number of monitoring wells in the uppermost aquifer:

a). at an appropriate location that is to the east and hydraulically upgradient of the MWL, b). at appropriate locations beneath the MWL, c). at appropriate locations at the point of compliance along the northern, western and southern boundary of the MWL, a RCRA regulated unit, and d.) at appropriate locations to the west of the MWL that are hydraulically downgradient of the MWL.

None of the requirements of a-c are met for groundwater flow direction. Although MW6 may be at an appropriate location for item d, Well MW6 is not sufficient to determine flow direction because more than one well is required for making the determination for the groundwater below the MWL.

l. The spurious use of water samping data furnished from two wells that are dry.

The steady decline in the water levels in the monitoring wells at the MWL is another example of failure to obtain representative sampling under RCRA requirements by DOE

and NMED. (40 CFR § 264.98 (a), (d) and (e). The water levels in wells BW1 and MW3 were too low for the collection of representative water samples, besides the fact that the wells have never produced representative water samples because of other factors. [Source: Field notes for construction of well MW5 provided by Mr. William Moats of the New Mexico Environment Department, August 11, 2006, p. 19].

Newer installed monitoring wells MW8 and MW9 are or will soon have water levels that are too low for sampling, i.e., below 4 ft.

For over a decade, DOE and NMED were aware that the two BW1 and MW3 wells eventually would go dry, but were without a concern to replace the wells. The DOE and NMED continued misrepresenting the water sampling data and information as true and correct for MW1 and MW3. The declining water levels were noted in a 2002 Sandia Report as follows:

> **"MWL monitoring wells will eventually become ineffective due to declining groundwater levels. In general, for a 5-inch diameter well, at least 4 ft of standing water is required above the bottom of the well screen to properly purge and sample a well. Groundwater levels in MWL wells will be monitored until the wells are no longer effective. The wells will then be plugged and abandoned."** [Source: page 25 *in* **SAND REPORT,** SAND2002-4098, Unlimited Release, Printed, December 2002].
>
> **"Groundwater levels at the MWL are declining at an average rate of 0.77 ft/year. This rapid rate of decline will limit the effective design life of MWL groundwater monitoring wells. Two wells, MWL-MW3 and MWL-BW1, will be ineffective within a few years and will require plugging and abandonment (P &A). MWL wells that require P&A may have to be replaced at a current cost of approximately $75,000 per well."** [Source: page 38-39 *in* **SAND REPORT,** SAND2002-4098, Unlimited Release, Printed, December 2002].

The field notes for the April, 2006 sampling event show that the water level in well BW1 was less than 0.2 feet above the bottom of the screen and the well was unable to produce a sufficient amount of water for the analytical suite [Source: Field notes for the April, 2006 sampling of MWL monitoring wells provided by Mr. William Moats of the New Mexico Environment Department, August 11, 2006].

The field notes for the April, 2006 sampling event show that the water level in well MW3 was approximately 4 feet above the bottom of the screen. However, the water samples collected from the well had a very high turbidity of 76.2 NTU's (Nephelometric Turbidity Units)[1]. **The high turbidity in the water samples produced from well MW3 is another reason the water samples are not representative and do not meet the requirements of RCRA 40 CFR §§ 264.97(a)(2) and 264.97(a)(3).**

[1] Nephelometric Turbidity Units are a measure of the clarity of water. Turbidity is measured with an instrument called a nephelometer, which measures the intensity of light scatted by suspended matter in the water. Turbidity in excess of 5 NTU is just noticeable to the average person.

The requirement for monitoring wells to produce water with low turbidity is described in the *EPA RCRA Manual* for Monitoring Wells – "RCRA GROUND-WATER MONITORING: DRAFT TECHNICAL GUIDANCE, OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, November 1992.

From page 6-48 of the *EPA RCRA Manual*:

> **"A well that cannot be developed to the point of producing low turbidity water (e.g., <5 NTU's) may be considered by the Agency to have been improperly completed (e.g., mismatched formation materials/filter pack/screen slot size) depending on the geologic materials in which the well is screened. If a well is not producing low turbidity ground-water samples, the owner/operator should demonstrate to the satisfaction of the appropriate regulatory agency that proper well completion and development measures have been employed, and that the turbidity is an artifact of the geologic materials in which the well is screened, and not the result of improper well construction or development. Failure to make such a demonstration could result in a determination by the Agency that the well must be redrilled."**

The 2006 water sampling event was not the first time the water produced from well MW3 had a high turbidity and was misrepresented as providing representative down-gradient monitoring data.

Well MW1 is another monitoring well that produced water samples with a high turbidity. The reason for the high turbidity is the high-flow rate pumping that is used to purge the wells to dryness.

The improper sampling methodology is used for the MWL monitoring wells. The incorrect method that is used for the collection of water samples from the MWL monitoring wells is described as follows in the most recent Sandia groundwater monitoring report:

> **"Prior to sample collection, each monitoring well was purged to remove stagnant well casing water. Most MWL monitoring wells recharge slowly, and multiple days were required to purge and sample these wells. The monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible, given the low yields of these wells"** [Source: page 15 in *"Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2005"* – Sandia Report SAND 2006-0391].

The effect of purging monitoring wells to dryness having the effect of stripping volatile contaminants such as PCE from the collected water samples is described in the *EPA RCRA Manual for Monitoring wells – "RCRA GROUND-WATER MONITORING: DRAFT TECHNICAL GUIDANCE,"* OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY 401 M STREET, S.W. WASHINGTON, D.C. 20460, November, 1992.

From Page 7-8 of the EPA RCRA Manual:

"Purging should be accomplished by removing ground water from the well at low flow rates using a pump. The rate at which ground water is removed from the well during purging ideally should be less than approximately 0.2 to 0.3 L/min (Puls and Powell, 1992; Puls et al., 1991; Puls and Barcelona, 1989a; Barcelona, et al., 1990)."

"A low purge rate also will reduce the possibility of stripping VOCs [volatile organic contaminants] from the water, and will reduce the likelihood of mobilizing colloids in the subsurface that are immobile under natural flow conditions. The owner/operator should ensure that purging does not cause formation water to cascade down the sides of the well screen. <u>At no time should a well be purged to dryness if recharge causes the formation water to cascade down the sides of the screen, as this will cause an accelerated loss of volatiles.</u> This problem should be anticipated; water should be purged from the well at a rate that does not cause recharge water to be excessively agitated. Laboratory experiments have shown that unless cascading is prevented, up to 70 percent of the volatiles present could be lost before sampling" (emphasis supplied).

The monitoring wells at the MWL are purged with submersible pumps that produce groundwater at a flow rate of 2.5 to 3.1 liters per minute [Source: Field notes for construction of well MW5 provided by Mr. William Moats of the New Mexico Environment Department, August 11, 2006, p.19]; a rate ten times as fast as the low-flow rate recommended above in the excerpt from the EPA RCRA Manual.

The record for the monitoring wells at the mixed waste landfill shows failure to comply with appropriate sampling methodology by DOE and NMED because of the use of sampling methods that would cause a loss of volatile contaminants from the water samples. The poor productivity of some wells because of the plugging action of the mud-rotary drilling method was used as a reason to sample all of the wells with a methodology that will strip the volatile contaminants from the samples, and in addition, change the water chemistry because of the addition of oxygen due to the exposure of the water that refilled the wells to the atmosphere. The change in the chemistry of the water *by the addition of oxygen further reduces or masks the contaminant levels being searched for.*

m. The well screen of wells MW4 and MW5 are installed in both the fine-grained strata and the deeper highly permeable Ancestral Rio Grande Strata. The well screen of MW5 should only have been installed in the Ancestral Rio Grande Strata in order to be a downgradient well. The 20-ft long well screen of MW 5 is installed across contrasting strata with markedly different permeabilities as is the lower screen in well MW4.
n. <u>Groundwater flow rate</u>. **The speed of groundwater travel away from the MWL in the Sandia Report is inaccurately calculated because it is based on averaging the measurements of the permeability in the lower screen in well MW4, the screen in well MW5, and the screen in well MW6.** Nevertheless, a Sandia report presents an average hydraulic conductivity

(permeability) of 1.81 feet per day and uses the average value to calculate an average rate of groundwater travel of 18.5 feet per year [Source: abstract and Tables 3-3 and 3-4 *in* SAND REPORT, SAND2002-4098, Unlimited Release, Printed December 2002].

