May15, 2007 Citizen Action Comments

RE: New Mexico Environment Department (NMED) Notice of Disapproval (NOD) (Nov. 20, 2006) Requiring Soil-Vapor Sampling and Analysis Plan (SAP) for the Sandia National Laboratories' (SNL) Mixed Waste Landfill (MWL) Pursuant to Public Notice 07-01 and Public Notice of April 15, 2007.

Citizen Action has previously submitted documents to pursuant to or relevant to the above captioned matter. Those documents include the following documents and are herein incorporated by reference for response by NMED to the issues raised therein:

1. RE: Memorandum in Support of Citizen Action's February 28, 2007 Request for Revision and Re-issuance of NMED Notice of Disapproval, and; NMED's Responses to Citizen Comments (3/28/07).
2. Citizen Action Comment RE: April 13, 2007, New Mexico Environment Department ("NMED") Public Meeting Notice ("Notice") issued regarding the Soil-Vapor Sampling and Analysis Plan for the Department of Energy/Sandia National Laboratories' Mixed Waste Landfill ("MWL"). Request for Notice Correction and Restatement.
3. Soil-Vapor Sampling and Analysis Plan at Sandia National Laboratories' Mixed Waste Landfill, Citizen Action Presentation to the New Mexico Environment Department May 1, 2007
4. CITIZEN ACTION NEW MEXICO'S COMMENTS AND RECOMMENDATIONS TO THE SECRETARY OF THE NEW MEXICO ENVIRONMENT DEPARTMENT (NMED) FOR THE SAP AND REQUEST FOR AN EXTENDED COMMENT PERIOD, PUBLIC HEARING AND A CEASE AND DESIST ORDER FOR CONSTRUCTION ACTIVITIES AT THE MIXED WASTE LANDFILL.
5. CITIZEN ACTION REQUEST TO HOLD TECHNICAL HEARINGS FOR ISSUES REGARDING STORM WATER EROSION CONTROLS INCLUDING SOIL SAMPLING AND VADOSE ZONE MONITORING FROM PAST AND PRESENT STORM WATER RUN-ON AND RUN-OFF AT THE MWL.

Introduction and General Comments

The 11/20/07 NMED Notice of Disapproval (NOD) set forth numerous requirements in both Part 1 and Part 2 of the NOD that tie soil gas monitoring to other monitoring requirements and soil conditions, including, but not limited to: Rupturing of containers and the leaking of their contents (Public Notice 07-01); soil loss by wind and erosion (#7); vadose zone monitoring (#8); over construction (#12); soil compaction (#13); run-off and run-on controls (#16); evolving soil conditions; transport models (Part 2, #2); Fate and Transport (Part 2, #11); placement of neutron probes, i.e., how will the performance of the soil cover be monitored (Part 2, #9); surface soil monitoring for radionuclides and metals (Part 2, #14); soil vapor monitoring (Part 2, #15); Risk Assessment (Part 2, #17); and, additional groundwater monitoring wells (Part 2, #18-20).

The NMED areas of concern have not been adequately addressed by SNL/DOE. Much of the previous MWL characterization was improperly performed, limited in scope, or provided flawed data. Soil gas monitoring, groundwater monitoring, including but not limited to vadose zone characterization, air monitoring, surface soil run-off are all facets of characterization that have not been adequately performed at the MWL. A new characterization of the MWL should be performed, especially since the current data is over a decade old.

MWL wastes will remain hazardous for at least 100,000 years in the center of urban Albuquerque, with no engineered features for the shallow trenches or pits such as liners, leachate collection, or early detection of leaks. The wastes could not be combined as they were disposed by today's health and safety standards.

SNL/DOE argued at the public hearing for permit modification against the excavation of the MWL as being "too dangerous to workers and the public." John Gould, SNL, however, recently argued at the 5/1/07 public technical hearing, that the dump is "too safe" to bother digging up. SNL/DOE doublespeak continues.

While anecdotal information exists for 100,000 cu ft of radioactive wastes being placed in the MWL, there is little information as to the locations and amounts of heavy metals, VOCs, and SVOCs placed in the MWL. Organic hazardous wastes were disposed of at the MWL beginning in 1959 and continued until 1962 when the Chemical Waste Landfill (CWL) was opened. 270,000 gallons of hexavalent chromium contaminated radioactive waste water was disposed of in Trench D. The disposition of that water was not determined by monitoring well MW4 because the screen was placed too far below the water table under Trench D. A uranium chip fire in Trench B required 5,000 gallons.

Present in the MWL are at least eighty-seven (87)-55 gallon drums contaminated with spent demineralizer resins, numerous drums containing alpha emitters, acid wastes, uranium solutions, tritium water, oils, nitric acids, phosphoric acids, toluene solvents, uranium hydroxide, metallic sodium and high level radioactive waste from nuclear reactor experiments conducted during the mid-1980s. Thus, ignitable waste is present in the dump. PCBs which are regulated under the Toxic Substances Control Act (TSCA) are in the dump, but have not been considered for treatment as such by the Environmental Protection Agency. Greater than Class C transuranic wastes are in the MWL.

The information requested by NMED reveals data gaps that need to be filled prior to emplacement of the soil cover. The situation is made more complex because NMED allowed the subgrade portion of the soil cover to be constructed with compaction <u>prior to</u> resolving issues: for citizen concerns; filling the data gaps in the NOD; the completion of the Corrective Measures Implementation (CMI) Report; and the final approval of the CMI Plan. Thus, the remedy has proceeded in advance of the provision of data by SNL/DOE; in advance of a complete characterization of the MWL both for the hazardous wastes present, for the above factors cited in the NOD, and; in advance of a competent risk assessment.

Regulatory Issues

Citizen Action has furnished NMED numerous previous comments regarding regulatory requirements at the MWL. The MWL lost interim status after failing to file a Part a Resource and Conservation Recovery Act (RCRA) Part A application after the NNMED gained regulatory authority under RCRA for mixed waste. Loss of interim status required closure and obtaining a post closure permit for the MWL.

The MWL is subject to the post closure requirements of 40 CFR 270.1 through its own DOE Orders, including 5820.2A which incorporated RCRA requirements for landfills that became applicable September 1988, prior to when the MWL purportedly ceased operations for receiving wastes in December 1988. The soil cover construction is proceeding in the absence of a post closure permit. The soil cover is the de facto final closure of the MWL and no further requirements for long-term monitoring have been provided either by a post closure permit or in documents in lieu of a post closure permit.

Although NMED may be acquiescing to SNL/DOE by not requiring SNL/DOE submit a post closure permit application, *SNL/DOE nevertheless has an independent duty to comply with DOE Orders*, 5820.2A, 450.1, 5400.1, 435.1 and 5480 along with the RCRA statutes cited in those Orders. SNL/DOE has a duty to comply with 40 CFR 265.310 standards of Subpart N – Landfills for closure and post-closure care of the MWL. Those requirements include long term maintenance and monitoring leak detection, maintain and monitor the ground-water monitoring system under Subpart F and prevent run-on and run-off from eroding or otherwise damaging the final cover.

The MWL will require long-term monitoring under a post closure permit. These monitoring systems do not presently exist. Institutional controls are inadequate to address the nature of the long-lived radionuclides in the dump and SNL/DOE are violating DOE Orders by leaving these wastes in place.

The soil cover construction is proceeding in the absence of data and SNL/DOE are unwilling to provide the data except through a very limited number of FLUTE wells to be placed at sparse locations at the MWL. The NMED requested installation of additional monitoring within the dump will "compromise the integrity of the cover," according to SNL/DOE. See Response to #19, Comment Set 2, 1/15/07). **NMED should require the full installation of all long-term monitoring systems prior to the construction of the soil cover.** NMED should recognize the applicability of RCRA subpart F and other requirements to the MWL through the DOE Orders, Consent Order and enforce RCRA requirements.

The monitoring system should be beneath the dumps' pits and trenches for early detection beneath the dump and should include soil gas monitoring and groundwater monitoring through the entire vadose zone all the way to the uppermost aquifer as defined by RCRA. Each trench should have a monitoring well beneath for early detection of contamination. This monitoring is especially crucial in light of the fact that the dump is not an engineered landfill, lacks a liner, lacks leachate collection and no monitoring well

or other system for early detection of contaminant movement currently exists beneath the dump. Such monitoring for both soil gas and groundwater could be accomplished simultaneously by the inside-outside well design currently used at the Chemical Waste Landfill at SNL.

All construction activities for the soil cover should cease until long-term monitoring systems are put in place at both the perimeter and across the entire MWL beneath each trench and including pits, especially at hot spots. Data should be obtained from the monitoring system for a period of 3-5 years.

The Fate and Transport Model which currently relies on assumed values rather than hard data from vadose zone and other characterization should be abandoned. SNL/DOE admits 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).

If groundwater contamination is discovered after the installation of reliable monitoring systems, appropriate action to eliminate the contamination must be taken. Taking such action in advance of full soil cover construction will avoid the costs of digging up the soil cover.

Prior Assurances of SNL/DOE

The DOE/SNL/NM Responses to the NMED 10/30/99 NOD (p.6), assured the NMED that as part of the institutional controls at the MWL, environmental monitoring under DOE Order 5820.2A would consist of: inspections for erosion, subsidence, condition of vegetation, vadose zone monitoring for moisture content, and groundwater monitoring for contaminant detection. As will be seen in greater detail below, the SNL/DOE has failed to perform these duties consistent with its own Order:

Erosion— For decades of operation, the MWL has not had erosion controls in place to control against storm water run-off and flooding. The subgrade was constructed before provision of erosion controls. The surface path for storm run-off of radionuclides such as plutonium, RCRA heavy metals, PCBs has not been analyzed and incorporated into a risk assessment.

Subsidence— must be characterized for the non-uniform containers and wastes being left in the MWL for long term performance.

Condition of Vegetation—SNL/DOE currently only intend to monitor animal burrows and ant nests, not vegetation. Vegetation is a significant pathway for tritium uptake.

