Sign In MWL 7/27/06 06-024
Los Griegos

Public Meeting Mixed Waste Landfill CMI Plan

Name	Organization	Address
William P. Moats	NMED-HWB	District I, 5500 San Antonio NE
James Bearzi	NMED-HWB	2905 Rabbit Pk. Dr. E Bldg 1 SF
Dorie Bunting	Citizen Action	1940 Poplars SW 87105
GARY WALVATNE	TECHLAW/NMED	
John Gould	DOE/SSO	
Mark Miller	SNL	PO Box 5800, MS-1042
CLIFF HO	SNL	
Susan Rodriguez	Citizen Action	
JEFF PENCE	SNL	
Tim Goering / Jack Dalton / C.A.	GRAM Inc.	P.O. Box 262 Sandia Park, NM 87047
Bob GILKESON	CITIZEN	Rhgilkeson@aol.com
Chantler Thompson	Interpreter	
JOE ESTRADA	USDOE/Sandia Site Office	POB 5400 ALBUQUERQUE, NM 87154
Ellen R Robinson	citizen	ellen2736@aol.com
DAVID ROBINSON	RESIDENT	AMSADAVE@AOL.COM
Dick Fate	SNL	
Floy Barrett	citizen	316 Washington N.E., Abq. 87108
Tonya Covington	citizen	POBox 40373 87196
Michael H. McFadden	NNSA/SSO	P.O. Box 5400, Albq., 87185
KIM FISHER	ACPJ	1508 CALIFORNIA NE ABQ 87110-6634
Phil Carter	citizen	222½ Vassar SE 87106
Edward Garcia	citizen	829 Loma Hermosa NW 87105
Jamie Welles	Citizen Action / Citizen/stakeholder	PO Box 7143 Albuq NM 87194 / 1721 Solano Dr NE Albq 87110

Name	Org	Address
E M. MURPHY	CITIZEN	1233 COLUMBIA NE ALB 87106
F. LAUFER	SNL	141 PLACITAS TRAILS, PLACITAS, NM 87043
Chris Campbell	WERC/NMSU	2444 Louisiana NE ABQ. 87110
JAY VANCE	EnergySolutions	
PAUL ROBINSON	SW RESEARCH	P O BX 4524, ABQ, NM 87106
William S. McDonald	NMED/HWB	District 1

State of New Mexico
Office of Public Facilitation

JULIA HOSFORD BARNES
Staff
200 West De Vargas, Suite 2
Santa Fe, New Mexico 87501
(505) 470-7349 jhb1@nm.net

Administratively housed at the
New Mexico Environment
Department

PUBLIC DIALOG
SANDIA NATIONAL LABORATORY'S CORRECTIVE MEASURE IMPLEMENTATION PLAN (TECHNICAL ISSUES)
MAY 25, 2006
9:00 – 4:35

JULIA BARNES, FACILITATOR

NMED IS SEEKING TECHNICAL COMMENTS, QUESTIONS AND RECOMMENDATIONS IN FOUR PRIMARY AREAS OF THE CMI PLAN FOR THE MIXED WASTE LANDFILL (MWL):

1) ACTIONS TO BE TAKEN/ NEEDED BEFORE IMPLEMENTATION
2) IMPLEMENTATION OF THE REMEDY
3) ACTIONS TO BE TAKEN/ NEEDED IMMEDIATELY AFTER IMPLEMENTATION
4) ACTIONS RELATING TO LONG TERM IMPLEMENTATION AND MONITORING

MEETING OUTCOMES:

NMED INTENDS TO

- ENSURE THAT THE PUBLIC UNDERSTANDS THE CMI PLAN;
- ANSWER QUESTIONS RAISED ON TECHNICAL ISSUES; AND
- TAKE COMMENTS AND RECOMMENDATIONS FROM THE PUBLIC REGARDING THE TECHNICAL IMPLEMENTATION OF THE CMI PLAN

PLEASE NOTE THAT THE AGENCY HAS TAKEN FINAL ACTION ON SELECTING THE REMEDY TO BE USED. NMED WILL *NOT* SELECT A DIFFERENT REMEDY AS A RESULT OF THIS MEETING.