However, Well MW6 is the only well with a screen installed in only the uppermost aquifer. The screens that were tested in wells MW4 and MW5 are installed in both the fine-grained sediments that have low permeability and in the uppermost aquifer. Table 3-3 in the Sandia report acknowledges that the screens in wells MW4 and MW5 are installed in both the fine-grained sediments and the uppermost aquifer, and that the calculated permeability values are a composite, and not representative of the permeability in either layer of strata. **The Sandia report makes false and material representations for calculation and reporting of a groundwater flow rate.**

The DOE/Sandia testing methodology using "slug" tests rather than pumping tests, further lowers the permeability assigned to the rate of travel for the uppermost aquifer. This masks the danger that may exist for knowing the rate of travel for contaminants in the uppermost aquifer. The text of the Sandia report presents an average value for the permeability of the uppermost aquifer of 1.81 feet per day, whereas the permeability measured by a slug test in well MW6 was a significantly higher value of 5.05 feet per day. Again, well MW6 is the only well with a screen installed in only the uppermost aquifer. A problem with the permeability value calculated for well MW6 is that the value was from a slug test procedure that was performed in the well instead of the more accurate pumping test procedure. EPA recognizes the limitation of the slug test methodology in a "Groundwater Issues Report" *[EPA Report EPA/540/S-93/5403, February 1993]:*

> **"The most reliable type of aquifer test usually conducted is a <u>pumping test</u>. In addition, some site studies involve the use of short term slug tests to obtain estimates of hydraulic conductivity, usually for a specific zone or very limited portion of the aquifer. It should be emphasized that slug tests provide very limited information on the hydraulic properties of the aquifer and often produce estimates which are only accurate within an order of magnitude."**

The "pumping test" referred to in the EPA report is not a pumping test performed only in a single well, but a pumping test performed with a minimum of two wells – a pumping well and an observation well at an appropriate distance away from the pumping well. The importance of multiple-well pumping tests is also recognized in the characterization requirements of the Nuclear Regulatory Commission (NRC) for closure of uranium mill tailings sites. From the NRC Standard Review Plan:

> **"Hydraulic conductivity and storage coefficients are determined by conducting aquifer pump tests on several wells at the site. Pump test methods that are consistent with American Society for Testing and Materials standards for the measurement of geotechnical properties and for aquifer hydraulic tests are considered acceptable by the NRC." [Source: NUREG 1620-Rev 1]**

Another example of the poor quality of data from slug tests is the description of slug tests in the *"Geotechnical Design Manual"* of the State of Washington:

> **"However, slug tests are not very reliable and may underestimate hydraulic conductivity by one or two orders of magnitude, particularly if the test well has been inadequately developed prior to testing. The test data will not provide an indication of the accuracy of the computed value unless a pumping test is done in conjunction with the slug test. Because the slug tests are short duration, they reflect hydraulic properties of the soil immediately surrounding the well intake."** [Source: *"Geotechnical Design Manual" M 46-03 Chapter 5-6, September 2005,* State of Washington]

In addition, it is well known by professionals that single-well tests underestimate the permeability of the highly permeable aquifer strata because the activities to install the well result in lowering the permeability of the screened interval compared to the in situ permeability of the aquifer strata. The slug tests and single-well pumping tests are affected by the permeability of the well screen and the sand pack materials that were placed around the screen, and also by the damage of the drilling to the strata that surround the borehole wall.

There is an important need to have very accurate knowledge of the hydraulic characteristics of the uppermost aquifer in the region between the MWL and the Mesa del Sol Subdivision because of the danger of the MWL to the water supply for the subdivision. The Mesa del Sol subdivision will be developed for 80,000 residents. A review of the available information supports an estimated travel time for groundwater beneath the MWL to the supply wells of the Mesa de Sol Subdivision of between ten and twenty years as compared to the travel time of near one thousand years based on the travel rate of 18.5 feet per year that is published in the Sandia report.

It is important to understand that the groundwater flow rates that are published in the Sandia reports are spurious and there is a pressing need for accurate knowledge of the rate of travel of the groundwater in the uppermost aquifer beneath the MWL. Gaining accurate knowledge of the rate of groundwater travel requires the installation of an appropriate number of monitoring wells in the uppermost aquifer at appropriate locations, and the performance of a pumping test that collects data from the set of wells.

The NMED, SNL/DOE knew at all times up until the present that the well monitoring system was/is inadequate and not in compliance with RCRA, the CO or Module IV and could not provide representative and reliable groundwater samples for monitoring the uppermost aquifer or the unsaturated zone for detection of contamination and movement of hazardous and radioactive waste.

That NMED, SNL/DOS represented the false information that the wells and well monitoring system were reliable and representative to the citizenry and public agencies by means of testimony at public hearings, written and electronic reports and documents sent through the United States Post Office or by means of federally regulated telecommunications.

Administrative decisions to place a dirt cover over the Mixed Waste Landfill at Sandia National Laboratories and proceeding with the construction of such cover relied upon and were based substantially upon false information and data supplied by NMED and SNL/DOE from the deficient, non-RCRA compliant well monitoring system at SNL and the unrepresentative water samples obtained.

SNL/DOE and NMED have knowingly and intentionally used false well monitoring water sampling data and information about the wells of the monitoring network at the MWL up to the present to obtain administrative decisions for the Mixed Waste Landfill that favored the dirt cover remedy and leaving the wastes as a disposal.

The placement of the dirt cover over the hazardous and radioactive wastes at the MWL constitutes an illegal disposal of those wastes under RCRA and DOE Orders.

NMED, SNL/DOE knowingly presented and continue to present false information from its well monitoring system to the NMED for obtaining approval for construction and to continue with ongoing construction of a dirt cover rather than excavation of the hazardous and radioactive wastes at the MWL to protect the public.

That NMED, SNL/DOE are knowingly using false and scientifically unreliable data and information from the deficient well monitoring system to enter into a Fate and Transport Model to deceive the public and regulatory bodies about the movement of the wastes under the MWL.

There is evidence of contamination in the groundwater from the MWL and both SNL and NMED are aware of the contamination of groundwater by the MWL but continue to misrepresent that contamination as coming from the well screens. SNL and NMED have not taken further corrective action as required by **RCRA 40 CFR §264.99. Compliance Monitoring Program –** for the release of nickel contamination.

o. **Well MW1.** The irrefutable evidence of contamination in well MW1 is the very high levels of dissolved nickel that are continuing to rise to higher levels in the most recent water samples; a dissolved concentration of 405 ug/L for the 2005 sampling event. In contrast to the high levels of dissolved nickel, the dissolved chromium levels are much lower than expected as natural background with a very low level of total chromium of 1.05 ug/L in the water sample collected in the 2005 sampling event.

p. The very low chromium levels disprove the claim of SNL that nickel and chromium are produced from corrosion of the stainless steel screen. The nature and extent of groundwater contamination at well MW1 is not known because of the improper purge to dry water sampling methodology. The source of the nickel contamination in well MW4 is probably from the MWL but this is not certain because of the cross-gradient location of the well and a lack of background water quality data at a location upgradient of the well. The RCRA Phase 2 Investigation identified that nickel wastes have been released from the MWL.

q. **Well MW4. EPA Oversight Report (12//12/07) recommended plugging of the well.** The anomalously low levels of nitrate and dissolved oxygen, and the negative oxidation reduction potential are evidence of organic contamination from the MWL in the groundwater produced from the upper screen in well MW4. There is a high probability that one of the organic contaminants is toluene; toluene is often detected in the groundwater samples and the RCRA Phase 2 Investigation identified that toluene wastes have been released from the MWL. The nature and extent of contamination in the groundwater at well MW4 is not known because of the improper purge to dry sampling methodology.

r. There has been leakage between the upper and lower screen in well MW4, allowing mixing of water from the AF and the ARG aquifer.

s. **Well MW5** is across both the AF facies and the ARG aquifer. The well screen interval is contaminated with grout.

t. **Well MW6.** The trend over time in nitrate concentrations from 4.60 mg/L to 1.08 mg/L with an associated decline in oxidation reduction potential are evidence of a plume of contaminated groundwater approaching well MW6. The change in water chemistry at well MW6 is evidence of an emerging environmental emergency because of the poor knowledge of the impact of the MWL on the Ancestral Rio Grande Aquifer Strata – the productive aquifer strata for the regional groundwater resource and the uppermost aquifer under RCRA. Well MW6 is the only well at the MWL that is installed in the Ancestral Rio Grande Strata and the well is located 500 feet west of the MWL along the direction of groundwater flow.

NMED and SNL know that the dirt cover will not prevent the entry of hazardous and radioactive wastes from the MWL into the groundwater and air and that the LTMMP will not provide warning.

The dirt cover remedy will allow hazardous and radioactive wastes to continue to migrate without a reliable monitoring system so that SNL/DOE can thereby avoid taking corrective actions for clean up.

NMED and SNL know that the MWL cannot be monitored by the present well monitoring system proposed for the LTMMP for present and future detection of the movement of the wastes under the MWL. This leaves the public and environment subject to imminent and substantial risk.

NMED should require retraction of the LTMMP. NMED should enforce the requirements of RCRA for the MWL as a regulated unit. NMED must enforce the 5-year review requirement as required by the Final Order (2005 Curry). NMED should reopen the entire MWL remedy proceeding for the taking of new evidence at a public hearing.

Respectfully submitted,

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MWL Monitoring Well Network

- 7 wells
  - BW-1 (Upgradient)
  - MW1, MW2, MW3, MW5, MW6 (Downgradient)
  - MW4 (Onsite)

ATTACHMENT 1

Federation of American Scientists Secrecy Report

EPA SAID TO HAVE SUPPRESSED, MISCLASSIFIED RECORDS

Officials of the Environmental Protection Agency intentionally stopped keeping records concerning potentially hazardous landfills in New Mexico in order to circumvent the disclosure requirements of the Freedom of Information Act. They also marked unclassified records as "confidential" in order to restrict their dissemination, a report <http://www.fas.org/sgp/othergov/ig-epa-reg6.pdf> (pdf) from the EPA Inspector General found.

One EPA official told the IG that "her section discontinued record keeping in favor of undocumented phone calls and conversations ... to prevent the production of documents.... [She] informed us that her section had discontinued record keeping... because of ... requests for information under the Freedom of Information Act" that had been filed by Citizens Action New Mexico, a public interest group investigating potential contamination of Albuquerque's groundwater.

The Inspector General report <http://www.fas.org/sgp/othergov/ig-epa-reg6.pdf> said that failure to document agency activities is a violation of EPA policy and federal law, which require the preparation and preservation of "adequate and proper" records of agency functions, decisions and transactions.

