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Covering Up 30 Years of Radioactive and Hazardous Waste: Mixed Waste Landfill from U.S. Department of Energy/Sandia National Laboratories

Citizen Action (through New Mexico Community Foundation)

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Citizen Action

Covering Up 30 Years of Radioactive and Hazardous Waste: Mixed Waste Landfill

U.S. Department of Energy/Sandia National Laboratories

Comments submitted to the NMED regarding the Class 3 Permit Modification/Corrective Measures Study for the Mixed Waste Landfill

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**Questions requesting responses are in italics.*

I. Kennett report:
"Nuclear Assessment Project Summary/SNL MWL, August 2003"

1. A white paper ("SNL/MWL Nuclear Spent Fuel Disposal," 5/12/03) prepared by Dr. Eric Nuttall, Professor of Chemical and Nuclear Engineering at the University of New Mexico, was submitted to the NMED regarding the HLW issue. Dr. Nuttall served as a panelist on the first WERC "Independent Peer Review of the MWL" (2001) and was responsible for reviewing the inventory of the MWL as a part of the Fate and Transport section on the MWL.

Dr. Nuttall's research has concluded that waste generated as a result of the oxide reactor fuel experiments *is* buried in the MWL and should be characterized as HLW. His report was submitted to the NMED prior to the announcement that Roger Kennett of the NMED/DOE Oversight Bureau would be completing a report on this issue. However, the conclusions reached by Dr. Nuttall were never addressed in Mr. Kennett's report nor were any of the references from Dr. Nuttall's report included in the Kennett report. *Question: Since the Kennett report failed to review and address Dr. Nuttall's white paper we request that his paper be reviewed with responses from the NMED. We also request that this information be included as part of the CMS process for the MWL.*

2. Whether the materials related to the classified portion of the MWL retain their status as classified or not should not reduce the burden of DOE to demonstrate that its nuclear wastes are properly stored and monitored. *Question: What are the standards that apply to the nuclear material storage activities described in the Kennett report? We would like to request documentation from the NMED that demonstrates these standards have been attained.*

3. The term "Special Nuclear Material" is used in the Kennett report to describe the waste generated as a result of the oxide reactor fuels experiments. However, according to the Kennett report the waste generated from the experiments cannot be classified as high level waste (HLW) due to the "short duration of the irradiation in the ACRR did not change the U/Pu inventory in either spent or fresh fuels*." Question: The Kennett report refers to oxide reactor fuels sent to SNL as "spent fuel." The term "spent fuel" is synonymous with HLW. The assumption that the oxide reactor fuels cannot be classified as HLW cannot be made without having more information about the previous history of the spent fuels sent to SNL. For example, what temperatures were the fuels exposed to before being sent to SNL? We would therefore like to request additional information to clarify this assumption made in the Kennett report.*

4. The Kennett report concludes that waste from the experiments is contained in "experimental packages" containing spent fuel in storage at SNL now stored somewhere on base. The Kennett report provides no substantive information on the nature or adequacy regarding the "storage" of the materials produced from the ACRR experiments whether spent nuclear fuel, special nuclear material or "status unknown." *Question: What basis is used by the NMED to characterize the adequacy of the storage conditions for the waste in the context of state or federal regulatory authority?*

5. The Kennett report appears to have relied heavily on photos to demonstrate that the special nuclear material in question is being stored properly. However, the report fails to identify the location where the waste from the experiments is currently being stored. Photos are not equivalent to visual inspections and monitoring data. *Question: If the material is not classified as HLW why is it being stored on base? Will the special nuclear material/spent fuel storage areas be subjected to appropriate inspections by the NMED? Will this information as well as information regarding the location of the waste generated as a result of the oxide reactor fuels experiments be disclosed to the public?*

6. The lack of specificity and clarity in the Kennett report results in part from the failure of DOE to declassify the documents related to the spent fuel activities and the classified portion of the MWL. As SNL has published several SAND reports about the ACRR experiments that generated the spent fuel in question, little basis remains for retaining the documents in a classified status. *Question: Citizen Action reiterates its request that NMED seek the declassification of ALL documents related to the classified portion of the MWL in order to resolve this matter.*

7. The Kennett report states there are 4 canisters buried the MWL. FOIA document # 20 (April 1, 1997) indeed confirms this in paragraph 1 under Discussion which states that "classified pits 35 and 36 contain 4 stainless steel canisters."

However, FOIA document # 22 (February 20, 1997) states that Sandia employees "mentioned that additional cans were disposed of at the landfill, usually in vertical, small-diameter holes drilled in the bottom of trenches" (page 1, 3rd paragraph).

FOIA document # 22 also states: "all the spent cans were hastily disposed of" (page 1, paragraph 3) and "there are no doubt additional cans in the landfill, but their location is unknown" (page 2, paragraph 1). The document goes on to state that twelve Co-60 sources are buried in SP-5 entombed in a lead burial cask in June, 1987.

