MWL

Kieling, John, NMENV

ENTERED

From: Dave McCoy [dave@radfreenm.org]
Sent: Friday, May 18, 2007 3:33 PM
To: Kieling, John, NMENV
Subject: FW: Citizen Action Soil Gas comments
Attachments: CA Oral Presentation Soil vapor sampling Plan May.1.07.doc; Request for Correction of Notice for Soil Vapor Meeting.doc; Request for Comment period on Soil gas Workplan.doc

May 18, 2007

Dear Mr. Kieling,

Citizen Action submitted comments additional to those that are posted on the NMED website that we believe should be posted on the NMED website.

The documents that were additionally submitted by Citizen Action are attached as electronic copies to this email.

All applicable documents that we have submitted are contained within the first paragraph of the text of the May 15, 2007 Comments.

Please call me if you have any questions. Thank you.

Sincerely,

David B. McCoy, Executive Director
Citizen Action New Mexico
POB 4276
Albuquerque, NM 87196
505 262-1862
dave@radfreenm.org

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Version: 7.5.467 / Virus Database: 269.7.4/810 - Release Date: 5/18/2007 1:35 PM

Kieling, John, NMENV

From: Dave McCoy [dave@radfreenm.org]
Sent: Thursday, May 24, 2007 1:02 PM
To: Kieling, John, NMENV
Subject: FW: Citizen Action Soil Gas comments
Attachments: CA Oral Presentation Soil vapor sampling Plan May.1.07.doc; Request for Correction of Notice for Soil Vapor Meeting.doc; Request for Comment period on Soil gas Workplan.doc

John, Your acknowledgement of this email and inclusion of the additional Citizen Action comments that were furnished to NMED would be appreciated. Thank you.
Dave McCoy.

-----Original Message-----
From: Dave McCoy [mailto:dave@radfreenm.org]
Sent: Friday, May 18, 2007 3:33 PM
To: 'john.kieling@state.nm.us'
Subject: FW: Citizen Action Soil Gas comments

May 18, 2007

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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, in accordance with applicable regulatory requirements." 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

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[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

implementation of a corrective action to mitigate the possibility of any impacts to groundwater."

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.

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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.*

- 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 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
John E. Kieling
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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,

David B. McCoy, Executive Director
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December 18, 2006

Mr. James Bearzi, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

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. Mayerson1, 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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