9:00 – 9:30 **OVERVIEW OF THE CMI PLAN** **JAMES BEARZI**

- CMI PLANNING PROCESS/ REMEDY SELECTED
- FINAL AGENCY DECISION ON ACCEPTED REMEDY: COVER
- CMI PLAN
- BRIEF SUMMARY OF WRITTEN COMMENTS RECEIVED TO DATE
- ACCEPTING WRITTEN COMMENTS AND PROPOSED RECOMMENDATIONS FOR IMPROVEMENTS TO THE CMI PLAN FROM 5/25/06 THROUGH 6/9/06

9:30– 10:30 **ACTIONS TO BE TAKEN/ NEEDED BEFORE IMPLEMENTATION** **GROUP DIALOG**

- LIST OF COMMENTS RECEIVED TO DATE (JAMES BEARZI)
- DIALOG REGARDING PUBLIC COMMENTS
    - FATE AND TRANSPORT MODEL DOESN'T CONSIDER BIO-INTRUSION
    - FATE AND TRANSPORT MODEL PREDICTS GROUNDWATER CONTAMINATION

10:30 – 10:45 BREAK

10:45 – 11:30 **ACTIONS TO BE TAKEN/ NEEDED BEFORE IMPLEMENTATION (CONTINUED)**

- DIALOG REGARDING PUBLIC COMMENTS (CONTINUED)
    - FATE AND TRANSPORT MODEL DOESN'T CONSIDER HUMAN INTRUSION
    - FATE AND TRANSPORT MODEL DOESN'T CONSIDER ALL WASTE TYPES IN THE LANDFILL
    - MODEL RELIES ON OUT-DATED DATA
    - FATE AND TRANSPORT MODEL DOESN'T ACCOUNT FOR CONTAINER DETERIORATION
    - TRIGGERS ARE NOT DEVELOPED FOR ALL WASTE TYPES/MEDIA IN THE LANDFILL

11:30 – 12:00 **OPEN SPACE**– COMMENTS, QUESTIONS OR RECOMMENDATIONS

12:00 – 1:15 LUNCH

1:15 – 1:45 **IMPLEMENTATION OF THE REMEDY** **GROUP DIALOG**

- LIST OF COMMENTS RECEIVED TO DATE / BRIEF DESCRIPTION OF THE REMEDY (JAMES BEARZI)
- DIALOG REGARDING ANY CONCERNS/QUESTIONS RAISED BY THE PUBLIC

1:45– 2:45 **ACTIONS TO BE TAKEN/ NEEDED IMMEDIATELY AFTER IMPLEMENTATION**
GROUP DIALOG

- LIST OF COMMENTS RECEIVED TO DATE (JAMES BEARZI)
- DIALOG REGARDING COMMENTS
    - WHAT THINGS SHOULD BE MONITORED FOR (AND WHAT MEDIA)
    - METHODS OF MONITORING
    - LOCATIONS TO MONITOR

2:45 – 3:00 BREAK

3:00 – 4:00 **ACTIONS TO BE TAKEN/ NEEDED FOR THE LONG TERM** **GROUP DIALOG**

- LIST OF COMMENTS RECEIVED TO DATE (JAMES BEARZI)
- DIALOG REGARDING COMMENTS
    - LONG TERM MONITORING AND MAINTENANCE PLAN
    - PUBLIC PARTICIPATION IN THE FUTURE EFFORTS

4:00 – 4:30 **OPEN SPACE** – COMMENTS, QUESTIONS OR RECOMMENDATIONS

4:30 – 4:35 **CLOSING REMARKS** **JAMES BEARZI**

- ACCEPTING WRITTEN COMMENTS AND PROPOSED RECOMMENDATIONS FOR IMPROVEMENTS TO THE CMI PLAN FROM 5/25/06 THROUGH 6/9/06
- THANKS FOR PARTICIPATING!

SNL

Response to Public Comments on the SNL Fate and Transport Model of the Mixed Waste Landfill

Clifford K. Ho, Timothy J. Goering,
Jerry L. Peace, and Mark L. Miller

Sandia National Laboratories
Albuquerque, NM 87185
(505) 844-2384
ckho@sandia.gov

- **Biotic uptake (plants, ants, animals) can mobilize contaminants to the surface**
  - Biotic uptake was not considered in the models
    - Field studies show 90% of the root mass in the MWL vicinity is in the upper 50 cm of soil (Peace et al. 2004)
    - The rock bio-intrusion barrier should restrict small burrowing animals and root growth, as long as the underlying materials are relatively dry (Anderson and Forman, 2002)
    - 80% of ant species found at NTS did not burrow deeper than 3 feet (Neptune and Co., Document #05100-02). Depth to waste at MWL will be 7-10 feet after cover.
  - SNL will work with NMED to consider evaluation of plants and surface materials (e.g., ant hills) as part of its long-term monitoring program
    - Details to be presented in the MWL Long Term Monitoring and Maintenance Plan, scheduled for completion in 2008
    - Sandia will work closely with NMED to identify appropriate monitoring triggers