Vadose zone monitoring— has not been performed. The thickness of the vadose zone, the infiltration rate, hydraulic conductivity and site specific transport parameters used for the Fate and Transport Model are all based on assumed parameters and distributions rather than hard data. (See, *Probablistic Performance-Assessment Modeling of the Mixed Waste Landfill at Sandia National Laboratories*, p. 25. (2nd Edition)). The vadose zone monitoring must be accomplished both for soil gas and groundwater monitoring for early detection of contamination beneath the dump.

Groundwater monitoring for contaminant detection—The well monitoring network is non-compliant with RCRA requirements or the Consent Order of April 29, 2004 or the DOE Orders. SNL/DOE compacted pits and trenches at the MWL with no soil or air monitoring in place for containers that may have ruptured over time or through compaction activities.

SNL/DOE Specific Comment Responses

SNL/DOE Response to Comment 15 is especially troubling. NMED demands that SNL "Develop trigger levels for tritium, radon, PCE and total VOCs as soil vapor. The NMED expects soil-gas in the vadose zone to be monitored for these constituents."

While the SNL/DOE Response recognizes the need for a "robust monitoring system" SNL/DOE only offer three FLUTE sampling wells on the perimeter of the dump. A system of only three FLUTEs installed on the perimeter cannot possibly provide for early detection beneath the MWL or even for the perimeter of the dump. The entire perimeter and at a distance to the perimeter as well as the area across the dump must be monitored and at varied depths including deep vertical wells reaching to the Ancestral Rio Grande Deposits.

SNL/DOE claim low levels of VOCs in the vadose zone "based on 16 years of groundwater monitoring data." The well monitoring data for the seven MWL monitoring wells is highly flawed and RCRA non-compliant for many reasons set forth by Citizen Action and Geologist Robert Gilkeson in numerous documents. For example, Monitoring well MWL-MW3 pumps its samples from 2.09 ft above the bottom of the well screen and has a corroded stainless steel well screen that interferes with detection of contaminants. The well has failed for it purpose under the Consent Order of April 29, 2004 and NMED should order replacement as it did for MWL-BW1 that had a similar water level of 2.29 ft above the bottom of the well screen.

In addition, it is false for SNL/DOE to claim they have performed any vadose zone monitoring beneath the dump. SNL/DOE simply have not characterized what is in the vadose beneath the MWL. MWL-MW4 has its upper screen across both the Alluvial Fan fine-grained materials and partially into the uppermost aquifer of the Ancestral Rio Grande Deposits. The vadose zone beneath the MWL must be adequately characterized.

The proposed 3 FLUTE wells do not eliminate the need to monitor the soil gas beneath the dump on a continuous basis. The FLUTEs are temporary wells. Again, there is no liner protection, leachate collection or leak detection system for dangerous wastes that SNL/DOE intend to leave in place forever. VOCs can travel in a vapor or liquid phase and may have gone well below a depth of 30 feet especially when combined with the other wastes in the dump. Phase 2 RCRA Facility Investigation only collected soil gas data at 10 and 30 ft beneath the surface. Data showed increasing levels of contaminants to 30 ft indicating that sampling at greater depths should have continued.

The proposed 3 FLUTE wells do not characterize the full range of the vadose zone all the way to the uppermost aquifer as defined by RCRA. SNL/DOE cannot claim, as they do, that the FLUTEs will identify potential threats to groundwater because they will not be beneath the dump and they do not reach the uppermost aquifer. Full characterization of the vadose zone, all the way to the uppermost aquifer beneath the unlined dump, which has no early detection system for contamination, is a necessity and required by RCRA. Again, the use of the inside-outside wells, used at the Chemical Waste Landfill (CWL), could monitor both soil gas and groundwater beneath the dump as one operation and could additionally provide soil moisture content data.

Because the proposed 3 FLUTE wells will not monitor groundwater or soil beneath the dump, the FLUTEs will not provide any ongoing early detection from beneath the dump with which to update the Fate and Transport Model.

The FLUTEs will not achieve the purpose of monitoring for tritium because they are in the wrong location, at sparse locations on the perimeter, the trigger detection levels are set too high, and tritium beneath the dump will not be analyzed.

Tritium detection levels for groundwater should be at no greater than 1 pCi/L.

Tritium and radon should both be analyzed as soil gas. SNL/DOE should be required to monitor tritium and radon beneath the dump as soil gas. Significant releases of tritium and radon for contamination of the groundwater will be the releases *beneath* the dump. SNL/DOE has only conducted studies to 26 ft below ground surface. SNL/DOE's claim of low levels of tritium ignores the fact that detection levels were set too high in the first place.

Tritium and radon should also be monitored around the entire perimeter and away from the boundary of the MWL and across the dump with coverage at each previously identified hotspot.

SNL/DOE's proposed trigger level of 20,000 pCi/L for tritium in soil gas cannot accomplish early detection of tritium at the perimeter of the dump because it is set ridiculously high. Detection limits must be lowered to the state of the art detection ability to no more than 250 pCi/L for soil gas in order to achieve early detection. NMED should enforce a requirement of collection of tritium and radon samples from beneath the dump, especially at hot spots identified during RFI Phase 1 and 2, through the entire vadose zone to and including the uppermost aquifer.

PCE, TCE and total VOCs should be collected from beneath the dump. Additionally, the complete suite of all VOCs known to be in the dump should be <u>individually</u> sampled. The use of minimum detection levels should be used for TCE and PCE rather than the trigger of 20 ppmv. The trigger levels for VOCs should be set to the state of the art detection ability given there is no liner, no leachate collection and no leak monitoring detection system for these long-lived hazardous wastes.

The SNL/DOE analogy to trigger levels for VOCs used at the CWL is particularly misleading because for the low levels of detection identified at the CWL, levels that already also exist at the MWL, NMED required that the CWL be excavated! There is great inconsistency in NMED enforcement standards for the MWL compared to the CWL given that the wastes dumped in the CWL were previously the type of wastes dumped in the MWL for many years!

SNL/DOE further cannot claim that the triggers are sufficient to protect the groundwater because the FLUTEs do not monitor the groundwater of the uppermost aquifer and are in the wrong position. Moreover FLUTEs are a temporary design. The triggers are set too high for early detection.

SNL/DOE Response to Comment #16 focuses primarily on vertical infiltration and saturation as a function of the soils in the soil cover and not for the underlying soils. But the Response "assumes" the soil moisture characteristic for MWL soils from samples collected 500 ft away and presents no hard data. No confidence should be given to collection of samples that were 500 ft away from the dump for achieving values beneath the dump for vertical travel.

SNL/DOE's discussion of moisture content in underlying soils is deficient because the soils of the vadose zone all the way to the uppermost aquifer beneath the dump have not been characterized.

The fact of lateral hydraulic conductivity at the MWL has also not been factually determined for the unsaturated or the saturated zones at the dump. An unreliable statistical method averaging flow screens rates at MW4, MW5 and MW6 was used. MW4 and MW5 have well screens that are across different strata. MW5 has a well screen that was contaminated by dumping bentonite grout into the well screen. MW4 and MW5 should both be replaced under requirements of the 4/29/04 Consent Order.

Setting moisture content value at 23 percent volumetric moisture content of underlying soils to reach a depth of 100 ft is too great an interval because it allows for too much moisture and contaminant movement to take place beneath the dump which has no liner or leachate collection system. SNL/DOE are playing the phony card of "false positive interpretations" to bootstrap higher levels for contamination to move to deeper levels at the dump. The volumetric moisture content should be set for no deeper than the depth of the pits and trenches.

SNL/DOE Response 18 states "The proposed trigger levels for 1,1,1-TCA, ethylbenzene, styrene, toluene and total xylenes in groundwater are regulatory-based, and are set at a value of one-half the EPA Primary Drinking Water Standard (MCL) (EPA 2003a) for each constituent." The proper regulatory based standard would be for "early detection" under RCRA, a standard which is lower than the EPA Drinking Water Standard.

NMED is correct that levels of detection should be set lower. Early detection of contaminants leaving the unlined dump is required. The level of detection should be set near the state of the art competency for detection of these contaminants. SNL/DOE's argument regarding "false positives" should again be rejected as an attempt to justify higher trigger levels than necessary.

SNL/DOE's argument that it is providing a "robust vadose-zone monitoring system" should be rejected as well for reasons that: the vadose zone under the dump is not monitored; the FLUTEs are in the wrong location; there are too few monitoring locations, and; the FLUTEs do not provide or substitute for the groundwater monitoring that is required under Subpart F.

The SNL/DOE Response to Comment #19 is to challenge NMED authority to propose additional monitoring at locations where contaminants were detected at their highest levels during the RFI. SNL/DOE states: "Additional monitoring at locations within the landfill using intrusive techniques is not recommended, and could compromise the integrity of the cover."

SNL/DOE ignores the fact that the additional monitoring can be installed at present, whether the subgrade has been installed or not. The additional monitoring wells for both soil gas and groundwater should be installed presently even though DOE may be required to dig up the subgrade and/or reconstruct the subgrade later. SNL/DOE ignore the fact that the cover has not been completed, nor has the CMI Plan been finalized and approved. SNL/DOE agreed to wait until final approval of the CMI Plan before continuing construction of the soil cover. The final CMI Plan should not be approved until monitoring data gaps for all pathways have been examined.

SNL/DOE's response only address soil-gas and it is clear that the NMED requirement addresses additional groundwater monitoring locations as well, especially for the vadose zone and uppermost aquifer beneath the dump. The proposed location of additional FLUTEs around the perimeter of the dump is vague and unresponsive to the problems of vadose zone monitoring and early detection of releases beneath the dump. The FLUTEs do not meet the need to install a competent well monitoring network for the ground water in the flow systems of the AF series and the ARG Deposits.