Another EPA official "withheld [a document] from the public by marking it Confidential, a security classification category" even though it "contained no classified information." Officials said they only meant to indicate that the document was a deliberative draft, not that it was classified. But the IG said that too is a violation of agency policy, which prohibits the use of classification markings on unclassified records.

The Inspector General said that because of defective record keeping, it was unable to determine whether EPA oversight of the New Mexico landfills was actually satisfactory or not.

In a response to the IG, the regional EPA office firmly "denied its staff took inappropriate steps to withhold information from the public." But the EPA response "did not address evidence presented in the report that ... staff intentionally stopped documenting discussions to avoid responding to the public's FOIA requests," the IG countered.

The EPA also replied that "the term 'confidential' is commonly used throughout the Agency for many documents" and does not imply that the documents are classified. But if so, this practice is "in violation of EPA security policies," the IG said, since the "confidential" label is strictly reserved for classified records.

In a lengthy reply appended to the IG report <http://www.fas.org/sgp/othergov/ig-epa-reg6.pdf> , the regional EPA office said it did not concur with the findings or the recommendations of the Inspector General, and that local EPA officials had done nothing wrong. Because of the non-concurrence and the resulting impasse, the issue will be elevated to the EPA deputy administrator for resolution. See "Region 6 Needs to Improve Oversight Practices," <http://www.fas.org/sgp/othergov/ig-epa-reg6.pdf> Office of Inspector General, U.S. Environmental Protection Agency, April 14, 2010.

The IG report was first reported by John Fleck of the Albuquerque Journal on April 16, and was also covered by Superfund Report on May 3.

>From a secrecy policy point of view, the new report illustrates the potential for active Inspector General oversight of agency classification practices, but also the possible limitations of such oversight. The IG pursued its mandate fearlessly and relentlessly, and presented its conclusions forthrightly, even though they were unwelcome to the agency. On the other hand, the IG investigation did not succeed in resolving the issues it raised, at least not yet. Worse, "the estimated cost of this report... is $272,846," the 28-page IG report <http://www.fas.org/sgp/othergov/ig-epa-reg6.pdf> stated, which is equivalent to an astounding and unsustainable $10,000 per page.

Friday, April 16, 2010
http://www.abqjournal.com/news/state/16234356568newsstate04-16-10.htm
EPA Hid Concerns Over Sandia Landfill

By John Fleck

Journal Staff Writer

Federal officials tried to hide their concerns about a Sandia Labs radioactive and hazardous waste landfill from the public, an internal Environmental Protection Agency review has found.

Publicly, the staff at the agency's Dallas office said the groundwater monitoring network around the landfill was adequate to detect leaks. Internally, agency staffers had doubts, but they avoided discussing the issue in writing "specifically to withhold the information from the public," according to a report by the EPA's Office of Inspector General.

The report concluded the EPA staff action was intended to stifle inquiries from Citizen Action, an Albuquerque-based group that has doggedly pursued concerns that Sandia National Laboratories' Mixed Waste Landfill threatens Albuquerque's groundwater.

According to the report, the EPA conducted much of a 2007-08 review of the landfill orally and in telephone conversations in order to avoid creating documents Citizen Action would be able to obtain under the Freedom of Information Act.

Dave McCoy, executive director of Citizen Action, could not be reached for comment Thursday. But in a March 24 letter to the EPA, McCoy accused the agency of trying to cover up its concerns about the landfill and of stonewalling his FOIA requests on the issue.

A spokesman for EPA's Region 6 office in Dallas declined comment beyond a written statement, saying the office "respectfully but fundamentally disagrees" with the report and the office believes its actions on the issue were consistent with established procedures.

The Inspector General's investigation was done in response to a complaint from Citizen Action.

Located on the southern part of Kirtland Air Force Base, the landfill contains radioactive and other chemical wastes dumped in unlined pits and trenches from 1959 to 1988.

Citizen Action has long contended the waste could leak, contaminating Albuquerque's groundwater. The group argues the waste should be dug up and moved to a safer place.

The New Mexico Environment Department disagrees and has allowed Sandia to leave the waste where it is. An earthen cover ‹ intended to prevent water from getting into the landfill and carrying contamination into the groundwater ‹ was completed last summer.

The issues raised in the Inspector General's report revolve around landfill groundwater monitoring as it was being done in 2007. Since that time, four new wells have been drilled that should remove any doubt about the adequacy of groundwater monitoring at the site, said David Miller, who oversees the project for Sandia.

"We certainly believe that it's fully adequate," Miller said Thursday.

The state Environment Department had determined that the wells were adequate, but McCoy asked the EPA for a second opinion.

In a Dec. 13, 2007, letter, EPA officials called the state's decision to approve the monitoring network "technically sound" and said the agency had found no evidence to indicate the landfill posed any danger.

According to the report released this week, EPA staff internally agreed with some of Citizen Action's concerns about the groundwater monitoring network's shortcomings.

The unnamed EPA official reviewing the groundwater monitoring "discontinued record keeping of phone calls and discussions" with the state Environment Department to avoid making them subject to Citizen Action's "extensive requests for information under the Freedom of Information Act," according to the Inspector General's report.

The report also quotes EPA officials as saying the state had adopted a similar approach, saying regulators had "become reluctant to engage in open discussions with (EPA) in order to avoid (Citizen Action's) distortion of facts, repetitive Freedom of Information Act requests, and threats of lawsuits."

Environment Department spokeswoman Marissa Stone Bardino disputed that statement, saying it has "no factual basis."

"The department has continued to perform its work openly and transparently, which includes recording information for the preservation of records related to the Mixed Waste Landfill," Bardino said in a statement. "Department staff frankly discusses issues related to the landfill with EPA's Region 6 staff."

In November, the state Court of Appeals forced the state to turn over a consultant's report on the landfill to Citizen Action. The state had taken the unusual step of suing the organization, trying to block release of the report, despite a ruling from the Attorney General's Office that it fell under the state's public records law.

January 14, 2008

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Dear Mr. Edlund,

Citizen Action and Registered Geologist Robert Gilkeson are in receipt of your December 13, 2007 letter (the *EPA Region 6 letter*) regarding the groundwater monitoring practices at the Sandia National Laboratories' (SNL) Mixed Waste Landfill (MWL). The *EPA Region 6 letter* has not responded to the issues concerning:

- the unreliable groundwater monitoring wells and past/present record of unreliable data;
- the obvious contamination of the groundwater from chromium and nickel exceeding the state and federal drinking water standards at the MWL dumpsite;
- the improper sampling practices;
- the need for additional monitoring wells at the point of compliance in the uppermost aquifer and at the water table;
- the need for installation of monitoring wells below the MWL dump to investigate groundwater contamination from locations where high levels of tritium and the solvent PCE were discovered in the RCRA Facility Investigation, and
- the lack of vadose zone monitoring required under RCRA.

The intention of DOE/SNL and NMED is to leave wastes permanently buried in unlined pits and trenches with protection of groundwater based on a computer model to predict the contamination of groundwater by tritium and PCE. However, there is no groundwater monitoring directly beneath where tritium and PCE are known to be buried and released. To verify the performance of the computer model, it is crucial for monitoring wells to be installed beneath the areas in the dump where high levels of tritium and PCE are known to be buried. In addition, nickel contamination needs to be investigated; downgradient "point of compliance" wells on the western and southern side need to be installed; and the vadose zone needs to be monitored by installing a network of vadose zone wells inside the dump to monitor for releases directly below the unlined trenches and pits.

The MWL dump was opened as the “TA-3 Low-level Radioactive Waste Dump” in March 1959 and operated to dispose of hazardous, radioactive and mixed wastes in unlined pits and

trenches until December 1988. Liquid wastes were dumped in the MWL from 1959 through 1975.

EPA states that: "The EPA has functioned in an oversight role ... a responsibility which we take seriously throughout the region."[1] It would seem that the *EPA Region 6 letter* shows that EPA Region 6 is either unwilling or unable to recognize and document that the New Mexico Environment Department's (NMED's) overall actions and decisions at the MWL dump have not been technically sound and consistent with applicable RCRA requirements or with the standard industry practice of professionals in the groundwater protection practice.

Therefore, in this letter Citizen Action and Robert Gilkeson repeat the request made on March 1, 2007 that EPA Region 6 forward the detailed information about the failed groundwater protection practices at the MWL dump to the EPA National Risk Management Research Laboratory (known as the EPA Kerr Lab) for review. In addition, we submit 22 questions to EPA Region 6. Please be prompt to answer the questions and to inform Citizen Action of the action taken by EPA Region 6 on this request to have the EPA Kerr Lab perform the needed review.

Our letter of March 1, 2007 and subsequent supplements contained factual information to show that the monitoring well network at the MWL dump never produced accurate knowledge about groundwater contamination. The EPA response in December 2007 was because of two letters from Senator Bingaman's office. We appreciate Senator Bingaman's efforts in this matter. Unfortunately, the EPA letter does not deliver the detailed analysis of the groundwater monitoring practices that was promised to Senator Bingaman. We find the late response from EPA to our letter and the many mistakes in the EPA response to be unacceptable.

The Needed Review of the *Moats Evaluation*. An important part of our request to EPA Region 6 was for the EPA Kerr Lab to review the November 6, 2006 report by Mr. William Moats and others of the New Mexico Environment Department (NMED) entitled "Evaluation of the Representativeness and Reliability of Ground Water Monitoring Well Data" (the *Moats Evaluation*).