- **Human intrusion at the MWL was not considered in the fate and transport model**
  - For modeling human receptors, we assumed that the exposed individual was located at the landfill
    - Inhalation and dermal exposure was assumed to occur 24/7 above the landfill
    - Drinking water was assumed to be taken directly beneath the landfill and consumed at a rate of 10 L/day (2 L/day recommended by EPA)
  - We did not consider human disruption (excavation, construction) on potential future releases

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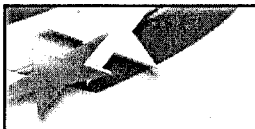

- **Modeling did not consider all constituents in the MWL inventory, in particular, beryllium and metallic sodium**
  - We identified the primary constituents of concern with NMED prior to the study based on inventory, mobility, and past data. These included 11 radionuclides (plus decay products), 2 heavy metals, and PCE (as a proxy for all VOCs)
  - Beryllium and metallic sodium are not expected to pose any additional risks
    - Beryllium
      - Not a significant component of the inventory; Present in 4 pits in the Classified Area
      - Beryllium Kd's range from 250 mL/g in sand to 3,000 mL/g in organic-rich material [Sheppard and Thibault, 1990]; constituents with similar Kd's were found to be relatively immobile
    - Metallic Sodium
      - Not listed in the MWL inventory

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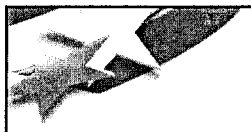

- The model did not consider new compounds formed as a result of radiolysis
  - Radiolysis is the molecular decomposition of a substance as a result of radiation
  - The modeling of constituents (amount and characteristics) formed as a result of radiolysis is highly uncertain and speculative
  - Radiolysis is more likely to occur from high-level radioactive waste, rather than the low-level waste disposed of at the MWL

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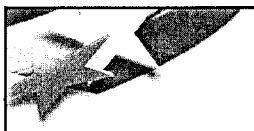

- The model does not consider "trigger levels" for the entire inventory of contaminants
  - Constituents of concern that were shown to pose a potential risk were proposed as triggers
  - Identification of triggers for long-term monitoring will be performed in conjunction with NMED

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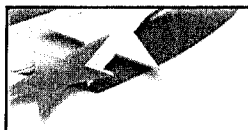

- **The model did not use current data**
  - The model used the most recent data (1993) providing subsurface concentrations of PCE and tritium for calibration of the models
    - Groundwater concentrations are measured annually, and no PCE has been detected at the MWL in 16 years
  - NMED has requested that the MWL fate and transport model be updated every 5 years. Data collected during long-term monitoring at the site will be used to update the model.

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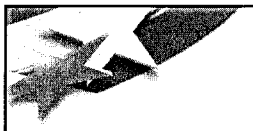

- **The model fails to consider the deterioration of waste containers**
  - The model assumed that all waste, except for Ra-226, was uncontained and available for transport by diffusion or leaching
  - Different degradation scenarios were used for sealed sources of Ra-226 to model the generation and release of Rn-222 gas

Sandia National Laboratories

SNL

SAND2005-6888
Unlimited Release
Printed November 2005

Probabilistic Performance-Assessment Modeling of the Mixed Waste Landfill at Sandia National Laboratories

Clifford K. Ho
Geohydrology Department

Timothy J. Goering
GRAM, Inc.

Jerry L. Peace
Geophysics Department

Mark L. Miller
Environmental Management Department

Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185
Contact: ckho@sandia.gov
(505) 844-2384

Abstract

A probabilistic performance assessment has been conducted to evaluate the fate and transport of radionuclides (amercium-241, cesium-137, cobalt-60, plutonium-238, plutonium-239, radium-226, radon-222, strontium-90, thorium-232, tritium, uranium-238), heavy metals (lead and cadmium), and volatile organic compounds (VOCs) at the Mixed Waste Landfill (MWL). Probabilistic analyses were performed to quantify uncertainties inherent in the system and models for a 1,000-year period, and sensitivity analyses were performed to identify parameters and processes that were most important to the simulated performance metrics. Comparisons between simulated results and measured values at the MWL were made to gain confidence in the models and perform calibrations when data were available. In addition, long-term monitoring requirements and triggers were recommended based on the results of the quantified uncertainty and sensitivity analyses.