These concerns of Citizen Action and Geologist Robert Gilkeson for the well monitoring network at MWL are now echoed in part by the NMED in its letter of March 23, 2007 ordering MWL-BW1 replacement because "the water level in MWL BW-1 is only 2.29 feet above the bottom of the well screen." SNL/DOE has not to our knowledge complied with the letter's requirement to inform the NMED of other wells that are going dry—e.g., that the water level in MWL MW-3 is only 2.02 feet above the bottom of the screen. NMED echoes our concerns that:

- Stainless steel well-screens mask chromium and nickel contamination from the MWL. NMED claims that at Los Alamos National Laboratory of corrosion of well screens is merely speculative. Claims of corrosion at the MWL should be considered equally as speculative by NMED. If it is corrosion, then it masks

contaminant detection and the wells should be replaced. If not corrosion, then chromium or nickel contamination from the dump is present.

- Installation of wells by use of drilling fluids is to be avoided. (BW1, MW2, MW3).
- Construction materials with the potential to interfere with the reliability of hydrologic or analytical data are to be avoided (MW5 grout contamination).
- Screening is to be in the uppermost portion of the saturated zone (MW4 and MW5 have their screens across two different strata). Only one well at the MWL, MW6 is in the uppermost aquifer as defined by RCRA although RCRA requires three downgradient wells in the uppermost aquifer.

NMED should move to require replacement of wells that hide contamination and fail for their purpose at the MWL.

The 3/23/07 NMED letter is an implicit rejection of the Moats' Evaluation proposition that that all of the wells are in the proper location and furnishing reliable and representative water samples.

The shortcomings in the well monitoring network do not and cannot provide long term monitoring as required by RCRA post closure requirements. The historic data furnished by the well monitoring network has been worthless to provide a basis for closure remedy and assurance that the wastes will not contaminate the groundwater. Thus, SNL/DOE is not in compliance with monitoring measurements to evaluate actual and prospective performance within and outside each facility and disposal site. The historical and current monitoring data cannot be used as ongoing data to validate the Fate and Transport Model to assess performance.

The RFI Phase 1 and 2 studies are over 15 years old. The sampling data was limited at that time. Ongoing monitoring for soil gas has not been accomplished by SNL/DOE. Rupturing of containers by the passage of time was a major concern in the NOD. The rupturing of containers due to compaction activities should be of equal or greater concern. SNL/DOE maintained at the public technical meeting that rupturing of containers had not occurred. That is pure speculation on the part of SNL/DOE because there was no ongoing monitoring conducted beneath the dump to provide that information.

DOE/Sandia failed to comply with its RCRA duties under DOE Order 5820.2A. In 1986, the EPA published a notice that the hazardous component of mixed waste was subject to RCRA. In 1987, the Department of Energy (DOE) published a notice that declared the hazardous component of mixed waste was subject to RCRA regulation. DOE Order 5820.2A for Radioactive Waste Management (September 26,1988), in effect before the closure date (December 6, 1988) of the MWL, also set forth the policies, guidelines and requirements that facilities conducting the management of radioactive and mixed wastes be in conformance with RCRA or CERCLA.

SNL/DOE has failed to respond to the long term monitoring issues raised by the NMED by not providing documentation as to how the long term monitoring will be carried out. **DOE O 5820.2A requires permanent isolation of transuranic waste from the biosphere**.

SNL/DOE did not monitor surface soil for transuranics during RFI Phase 1 and 2 for either the storm water run-off pathway or the air pathway. (See below). 40 CFR 264 standards for hazardous waste management are not met under Subpart G for post closure. Monitoring requirements under 40 CFR 265.121 are not met. Long-term monitoring requirements should be put into place now at the dump.

DOE is not meeting the 5820.2A requirements that external exposure to the waste and concentrations of radioactive material which may be released into surface water, ground, water, soil, plants and animals results in a dose equivalent that does not exceed 25 mrem/yr to any member of the public. What is the currently calculated dose? Proposals to study ant's nests or animal mounds are welcome but are too limited. Full flora and fauna information should be assembled.

SNL/DOE have made no efforts as required under DOE Orders to consider maintaining releases as low as is reasonably achievable by in-situ treatment, excavation, or other methods.

SNL/DOE fail to protect groundwater resources consistent with State and Federal requirements under RCRA by maintaining wells that are corroded, in the wrong location, cross-contaminating different strata—as set forward in numerous prior Citizen Action documents.

The air pathway analysis for the MWL gas emissions under the EPA-600/R-05/123a *Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities* (September 2005) under RCRA.

Although the risks for fire and explosion at the MWL may be low, these risks have occurred in the past and are data gaps that are not analyzed by the SAP. Methane data should be provided for the MWL. Ignitable wastes, such as liquid sodium, in the MWL are not calculated. In 1974, Trench B had a uranium chip fire. Landfill fire and explosive hazards along with the potential inhalation risks to receptors are not considered in the SAP.

Comment #17. Remarkably, NMED, neither at the time of the NOD issuance nor for the soil cover remedy approval, did not have in its possession a copy of the 1995 *A Human Health Risk Assessment for the MWL, SNL*. (Risk Assessment). That document presents additional concerns that were not brought forward during the permit modification public hearings, included in the NOD or in later documents. The NMED should evaluate the shortcomings presented by the Risk Assessment and issue additional comments or another NOD.

Because of the data gaps cited above, SNL/DOE and the NMED can not currently construct a valid risk assessment to support closure and post closure decisions for the MWL.

Because the Risk Assessment was not examined, the basis for the remedy of a soil cover is unsupported.

SANDIA NATIONAL LABORATORIES MIXED WASTE LANDFILL STORM RUN-ON/RUN-OFF ISSUES:

1. Specific: The 50-year Failure of Sandia National Laboratories to Provide Storm Run-on and Run-off Protection at the MWL.
2. General: The Lack of a Storm Run-on and Run-off Program at Sandia National Laboratories

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, requires that DOE control and monitor radiological exposures from its facilities and activities. SNL is required to control and contain the transport of radioactive contaminants such as those at the MWL from the erosive forces of wind and storm water. SNL has failed to provide the protection of a storm water run-on and run-off plan at the MWL.

40 CFR 265.111 requires that the owner or operator must close a hazardous waste treatment, storage and disposal facility to control, minimize or eliminate post-closure escape of contaminated run-off to the ground, surface waters or to the atmosphere.

40 CFR 265.112 (b) (5) requires that closure performance standards require run–on and run-off control.

The March 1993 MWL Phase 2 RCRA Facility Investigation Work Plan stated (p.2-62):

"The surface-water pathway at the MWL would be of potential concern if erosion were to remove the surface soil cover from the MWL, and to mobilize contaminants from the surface soils near the landfill."

The October 30, 1998 NMED NOD for the Phase 2 RCRA Facility Investigation stated,

"Because land located approximately 1 mile west of the MWL could be developed for residential use, DOE/SNL must evaluate the potential for off-site contaminant migration from the landfill. The evaluation should consider ecological and human health impacts from any potential migration of COC's [Contaminants of Concern]."

Public comments were concerned about the surface run-off at the MWL. The November 21, 2006 Responses to Public Comments on the Sandia National Laboratories' Mixed Waste Landfill (p. 29) contained a comment by Citizen John Tauxe that the model was applied inconsistently between groundwater infiltration and surface water runoff pathways. NMED ignored the potential for the surface run-off pathway and did not offer any remedy to protect against storm run-off contaminants from the MWL.

The November 20, 2006 Notice of Disapproval: Mixed Waste Landfill Corrective Measures Implementation Work Plan, November 2005, and Requirement for Soil-Vapor Sampling and Analysis Plan Sandia National Laboratories (p.3) stated:

"16. Demonstrate with calculations and other information whether run-off and run-on controls have been adequately designed to handle peak precipitation events. Evaluate and discuss whether additional run-on controls should be constructed at locations further away from the landfill (e.g., at distances of 25 to 50 meters) to provide more protection for the cover from heavy rainfall events."

In a report by Tom Hakonson, Ph.D., is stated (p. 46): "The selection of the ET [enviro-transpiration] cap was based upon a risk assessment conducted by SNL/NM in the Phase 2 RFI, which showed that migration of waste contaminants by surface and subsurface processes was not predicted to significantly impact receptors." The erosion potential from storm run-off was not protected against by SNL as is evident in the SNL request to NMED to allow the placement of a mat and for construction of swales/canals at the MWL.

Failure to conduct adequate surface soil sampling precluded risk analysis for both the surface runoff pathway and for airborne emissions inhalation pathway. The *Preliminary Human Health Risk Assessment for the Mixed Waste Landfill, Sandia National Laboratories, Albuquerque, New Mexico* (January 1995) was based on the limited and insufficient data from the RFI phase 1 and 2 surface soil sampling. "No surface soil sampling was performed during the RCRA Facility Investigations Phase 1 and Phase 2 for RCRA heavy metals." (P.9). (http://www.nmenv.state.nm.us/hwb/SNL/MWL/Preliminary_Human_Health_Risk_Assess_MWL_by_Johnson(1-1995).pdf)

The 1995 Risk Assessment states further: "In addition, the lack of surface soil data precludes modeling the potential airborne emissions from the site. The potential pathways of concern for the future resident include inhalation and absorption of tritium, external radiation, and ingestion of groundwater. Inhalation of radioactive air particulates was not assessed for the same reason as for the worker scenario. Incidental ingestion of soil, and ingestion of contaminated food also were not assessed *because surface soil data have not been collected*." (Emphasis supplied).

The RFI Phase 2 Report (p.7-6) states "Surface soil sampling for radionuclides showed all values to be below the 95th percentile or UTL background level, with the exception of tritium." However, the only data presented in the Phase 1 and 2 reports is from 10 samples that did not adequately characterize for radionuclides other than tritium.

The areas outside the now constructed subgrade and boundaries of the MWL along the drainage pathways from the MWL should be examined for radionuclides and other contaminants for compliance with terrestrial monitoring requirements under DOE O 450.1.

The surface soil flow path away from the MWL was not appropriately examined for contaminant dispersal as required also by the Sandia Environmental Monitoring and Surveillance Plan (PG470247) (p.13).

> "**Stormwater -** Stormwater flowing over the ground surface has the potential to pick up and transport contaminants. Accordingly, this is considered in the design of terrestrial sampling, stormwater and groundwater sampling plans considering the watershed approach."