Our request for the EPA Kerr Lab to review the *Moats Evaluation* was appropriate because the Kerr Lab reviewed a similar report to assess the monitoring wells at the Los Alamos National Laboratory (LANL). The *Moats Evaluation* was modeled after the LANL *Well Screen Analysis Report* (WSAR) and NMED claimed the *Moats Evaluation* was superior to the WSAR, but the subsequent revisions of the WSAR do not recognize or incorporate the *Moats Evaluation*. Registered Geologist Robert Gilkeson disagrees and finds that neither the LANL WSAR nor the *Moats Evaluation* identify if any well produces reliable and representative water samples. This was also the finding of the EPA Kerr Lab for the LANL WSAR. The National Academy of Sciences (NAS) also found that the WSAR showed a lack of basic scientific knowledge and the evidence relied upon

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[1]EPA Regional Administrator Richard E. Greene, June 21, 2007 letter to Senator Jeff Bingaman

was not statistically valid (*Groundwater Protection Practices at LANL*-- NAS 2007 Final Report, p.60).

The review of the LANL WSAR by the EPA Kerr Lab was because of a request from the Northern New Mexico Citizens Advisory Board (CAB) to EPA Region 6. Citizen Action is informed that the CAB is now in the process of requesting EPA Region 6 for a new review by the EPA Kerr Lab of the revised LANL WSAR. It is an arbitrary action for EPA Region 6 to refuse the request of Citizen Action for the review of the *Moats Evaluation*. The request in March 2007 for the EPA Kerr Lab to make this review was not only from Citizen Action but also from the Albuquerque-Bernalillo County Groundwater Protection Advisory Board (GPAB). The GPAB went directly to the EPA Kerr Lab with its request that EPA Region 6 apparently stifled. The NMED is on record at a meeting of the GPAB on 12/14/2006 that it did not oppose the request. In a July 17, 2007 letter to Citizen Action NMED, Mr. Bearzi welcomes the review by EPA of the *Moats Evaluation*.

The *EPA Region 6 letter* places the following reasons for not requesting the review of the Moats Evaluation by the EPA Kerr Lab, and for not even having the EPA Region 6 staff review the report:

> "We did not conduct a rigorous technical review of the November, 2006, NMED report [the *Moats Evaluation*] because NMED has already directed SNL to replace a number of monitoring wells due to factors such as well screen corrosion and dropping water levels."

In fact, the *Moats Evaluation* did not address the important effects of the above factors to prevent the monitoring wells at the MWL dump from producing reliable and representative water samples. Instead, the *Moats Evaluation* was only a scientifically flawed study to make the unsupported finding that the three monitoring wells drilled with the mud rotary method produced historical water quality data that was reliable and representative. The mud rotary drilling method invaded the three wells with bentonite clay drilling muds with well known properties to prevent the wells from detecting contamination from the MWL dump.

The *Moats Evaluation* was modeled after the LANL WSAR and the EPA Kerr Lab found that the LANL report was not credible to assess that monitoring wells had recovered from the effects of bentonite clay muds to hide contamination. In addition, the failure of the *Moats Evaluation* to recognize the properties of corroded well screens to mask the detection of contamination is another important reason for the EPA Kerr Lab to review the findings in the report.

- **Therefore, in this letter, Citizen Action and Mr. Gilkeson repeat the request for EPA Region 6 to send the *Moats Evaluation* to the EPA Kerr Lab for review. Please be prompt to inform Citizen Action of the action taken by EPA Region 6 on this matter.**

The needed review of the lengthy period of unreliable groundwater monitoring practices at the Sandia MWL Dump is not provided by the EPA letter of December 13, 2007. The *EPA Region 6 letter* recognizes the importance of a reliable network of monitoring wells for protecting the valuable groundwater resource from contamination by the toxic hazardous and radionuclide wastes that are buried in unlined pits and trenches in the Sandia MWL dump:

> "The EPA believes that ensuring the effectiveness of the fundamental aspects of the ground water monitoring well system is the most important element in detecting releases and protecting ground water resources. Therefore, EPA reviewed the overall MWL ground water monitoring system in order to determine its efficacy in detecting contamination. We reviewed well locations, depth of wells and well screens, purging and sampling methods, downhole videos, and analytical results."
> "Based on our review, we have determined that NMED's overall actions and decisions for administration of the authorized program have been technically sound and consistent with applicable RCRA requirements. We have also found no evidence to indicate that the MWL poses an imminent or substantial danger to citizens or ground water supply."

The above statement by EPA Region 6 that NMED's actions have been "technically sound and consistent with applicable RCRA requirements" is not supported by any documentation. The EPA letter cites the recent NMED orders for new monitoring wells and sidesteps the historical problems that EPA said it would evaluate.

In fact, the incorrect well locations, misplaced well screens, improper purging and sampling methods, downhole videos that show screen corrosion, and analytical results all show that NMED's actions at the MWL dump have not been technically sound and consistent with either the applicable RCRA requirements or the standard industry practice for groundwater monitoring. **These problems were always present and continue to exist.** For years, elevated levels of nickel and chromium have been present, improper sampling methods of pumping wells dry and returning days later to collect samples were used. Corrosion that could hide detection of contamination existed in well MW1 since at least 1992. No upgradient background well ever existed at the MWL. Wells BW1, MW1, and MW2 were known to be cross-gradient since at least 1961.

In addition, the review of the *Moats Evaluation* by the EPA Kerr Lab is one requirement for EPA Region 6 to make a finding that NMED's actions have been technically sound. EPA Region 6 has not allowed this review, but should do so now.

Furthermore, the unsubstantiated finding in the December 13, 2007 letter from EPA Region 6 that groundwater protection practices at the MWL dump have been technically sound and consistent with applicable RCRA requirements is in contradiction with present fact and with findings in earlier reports by EPA, NMED, and DOE.

The fact that new installations for three of the seven wells at the MWL have been ordered by NMED as a result of communications between EPA, NMED and ongoing discussions

with Citizen Action and Mr. Gilkeson during the EPA review indicates that there were indeed serious historical problems for obtaining reliable water data at the MWL groundwater monitoring network.

In addition, the DOE/SNL proposal to plug and abandon well MW2 because of its corroded well screen and cross-gradient location shows that NMED and DOE/SNL recognize problems with four of the seven wells. However, the problems that require replacement of wells MW4 and MW5 are still not recognized by DOE/SNL and NMED. Furthermore, well MW6 is located too distant from the MWL dump to meet the point of compliance requirement of RCRA for a detection monitoring well. In fact, none of the seven monitoring wells at the MWL dump have produced the needed knowledge of groundwater contamination from the buried wastes.

The incorrect locations of monitoring wells at the MWL dump. The *EPA Region 6 Letter* states that EPA Region 6 studied the locations of monitoring wells at the MWL dump but then ***fails*** to present the obvious fact that only one of the seven monitoring wells meets the location requirements of RCRA. Figure 1 is a map from the *RCRA Ground-Water Monitoring: Draft Technical Guidance, November 1992*. This EPA report is cited as guidance for meeting RCRA requirements for monitoring wells in the NMED SNL Consent Order and also in the NMED Draft RCRA SNL Permit that was released in September 2007 for public comment.

Figure 1 shows the requirement of RCRA and the standard industry practice for locating a network of monitoring wells immediately along and as close as possible to the hydraulically downgradient side of disposal facilities where hazardous wastes are buried.

For comparison, Figure 2 shows the locations of monitoring wells at the MWL dump. The first four monitoring wells (MWL-BW1, -MW1, -MW2, and -MW3) were installed in 1988 and 1989 with locations based on the assumption that the direction of groundwater flow was to the north. Accordingly, as shown on Figure 2, wells MW1 and MW2 were located north of the dumpsite and well BW1 was located 500 feet south of the MWL to provide background water quality data.

After the wells were installed, the water level measurements revealed that the direction of flow at the water table below the MWL dump was to the southwest. Therefore, wells MW1 and MW2 were not at the locations required by RCRA for detection wells to be located immediately along the downgradient boundary of the buried wastes and well BW1 did not meet the requirement of RCRA to provide background water quality data for a location upgradient of the dumpsite.

Of the seven monitoring wells, only well MWL-MW3 is at an appropriate location to meet the requirements of RCRA for detection monitoring wells. However, other factors including 1) the mud-rotary drilling method, 2) the corroded well screen and 3) the improper methods used to collect water samples have always prevented even well MW3 from producing reliable and representative water samples.

Figure 2 shows that no monitoring wells were ever installed immediately south of the MWL dump even though this is a requirement of RCRA in 40 CFR §264.95 because of the southwestern direction of flow of water at the water table beneath the dumpsite.

- **1. What is the proof for EPA's conclusion that wells BW1, MW1, MW2, MW4, MW5 and MW6 were installed at proper locations with screens installed in proper strata and that <u>any</u> of the seven wells, including well MW3, ever produced reliable and representative water samples for detection of contamination from releases from the MWL dump?**

<u>Earlier Reports by EPA, DOE and NMED recognized that monitoring wells were not at the correct locations.</u>

- DOE/SNL knew in May 1991 from the DOE Tiger Team Assessment of SNL ((p. 3-59) that

> "The number and placement of wells at the mixed waste landfill is not sufficient to characterize the effect of the mixed waste landfill on groundwater."