Question: Based on the information above there appears to be a number of discrepancies concerning the exact number of canisters that are buried in the MWL. This conflicts with the Kennett report that states there are only 4 canisters present in the landfill. Where are the "other" canisters buried? What are their contents? We would appreciate the NMED's response to the FOIA documents and would like to know what corrective measures will be taken by the NMED to investigate this matter further before making a decision on a remedy for the MWL.

8. FOIA document #22 (page 1, paragraph 3) states that great care was taken to drill holes in the bottom of trenches for vertical disposal of additional canisters. *Question: Why were these holes drilled for the disposal of these canisters? What are the differences between the canisters that were placed in drilled holes in the classified area vs. other canisters that were "haphazardly disposed of" in other areas of the MWL? Why was great care taken to drill the holes and place the canisters in them? Why are the curie levels taken above these pits so high*

and what might account for these high levels? Why do the recorded curie levels not match the pits' known inventory?

9. SNL/DOE believes that due to the Co-60 sources buried in the MWL that excavation of the landfill presents too great a risk to workers. However, FOIA document #22 (2nd page, paragraph 3) contains a statement by Mr. Jerry Peace who recommends that workers remove the "removable concrete caps" placed over pits SP-4 and SP-5 by crane to examine the pit contents to investigate whether the contents present a threat to human health and the environment. *Question: What are the contents of SP-4 and SP-5? Was the investigation to determine the pit contents ever completed by SNL? If not how does the NMED intend to resolve this matter? If the MWL is too dangerous to excavate due to the presence of Co-60 why does SNL recommend removal of the concrete caps over the 12 Co-60 sources buried in the MWL in 1986? (page 2, paragraph 3).*

10. FOIA document #21, 3rd paragraph (March 20, 1997) states that based on interviews with TA 5 personnel "there may be hazardous waste constituents in the canisters" ... and ... "as there is little process knowledge, there have been no controls since it was generated. There will need to be thorough sampling and investigation to ensure that no hazardous material is present in the waste" (page 2, paragraph 1). *Question: According to this document SNL felt it necessary to conduct "thorough sampling" of the waste in the canisters. Was this sampling ever completed and if so what were the results? If not, does the NMED intend to require sampling to further characterize the contents of these canisters for hazardous waste constituents?*

11. FOIA document #22 states that "TA 5 employees were confused as to why the cans were in Pits 35 and 36 because these tests, as well as the cans, were not considered classified." SNL concludes this was because the landfill was scheduled for closure and there was not enough time to contract a drilling rig to drill holes in the trenched area so the cans were hastily dropped in the classified area." *Comment: If this reasoning is true it demonstrates the poor record-keeping at the MWL until its closure in 1988. *Note: the same document states that in addition to canisters disposed of in Pits 35 and 36 additional canisters were disposed of in the "bottom of trenches" much like the yard holes used for IRNM in other areas at SNL.*

12. FOIA document # 22 states that some of the cans were mummified, a term in this case that refers to placing a contaminated primary canister within an outer container. *Question: Why was this done and what were the contents of the materials inside the canister, i.e., material types, volume and curies?*

13. A document recently released to Citizen Action as a result of a request filed under the FOIA is titled, "SNL Site Team Report on Assessment of Energy Storage of Irradiated Reactor Fuel and other Reactor Irradiated Nuclear Materials" (RINM report). *Did the NMED have access to this report before it was released to Citizen Action by DOE?*

14. In the RINM report it is stated, "SNL did not submit an EM-37 questionnaire on spent fuel." *What does an EM-37 questionnaire refer to?*

15. Under the section “Sandia Pulse Reactor Facility” p.14 the RINM states, “There are also various concerns associated with the long-term storage of any radioactive material, specifically leachability of material, decay rates, and potential corrosion of the containment packages due to environmental conditions.” *Does the NMED know the current status of the RINM in the yard holes and other locations as listed in the RINM report? (p.7).*

16. Under the appendix section for “Hot Cell Facility” p.15 states “experiment vessels typically contain soldered electrical connections and may also contain hazardous materials such as cadmium, silver, lead, metallic sodium, etc.” *Has the NMED investigated these hazardous waste constituents? (p.2)*

17. In the RINM report under SNL Reactor Fuel Summaries Sept. 1993 (-2-), 3.0 FUEL INFORMATION, the chart lists (3.5) “fuel mass of element” and (3.6) “EOL Fuel Mass.” *What do these terms refer to?*

We request the NMED provide comments on the following conclusions reached by Citizen Action:

- The conclusion reached in the Kennett report that only 4 canisters are buried in the landfill is incorrect. *Does NMED believe there are more than 4 canisters buried in the landfill? Has the NMED determined: 1) the canisters are empty; 2) the canisters contain waste; 3) the canisters contain rad and/or hazardous waste; and 4) volume and curies of waste. Please illustrate how the NMED has determined this.*

- The information contained in these FOIA documents represents a distinct contradiction in that claims by SNL that the inventory of the MWL is excellent and points to further uncertainties about the inventory of the MWL. *Does NMED agree with this conclusion? Please comment.*

- According to SNL there may be hazardous waste contained in the canisters which the NMED has regulatory authority over (mixed waste). *After review of the FOIA document #21 does NMED believe that hazardous waste may be contained in the canisters? If so, can NMED request that sampling be conducted to inspect the contents of the canisters?*