The terrestrial Sampling Locations shown in PG470247 indicate that only the four corners of the MWL were sampled and not the storm water run-off pathways away from the dump as identified by the topographic map. (See, RFI Phase 2 Report, p.1-4 Topographic Map of the MWL.) The terrestrial sampling on flow paths away from the dump is not adequately covered. At the four locations where soil was sampled, the analytical results are that soils are elevated in tritium. The actual activity levels are not listed. No samples were taken away from the dump along the storm water flow paths.

There was additionally surface soil contamination by low levels of plutonium detected in surface soil at the MWL at the location of the now closed Interim Status Storage Unit. (April 16, 2007, Letter to Citizen Action from New Mexico Environment Department.) Plutonium along the storm run-off pathway was not monitored. Additionally as stated above, the RFI Workplan requirements for 100% of the 164 out of 182 required samples analyzed only 10 samples for tritium and not plutonium.

Given the failure to collect data at the MWL for the surface soil contamination along the run-off pathway from the MWL, the Preliminary Risk Assessment (1995) could not analyze the risk to human health from plutonium and other radionuclides, RCRA metals, PCB's and other chemical contaminants.

Given that many of the contaminants in the MWL can remain dangerous for at least a hundred thousand years, SNL/DOE using the principal design storm of the 100 years-6 hours event is not reasonably conservative. SNL/DOE use of the run-off criteria used by the City of Albuquerque may not be adequate for the long-term danger posed by the contaminants.

- Frequency of floods based on the historical record should be identified.
- The Probable Maximum Storm should be identified.
- The Probable Maximum Flood should be identified.
- Effects for global warming should be taken into account for the long term duration of the dump's wastes.

Surface Soil Sampling required by DOE Orders and by the RCRA Facility Investigation Workplan was not performed for nuclear weapons radionuclides, heavy metals, PCBs, etc. The storm water run-off pathways for these contaminants were not characterized. Surface Soil sampling across the Mixed Waste Landfill was only evaluated for tritium for which significant levels of contamination were present. That suggests that other contaminants may also be present across the surface of the MWL, but have not been characterized.

Transuranic Waste (TRU)—the SWIMS database indicates that about 50 cu ft of TRU waste containing 1.2 mCi of total activity was disposed of at the MWL. Memoranda And Waste Management Site Plans from the early 1970s indicate that the amount of TRU waste could be as high as 600 cu ft. The major contaminants included in this waste category are Pu-238 and Pu-239. (A Preliminary Human Health Risk Assessment for the Mixed Waste Landfill, Sandia National Laboratories, 1995, p. 12) http://www.nmenv.state.nm.us/hwb/SNL/MWL/Preliminary_Human_Health_Risk_Assess_MWL_by_Johnson(1-1995).pdf

Pu-238 and Pu-239 in the surface pathways are unknown. With a half-life of 87.7 years for Pu-238 and 24,100 years for Pu-239, both of these contaminants should be of concern along the surface soil pathway.

No characterization was done with the surface soil samples for plutonium as required in the Work Plan at the Mixed Waste Landfill during the RCRA Facility Investigations (RFI) Phase 1 and Phase 2. The Phase 1 *Work Plan for an Expanded Site Assessment at the Mixed Waste Landfill* (July 1989) by Ecology and Environment, Inc., (Table 3-2, p. 3-11) stated 197surface soil samples were to be collected for Tritium, Gross Beta, Gamma Spectrometry, Isotopic-Uranium, and Strontium 90 if gross beta and the gamma isotopic scan indicate its presence.

The number of samples collected did not meet the 1989 Work Plan requirements. The Phase 1 Report (p.3-24) states:

> "A total of 164 surface soil samples including duplicates and blanks were collected at the MWL. The workplan specified the collection of 182 samples. Samples could not be collected where surface obstacles prevented access (i.e., above ground storage casks, disposal pits and associated concrete, steel, or wood caps, unyielding ground), *or near areas of excessively high radiation marked areas (previously roped off by SNL)*. Originally, all of the samples were to be analyzed for tritium, gross beta activity, gamma emitters (gamma spectroscopy), isotopic uranium, and isotopic plutonium. Ten Percent of the samples (randomly selected) were analyzed to determine if the radiological parameters could be determined. The remainder of the samples were list [lost?] by the laboratory.[1] The actual analyses were for tritium, gross beta activity, gross alpha activity, gamma emitters, and isotopic uranium." (Emphasis added).

On the contrary, however, The RFI Phase 1 Report at Table 5-6 (p. 5-11) shows that gamma emitters were not analyzed. In addition, the analytic results for gamma emitters are not presented anywhere in the Phase 1 or Phase 2 Reports.

This statement is an indication that high levels of surface soil contamination were present and were not characterized for plutonium and many other contaminants, especially given the fact that only ten samples were analyzed. The ten samples, moreover, did not analyze for nuclear weapons related contaminants other than tritium, Ra-226, U-234, and U-238 (Table 5-6, p. 5-11).

[1] This sentence makes no sense unless the word "list" is changed to "lost." The writing is sloppy at critical junctures that could indicate deliberate miscommunication.

None of the later sampling in the RFI Phase 2 looked for plutonium or other radionuclides, with the exception of tritium.[2] Plutonium was detected in the surface soils from a limited study of the closure of an Interim Status Storage Unit. (Also, see below). The gamma isotopic scan was not performed as required by the RCRA Phase 1 Workplan. The Phase 1 Report (p.3-25 and Table 3-4) showed that the Workplan activity for Surface Soil Sampling was for -- "182 Samples to be collected for analyses for Tritium, Gross Beta, Gamma Spectrometry, Isotopic-Uranium , and Isotopic Plutonium. 100% Analysis of samples." The Completed work was -- "164 samples collected for Analyses for Tritium, Gross Alpha/Beta activity, Gamma Spectrometry, and Isotopic Uranium. Iso-Plutonium only if elevated gamma readings noted. Only 10% analyzed in 1989. Remainder to be analyzed in Phase II."

The remaining 90% of the samples were supposed to be analyzed in Phase 2. Apparently the laboratory lost the samples. (See fn 1). In the Phase 2 (p. 4-29) surface soil sampling, however, there is indication only that surface soil samples were collected for tritium. The remaining analysis of Phase 1sampling was apparently not accomplished.

The failure to accomplish the RCRA Workplan for Phase 1 and 2 gives no confidence that soil surface contamination from plutonium or other radionuclides does not exist because only 10 samples were actually analyzed and for a limited analytical suite.

Respectfully submitted,

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[2] The number of samples stated in the Phase 1 Work Plan (1989) differs from the number stated in the Phase 1 Report.

Soil-Vapor Sampling and Analysis Plan
At Sandia National Laboratories' Mixed Waste Landfill
Citizen Action Presentation to the New Mexico Environment Department
May 1, 2007

Governor Richardson's position that we need to dismantle our nuclear weapons laboratories demands a new mission for Sandia.[1] Citizen Action would recommend that Sandia place itself in the lead for action on cleaning up legacy waste sites starting with the Sandia Mixed Waste Landfill.

In the past Citizen Action's focus has been on groundwater. Now it is on the need for monitoring of the air pathway. As was true with the defective groundwater monitoring network at the MWL, there is too little data that will be obtained from the limited soil sampling proposed by Sandia to make a decision that the wastes can safely remain in place in the middle of an urban center for the duration of their toxicity.

Sandia failed to extensively monitor these significant pathways for release. Sandia did not monitor continuously and now Sandia is proposing to still offer extremely limited sampling.

The sampling plan proposed by Sandia does not address the Notice of Disapproval specifically with respect to the problem of containers that may have ruptured and released their contents over the decades of time. The sparse sampling proposed does not address the releases that may have been extensive across the 2.6 acre MWL disposal site.

Now there is the additional need for data from the recent compaction of containers that took place within the individual trenches and pits. The comprehensive study that is necessary is both made more urgent and difficult to carry out due to the installation of the subgrade. No sampling is planned above or below the pits or trenches. No monitoring was in place when the trenches and pits were compacted possibly releasing considerable amounts of contaminants to the vadose zone as liquids and vapors. There are no plans for ongoing monitoring to identify areas where compaction activities ruptured containers and released contaminants.

The proposed sampling is not responsive to the NMED NOD. We need the total picture from releases of container rupture that is present and will be a danger realized over a period of thousands of years.

The SAP needs to include installation of a permanent monitoring capability for soil gas at a large number of locations both aerially and vertically.

Some of the wastes at the MWL are too dangerous to be left in place. Wastes that are greater than Class C cannot be legally left in place at the MWL. Dangerous emissions that cannot be controlled by leaving the wastes in place are not monitored. We need to

[1] "This is an existential problem. It is urgent. We need to free humanity from the threat of nuclear destruction." Gov. Bill Richardson at John Hopkins University, March 28, 2007.

have careful monitoring put in place now for both air, water and surface pathways and there are no plans in place for that careful monitoring.

Despite this knowledge only a one-time sample of these dangerous contaminants was made in the early 1990s. The work in the 1990s was at sparse locations that gave knowledge that hot spots existed but did not adequately follow up to map and monitor the hot spots. The highest levels at the hot spots were not characterized. Nobody knows what portion of the Albuquerque population may have been exposed to the types of VOCs, solvents, heavy metals and radionuclides at the MWL escaping from exposed waste and contaminated surface soils. NMED Comment 60 Phase 2 RFI- "Vapor-phase transport to groundwater was not considered for tritium."

There are the growing populations of Mesa del Sol, south county and Isleta Pueblo. The necessary data from soil gas monitoring has never been in place to support the decision to leave the wastes permanently buried at the MWL or to measure the body burden that the public has already had to assume and will assume for the future.

An issue of environmental justice arises from the lack of concern for monitoring and controlling past, present and future exposure of these communities.

There was never a proper characterization of the wastes at the Mixed Waste Landfill. There has not been adequate soil gas monitoring nor has an adequate well monitoring network existed at the MWL. The characterization of the wastes by Sandia only recognized the 100,000 cu ft of radioactivity above 6,500 Ci. The CEARP performed actually recognized over 700,000 cu ft of radioactive and hazardous wastes in the dump and 100,000 cu ft was later assigned to the radioactive portion of the wastes.