- In June 1991, the DOE Technical Review: Compliance Activities Workplan for the Mixed Waste Landfill, Sandia National Laboratory (Kenneth Rea, Environmental Restoration Technical Support Office) stated under Comments:

> "19/1/1 It is stated that 'three additional wells were installed, two downgradient and one upgradient…' It would be appropriate to mention here that data from these wells indicated that <u>this network has in fact only one downgradient well and no wells that are definitely upgradient</u>.". (Emphasis supplied).

- The SNL Annual Ground-Water Monitoring Report (March 1992 for Calendar Year 1991) states:

> p.7- "The ground-water surface elevation data were evaluated to determine whether the monitoring well network meets the requirements of being comprised of at least one upgradient and three downgradient wells, as specified in 40 CFR 265-93 (f). <u>This requirement cannot be demonstrated at this time</u>" [emphasis supplied].

- The SNL March 1993 Mixed Waste Landfill Phase 2 RCRA Facility Investigation Work Plan, states, (p. 2-31, para 2.2.5.2) (AR005409):

"Although regional potentiometric maps indicate that the hydraulic gradient at the MWL is toward the west and northwest (Figure 2-16), <u>current water level data for the four MWL monitor wells suggest that the hydraulic gradient is toward the **southwest**</u>, approximately 40 degrees counterclockwise to the regional gradient" [emphasis supplied].

- EPA Comment 11 contained in The Final Mixed Waste Landfill RFI Work Plan Summary Report (September 6, 1994) stated,

"**Based on the southwest gradient flow of groundwater, the MWL monitoring wells are located crossgradient instead of downgradient from the MWL; therefore, contaminants emanating from the MWL may not be detected in the monitoring wells.**"

- September 14, 1998, 1:12 Santa Fe MWL (AR 010980-82) handwritten notes of Will [Moats] and Benito [Garcia] discussing an NOD and closure standards (AR 010981):

"Will- Detection system is inadequate.

"Benito- Why? Write that in there

"Will- they only have 1 well down gradient…"

These above statements were a matter of public record and also were provided to EPA Region 6 by Citizen Action.

These above statements address the monitoring well network through year 1998 that consisted of wells BW1, MW1, MW2, MW3 and MW4.

- **2. What is the proof of EPA Region 6 that none of the above statements were correct and remain accurate to the present time for the existing monitoring well network?**

Monitoring Wells MW5 and MW6 were installed in 2000. However, the mistakes in installation of wells MW5 and MW6 prevented the two wells from meeting the requirements of RCRA and the standard industry practice for detection of groundwater contamination from the MWL dump. In addition, well MW4 is an angle well that was installed inside the MWL dump beneath an unlined trench where 270,000 gallons of reactor coolant water was disposed of. However, mistakes in well construction always prevented well MW4 from producing reliable and representative water samples to investigate if the liquid wastes were contaminating the groundwater.

The failure to identify the two groundwater flow systems beneath the MWL dump. Figure 3 is a cross-section that shows the two distinct groundwater flow systems in the hydrogeologic setting beneath the MWL dump. The upper flow system is at the water table in the fine-grained alluvial fan sediments. The direction of flow at the water table is to the southwest. The monitoring wells that are installed across the water table in the alluvial fan sediments are wells MWL-BW1, -MW1, -MW2, and -MW3.

The deeper flow system is in the Ancestral Rio Grande (ARG) strata that are beneath the layer of fine-grained sediments. Figure 3 shows that the only monitoring well with a screen installed only in the ARG strata is well MW6. The direction of groundwater flow in the ARG strata below the MWL dump is poorly known but the available data indicate flow is to the west or possibly northwest. The ARG strata are the sole source aquifer for the region of Albuquerque. The ARG strata produce large flows of groundwater to water

supply wells but the fine-grained alluvial sediments that form the layer above the ARG strata are not capable to produce groundwater in sufficient amounts to be utilized as a water supply.

RCRA (40 CFR 264.98(a)(2) requires the installation of monitoring wells across the water table in the fine-grained sediments for early detection of contamination "beneath the waste management areas" and also in the deeper productive ARG strata that are the fast pathway for horizontal travel of contaminated groundwater to the supply wells. The monitoring wells installed at the MWL dump have failed over all time to meet the requirements of RCRA for monitoring contamination in either flow system. The only monitoring well with a screen installed only in the ARG strata is well MWL-MW6.

Mistake in the location of well MW6. Figure 3 shows that the only monitoring well with a screen installed only in the ARG strata is well MWL-MW6. NMED instructed DOE/SNL to install well MWL-MW6 in the ARG strata at the distant location 500 feet west of the western boundary of the MWL dump. However, this location does not meet the compliance requirements of 40 CFR §264.95 as stated in pertinent part:

> "The point of compliance is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units."

The "hydraulically downgradient limit of the waste management area" is immediately along the western and southern side of the MWL dump. In §264.95 the "uppermost aquifer" is referring to the productive ARG strata monitored only by well MW6 and not to the fine-grained alluvial sediments that are poorly productive of groundwater.

- **3. Does EPA Region 6 recognize that well MWL-MW6 does not meet the point of compliance requirements of 40 CFR §264.95 because of the 500-ft distance of MW6 away from the western side of the MWL?**
- **4. Does EPA Region 6 recognize the requirement of RCRA 40 CFR §264.95 for monitoring wells to be located in the ARG strata at the point of compliance immediately along the western and southern side of the MWL dump?**

RCRA 40 CFR §264.98 requires a detection monitoring program at the MWL dump that meets the following requirement:

> §264.98(e). The owner or operator must determine the ground-water flow rate and direction in the uppermost aquifer at least annually.

DOE/SNL has never installed the network of monitoring wells at the MWL dump to meet the requirement of 40 CFR §264.98(e). DOE/SNL does not have accurate knowledge of the ground-water flow rate and direction in the uppermost aquifer i.e., the ARG strata because only one monitoring well MW6 exists in the uppermost aquifer. The averaging of different wells in different strata further misrepresents the flow properties at the MWL. Similarly, DOE/SNL does not have accurate knowledge of the direction or rate of flow at the water table in the fine-grained alluvial sediments.

- **5. Does EPA Region 6 support the installation of a network of monitoring wells at the MWL dump to meet the requirement of 40 CFR §264.98(e)?**

Mistakes in the installation of well MWL-MW4. Figure 3 shows that well MW4 is a multiple-screen well with two well screens. The upper screen is installed in the fine-grained sediments deep below the water table and the lower screen is installed across the contact of the fine-grained sediments with the ARG strata. The well was installed to investigate contamination at the water table but fails to meet this purpose because the top of the upper screen was installed too deep below the water table. There is the ubiquitous presence of nitrate at high levels in the water samples collected from the water table below the MWL dump, but the water produced from the upper screen in well MW4 is low in nitrate. The water samples produced from monitoring well MW-6 show that water in the ARG strata are also low in nitrate.

Figure 3 shows that the water level measured in the upper screen in well MW4 is much deeper than the water levels measured in the wells that are installed across the water table. In fact, the deep water levels measured in the upper screen in well MW4 is nearly identical to the level measured in the deeper ARG strata at well MW6. The anomalously deep water level measured in the upper screen in well MW4 is evidence of leakage between the upper and lower screen. The water level information, the quick refilling of the upper screen in well MW4 after it is pumped dry, and the low levels of nitrate are all evidence that there is leakage between the upper and lower screens in well MW4. At a minimum this leakage has been present since 2001 to the present. The placement of the upper screen at too great a distance below the water table and the ongoing leakage have prevented well MW4 from producing reliable and representative water samples for knowledge that releases from the MWL dump are contaminating the groundwater. There is an immediate need to plug and abandon well MW4 and replace the well with a new well installed to investigate groundwater contamination at the water table beneath the MWL dump.

- **6. Does EPA Region 6 recognize the mistakes in the installation of well MW4 that have prevented the well from ever producing reliable and representative water samples for detection of groundwater contamination at the water table below the MWL dump?**
- **7. Does EPA Region 6 recognize that leakage is occurring between the two screens in well MW6 and there is an immediate need to plug and abandon the well and install a new well to investigate groundwater contamination at the water table below the MWL dump?**

Mistakes in the installation of well MWL-MW5. Figure 2 shows that well MW5 is at a location too distant (175 ft) from the western boundary of the MWL dump to meet the point of compliance requirements of RCRA. Figure 3 shows that the screen in well MW5 is installed too deep below the water table to detect contamination at the water table. In addition, Figure 3 shows that an important mistake in the installation of well MW5 is that *the well screen is installed across the contact of the alluvial fan sediments with the*

deeper ARG strata. The well produces a mixture of water from both geologic formations and is not reliable for the detection of contamination in either formation.

The NMED SNL Consent Order (section VIII.A.6) requires wells to be installed in only one zone of saturation in terms of aquifer properties as follows:

> "In constructing a well or piezometer, Respondents shall ensure that the well or piezometer will not serve as a conduit for contaminants to migrate between different zones of saturation."

An October 30, 2001 position paper of the NMED Hazardous Waste Bureau provides additional caution on cross-cutting screens as follows:

> *"Wells with screened intervals connecting intervals of different head and/or hydraulic conductivity may act as conduits for vertical flow within the screened interval."*

The information on Figure 3 shows that the screen in well MW5 is connecting intervals of different head and hydraulic conductivity.

Furthermore, the record of well construction shows that bentonite clay/cement grout was mistakenly poured inside the well and that the well development activities were not successful to clean the grout from the screened interval. The clay and the cement have strong properties to mask the detection of contamination in the water samples produced from the well.