- SNL has not included information in the Corrective Measures Study (CMS) for the MWL concerning the presence of these canisters and the uncertainties surrounding the contents of these canisters. *Will NMED request that SNL include this information in the CMS and address any uncertainties surrounding the contents of the canisters?*

- The Kennett report states: "all canisters with fuel are in storage." This information is based solely on 4 canisters buried in the MWL and fails to address the canisters and fuel rods that were reportedly melted together as referenced in Dr. Nuttall’s paper. *We request that NMED review Dr. Nuttall’s white paper and provide written comments regarding his conclusions. We request that these comments be included in the CMS.*

- It is stated in the RINM report that a review of records indicated “no RINM was buried in the burial site located in Technical Area III south of TA-5 that was used until December 1988 for mixed waste disposal” (p.4). However, no records or information exists to verify this claim nor is there evidence presented in either the Kennett report or the RINM report that can provide additional information as to the location of the melted fuel elements addressed in Dr. Eric Nuttall’s white paper. *Please comment.*

II. Known Inventory MWL

The following are selected statements and/or information taken from documents obtained by Citizen Action in 2000 under the Freedom of Information Act (FOIA) concerning the MWL inventory. A summary of information obtained under the FOIA is included in the document, "Summary of information obtained under the Freedom of Information Act."

"An estimated 720,000 cubic ft. of waste has been buried on site during the 28-year operation."

- SNL ER Program Information Sheet, 1987 (FOIA 90).

"Approximately 50,000 ft. of radioactive waste has been buried at the site."

- SNL Working Draft, Sampling Plan 1992 (FOIA 92).

*(*note: latest estimate of total waste buried at the MWL = 100,000 cubic feet)*

Question: Please comment why the estimate of volume of waste has continued to change.

"Accurate records before 1965 no longer exist and records from 1965 to 1976 are incomplete with regard to wastes disposed of in the MWL from 1960-1988. It should be noted that the files contain conflicting data. Researchers applied straight-line averages to waste disposed from 1959-1969, and estimated values for individual waste categories from 1970-1976."

- SNL ER Program, 1993, Phase 2 RFI Work Plan (FOIA 101).

Question: Although the "lost records" have been found, according to SNL, please comment on the following statements: 1) "files contain conflicting data;" 2) researchers applied straight-line averages to waste disposed of from 1959-1969; and 3)"estimated values for individual waste categories." Does the NMED believe that these statements are representative of a Cold War waste site with an "excellent" inventory?

"All records prior to 1964 were destroyed as part of a records purge."

- Letter from Delacroix Davis, Jr. to James G. Steger, 1977, pg. 11 (FOIA 50).

Question: SNL has stated that these records were found. What information does the NMED have on this?

"They have a feel for what is in there but the numbers are questionable… use vegetation as indicator. Succulent plants work best. Elevated concentrations [found] up to 5 km away."

- Interview with Donna Hartzel to "G.L., 1989 (FOIA 112).

Question: Has the NMED reviewed this document? Has the NMED conducted any off-site radiological monitoring to detect tritium in vegetation and succulents? Does the statement in this document mean that biological transport of tritium has been occurring for years? What were the elevated concentrations of tritium referred to in this report and is this still

occurring? What does Donna's term, "have a feel for" mean in terms of describing the MWL inventory?

"Most of the waste from this facility should be considered mixed wastes since the exact composition of the wastes is uncertain and radioactive chemicals as well as classified toxic materials can be expected."

- Memo to J.C. Vandermolen from G.J. Smith, SNL (FOIA 43).

Question: Is this statement indicative of a landfill with an excellent inventory?

"… the most common metal disposed of at the MWL is lead. Also, barium, beryllium and chromium were *probably* disposed of. No records are available on the quantities of metals disposed of…"

- SNL ER Program Information Sheet FOIA, 1987 (FOIA 90).
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Question: Does NMED have accurate records of quantities of metals (such as lead) disposed of at the MWL?

"SP-4 contains what is purported to be reactor vessel plates. Very little is known about these plates, their origin, number, size or configuration."

- Memo from Jerry Peace/SNL to Mark Jackson, John Gould/DOE/KAO, 1997 (FOIA 22).

Question: That little is known about the "reactor vessel plates" – is this still the case?

"Radioactively contaminated waste water was discharged into one of the trenches during one month of 1967; the water could potentially have increased the migration rate of contaminants through the soil column toward the aquifer."

- SNL ER Program Information Sheet FOIA, 1987 (FOIA 90).

Question: SNL/DOE maintains that no liquids were disposed of in the MWL, and those that were disposed of were containerized. Does the NMED agree that this statement from FOIA document 90 refers to liquid waste water that is not containerized?

"… [MWL] received a variety of radioactive and potentially radioactive/hazardous chemical mixed wastes… Primary radionuclides are uranium and tritium, some plutonium and plutonium-contaminated material, cobalt-60, cesium-137, radioactive tracers, rad waste from operating and decommissioned Sandia Pulsed Reactors and Sandia Engineering Reactor as well as neutron-activated materials from weapons experiments at the Nevada Test Site. Radioactively contaminated oils and naphthalene scintillation vials…"

- SNL ER Program Information Sheet FOIA, 1987 (FOIA 90).