The dangerous wastes were disposed of in a manner that would not be allowed today. There is the possibility for powerful synergistic chemical reactions and increased mobility of radioactive materials that was and is not considered. It is known from studies in the state of New York that landfill gases in ordinary municipal dumps can travel underground distances greater than 1500 ft. Radon gas has never been characterized in the vadose zone beneath the MWL and is not planned for characterization in the present soil sampling plan.

The large amounts and locations of various types of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and heavy metals placed in the MWL are not known. So there is an increased need for careful and continuous monitoring.

The variety and amounts of wastes and the emplacement in different pits and trenches, make it extremely unlikely that the MWL is a homogeneous emitter. The current Sandia sampling analysis plan fails to consider:

- the differences in types and emission rates that may exist for the individual pits and trenches and for the different locations within the trenches themselves;
- monitoring the hot spots that were discovered for tritium (See attached figure 2-1 and compare with tritium hot spot locations in Fiure 4.25);

- the southeast corner of the MWL has an acid pit that has no planned monitoring;
- the landfill gases may travel toward the eastern boundary of the MWL and no monitoring is planned for this pathway;
- NMED Comment 60 Phase 2 RFI- Vapor-phase transport to groundwater was not considered for tritium
- NMED Comment 61 Phase 2 RFI- Active soil-gas sampling was limited to a maximum depth of 30 ft. Generally soil-gas concentrations increased with depth. NMED recognized that soil gas sampling was not done to a sufficient depth but the SAP presently still only plans a depth of 30 ft.
- NMED Comment 64 Phase 2 RFI- Tritium concentrations in sediment samples from the MW4 borehole at depths below the water table exceed the local background level for tritium. NMED should recognize that the planned testing for tritium at 30 ft also does not go deeply enough.
- Real time detection beneath the MWL is necessary below all trenches and pits and at the boundary of the MWL for the vadose zone because there is no liner.

The characterization of the wastes at the MWL has never been adequate for monitoring of the air pathway. The Phase 2 2 RCRA Facility Investigation (RFI) (p.4-1) states "The MWL is considered the most significant diffuse radiological source at SNL, NM." The Phase 2 RFI Work Plan identified the MWL "with a high potential for contaminant release through both the soil and/or surface water pathways." (p. 4-1). "Individuals or populations may be exposed to contaminants through inhalation of air contaminated with vapors or particulates. … Tritium is presently being mobilized from the MWL in the vapor phase, with a maximum flux of 6,120 $pCi/m^2/hr$ measured east of the classified area during the summer of 1992. This vapor-phase tritium is highly mobile and may be transported through the air pathway offsite. Tritium may also be taken up by plants and then dispersed. Other radionuclides may be adsorbed to soil particles which may be blown into population areas." (P. 2-59, 2.4.2.1).

In the NMED Comments to the DOE/SML/NM MWL RFI Phase 2 Report (p.2, para 7) there is the recognition that the radioactive/mixed waste in pits SP-4, SP-35 and SP-36 had high levels of radiation and "could be removed and disposed of elsewhere, <u>in accordance with applicable regulatory requirements</u>." So, if these requirements existed, why didn't Sandia follow them and why hasn't the NMED enforced them? Were these pits opened and backfilled with concrete or dirt that was compacted?

The April 29, 2004 Consent Order between Sandia and NMED requires vadose zone monitoring that is in compliance with the RCRA Groundwater Monitoring: Draft Technical Guidance, Nov. 1992 and 40 CFR § 264.98.

RCRA Groundwater Monitoring: Draft Technical Guidance, Nov. 1992-- 5.1.2.4 Vadose Zone Monitoring -- At some sites where the potentiometric surface or water table is considerably below the ground surface, contaminants may migrate in the vadose zone for long distances or for long periods of time before they reach ground water. At other sites, the potential may exist for contaminants to migrate laterally beyond the downgradient extent of the monitoring well network along low hydraulic conductivity layers within the

vadose zone. A vadose zone monitoring system may be necessary in these and other cases to detect any release(s) [aka – soil gas] from the hazardous waste management area before significant environmental contamination has occurred. Leachate released to the vadose zone, for example, may be detected and sampled using tensiometers. The use of vadose zone monitoring equipment can potentially save the owner/operator considerable expense by alerting him or her to the need for corrective action before large volumes of the subsurface have been contaminated.

The Agency recommends unsaturated zone monitoring where it would aid in detecting early migration of contaminants into ground water. The Regional Administrator also can require this monitoring on a case-by-case basis as necessary to protect human health and the environment under §§3004(u) and 3005(c). The elements, applications, and limitations of a vadose zone monitoring program are provided by Wilson (1980) and USEPA (1986b).
Moreover, the Agency is currently updating its existing guidance on vadose zone monitoring.

40 CFR § 264.98 Detection monitoring program.

An owner or operator required to establish a detection monitoring program under this subpart must, at a minimum, discharge the following responsibilities:

(a) The owner or operator must monitor for indicator parameters (e.g., specific conductance, total organic carbon, or total organic halogen), waste constituents, or reaction products that provide a reliable indication of the presence of hazardous constituents in ground water. The Regional Administrator will specify the parameters or constituents to be monitored in the facility permit, after considering the following factors:

(1) The types, quantities, and concentrations of constituents in wastes managed at the regulated unit;

(2) The mobility, stability, and persistance of waste constituents or their reaction products in the unsaturated zone beneath the waste management area; …"

The vadose zone monitoring required under RCRA does not exist. This SAP does not address this non-compliance.

The proposed long-term monitoring for the MWL also does not meet RCRA long-term monitoring requirements nor DOE Order 450.1 and 435.1 requirements.

Soil-gas monitoring from beneath the dump through the vadose zone down to the uppermost aquifer needs to be accomplished for the MWL.

The vadose zone has not been monitored as it should have been prior to the decision to permanently dispose of long lived radioactive and hazardous wastes above the aquifer with potential to also enter the air pathway.

The absence of a liner beneath the MWL requires comprehensive vadose zone monitoring ***now***, and not after the dirt cover has been installed.

Newer technologies are available and were developed at Sandia Laboratories to characterize and monitor the releases from hazardous environments such as the MWL. Why hasn't Sandia applied these technologies at the MWL?

An article by Irwin and Brouillard[2] describes the technological design of a new landfill at SANDIA to protect groundwater. The article describes the liner and detection systems installed beneath the trench for real-time monitoring of remediated wastes disposed of in a large trench. One realizes just how deficient the characterization and monitoring at the MWL is by comparison:

> "Sandia National Laboratories in Albuquerque, New Mexico, operates a Corrective Action Management Unit (CAMU) for the DOE. The CAMU containment cell has a capacity to permanently store up to one million cubic feet of treated soil. The containment cell is situated approximately 500 feet above groundwater in a region with low rainfall and infiltration. These site conditions required a unique approach to monitoring cell integrity and protecting groundwater. **To satisfy RCRA groundwater monitoring requirements**, a Vadose Zone Monitoring System (VZMS) for detecting leaks was incorporated into the containment cell design. One component of the VZMS, the Primary Subliner (PSL) monitoring subsystem, utilizes the containment cell subliner to focus potential leakage into five longitudinal trenches, which are filled with a wicking material surrounding vitrified clay piping. The vitrified clay piping provides access for neutron probes to measure soil moisture content directly under the containment cell. The other component of the VZMS, the Vertical Sensor Array (VSA), consists of 22 time-domain reflectometers that provide a backup to the PSL. These two vadose zone monitoring subsystems allow for real-time leak detection, as well as long-term assessment and assurance of containment cell performance." (Emphasis supplied).
>
> … "Vadose zone monitoring of the CAMU containment cell was accepted by EPA Region VI regulators because of its high probability for early detection of leakage if it were to occur, as well as enabling timely implementation of a corrective action to mitigate the possibility of any impacts to groundwater."

[2] *Real-Time Monitoring Capability for Performance Assessment*
Corrective Action Management Unit Containment Cell
*Sandia National Laboratories, New Mexico,*Michael J. Irwin1, Lee A. Brouillard

Given the longevity of the MWL wastes containing greater-than-Class C transuranics, the dump will remain a toxic time bomb of waste for at least the next 100,000 years.

With the recent compaction performed at the dump for subgrade construction that may have caused unmonitored releases and future releases, a permanent soil gas monitoring network needs to be done for the long-term. In addition, a long term well monitoring network needs to be installed. (See, 40 CFR 265.121 and 63 FR 56710).

Horizontal drilling methods developed by Sandia National Laboratories could be used beneath the MWL. This method would be especially indicated since the compaction and rupture of containers at the MWL. The technique was used at Rocky Flats and touted as being a cost effective method for characterization.
http://rockyflats.apps.em.doe.gov/references/145-Side_Drill_Detect_Under_Bldgs.pdf
"Horizontal Directional Drilling and Environmental Measurement While Drilling (HDD/EMWD) allows remote characterization of the soil. The system provides testing for suspected underground contamination from a distance. It also provides the immediate production of data on what contamination there may be and where it may be found. Conventional vertical drilling methods used previously required workers to stand directly above the borehole. Potentially contaminated soil was brought to the surface where it could become a hazard to workers and the environment."

A patented inside-out well design from the United States Department of Energy's Idaho National Engineering and Environmental Laboratory (INEEL) accommodates simultaneous gas sampling and groundwater sampling as well as remediation in the same bore hole - a trick that until now required multiple wells or complex well-within-a-well solutions. The technology is used to monitor volatile organic compounds (VOCs) at INEEL, Sandia National Laboratory, Los Alamos National Laboratory, NASA White Sands, and Tucson Airport. This technology should be given consideration for use at the Sandia MWL. Sandia National Laboratory is currently using the INEEL technology in six vapor-extraction wells ranging from 140 to 486 ft. deep at the 2-ac. chemical-waste landfill. http://www.erosioncontrol.com/msw_0103_inside.html
The MWL is not properly designed to meet RCRA regulations in effect for vadose zone monitoring for early leak detection at the MWL.