Monitoring well MW5 has never produced reliable and representative water samples for the detection of groundwater contamination from releases from the MWL dump. There is an immediate need to plug and abandon well MW5 and install two new monitoring wells east of well MW5 immediately at the western boundary of the MWL dump. One of the new wells should be screened across the water table. The second well should be screened only in the ARG strata.

- **8. Does EPA Region 6 recognize that well MWL-MW5 has never produced reliable and representative water samples for detection of groundwater contamination at the water table in the alluvial fan sediments?**
- **9. Does EPA Region 6 recognize that well MWL-MW5 has never produced reliable and representative water samples for detection of groundwater contamination in the ARG strata and that the ARG strata are the "uppermost aquifer" as defined in RCRA?**
- **10. Does EPA Region 6 recognize the need to plug and abandon well MWL-MW5 and replace the well with two new monitoring wells installed at the point of compliance?**

The corrosion of stainless steel well screens has masked the detection of groundwater contamination below the MWL dump for longer than the past ten years. See Table 1. Monitoring wells MWL-BW1, -MW1, -MW2 and -MW3 have stainless steel screens. For more than the past ten years, corrosion of the screens was claimed as responsible for the measurement of high levels of nickel and chromium in the water samples produced from the wells. However, the levels of nickel contamination in MW1 are an order of magnitude higher than the nickel levels in BW1. Both well screens are stainless steel and corroded. The markedly higher levels of nickel measured in MW1 exceed the level that can be assigned to corrosion and represent direct evidence of a release from the dump. In fact, on July 2, 2007 DOE/SNL sent a letter to notify NMED that chromium levels measured in water samples produced from wells MWL-MW1 and -MW3 for the April 2007 sampling event exceeded the EPA MCL for chromium and that corrosion of the stainless steel well screens was responsible for the high concentrations.

Over the years, NMED made the mistake to accept the unsubstantiated claim by DOE/SNL that corrosion of the stainless steel screens was the only source for the high levels of chromium and nickel. There is a record of disposal of a large volume of chromium liquid wastes in the MWL dump. There is also a record of the release of nickel wastes to the geologic formations below the dump. The buried wastes in the dump may be a contributor to the high levels of nickel and chromium contamination measured in the groundwater below the dump.

It was a mistake for NMED to order DOE/SNL to plug and abandon wells MW1 and MW3 without first collecting water samples for special analytical techniques that would possibly identify if there was a release from the MWL dump. For example, water samples should be analyzed for low-levels of tritium and with chromium isotopic analyses to identify if the wastes in the dump were a contributor to the chromium contamination measured in groundwater. NMED should order DOE/SNL to collect water samples from the two wells for these analyses if the wells have not already been plugged and abandoned.

In addition, NMED should have ordered DOE/SNL to replace the wells with wells that have PVC screens when the anomalously high levels of nickel and chromium were first known to be present. High levels of chromium were first measured in well MW1 in 1997 and in MW3 in 2001.

Table 1 presents the nickel concentrations measured in wells MW1, BW1, and MW2. There is a history of measurement of anomalously high levels of nickel in water samples from well MW1 beginning with the first water sample collected in 1990 with total and dissolved levels of 46 and 43 ug/L, respectively. For comparison, the NMED approved background for total and dissolved nickel in groundwater is 28 ug/L.

Over the years, the waters produced from well MW1 show exceptionally high levels or nickel with levels above 400 ug/L since 2004. The high levels of dissolved nickel measured in well MW1 are anomalously high for the levels expected from corrosion of stainless steel well screens. Recent research has established that corrosion produces the

highest levels of nickel in the early years of onset of corrosion, and in later years the dissolved nickel levels show a large decline. The decline is because of the exceptional properties of the corrosion products encrusted on the well screens to lower the concentration of nickel in water samples produced from the corroded screens. The corrosion products have an iron oxide mineralogy with strong properties for adsorption of trace metals including nickel and chromium. Table 1 shows that this phenomenon of increase in nickel levels to a plateau followed by a great decline in measured values is recorded for the history of nickel values measured in the water samples produced from wells BW1 and MW2.

- For well BW1, the highest level of nickel @ 191 ug/L was measured in 2001. Since 2001, the measured nickel levels declined to a value of 35.5 ug/L in 2005.
- For well MW2, the highest level of nickel @ 124 ug/L was measured in 2000. Since 2000, the measured nickel levels declined to a value of 6.8 ug/L in 2006.

However, the nickel contamination measured in well MWL-MW1 does not show the pattern expected from corrosion. Instead, the consistent and continuing high levels are evidence of nickel contamination in groundwater because of a release from the MWL dump. Very high levels of 538 and 467 ug/L dissolved nickel were measured for two sampling dates in 1998. The measured values remained high and above 400 ug/L for samples collected in years 2004 to 2006. There is a need to investigate the groundwater contamination at the location of well MW1 by installation of a new monitoring well with a nonmetallic PVC screen immediately between the location of well MW1 and the northern side of the MWL dump.

EPA fails to address the nickel contamination that is present in the groundwater from a release from the dump. The nickel contamination is required under RCRA to be investigated. Instead, the current plan is plug and abandon MW1 without further investigation. The corrosion that is present in MW1 may be hiding contamination additional to the nickel. The improper sampling at MW1 further masks the contamination at MW1. See Table 1 for the MWL-MW1 data on nickel.

In 1974, EPA set the drinking water standard for nickel at 100 ug/L. However, EPA remanded the drinking water standard for nickel on February 9, 1995 and has not set a new standard. The New Mexico groundwater quality standard for nickel is 200 ug/L. The 2004 World Health Organization Guideline Value is that drinking water shall not contain nickel at concentrations greater than 20 ug/L. The nickel values of greater than 400 ug/L that are consistently measured in the groundwater produced from well MW1 are far above the water quality standard of the state of New Mexico of 200 ug/L.

NMED has a history of arbitrary and inconsistent practice at the Los Alamos National Laboratory (LANL) and Sandia. When LANL made a claim to NMED that the high levels of chromium and nickel measured in two screened intervals of a LANL monitoring well were because of corrosion, NMED immediately responded with an order in a letter dated April 5, 2007 to install new wells stating that

> "The required actions stem from <u>speculation</u> by the Permittees that nickel and chromium detections represent leaching of stainless steel well casing in screens #1 and #2" [emphasis added].

It is well known in the technical literature including the RCRA guidance documents that corrosion causes stainless steel screens to be encrusted with corrosion products that have properties to prevent the detection of many contaminants of concern for releases from the MWL dump. From the pertinent section of *RCRA Ground-Water Monitoring: Draft Technical Guidance, November 1992*:

> "Monitoring well casing and screen materials should not chemically alter ground-water samples, especially with respect to the analytes of concern, as a result of their sorbing, desorbing, or leaching analytes. For example, if a metal such as chromium is an analyte of interest, the well casing or screen should not increase or decrease the amount of chromium in the ground water. Any material leaching from the casing or screen should not be an analyte of interest, or interfere in the analysis of an analyte of interest" (p.6-16 to 6-18).

> "The presence of corrosion products represents a high potential for the alteration of ground-water sample chemical quality. The surfaces where corrosion occurs also present potential sites for a variety of chemical reactions and adsorption. These surface interactions can cause significant changes in dissolved metal or organic compounds in ground-water samples" (p. 6-30).

> "Disadvantages of stainless steel well casing and screen materials:
> · May corrode under some geochemical and microbiological conditions;
> · May sorb cations and anions;
> · May contribute metal ions (iron, chromium, nickel, manganese) to groundwater
> samples;
> · High weight per unit length; and
> · Type 304 and Type 316 stainless steel are unsuitable for use when monitoring for inorganic constituents" (p. 6-32). (Emphasis supplied).
> [Note: The well screens at the MWL dump are Type 304 stainless steel. Many of the contaminants of concern at the MWL dump are inorganic constituents. In 2007, NMED has ordered for the replacement monitoring wells at the MWL dump to be installed only with screens made of nonmetallic PVC.]

- **11. Does EPA Region 6 recognize that corrosion of the stainless steel screens has prevented monitoring wells MWL-BW1, -MW1, -MW2 and -MW3 from producing reliable and representative water samples from at least 1997 to the present?**

RCRA identifies the high levels of nickel contamination measured in the water samples produced from monitoring well MWL-MW1 as "Statistically Significant Evidence of Contamination." The discussion of "statistically significant evidence of contamination" is in **40 CFR 40 CFR §264.98 Detection Monitoring Program** with the following pertinent parts:

"(2) The owner or operator must determine whether there is statistically significant evidence of contamination at each monitoring well as the compliance point within a reasonable period of time after completion of sampling. The Regional Administrator will specify in the facility permit what period of time is reasonable, after considering the complexity of the statistical test and the availability of laboratory facilities to perform the analysis of ground-water samples."

"(g) If the owner or operator determines pursuant to paragraph (f) of this section that there is statistically significant evidence of contamination for chemical parameters or hazardous constituents specified pursuant to paragraph (a) of this section at any monitoring well at the compliance point, he or she must:

(1) Notify the Regional Administrator of this finding in writing within seven days. The notification must indicate what chemical parameters or hazardous constituents have shown statistically significant evidence of contamination;"

"(4) Within 90 days, submit to the Regional Administrator an application for a permit modification to establish a compliance monitoring program meeting the requirements of §264.99. The application must include the following information:

(i) An identification of the concentration of any appendix IX constituent detected in the ground water at each monitoring well at the compliance point;

(ii) Any proposed changes to the ground-water monitoring system at the facility necessary to meet the requirements of §264.99;"

DOE/SNL did not inform NMED that the high levels of nickel measured in monitoring well MWL-MW1 represent "statistically significant evidence of contamination" and that DOE/SNL was required to establish a compliance monitoring program meeting the requirements of 40 CFR §264.99. The monitoring wells installed at the MWL dump never met the compliance monitoring program requirements of §264.99. A minimum requirement was to replace monitoring well MWL-MW1 with a well that had a nonmetallic PVC screen to make a determination of the source of the nickel contamination that was consistently and continuously measured to the present time at high levels in the water samples produced from the well.