Question: Is there a complete inventory of each of these specific waste products, i.e., quantity, type, curies, and method used for containment?

"Chemical wastes include acids, solvents, trichloroehylene (TCE), carbon tetrachloride, and scintillation cocktails. Other wastes disposed of in the classified area include uranium, thorium, plutonium, enriched lithium, various (leaky and intact) sources, plutonium-contaminated wastes from various facilities, and plutonium-contaminated nuclear weapons test debris."

- Appendix D, SNL Site Health and Safety Plan Form, 1992 (FOIA 116).

Question 1: SNL maintains that no liquid waste disposed of in the MWL. The term "leaky" does not typically refer to solid waste. Please respond.

Question 2: Based on SNL's reports less than a gram of Pu is buried in the MWL. Does this amount take into consideration the total volume of plutonium-contaminated wastes and the Pu reportedly contained in 19 drums as reported in the MWL known inventory?

"Characteristics of contamination: disposal in unlined pits and trenches; contaminated oils, liquids and solvents; solid and liquid wastes."

- Remedial Action and D & D Scope Definition Worksheet, SNL, 1991 (FOIA 108).

Question: SNL maintains there was no liquid waste disposed of at the MWL. This statement refutes this claim. Please respond.

"Possible mixed fission products went to dump. Lots of fuel in mountains stored. Only neutron activated material went to the dump. Lots, large amounts of Du."

- Interview with former SNL employee H. Abbott, 19…?…(FOIA 1).

Question: We would like to request a list of the types of mixed fission products, volumes, and curies disposed of at the MWL. Does the NMED have a record of where these mixed fission products originated? What does the statement "lots of fuel stored in mountains" refer to?

"Two summers ago workers found 5 feet of water in nearby completed trench. Workers pumped water into the trench to the west."

- Interview with Donna Hartzel to G.L., 1989 (FOIA 112).

Question: Does this statement indicate that workers were ordered to never release any "liquids" into the MWL?

"Incompatible and unneutralized ignitable and reactive gases may have been placed in pits and trenches. Subsequent reactions may generate hazardous vapors which could penetrate soil caps and be released. Potential for release to air from pits 24-30 is high."

- SNL ER Program Information Sheet FOIA, 1992 (FOIA 90).

*(*note: passive soil gas surveys conducted in 1993-94 found no large releases of hazardous vapors; however, active soil gas surveys in classified pits 24-30 have not been conducted.)*

Question: Is it true that no active soil gas surveys have been conducted in classified pits 24-30?

"Organic wastes were disposed of at the MWL beginning in 1959 and continued until 1962 when the Chemical Waste Landfill was opened."

- ER Program/Site Health and Safety Plan, 1992 (FOIA 116).

Question: Uncontainerized liquids were disposed of at the Chemical Waste Landfill (CWL) prior to the opening of the MWL; however, SNL maintains that all liquids were solidified before being disposed of in the MWL. Why would SNL solidify liquids disposed of in the MWL and not those disposed of in the CWL? Both landfills are unlined, and were used for materials disposal.

"Based on interviews with TA5 personnel here may be hazardous constituents in the canisters. As there is little process knowledge, there have been no controls since it was generated …"

- Memo from W.B. Cox, SNL to G.K. Laskar, DOE/KAO, 1997 (FOIA 21).

Question: What do the statements, "there is little process knowledge, there have been no controls since it was generated" refer to? Is this information adequate to determine what materials are in the canisters?

"Records of disposal in pits from Nevada Test Site and South Pacific were examined and then disposed of at the MWL."

- Interview with former SNL employee Bob Schwing, 1995 (FOIA 7).

Question: Is there a record of such wastes, i.e., type of waste, quantity, curie levels, type of containment, and in which section at MWL it was disposed of?

"…other records suggest 600 cubic ft. of transuranic (TRU) wastes may have been buried at the MWL; waste records did not define contents of the TRU wastes before 1972, thus actual presence and quantities of these wastes cannot be accurately determined…"

- SNL ER Program, 1993, Phase 2 RFI Work Plan (FOIA 101).

Question: Does the NMED have documentation that gives further information (total types of TRU waste, volume, curies) about the transuranic wastes disposed of at the MWL? Does the NMED believe this information represents an accurate inventory of waste disposed of at the MWL?

"On the order of 1000s of rem/hr. [disposed of in MWL] on contact. Truckload after truckload was disposed of during decommissioning. Some elements of reactor exceeded 5000 rem/hr. Disposal of much material in pits – 100 rem/hr."

- Interview with former SNL employee Max Moms regarding disposal of nuclear reactor materials in dump, 1998 (FOIA 12).

Question: What "elements of reactor exceed[ing] 5000 rem/hr." does this refer to?

"Organic hazardous wastes [TCE], acids, carbon tetrachloride, and scintillation cocktails (toluene based) were disposed of in the Mixed Waste Landfill beginning in 1959 and continued until 1962 when the Chemical Waste Landfill was opened. Many of these were radioactively contaminated."