Soil-gas monitoring from beneath the dump through the vadose zone down to the uppermost aquifer needs to be accomplished for the MWL.

The need for monitoring radon emissions is now recognized after the Phase 2 RFI has been completed. The NOD specifically cites radon emissions from sources that have not been contemplated by the Fate and Transport model. A large number of wastes that produce radon emissions in the dump were ignored. Sandia now plans only to do that monitoring after the soil cover has been installed. The radon monitoring should be performed before soil cover installation for characterization of the vadose zone beneath the dump and possible remediation if necessary to protect the public and environment.

A public meeting should be held for the deficiencies of the Fate and Transport Model. Citizen Action considers the published Fate and Transport Model as lacking any

predictive value for release of contaminants from the MWL and cannot be salvaged. The Fate and Transport Model failed to predict the chromium and nickel groundwater contamination.

In an article by Shlomo P. Neuman[3] regarding mathematical models for DOE legacy waste sites, he states:

> "The tendency has been to rely on models at the expense of detailed site investigations, site monitoring, and field experimentation. In fact, models have often been used to "demonstrate" that additional site or experimental data would be of little value for a project. The reasons for this state of affairs are easily identified as regulatory and budgetary pressures.
>
> "It is often tempting to 'demonstrate' by means of a model that a given waste disposal or remedial option is safe, or that additional site data would be of little value, by basing the model on assumptions, parameters and inputs that favor a predetermined outcome."

The characterization of contamination along the storm run-off pathway has not been performed in a meaningful way. Samples are only collected at the four corner locations of the MWL. There has been no study of the topography away from the MWL site to map the storm runoff pathways. Instead there has been blind sampling at the four corners of the MWL.

There is no data on the current levels of biological uptake and dispersion that is currently existing in the vicinity of or at a distance from the MWL.[4]

CONCLUSION

- The soil-gas sampling plan must perform comprehensive soil-gas characterization to identify where long term monitoring is required.
- Measurements need to be made over and under the areas where there has been compaction.
- Soil Gas Plan needs to address monitoring presently and for the long-term in the unsaturated zone. A phased approach over several years should be performed in which the soil-gas sampling plan is the start for installing the permanent network for long-term monitoring of soil gas and groundwater.
- Since Sandia plans to dispose of the wastes in unlined pits and trenches without the protections provided for by an engineered landfill with a liner and leachate

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[3] ***National Academies Press*** **- "Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites (2000), Appendix G – "Mathematical Models Used for Site Closure Decisions"** ***by Shlomo P. Neuman and Benjamin Ross***

[4] T. E. Hakonson, 2/15/02, *Review of Sandia National Laboratories/New Mexico Evapotranspiration Cap Closure Plans for the Mixed Waste Landfill.*

collection, long-term monitoring of the wastes must be provided prior to soil cover installation.

- A comprehensive soil sampling plan will also identify important locations for placement of long term monitoring wells.
- Extraction and treatment of soil gases should be anticipated and may be necessary.
- Radon gas monitoring in the vadose zone and in the air above the MWL should be performed now.
- The minimum number of monitoring points will be greater than 100 sampling ports in 3 dimensions.
- The Fate and Transport Model should have a public hearing for its deficiencies.
- Characterization of contamination along the storm run-off pathway should be performed.
- A Risk Assessment Study needs to be performed after proper characterization of the soil-gas pathway, the groundwater pathway and the surface run-off pathway have been completed.

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April 27, 2007
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Citizen Action Comment RE: April 13, 2007, New Mexico Environment Department ("NMED") Public Meeting Notice ("Notice") issued regarding the Soil-Vapor Sampling and Analysis Plan for the Department of Energy/Sandia National Laboratories' Mixed Waste Landfill ("MWL"). Request for Notice Correction and Restatement.

The NMED Notice states "The Soil-Vapor SAP is not considered to be a part of the [Corrective Measures Implementation] CMI Plan, but instead is a stand alone document."

For the reasons set forth below Citizen Action respectfully disagrees with this statement in the Notice.

The MWL is regulated under the Resource Conservation and Recovery Act ("RCRA"). NMED is required to operate at all times under the RCRA for the MWL. The NMED issuance of a November 20, 2006 *Notice of Disapproval : Mixed Waste Landfill Corrective Measures Implementation Work Plan, November 2005, And Requirement for Soil-Vapor Sampling and Analysis Plan Sandia National Laboratories* ("NOD") is exercise of NMED's authority under RCRA. The NOD links the CMI Plan and includes the requirement for a Soil-Vapor and Sampling Plan. The Soil-Vapor SAP is part of the RCRA CMI Plan and has been treated as such by the Department of Energy/Sandia National Laboratories' ("DOE/SNL") and the NMED.

The entire CMI Plan and the NOD related to the CMI Plan are under the RCRA rubric:

- Soil sampling was required by the Phase 2 RCRA Facility Investigation.
- The planned sampling DOE/SNL has submitted in response to the NMED NOD is linked to the previous Phase 2 locations where Volatile Organic Compounds and tritium were detected.
- Module IV of the HSWA Permit is part of the RCRA process. Module IV (p.12) requires measures to protect the aquifer such as "monitoring of temperature, pressure and moisture in the vadose (unsaturated) zone, moisture and vapor flux investigations and numerical simulations." (Emphasis supplied). DOE/SNL is required to have in place a program to collect analytical data on, among others, "subsurface gas contamination when necessary to characterize contamination from a SWMU [Solid Waste Management Unit]."
- The 11/20/07 NOD references soil gas throughout the NOD. states that "The NMED may also require soil gas monitoring to be conducted at depths other than 173 feet … Monitoring details will need to be included in the long-term monitoring and maintenance plan, due within 180 days following approval of the

CMI Report." (P.2, para 8). Further, gas phase constituents are required to be discussed for tritium, radon, and PCE. (P.5). Soil gas monitoring in the vadose zone is required. (P. 7). Trigger levels for soil volatile organic compound gases such as 1,1,1-TCA, ethylbenzene, styrene, toluene and total xylenes are cited as being too high. (P. 7). Proposed listing of monitoring triggers for Subsurface Soil Gas are to be expanded. (P. 7).

Conclusion

The error in the Notice should be corrected by NMED. The Soil-Vapor Sampling Analysis Plan is not a "stand alone" document. Subsurface soil gas sampling is part of a RCRA process under the CMI Plan and the HSWA Permit. The soil gas plan is linked to RCRA and the CMI Plan. The public is being denied two procedural rights: 1) The right to a public hearing with full evidentiary procedures in place as provided by RCRA; and, 2. The public is not informed that the decision for the soil gas plan is subject to appeal.

Please include this comment into the administrative record along with previous Citizen Action Comments on the Soil-Vapor Sampling and Analysis Plan.

Thank you.

Sincerely,

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December 18, 2006

Mr. James Bearzi, Chief
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Re:
1) Request for Public Review and Comment Period for Sandia National Laboratories ("SNL" or "Sandia") Soil Gas Work Plan;
2) Reply of Citizen Action in Opposition to NMED Responses to Citizen Comments, SNL MWL CMI (Nov. 21, 2006) ("NMED Response(s)");
3) Public Request for Information (bold numbered throughout text);
4) Request for NMED Secretary Ron Curry to Require NMED Staff to issue Notices of Violation at the Mixed Waste Landfill ("MWL") at SNL under the Resource Conservation and Recovery Act ("RCRA"), the Consent Order of April 29, 2004 ("CO"), and the Hazardous and Solid Waste Act ("HSWA") Module IV, and;
5) Request for NMED Secretary Ron Curry to Review Staff conduct at public meetings.

Dear Mr. Bearzi,

At the Groundwater Protection Advisory Board (GPAB) on Dec. 14, 2006, you stated that NMED had requested a work plan for soil gas analysis at the Mixed Waste Landfill operated by SNL. Citizen Action (CA) believes that this request is procedurally related to ongoing Corrective Implementation Measures Plan (CMIP); the Fate and Transport Model issues; as a continuation of the Phase 2 RCRA Facility Investigation, and; as controlled by NMED's position that the MWL purportedly is a SWMU under the HSWA Module IV portion of a permit. Sandia is required to have a community relations plan which allows for public participation in their investigation process. The data from the period of soil gas testing in or about 1993, as you mentioned at the GPAB, is old. CA believes that the data is also sparse and has not been thorough in its coverage as required by the HSWA permit.
1. **Please provide a copy of the NMED letter to SNL/DOE requesting a soil gas workplan.**

There has been a failure to establish monitoring wells near radiation hotspots that were found in the Phase 2 RCRA Facility Investigation: Pit 35, contained depleted uranium; Pit 36, contained high levels of DU, lithium, and four 55 gal. drums with fission products, possibly in liquid form(?); Pit 4 contains reactor vessel plates and Cobalt 60. The tritium

hotspot noted at Figure 4.2-5 occurs in relation to these pits (see Figure 4.1-1). Although tritium is a contaminant of concern for tracking, NMED has failed to require monitoring wells in this area. There is a cluster of Tritium disposal pits as seen in Figure 4.4-4 and no monitoring wells have been placed in that location. Between 1959-1962, SNL had no chemical disposal site. There is also an acid pit in the southern portion of the classified area of the MWL. This is an obvious area to also investigate with monitoring wells. The mobile constituent tritium should be monitored for early detection at those locations.

2.a. Please provide CA with a map of all the numbered pit locations in the classified area at MWL.
2.b. Please provide the numbered locations on a map for the soil boring locations at the MWL.

Contrary to the NMED statement to the GPAB that there have been no releases of contaminants to the vadose zone, the NOD stated, **"There is a 'hot spot' of contamination at a depth of 50 ft. Borehole 3 (BH-3). Contaminants are Ag (1.46 mg/kg), Cd (1.44 mg/kg), Co (105 mg/kg), Cu (645 mg/kg), Ni (97.5 mg/kg), and Zn (413 mg/kg)."** The background levels for copper are 7.3 mg/kg, for nickel 8.2 mg/kg, zinc at 26 mg/kg, Ag not detected in background, Cobalt at 4.7 mg/kg, Cadmium 0.9 mg/kg. Obviously, there have been releases of contaminants to the vadose zone and in amounts that are well in excess of background levels.