- **12. Does EPA Region 6 recognize that the high nickel values consistently and continuously measured in the water samples produced from monitoring well MWL-MW1 represent evidence of groundwater contamination due to a release from the MWL dump?**
- **13. Does EPA Region 6 recognize that there is a requirement to install a new monitoring well with a nonmetallic screen immediately near the location of well MW1 to accurately measure the nickel contamination and if other contamination is present given the properties of the corroded well screen to mask the detection of many inorganic contaminants of concern for the buried wastes in the MWL dump?**

Improper sampling methods have prevented wells MWL-BW1, -MW1, -MW2, -MW3, and -MW4 from producing reliable and representative water samples.
The *EPA Region 6 Letter* states that EPA Region 6 studied the methods used for purging the wells and collection of water samples but then ***fails*** to present the obvious fact that the improper purging and sampling methods have prevented five of the seven wells from producing reliable and representative water samples. NMED approved of the improper high-flow pumping methods that were used for purging the five wells to dryness with the collection of water samples days later from the highly aerated water that refilled the wells. The improper purging and sampling methods have prevented the wells from being reliable for the detection of the volatile solvent contaminants that are known to be buried in the MWL dump.

There are many EPA reports published over the past 20 years that describe the need to use low-flow purging and sampling techniques in order to collect reliable and representative water samples from monitoring wells installed in the alluvial sediments that are present at the water table below the MWL dump. Despite these reports, NMED requested for DOE/SNL to use high-flow sampling methods that masked the detection of the volatile solvent contaminants that may be present in the groundwater beneath the MWL dump.

In fact, DOE/SNL propose the use of low-flow purging and sampling techniques in the Long Term Monitoring and Maintenance Plan (LTMMP) that NMED released for public comment on October 31, 2007:

> "In order to obtain the most representative samples possible, the DOE/Sandia will use dedicated low-flow pumps and sampling techniques in MWL wells during long-term monitoring. Low-flow purging and sampling techniques are recommended for all MWL wells because the hydrogeologic environment is well suited for this type of groundwater sampling. In the past, low-flow sampling techniques have been successful at other sites across SNL/NM. However, on October 23, 2003, the NMED requested that all DOE/Sandia low-flow sampling (which the NMED termed "micropurging") be ceased for all RCRA-compliant groundwater monitoring at SNL/NM (NMED October 2003).
>
> The low-flow purging method has been approved by the EPA (Puls and Barcelona 1996) and offers the following advantages over conventional sampling methods currently used at the MWL:
> • Low-flow sampling causes less well disturbance, minimizing the disturbance of the fine-grained sediments that have collected in the wells. As a result, samples collected using low-flow purging and sampling methods typically have lower sample turbidity and variability of sampling results.
> • Low-flow sampling minimizes the required purge volume by up to 95 percent, reducing the time and labor required for purging and sampling and minimizing waste.
> • Low-flow purging reduces problems related to excessive drawdown and pumped volumes.
> • Dedicated equipment for low-flow sampling saves field time and eliminates

contamination from other wells and equipment handling" (p. 3-27).

- **14. Does EPA Region 6 recognize that the improper high-flow purging and sampling methods have prevented the collection of reliable and representative water samples from five of the seven monitoring wells at the MWL dump?**
- **15. Does EPA Region 6 recognize that the improper high-flow purging and sampling methods may have masked the detection of solvent contaminants in the water samples produced from the monitoring wells at the MWL dump?**

The MWL Dump monitoring wells are not at critical locations for knowledge of groundwater contamination from the highly mobile contamination in the buried wastes. The sampling investigations performed in the 1980's and early 1990's identified discrete regions inside the MWL dump where large quantities of tritium and solvent wastes including PCE were buried. There are no monitoring wells at appropriate locations to identify if these wastes have contaminated the groundwater. This is an important issue because the fate and transport model uses the highly mobile tritium and PCE as "indicator parameters" that the groundwater below the MWL dump is not contaminated. The assertion in the EPA Region 6 (12/13/07) letter of "no contamination" is disingenuous and not proven because there are no monitoring wells at the locations where this groundwater contamination would be expected to be present.

The NMED Notice of Disapproval (NOD) issued on November 24, 2006 ordered DOE/SNL to install monitoring wells inside the MWL dump where high levels of contaminants were discovered in the earlier RCRA facility investigations (RFI). The order from NMED Comment No. 19 and the response from DOE/SNL is as follows in pertinent part from the DOE/SNL response on January 15, 2007:

> **Comment 19 in the NMED Order: Propose some additional monitoring to be conducted at locations within the landfill where contaminants were detected at their highest levels during the RFI.**
> **DOE/SNL Response to Comment 19:** Additional monitoring at locations within the landfill using intrusive techniques is not recommended, and could compromise the integrity of the cover.

The refusal of DOE/SNL to install monitoring wells inside the MWL dump to investigate groundwater contamination by tritium and solvents including PCE is unacceptable. The existing monitoring well MWL-MW4 is installed through the cover. In addition, NMED issued an letter on October 30, 2007 that ordered DOE/SNL to install monitoring wells through the cover:

- Both new wells shall be positioned as close as possible to the former west fence that originally surrounded the Mixed Waste Landfill.
  NMED is aware that, once installed, the new wells will fall within the footprint of the new cover.

It is essential to install monitoring wells at locations inside the MWL dump where large quantities of the highly mobile tritium and solvent wastes are known to be buried. The monitoring wells should be a design for measuring contamination in the soil gas throughout the thick vadose zone and also measuring contamination in water samples

collected at the water table. If EPA Region 6 is opposed to installation of monitoring wells at locations inside the MWL dump, then an alternative is to install angle wells drilled at locations outside the dump. A disadvantage is that the angle wells will not provide the required knowledge of contamination in the vadose zone immediately beneath the locations where large quantities of tritium and solvent wastes are buried in unlined pits and trenches.

There is an essential need to monitor the release of contaminants to the vadose zone for early detection and remediation of the release. However, the DOE/SNL LTMMP does not propose to monitor the vadose zone beneath the unlined pits and trenches. Instead, DOE/SNL propose to monitor the vadose zone at only three locations that are located too distant from the unlined pits and trenches for the detection of releases that may contaminate the groundwater below the MWL dump. The proposed locations for the three vadose zone wells outside the perimeter of the dirt cover are displayed on Figure 5. The distance from any of the proposed wells to where large amounts of tritium wastes are known to be buried is greater than 150 feet. The three wells are a similar distance from where the sparse RFI data indicated solvent wastes were buried.

Indeed, the groundwater at the water table below the MWL dump may already be contaminated with tritium and solvents including PCE, but this contamination has not been detected because of the deficiencies in the existing network of monitoring wells and will not be investigated by the monitoring scheme in the DOE/SNL LTMMP.

- **16. Does EPA Region 6 support the order by NMED for DOE/SNL to locate monitoring wells "within the landfill where contaminants were detected at their highest levels during the RFI?"**
- **17. If EPA Region 6 does not recommend monitoring for groundwater contamination directly below the MWL dump, then what proof does EPA Region 6 have that such contamination has not already occurred?**
- **18. Does EPA Region 6 recognize the need for installing a network of monitoring wells at locations inside the MWL dump for "early detection" and remediation of the release of hazardous wastes from the unlined pits and trenches?**

In 2007 NMED and DOE/SNL recognized some of the deficiencies in the existing network of monitoring wells at the MWL dump. The fact that NMED now recognizes the requirement of RCRA to locate monitoring wells immediately along the western side of the MWL dump is shown by the instruction for the installation of two new monitoring wells in an order issued by NMED to DOE/SNL in a letter sent on 10-30-07:

> "The new wells need to be placed as close to the old landfill boundary as possible to ensure the detection of any contaminants in the groundwater. Thus, NMED approves the work plan with the following conditions.
> - Both new wells shall be positioned as close as possible to the former west fence that originally surrounded the Mixed Waste Landfill. NMED is aware that, once installed, the new wells will fall within the footprint of the new cover."

Figure 5 shows the locations proposed by DOE/SNL for the network of monitoring wells to be installed for long-term monitoring of the performance of the MWL dump after installation of the dirt cover. Figure 5 is from the DOE/SNL *Long-Term Monitoring and Maintenance Plan* (LTMMP) that was released by NMED for public comment on October 31, 2007. However, the LTMMP does not inform the public of the order by NMED on October 30, 2007 to install monitoring wells MWL-MW7 and -MW8 at locations that are different from the locations displayed on the figure in the LTMMP (i.e., Figure 3 in this letter).

In addition, the LTMMP that was released for public comment does not inform the reader that NMED has taken action to order DOE/SNL to plug and abandon wells MWL-BW1, -MW1, and -MW3 and install new monitoring wells MWL-BW2, -MW7, and -MW8. NMED is not waiting for public participation as required by RCRA in these decisions. Instead, the LTMMP "blindsides" the public that NMED and DOE/SNL have made many decision on the long-term monitoring well network at the MWL dump without having regard for concerns of the public.