- ER Program/Site Health and Safety Plan, 1992 (FOIA 116).

Question: It is clear that chemicals and solvents (i.e.; hazardous wastes) were disposed of in the MWL prior to the opening of the CWL. We request that these records, apparently on microfiche and stored at the INEEL, be made available to the public in order to fully characterize the contents of the MWL.

"Chemicals contaminated with radioactive materials were disposed of in the radioactive acid pit is pit until about 1969. Contaminated chemicals included solvents, acids, trichloroethylene and carbon tetrachloride."

- Interview with former SNL employee Frank Statzula (FOIA 58).

Question: This pit was never disclosed to members of the SNL/Citizens Advisory Board. Does the NMED have a complete inventory of the wastes that were disposed of in the radioactive acid pit?

"Never, ever put liquids in pits or trenches classified items disposed of in the classified area, hard and fast … no explosives allowed."

- Interview with George Tucker, former SNL employee, 1995 (FOIA 3).

Question: While this worker stated that no explosives were allowed to be disposed of in the MWL, FOIA document #21 states that metallic sodium "may be present." Please comment.

"After 1975, SNL required liquid wastes to be solidified prior to disposal. Before this time unsolidified radioactive liquids, whether containerized or not, were disposed of in the MWL."

- ER Program/Site Health and Safety Plan, 1992 (FOIA 115, 116).

Question: SNL/DOE maintains that no liquids were disposed of in the MWL, and those that were disposed of were containerized. This again conflicts with the statement made above in FOIA documents 115, 116. Please comment.

"The term, "Unk" means unknown; complete records of this breakdown were not begun until 1970. 1965 – Fission Product/Induced Activity: Unk. 1966 - Fission Product/Induced Activity: Unk. 1967 - Fission Product/Induced Activity: Unk. 1968 - Fission Product/Induced Activity: Unk. 1969 - Fission Product/Induced Activity: Unk. Total: Unk, Unk, Unk, Unk, Unk."

- Memo from W.D. Burnett to R.R. Malone, Waste Management Fact Book, Memo (FOIA 34).

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Question: Please comment as to whether these "Unk" statements are indicative of a landfill with an excellent inventory.

"Trailer was buried in Trench F, deeper than pictures show. Trailer was not a flatbed, but a box-type w/ doors, backed down in trench, unhooked and truck drove out."

- Interview with Fernando Dominguez, recalling information given to him by Charlie Bergland, 1998 (FOIA 5).

Question: When asked by the New Mexico Environment Department if any box-type trailers were buried at the MWL, SNL responded that no box-type trailers were buried in the landfill. Why is this when clearly there is information that exists to the contrary? Does this raise additional questions as to the landfill's "complete" inventory?

In 1984 estimates for clean up of the MWL were performed by George Tucker, SNL, and included: "air-supplied bubble suits, performed under an outer air support building with an inner metal Butler-type building with collapsible sides and HEPA filter ventilation. All waste would be shipped to the Nevada Test Site. Operation is assumed to require 'lots of manual labor.' " Total 1984 exhumation costs including equipment, labor and transportation: $129,690,000. Total 1989 exhumation costs including equipment, labor and transportation: $181,570,000.

- Memo to J.C. Vandermolen from G.J. Smith, SNL (FOIA 43).

Question: Please provide comments as to why the MWL cannot be cleaned up TODAY based on the above excavation scenario and cost estimates performed in 1984.

III. ET Cap Review

"Review of Sandia National Laboratories Evapotranspiration Cap Closure Plans for the Mixed Waste Landfill" - by Tom Hakonson, Ph.D., Environmental Evaluation Services, LLC.

Conclusions:

- Buried waste can be mobilized to the ground surface through plant roots and animals and insect burrowing can dramatically increase infiltration of water into landfill with covers as thick as those proposed;
- Vertical transport of contaminants to the ground surface by biota may be small on a short time scale, *but over many decades these processes may become dominant in mobilizing buried waste*;
- The long-term consequences of biointrusion into low level waste landfills located in arid areas estimated that doses to humans resulting from biological transport were as high as doses calculated from a human intrusion scenario (Pacific Northwest Laboratory);
- One of the more important deficiencies in Sandia National Lab's (SNL) closure plan proposed for the MWL is the assumption that vertical and horizontal transport of contaminants resulting from biological processes ***is not*** an important contributor to exposure pathways;
- Both cap designs (Dwyer et, al., SNL Environmental Restoration group) do a credible job of analyzing the evapotranspiration (ET) cover, and in the reviewer's opinion both cap designs will provide adequate protection of contaminants to ground water *assuming the site is diligently monitored and maintained throughout the post closure monitoring period while assuming the surface pathway proves to be unimportant in contributing doses to humans;*
- Under the right conditions the roots of ALL types of vegetation have the ability to extend several meters into the soil and transport contaminants to the surface.
- While an ET cap can minimize soil moisture it can contribute to vapor phase transport of volatiles;
- SNL's conclusion that waste has not been mobilized to the ground surface by animals is poorly supported as it is: 1) based on soil samples taken (in part) from areas of landfill recently backfilled; 2) sampling was coarse in resolution; 3) samples were non-random in space; and 4) samples purposely did not include disturbed areas created by burrowing animals;
- Once contaminants are transported to ground surface a complex distribution process occurs that can result in widespread transport of contaminants across the landfill surface to offsite areas;
- Human intrusion scenarios should take a conservative approach such as the loss of institutional controls under a subsistence farmer scenario;
- Changes in climate can radically affect the integrity of cap;
- SNL's proposed plan to use a neutron moisture gage (NMG) are vague on how the monitoring data will be used to conclude that percolation is or is not occurring. NMG is labor intensive (data must be downloaded and managed); NMG must be calibrated