For the contaminant PCE, several hot spots were identified in the sparse coverage for the sampling program. PCE was found in the shallow gas borings. The subsurface borings for soil gas were not co-located with the hot spots that were identified in the handful of surface sample collection locations. A new survey with high density blanket coverage of surface air/gas sample collectors and sub-surface borings would be appropriate over the entire MWL. First, air coverage then borings guided by the air sampling results in second phase. Third phase should be monitoring wells installed to investigate contamination of the vadose zone from ground surface to the water table. Only air rotary reverse circulation technology should be used for vadose zone monitoring. This is standard appropriate industry to characterize the areas MWL. Also it would be appropriate to install monitoring wells at the location. That coverage should also be placed over the classified area as well. This would be necessary to protect public health and safety and workers from toxic inhalation at SNL.

A detailed program to characterize the nature, rate and extent of releases of reactive gases from the MWL is required. The program is required to include, but is not limited to: provisions for continuous monitoring of subsurface gases released from the unit, and an assessment of the potential for threat to human health and the environment. There must also be a program described to collect data to describe human populations and environmental systems that are susceptible to contaminant exposure from the facility. This may include chemical and radiochemical analysis of biological samples. Data on observable effects in ecosystems may be required. Citizen Action emphasizes that the monitoring program is required to use ongoing monitoring not just sporadic sampling of

releases of reactive gases from the MWL. All requirements for sampling must be in accord with Section g.4 of the HSWA permit for air contamination (pp. 32-33).

With respect to sparse data, Figure 4.5-2 from the first round Passive Soil Gas Sampling Locations reveals a picture of limited locations for the area of the MWL. There are only 5 locations that are internal to the northern half of the unclassified section and only 5 locations for the southern half. The air pathway for exposure for human receptors has been inadequately characterized for tritium and VOCs.

The planned remedy of an evapo-transpiration cover will require the use of compaction equipment at the MWL. The compaction of the various trenches will further increase the release of tritium and other VOCs to the air pathway increasing human exposure. The wastes in containers must be appropriately characterized prior to compaction and the potential assessed for human and environmental risk.

Contrary to Mr. Bearzi's statement to the GPAB, the presence of metal contaminants (nickel, cadmium cobalt, copper, zinc) has been observed at the MWL at depths which can exceed 100 feet. These were noted in the NMED NOD (10/1998) and indicate that liquid wastes were disposed of at the MWL. The NOD required groundwater monitoring for metals. CA review of the ground water monitoring data released from the MWL shows that nickel is a contaminant at well MW1.

In addition, the NOD stated that "The MWL inventory is not complete. **Data derived from soil sampling beneath the landfill indicate that nickel is a possible contaminant at the MWL**." (Emphasis added). Monitoring well MW1 has detected a plume of nickel contamination in the groundwater. Monitoring well MW1 is located at 50-feet from the nearest disposal pit at the MWL and is showing high levels of nickel contamination because of contamination released from the dump. Because contamination is present at MW1, a background well is required upgradient to the east of MW1 that is installed to investigate contamination in the fine grained sediments. (See, RCRA Technical Enforcement Guidance Document, p.66-67).

The *Evaluation of the Representativeness and Reliability of Groundwater Monitoring Well Data, Mixed Waste Landfill, Sandia National Laboratories* New Mexico Environment Department/Hazardous Waste Bureau By: William P. Moats, David L. Mayerson[1], and Brian L. Salem ("Moats Evaluation") (p. 7, Nov./2006) observes that the values for concentration for nickel in MW1 show a marked increase over time. The Moats Evaluation *infers* from this that nickel is from progressive corrosion of the well screen for MW1. The Moats Evaluation fails to provide scientific justification for this "inference" and fails to consider why chromium levels are not also proportionately rising if the source of the nickel is from stainless steel well screen corrosion.

The claim by NMED and SNL/DOE that the high levels of nickel at MWL well MW1 are the result of corrosion of the well screen are technically incorrect and without basis. There is not a proportional amount of chromium which would also be detected along with the nickel if corrosion were the problem. In addition, corrosion would produce finely

divided suspended particles of chromium and nickel in the water samples produced from the well screen. This is not the case. Chromium has only been found at MW1 when there were instances of high turbidity in the sampling which picked up suspended sediments with high natural chrome. Nickel on the other hand was found dissolved in the water indicating contamination from elsewhere.

Two US EPA National Risk Management Research Laboratory Memoranda (EPA Memoranda) of February 10, and 16, 2006 by Robert Ford and Steven Acree reviewed documents concerning well construction practices and water quality evaluations at LANL. 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 is reviewed. The Moats Evaluation failed to cite the EPA Memoranda which critique the WSAR report on points which are comparable between LANL and the MWL at SNL for well monitoring deficiencies.

In September of 2006, the NMED filed a Notice of Disapproval of the LANL WSAR (September 2006). The concerns of NMED for the limited scope of the LANL WSAR also apply to the Moats Evaluation. As was true for the flawed LANL WSAR analysis, The Moats Evaluation fails to state that: the water quality data from the wells at the MWL are deficient to support the Moats Evaluation; wells at the MWL are improperly installed; in the incorrect location; going dry; causing cross-contamination because of leakage: lacking a point of compliance; the background well is cross-gradient rather than upgradient; the screens in two wells are installed in both aquifer types; there are insufficient downgradient wells, and; two of the monitoring wells that are supposed to be down-gradient are cross-gradient. The NMED SNL Consent Order (p.63) requires replacement of defective wells, but NMED is failing to order replacement at any location.

The Moats Evaluation is a poorly constructed technical document which appears to have been written primarily as a tool for rebuttal of Citizen Comments specifically regarding the Fate and Transport Model and the non-RCRA compliant well monitoring network at MWL. The Moats Evaluation has not been peer reviewed. The NMED Responses to citizen comments are contradictory, incorrect, based on false data or no data, misreading data, and data gaps.

Citizen Action has provided information to NMED in an October 2006 Notice of Intent to Sue (NOI) and a Supplement to the NOI (November 2006) at MWL and violations of RCRA for permitting and for the well monitoring system deficiencies as per RCRA. Those documents are herein incorporated by reference for purpose of Citizen Action's Reply to the NMED Response.

The Fate and Transport Model Response is wholly flawed for the purpose of predicting contaminant movement at the MWL, among other matters, because of its reliance on inadequate, non-RCRA compliant monitoring wells, incomplete data, misinterpretation of data, indifference to scientific methodology for data collection.

The NMED Response and regulatory posture at MWL fails to recognize or enforce compliance with the well monitoring construction, development and location requirements for the MWL under the RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (EC-G-2002-130, (OSWER 9950.1) ("Enforcement Document"). The provisions of the Enforcement Document are not optional or discretionary but **are required** by the Consent Order ("CO") of April 29, 2004 for the MWL. (CO, p. 64- "The design and construction of groundwater monitoring wells and and piezometers ***shall comply*** with the guidelines established in the RCRA Groundwater Monitoring Technical Enforcement Guidance Document. Emphasis supplied.) NMED should ask itself: when does NMED incompetence and willingness to violate regulatory standards become criminal? At a minimum, the following requirements of the Enforcement Document have not been met for (page numbers refer to the Enforcement Document):

p.22- Determining Ground-Water Flow Directions by locating wells so as to provide upgradient and down gradient well samples.

p.28- Adequately sealing of piezometers such as at MW4 which has a leaking packer.

p.31-33- Determining hydraulic conductivity. SNL has not identified the distribution hydraulic conductivity (K) values within each significant formation underlying the site at the MWL. Single well tests do not accurately collect information. Multiple wells are not provided. Two wells have gone dry.

p.34- Identification of the uppermost aquifer. It is doubtful that NMED even understands what the "uppermost aquifer" is, much less the requirement under 40 CFR 265 Subpart F to monitor the uppermost aquifer **beneath the facility in order to immediately detect a release.** NMED continues to deny that compliance with Subpart F is necessary. The uppermost aquifer is defined by 260.10. The definition of "uppermost aquifer" must meet the RCRA definition because NMED is the authorized agency to implement RCRA through its regulations. CA objects to NMED's failure to hold the monitoring system to RCRA requirements under 40 CFR 264 Subpart F as contained in the Enforcement Document and as required by the Consent Order.

p.35- Placement of monitoring wells to monitor for saturated zones that do not yield a significant amount of water yet act as pathways for horizontal contamination that can then reach a zone with a significant amount of water.

p.36- Characterization of plumes in saturated zones.

p.45- Placement of detection monitoring wells. "The minimum number of monitoring wells an owner/operator may install in a detection monitoring system under the regulations is four -- one upgradient well and three downgradient wells. Typically, site hydrology is too complex or the hazardous waste unit too large for the regulatory minimum number of wells to prove adequate in achieving the performance objectives of a detection monitoring system."

p.46- Upgradient monitoring wells are to provide background ground-water quality data in the uppermost aquifer… and of sufficient number to account for heterogeneity in background ground-water quality." The Moats Evaluation fails to address the problem of the non-existence of an upgradient well at the MWL and instead uses a worthless analysis of the "regional aquifer." As Citizen has pointed out to NMED numerous times, the MWL is not in compliance for a background monitoring well.