Figure 5 shows the proposal of DOE/SNL to install three new monitoring wells to the west of the MWL dump at locations within 70-ft of the western fence line whereas Figure 1 shows that during the 17 year period of collecting water quality data, only well MWL-MW3 was at a location this close to the western fence line of the dump.

The LTMMP still fails to meet the requirements of RCRA for the necessary network of monitoring wells because the flow of groundwater at the water table is to the southwest and the LTMMP does not install any monitoring wells along the southern side of the MWL dump. However, the LTMMP does identify the need to use low-flow purging and sampling techniques for the production of water samples from monitoring wells installed across the water table in the fine-grained sediments.

Furthermore, the LTMMP does not inform the public that NMED issued letters in 2007 that ordered DOE/SNL to 1). avoid the use of drilling methods that would invade the screened intervals of monitoring wells with any organic drilling additives or bentonite clay drilling muds, and 2). only use PVC screens in the new monitoring wells.

- **19. What is the position of EPA Region 6 about the requirement of RCRA to locate monitoring wells immediately along the southern side of the MWL dump?**
- **20. What is the position of EPA Region 6 about NMED ordering DOE/SNL to plug and abandon wells and install new monitoring wells without affording the public the opportunity to comment as required by RCRA?**

DOE/SNL annual groundwater monitoring reports have misrepresented the monitoring well network at the MWL dump. The annual DOE/SNL groundwater monitoring reports up to 2006 always presented the monitoring wells at the MWL dump to be at appropriate locations and to produce reliable and representative water samples. From the 2006 report prepared for SNL Department 6765 by Shaw Environmental, Inc.

"Annual groundwater sampling was conducted at the MWL located in Technical Area 3 at SNL/NM. Sampling was conducted from April 3 through April 18, 2006. All seven monitoring wells at the MWL were sampled, including background monitoring well MWL-BW1, on-site monitoring well MWL-MW4, and downgradient monitoring wells MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW5, and MWL-MW6" [emphasis supplied](p. 3).

The Executive Summary from the 2006 report -
"Annual groundwater sampling was conducted at the Sandia National Laboratories Mixed Waste Landfill (MWL) in April 2006. Seven monitoring wells were sampled using a Bennett™ pump in accordance with the April 2006 Mini-Sampling and Analysis Plan for the MWL (SNL/NM 2006). The samples were analyzed off site at General Engineering Laboratories, Inc. for a broad suite of radiochemical and chemical parameters, and the results are presented in this report. The results show constituent concentrations within historical ranges for the site and indicate no evidence of groundwater contamination from the landfill" [emphasis supplied].

- **21. Does EPA support the claim made in the DOE/SNL 2006 annual groundwater monitoring report that the well monitoring network consists of five downgradient monitoring wells and one background well?**
- **22. Does EPA support the position in the 2006 annual groundwater monitoring report that the well monitoring network produced water quality data that was reliable and representative to "indicate no evidence of groundwater contamination from the landfill?"**

Sincerely,

David B. McCoy, Executive Director
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Table 1. Total and Dissolved Zinc Measured in the Water Samples Produced From Monitoring Well MWL-MW1, -BW1 and - MW2 at the Sandia Mixed Waste Landfill.

- The well locations are displayed on Figure 1. All three wells have stainless steel screens that have become corroded.

	- Well MW1	- Well BW1	- Well MW2
	Nickel (ug/L)	Nickel (ug/L)	Nickel (ug/L)
Date	Total / Dissolved	Total / Dissolved	Total / Dissolved
09 - 90	46 / 43	ND[a] < 40 / ND < 40	ND < 40 / ND < 40
01 - 91	NA[b] / NA	NA / NA	NA / NA
04 - 91	NA / NA	NA / NA	NA / NA
10 - 91	NA / NA	NA / NA	NA / NA
07 - 92	150 / 63	ND < 40 / ND < 40	ND < 40 / ND < 40
01 - 93	78 / NA	ND < 40 / NA	ND < 40 / NA
04 - 93	97 / 94	7.5 / 16	14 (j)[c] / 13 (j)
11 - 93	95 / NA	ND < 40 / NA	ND < 40 / NA
05 - 94	110 / NA	NA / NA	ND < 40 / NA
10 - 94	130 / NA	ND < 40 / NA	ND < 40 / NA
04 - 95	120 / NA	NA / NA	7.5 (j) / NA
10 - 95	107 / NA	1.96 (j) / NA	NA / NA
04 - 96	145 / NA	ND < 0.81 / NA	3.42 (j) / NA
04 - 97	NA / NA	NA / NA	NA / NA
10 - 97	NA / NA	NA / NA	NA / NA
04 - 98	398 / 538	2.9 (j) / NA	5 (j) / 4
11 - 98	490 / 467	7.19 / 9.47	4.49 / 3.42
04 - 99	266 / 313	12.8 / 14.3	5.31 / 4.37
04 - 00	279 / 281	16.5 / NA	124 / NA
04 - 01	252 / NA	191 / NA	88.2 / NA
04 - 02	265 / NA	13.6 / NA	89.7 / NA
04 - 03	374 / NA	26.6 / NA	52 / NA
04 - 04	401 / NA	33.2 / NA	10.5 / NA
04 - 05	424 / 405	35.5 / NA	8.0 / 7.1
04 - 06	477 / NA	----------	6.8 / NA

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ug/L = micrograms per liter or parts per billion

ND[a] = nickel was not detected at the listed minimum detection level

NA[b] = nickel was not analyzed in samples collected on this date

(j)[c] = the listed value is an estimated value

- The NMED approved background for total and dissolved nickel in groundwater is 28 ug/L.

- The groundwater quality standard of the New Mexico Water Quality Bureau for nickel is 200 ug/L.

- In 1974, EPA set the drinking water standard for nickel at 100 ug/L. EPA remanded the drinking water standard for nickel on February 9, 1995 and has not set a new standard.

- The 2004 World Health Organization Guideline Value is that drinking water shall not contain nickel at concentrations greater than 20 ug/L.

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September 11, 1997

Mr. Michael J. Zamorski
Acting Area Manager
Kirtland Area Office
US Department of Energy
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

RE: Denial: Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories

Dear Mr. Zamorski:

The RCRA Permits Management Program (RPMP) has completed review of the US Department of Energy/Sandia National Laboratories/New Mexico (DOE/SNL) May 1996 submittal, **Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico**. The Department of Energy Oversight Bureau, New Mexico Environment Department contributed technical comments which were considered in the staff review and have been combined into the attached eighty-five (85) comments which need to be addressed in the Closure Plan/Post-Closure Care Permit Application.

DOE/SNL proposes No Further Action for Operable Unit 1289, Environmental Restoration (ER) Site 76, the Mixed Waste Landfill (MWL), coupled with three years of groundwater monitoring for tritium only, as an indicator contaminant. The RPMP does not agree that the MWL is appropriate for NFA at this time.

The submitted report and request for No Further Action are denied and further requirements are imposed. The basis for these actions is explained below.

Basis for denial. In 1986, the US Environment Protection Agency (EPA) published a notice that the hazardous component of mixed waste was subject to the Resource Conservation and Recovery Act (RCRA). EPA issued a clarification on how facilities would qualify for interim status for their mixed waste activities on September 23, 1988. Although the MWL continued to receive low-level radioactive waste and mixed waste through December 1988, it was never included in a Part A or Part B permit application.

Under 20 NMAC 4.1, Subpart IX, 40 CFR 270.1(c), owners and operators of landfills that received waste after July 26, 1982 are required to obtain a post-closure permit for the facility, unless closure by removal is demonstrated. For facilities that did not receive an operating permit, and close under interim status standards, this closure plan/post-closure permit application serves to impose several critical statutory and regulatory requirements, including the requirements for corrective action (61 FR 19438, May 1, 1996).

In line with this requirement, DOE/SNL must submit a closure plan and stand-alone post-closure permit application for the MWL which meet the requirements of 20 NMAC 4.1, Subpart VI, 40 CFR 265.110-120, **Closure and Post-Closure**, and 265.310, **Landfills, Closure and post-closure care**. These documents should utilize the findings in the report for the Phase 2 RFI conducted at the MWL, as well as HRMB's comments on this report. The comments are enclosed for your information.

Under the provisions of 20 NMAC 4.1, Subpart IX, the required documents must be received within one hundred and eighty (180) calendar days after receipt of this Letter of Denial.

Please call myself or Stephanie Kruse of my staff at 827-1561 if you have any questions or comments regarding this action.

Sincerely,

Robert S. (Stu) Dinwiddie, Ph. D., Manager
RCRA Permits Management Program

Enclosure

xc: John Tymkowych, NMED/HRMB
Roger Kennett, NMED/DOE OB
John Parker, NMED/DOE OB
Mark Jackson, DOE
Warren Cox, SNL
David Neleigh, EPA
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United States Senate

November 14, 2007

Mr. Richard E. Greene
Regional Administrator, Region 6
Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Greene:

The attached letter was sent to my office by David B. McCoy, Executive Director of Citizen Action New Mexico, and Robert Gilkeson. In the letter, Citizen Action requests my assistance in ascertaining the status of EPA's review of a well monitoring network for a mixed waste landfill and when a copy of the completed technical review will be made available to Citizen Action.

To expedite the process, I respectfully request you respond directly to Messrs. McCoy and Gilkeson with a copy of your response to my attention.

Thank you for your prompt attention to this matter.

Sincerely,

Jeff Bingaman
United States Senator

JB/dja