to soil (difficult when layered soils are involved); reliable measurements are limited to volumetric water contents above 5%; NMG integrates moisture content over a relatively large area making it difficult to pinpoint the specific zone depth being interrogated; NMG provides instantaneous estimates of soil moisture so that measuring after precipitation is critical; NMG should not be used as an early warning system (see page 50 for detailed review).

- Little or no planning has been done on the post-closure phase of Mixed Waste Landfill (MWL) closure and there is no contingency plan should the ET cap not perform as predicted;

Question: We would like to request that the NMED provide comments/responses to each of the above conclusions reached by Dr. Hakonson re: the MWL.

Recommendations:

1. Any post closure plan should provide measurements on all possible migration pathways that include vadose zone transport, soil sampling for surface contamination, and biological transport;
2. Soil surveys should be required in undisturbed areas closed early in the landfill operation with a comprehensive long-term sampling program after MWL is closed consisting of sampling of surface soils and biota;
3. A comprehensive sampling plan should be required that *reflects the inventory of contaminants in landfill, not just tritium*;
4. The use of biointrusion barriers to keep animals from burrowing into landfills has had mixed reviews in terms of effectiveness; a wire mesh type barrier proposed by Dwyer et.al. is the best choice for the MWL although it will not keep ants and other insects from burrowing into the landfill;
5. A contingency plan should be developed and incorporated into the post closure plan in the event the cap fails and/or contaminants are found to be migrating;
6. A financial assurance mechanism should be established for monitoring, maintenance, and contingency costs based on NMED requirements for closure and post-closure plans under RCRA: a) evaluation of the effectiveness of the cover at specific time intervals; b) monitoring; c) remedial measures that include excavation and removal of landfill contents should a significant problem be revealed through monitoring;

Question: We would appreciate the NMED's responses to each of Dr. Hakonson's recommendations listed.

IV. Risk

1. A new baseline risk assessment for the MWL has not been conducted by SNL due to the uncertainties of the inventory and source terms. This was verified by Tommy Tharp/SNL at a public meeting of the "WERC Independent Technical Peer Review of the Working Draft CMS for the MWL" in December, 2002. This was also mentioned in the WERC Peer Review Report.

Question: Please comment.

2. The Resnikoff "Risk Screening Review of SNL Risk Assessment for the MWL, SWMU 76" revealed numerous problems with SNL's methodology in its risk assessment for the MWL landfill. These problems included:

- SNL had results for measurements of Pu at 3 different labs; these samples were discarded (p. 9).
- SNL discarded samples showing high concentrations of COCs and kept samples with low concentrations. SNL reasoned that the samples with high concentrations were false positives (p.9).
- Radionuclide and cancer risks should be combined, not subtracted as SNL has done in its risk assessment (p. 11, 12).
- SNL's calculations apply only to an adult male and has used outdated conversion factors instead of newer DCFs that evaluate does to children as well as adults (p. 11, 12).
- Questions remain regarding the filtering of water samples by SNL (p. 8).
- Pit contents (see examples, Pits 35-36) do not match the gamma levels at surface taken by SNL (p. 7, 8).
- Purpose of RFI Phase 2 investigation was to "identify all potential or suspected sources of contamination" and "to determine thoroughly the contaminant source." This has not been accomplished (p. 6, 7).
- Recommendations that SNL conduct a risk assessment that includes "no administrative controls will be in place after 100 years" as advised by EPA and DOE (p.12, 13).
- SNL has not fully characterized the inventory of the MWL (p. 13).

Question: We would like the NMED to provide responses to each of these conclusions from the Resnikoff report. According to our knowledge this document reviewed by Dr. Resnikoff is the only baseline risk assessment for the MWL conducted by SNL to date.

3. The RFI Phase 2 conducted by SNL concluded that MWL contaminants "present little risk to groundwater or as air emissions to potential receptors."

Question: The conclusion by SNL that contaminants "present little risk to groundwater or as air emissions to potential receptors" was disputed in a memo sent to Will Moats by Barbara Malczewska-Toth (August 11, 1999) which also noted numerous deficiencies in the SNL risk assessment. The letter states: "Surface/subsubsurface soil erosion due to surface/subsurface water movement and windblown contaminant transport acts as the primary mean for contaminant migration out of the MWL to the surrounding environment ... this subsequently threatens human health and the environment." Does the NMED agree with this assessment of the MWL by Ms. Toth?