Downgradient monitoring wells must be located at the edge of hazardous waste management units to satisfy the regulatory requirements for immediate detection. Hydrologic factors likely to have an impact on contaminant movement (and detection) are not considered. There are not a sufficient number of detection monitoring wells screened at the proper depths to ensure that the ground-water monitoring system provides prompt detection of contaminant releases given site-specific conditions.

p.-54 "Longer well screens that span more than a single flow zone can result in excessive dilution of a contaminant present in one zone by uncontaminated ground water in another zone. This dilution can make contaminant detection difficult or impossible, since contaminant concentrations may be reduced to levels below the detection limits for the prescribed analytical methods." MW4 and MW5 are across multiple flow zones.

p.55- The different ground water flow directions are unknown at the MWL.

p.56- The factors affecting the number of wells that should be placed at the MWL are not considered.

p.66- No upgradient (background) well exists for the MWL as required by Subpart F.

p.67-There are not a sufficient number of background wells at the MWL to allow for depth-discrete comparisons of water quality. There is no monitoring well that reaches the bottom of the uppermost aquifer.

p.77- Mud rotary methods were used at MW2, MW3 and BW1. The Moats Evaluation's justification that use of mud rotary method provides adequate samples, on the basis of comparison of regional background values (because there is no MWL background well), combined with the use of median analyte values, is both unscientific and contrary to the EPA WSAR analyses, the Enforcement Guide and thus also to the Consent Order.

p.78- The well development logs show failure to appropriately develop wells at the MWL. NMED is simply lying to the public in its Response Comments that the situation is otherwise. Monitoring wells were not developed properly at NTU (clarity) 5:

- MW5 was left at NTU 50 at development. MW2 was left at NTU greater than 1000.
- MW3 was left at development "Clarity cloudy;" stopped development with a NTU above 1000; the well development was left for over two weeks and the turbidity was never measured again because no turbidity meter was available for 9 sampling events for a 5 month period from Nov. 29, 1989 to April 14, 1990. The bentonite clay drilling mud was not sufficiently withdrawn in real time.

Turbidity will disappear later because of flocculation of the drilling muds to form a clay paste on the surfaces of the aquifer strata; but a changed mineralogy is left that causes sorbing of contaminants of concern. The Moats Evaluation denies this obvious fact of sorbing contaminants that is well-documented in the scientific literature. Incredibly, NMED states: "The MWL is over 60 miles from LANL so problems with wells at LANL are not relevant to issues of ground water monitoring at the MWL."

CA notes that Mr. Bearzi's terminology, as used at the GPAB 12/14/06 meeting, for the "uppermost aquifer" is not accurate to the RCRA definition because he was referring to the fine-grained sediments. 3.**Please provide the current NMED definition**

in the New Mexico Hazardous Waste Regulations for "uppermost aquifer." The term aquifer or uppermost aquifer is not contained in the Consent Order (April 29, 2004).

Apparently, NMED believes that the monitoring system at MWL can just exist without meeting any kind of standards under RCRA, or including industry standards. NMED and SNL/DOE were and are required to meet the standards of RCRA Groundwater Monitoring Technical Enforcement Guidance Document. In the NMED Responses to Citizen Comments, SNL MWL CMI (Nov. 21, 2006), NMED states in pertinent part: "Although the regulatory requirements of 20.4.1.500 NMAC incorporating 40 CFR 264 Subpart F can be used as guidance, nearly all of the requirements of Subpart F do not apply to the MWL because it is not a permitted unit."

4.**Please provide documents that indicate which remaining requirements of Subpart F the NMED believes do apply to the MWL.**

5.**Please provide all documents and memoranda that show that 40 CFR 264.101 may be applied to a SWMU that does not have a permit and is not seeking a permit**.

6. Provide the Part A permit to which the MWL was listed in 1984.

7.Please provide CA the documents that reference the groundwater monitoring standards NMED thinks may be applicable to the MWL.

8.Please provide documents that explain what standards NMED claims to exist for monitoring under 40 CFR 264.101 and how those standards are in effect.

9.Please provide a copy of the MWL permit for a Corrective Action Management Unit (CAMU) that will be in effect under 40 CFR Subpart S at the MWL.

Stated in the Phase 2 RFI, "The monitoring well network was installed to detect potential contaminant releases to groundwater. The network was originally intended to comply with 40 CFR 265, Subpart F of RCRA and Section 206 of the Interim State Groundwater Monitoring Requirements of the New Mexico Hazardous Waste Regulations (HWMR-4)." Apparently, based on Davis 1994, NMED claims that Subpart F is not now applicable. (Phase 2 RFI at p. 5-1).

10.Please provide a copy of the Davis 1994 document to which the Phase 2 RFI refers for justification for use of 40 CFR 264.101 instead of 40 CFR 264.90- .100. (Davis, M.J. 1994. Memorandum to W. Cox and J. Peace on the "Regulatory Driver for Groundwater Monitoring at the Mixed Waste Landfill," Sandia National Laboratories/New Mexico, Albuquerque, New Mexico, June 6, 1994.")

Mr. Bearzi's description to the GPAB regarding the introduction of grout into well MW5 as not affecting the water quality sampling data was misrepresentation. The use of the bailer further pushed the grout into the surrounding well screen with great hydraulic pressure. Additionally, the well screen is across two different strata. NMED, in making these types of knowing misrepresentations, is failing to properly conduct regulatory functions. NMED knows fully that "Normally, a minimum of three downgradient wells is required for an adequate detection monitoring system." (NOD 1998, see also Consent Order at p. 64, and Enforcement Document, p.45- "The minimum number of monitoring wells an owner/operator may install in a detection monitoring system under the regulations is four -- one upgradient well and three downgradient wells").

NMED was in control of where the two additional down gradient wells were to be located, the strata to be monitored and NMED signed off on the construction. NMED located MW6 500 feet away from the boundary of the MWL. NMED knows that MW5 was compromised by the grout and had turbidity levels (NTUs) near 50, ten times above the EPA standards for well development, when the well development was terminated. The MW5 well screen was installed across contrasting strata with different Ksat.

Mr. Bearzi falsely claimed before the GPAB the locations of the wells were "entirely appropriate." In fact, neither wells MW4, MW5 or MW6 provided the necessary knowledge required to "re-evaluate the adequacy of the detection monitoring system," as required in the NOD (Response 37). This is because the well screens on MW4 and MW5 were installed across two different strata with different Ksat (permeability). MW6 was installed only in the deeper Ancestral Rio Grande strata. The wells were not installed at the level of the water table and cannot detect the flow of contamination at the level of the water table. Mr. Bearzi emphasized to the GPAB that this knowledge was being provided by these wells. There is no better information from the wells than before the wells were installed to address this deficiency that was indicated in the NOD.

Mr. Goering, DOE, claimed that the packer in MW4 is maintaining a seal between the upper and lower screen because the inflation pressure in the packer is remaining stable. However, a stable inflation pressure is not a measure of whether leakage is occurring. The trends in the water table levels for the upper screen are proof that leakage of groundwater is occurring between the upper and lower screen. The timing of the removal of the packer coincides with the accelerated drop in water levels measured in the upper screen. Those water levels have not recovered which is proof of ongoing leakage.

The Consent Order at page 63 states, "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." NMED violates regulatory requirements of RCRA and the Consent Order by allowing wells MW4 and MW5, as currently constructed and deployed to be in two different strata. When does NMED incompetence become criminal?

MW4 was constructed across two different strata on an angle. The purpose of the well MW4 was to monitor for 270,000 gallons of reactor coolant water that was dumped in Trench D. The well construction did not place the packer between the upper and lower screen for one year and four months. The samples for MW4 were composite samples from the time period of well completion on February 10, 1993 until May 1994 when MW4 packer was installed. (Well Completion Report for MW4 and the Moats Evaluation, p.7). This lengthy time period without a packer allowed contaminants to drain from Trench D into the uppermost aquifer. The drilling method of penetrating all the way to the uppermost aquifer also wiped out knowledge necessary to determine if the reactor coolant water had formed a mound on the surface of water table. The drilling method prevented determination of the mound because the drainage began during the drilling and continued on after MW4 was drilled. Knowledge as to whether the

contamination reached the water table was also wiped out. Drainage and leakage across the improperly sealed packer continues to occur.

Why has NMED not required "replacement with an equivalent well" as required in the Consent Order? Why does NMED not bring an NOD for violation of the Consent Order? Further, the design, construction and operation of the two wells do not comply with the guidelines established in EPA guidance as cited in the Consent Order and legally required by the Consent Order. (CO, p. 64). CA furnished NMED a Notice of Intent in October and November 2006 raising these issues and NMED still fails to take action and proclaims an adequate well monitoring network.

Mr. Bearzi claimed at the GPAB meeting that the wells were all at "proper locations." Well BW1 is not a background well because it is cross-gradient to the MWL. Proof of the inadequacy of background well BW1 is that the Moats Evaluation relies on regional background well data rather than the BW1. In fact, the GPAB was informed by Mr. Moats that the background monitoring well BW1 has now gone dry. **11.Provide the NMED notice to SNL/DOE to replace the background well BW1 as required by the Consent Order.**

Monitoring well MW2 is located cross-gradient and at 250 feet from the nearest disposal trench at the MWL.

The data for MW3 show that the well has for practical purposes also gone dry. This is a well that Mr. Bearzi recognized as having primary importance for knowledge of contamination at the water table. MW3 is the only well in the proper location for that knowledge and yet the well has gone dry. **12. Provide the NMED notice to SNL/DOE to replace the MW3 as required by the Consent Order for wells that no longer serve their purpose.**

NMED misrepresentations continue as a coverup for the NMED's failure to lawfully regulate the MWL.

For example, on page 52 of the Response to Public Comments, NMED claims "Based on well development records, considerable effort was made to properly develop the wells at the MWL, and this effort was successful." The efforts were not a success. NMED ought to take its regulatory duties to communicate honestly with the public a bit more seriously. Public service is public trust.

CA objects to the public denigration of the efforts of CA and Mr. Robert Gilkeson to hold the NMED and SNL/DOE responsible to protect the public health and welfare by Mr. Bearzi saying, "Gotta say this horse is dead." These types of comments coupled with the inference to Mr. Gilkeson as a "crackpot" and CA as "supposedly representing" persons concerned about the MWL, are comments from a public official that only inflame the perception that the NMED ignores both science and the health and safety of the public when it comes to regulation of the MWL.

CA respectfully suggests to the Secretary that NMED Staff public conduct at the GPAB meetings are an arrogant display of discourtesy, a misrepresentation of facts used to justify past mistakes and ongoing regulatory deficiencies and deserves a review by the Secretary.

Respectfully submitted,

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