4. The RFI Phase 2 states all chromium contamination at the MWL is chromium III, the most conservative type.

Question: Why was the assumption made by SNL that all chromium in the MWL is chromium III? Does the NMED specifically know the type(s) of all chromium contamination at the MWL and has this been integrated into SNL's risk assessments?

5. SNL claimed the inhalation pathway doesn't apply to metals due to their "lack of volatility." This was found to be incorrect as metals can attach to soil particles and be inhaled.

Question: Has SNL's risk assessments included the inhalation pathway of heavy metals into its formula to assess risk?

6. NMED recommends SNL use the EPA's IRIS and HEAST or EPA's NCEA to determine toxicological parameters.

Question: Has information from these sources been integrated in the risk assessments for the MWL?

7. The memo recommends SNL use exposure parameter values recommended by HRMB/NMED.

Question: Has this been incorporated into the risk assessments for the MWL?

8. The memo recommends exposure parameter values be used to evaluate exposure and risk from dermal contact with contaminants in soil under industrial, residential, and recreational land use scenarios.

Question: Has this recommendation been integrated into SNL's risk assessments for the MWL?

8. The January 31, 2003 "WERC Independent Technical Peer Review of the 'Working Draft CMS' for the MWL" stated:

(a) "It was pointed out by SNL staff at the January public meeting that these risk assessments were only relative to the different remedies being investigated and did not relate directly to the predicted risk. This issue needs to be clarified as it only adds uncertainty to the overall remedy if the risk assessment is not modeled relative to a conservative model of the site situation."

(b) "The risk assessment is based on known releases from the site ... several questions remained unanswered during the meetings about the amount and type of waste in the MWL."

(c) "It would seem that a sensitivity analysis of the risk assessment would give some indication of the significance of this concern especially in light of the relative nature of the assessment noted above." (WERC executive summary, p. v).

Question: We would appreciate the NMED's responses to the above conclusions (a-c) reached by the WERC.

9. The following questions refer to the "WERC Independent Technical Peer Review of the Working Draft CMS for MWL" Executive Summary section:

a. In section (ii. 1.) the WERC states that the site operational history (section 1.0 of the Draft CMS) fails to include information that the early inventory data (once believed to be lost) can now be found in microfiche at INEEL. This information is omitted from the CMS as well as the fact that the MWL was used for disposal of chemicals prior to the opening of the Chemical Waste Landfill. This information about the MWL was also found in documents obtained by Citizen Action under the Freedom of Information Act (FOIA).

Question: We request this information be included in the CMS. We also request that NMED require the release of these records and make them available to the public as well as for the complete characterization of the MWL inventory re: hazardous waste disposed of at the MWL.

b. In sections (ii and iii. a-e) the WERC describes the MWL inventory as: Anecdotal testimony in the records regarding disposal of non-stabilized free liquids (a); Location of many dangerous materials appear to be unknown such as nuclear fuel canisters and radioactive sealed sources (b); Amount of hazardous waste is not well understood, i.e.; inventory does not match characterization of Pit 35 ad Trenches B and C (c); Volumes of waste vary widely in different sections of report (d); Meaning of words :debris" and "all wastes" in CMS is uncertain (e).

Question: We request that NMED provide responses to the WERC's remarks in section iii a-e with regard to either agreement or disagreement.

c. In sections (iii and iv) the WERC strongly recommends that because the "uncertainty of the contents in the MWL could eventually lead to the requirement of excavation" SNL include an alternative that involves a temporary cap with future excavation; (iv, a).

Question: We request that NMED require SNL to include this alternative in the CMS.

d. In section (iv. c) the WERC recommends that SNL include an on-site disposal facility as an alternative for the waste. SNL has buildings that could be utilized for this. The WERC also recommends including an option for a RCRA approved landfill and an on-site retrievable storage unit.

Question: We request that NMED require SNL to include these options for waste as well as a scenario that includes the construction of a new CAMU to accept contaminated soils from the MWL.

e. In section (iv. d) the WERC recommends that SNL include a soil vapor extraction alternative as part of a long-term monitoring strategy.

Question: What is NMED's response to requiring SNL to including this option in the CMS and why was this option not previously considered by the NMED?

f. In section (iv and v. a,b) the WERC addresses SNL's risk analysis nad recommendation that SNL conduct a sensitivity analysis. A problem is SNL's consistent "bending" of information to favor its preferred alternative. To correct this situation it would behoove the NMED to require DOE to conduct an independent sensitivity analysis.

Question: Will the NMED require SNL to conduct a sensitivity analysis by an independent entity? However, a risk assessment that considers the entire inventory of the MWL is in order. Therefore, we request that uncertainties related to the inventory of the landfill be addressed in a risk assessment that includes ALL waste products, i.e., radioactive waste and radioactive decay products, hazardous waste, heavy metals, and potential new compounds formed as a result of radiolysis instead of an assessment of only two contaminants that have been found to be migrating from the landfill.

g. In section (vi. 4.) the WERC recommends that SNL conduct a numerical fate and transport model for simulation of the MWL. The data from this could then be integrated into a risk assessment that considers the sensitivities of various options for the MWL.

Question: Will NMED require SNL to develop such a model for the MWL to be included in the CMS?

V. General Comments

In 2001 Citizen Action went to Pete Maggiore, then Secretary of the New Mexico Environment Department, to request the NMED issue an order to SNL to complete a Corrective Measures Study (CMS) for the MWL. We did this because we felt DOE's proposed plan for the MWL, to simply cover the landfill with 3 ft. of dirt, was the wrong choice considering the public, who would be left with the burdens of this legacy waste site, literally had no knowledge of what was happening.

Three years and $10,000 later our worst fears have been realized. The same plan proposed by SNL/DOE for the MWL is the same plan (i.e., "preferred alternative") that has emerged from the CMS. Are we surprised? No.

From the beginning SNL/DOE has downplayed the risks of the MWL. Numerous independent experts, including independent scientists who participated as panel members of the WERC reviews of the MWL, have suggested that information concerning the landfill is: 1) incomplete; 2) biased; 3) disingenuous. It is obvious the "preferred alternative" supported by the CMS fulfills the requirements under the DOE's newly conceived program called "Accelerated Clean Up," a misleading and dishonest term in itself as it is not clean up, but cover up.

The CMS is neither a fair, honest or complete study. It has failed to present a full range of options for the waste. It has failed to honestly present the true costs of an excavation scenario. It has failed to produce a baseline risk assessment. It has failed to include historical data that relates directly to risk (i.e., DU buried in trenches that caught on fire upon exposing the DU to air). It has failed to consider the full inventory of the landfill and numerous uncertainties exposed in documents obtained by Citizen Action under the Freedom of Information Act. It has failed to consider any recommendations of independent reviews that attempt to find an appropriate solution for this waste site.

Considering the volume of scientific knowledge available at SNL, the CMS is an embarrassing and biased piece of propaganda designed to promote DOE's new policy of covering its waste sites with dirt and placing them under its fledgling long-term "stewardship" program, a program that is not based on science, but on short-sighted policy that places the public at risk.

It is unfortunate that we must witness the DOE crying poor mouth with claims that cleaning up the Mixed Waste Landfill is "too risky for workers" while plans are being made to build another nuclear bomb factory at a cost of $4.5 million that will result in the same contamination to the environment, increased cancers for workers, and the violation of international peace treaties of which our country is a signatory.

We request that the deficiencies cited in each of the three (3) reports submitted to the NMED on behalf of Citizen Action be addressed in the CMS for the MWL. Due to the lack of consideration of these important issues we request that the NMED not approve the Class 3 Permit Modification for the MWL.

Appendices

Number	Document title
1	Letter from Greg Lewis, Director, Water/Waste Management, NMED, to Michael Zamorski/U.S. DOE re: NMED's determination of Corrective Measures Study for the Mixed Waste Landfill. Oct. 11, 2001.
2	Letter to Maurice Weisberg from Roger Kennett, Aug, 22, 2003.
3	Roger Kennett NMED/DOE Oversight Bureau report: "Nuclear Fuel Assessment Project Summary." Aug. 2003.
4	Eric Nuttall, Ph.D., Professor, Dept. of Chemical and Nuclear Engineering, UNM, white paper: "SNL/MWL Nuclear Spent Fuel Disposal." 5/12/03
5	CD rom: SAND report. Nov. 1989.
6	SNL Site Team report: "Assessment of Vulnerabilities of DOE Storage of IRF/RINM." Oct. 1993.
7	Letter from Barbara Malczewska-Toth to Will Moats re: SNL/NM Risk Screening Assessment for SWMU 76. Aug. 11, 1999.
8	"Summary of Information Obtained under the Freedom of Information Act," complied by Citizen Action. 2001.
9	MWL radionuclide inventory compiled by Citizen Action.
10	WERC Final Report: Independent Peer Review of US/DOE/SNL MWL." Aug. 31, 2001.
11	WERC Final Report: "Independent Technical Peer Review of US/DOE/SNL Working Draft CMS for MWL." Jan. 31, 2003.
12	"Review of the Risk Screening Assessment for the MWL, SWMU76," by Marvin Resnikoff, Ph.D., Radioactive Waste Management Associates. July, 2001.

13	"Review of SNL ET Cap Closure Plans for the MWL," by Tom Hakonson, Ph.D., Environmental Evaluation Services, LLC. Feb. 2002.
14	Is 'Trust Us, We're the Government' Really a Guarantee? A Review of Financial Assurance Options for LTES at the MWL, SNL," by W. Paul Robinson, Southwest Research and Information Center, Albuquerque, N.M. June, 2002.
15	FOIA documents (numbered): 1, 3, 5, 7, 12, 19, 20, 21, 22, 34, 43, 50, 58, 90, 92, 101, 108, 112, 113, 115, 116

FOIA documents
1, 3, 5, 7, 12, 19, 20, 21, 22, 34, 43, 50, 58, 90, 92, 101, 108, 112, 113, 115, 116