At least one-hundred realizations were simulated for each scenario defined in the performance assessment. Conservative values and assumptions were used to define values and distributions of uncertain input parameters when site data were not available. Results showed that exposure to tritium via the air pathway exceeded the regulatory metric of 10 mrem/year in about 2% of the

simulated realizations when the receptor was located at the MWL (continuously exposed to the air directly above the MWL). Simulations showed that peak radon gas fluxes exceeded the design standard of 20 $pCi/m^2/s$ in about 3% of the realizations if up to 1% of the containers of sealed radium-226 sources were assumed to completely degrade in the future. If up to 100% of the containers of radium-226 sources were assumed to completely degrade, 30% of the realizations yielded radon surface fluxes that exceeded the design standard. For the groundwater pathway, simulations showed that none of the radionuclides or heavy metals (lead and cadmium) reached the groundwater during the 1,000-year evaluation period. Tetrachloroethylene (PCE) was used as a proxy for other VOCs because of its mobility and potential to exceed maximum contaminant levels in the groundwater relative to other VOCs. Simulations showed that PCE reached the groundwater, but only 1% of the realizations yielded aquifer concentrations that exceeded the regulatory metric of 5 μg/L.

Based on these results, monitoring triggers have been proposed for the air, surface soil, vadose zone, and groundwater at the MWL. Specific triggers include numerical thresholds for radon concentrations in the air, tritium concentrations in surface soil, infiltration through the vadose zone, and uranium and select VOC concentrations in groundwater. The proposed triggers are based on U.S. Environmental Protection Agency and Department of Energy regulatory standards. If a trigger is exceeded, then a trigger evaluation process will be initiated which will allow sufficient data to be collected to assess trends and recommend corrective actions, if necessary.

View of the Mixed Waste Landfill looking southwest (circa 1987). The Mixed Waste Landfill occupies 2.6 acres in Area III at Sandia National Laboratories, about 5 miles southeast of the Albuquerque Sunport. From 1959-1988, the landfill received approximately 100,000 cubic feet of low-level radioactive waste containing ~6,300 curies of activity.

Table 1. Summary of scenarios and performance objectives used in the performance assessment of the MWL.

Scenario	Description	Performance Objectives[a]
1	Water percolates through the cover to the waste	• Infiltration through the cover shall be less than 10^{-7} cm/s (a unit-gradient flow is assumed to equate infiltration to hydraulic conductivity) (U.S. EPA 40 CFR 264.301)
2	Tritium diffuses to the atmosphere and migrates via gas and aqueous phases through the vadose zone to the groundwater	• Dose to the public via the air pathway shall be less than 10 mrem/yr (excludes radon) (U.S. EPA 40 CFR 61.92) • Dose from beta particles and photon emitters shall be less than 4 mrem/yr (U.S. EPA 40 CFR 141.66; U.S. EPA, 2003) • Tritium concentrations in groundwater shall not exceed 20,000 pCi/L (40 CFR 141.66 Table A; tied to 4 mrem/yr)
3	Radon steadily diffuses to the atmosphere and migrates via gas and aqueous phases through the vadose zone to the groundwater	• The average flux of radon-222 gas shall be less than 20 pCi/m^2/s at the surface of the landfill (U.S. EPA 40 CFR 192) • Radon concentrations in groundwater shall not exceed 300 pCi/L (proposed EPA rules, Federal Register: November 2, 1999 (Volume 64, Number 211) Pages 59345-59378)
4	One or more radionuclides migrate via the aqueous phase through the vadose zone to the groundwater	• Maximum concentrations in groundwater of gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L (U.S. EPA 40 CFR 141.66; U.S. EPA, 2003) • Uranium concentrations in groundwater shall not exceed EPA MCL of 30 µg/L (U.S. EPA 40 CFR 141.66; U.S. EPA, 2003) • Dose from beta particles and photon emitters shall be less than 4 mrem/yr (U.S. EPA 40 CFR 141.66, U.S. EPA, 2003)
5	Lead and cadmium migrate via the aqueous phase through the vadose zone to the groundwater	• Lead concentrations in groundwater shall not exceed the EPA action level of 15 µg/L (U.S. EPA, 2003) • Cadmium concentrations in groundwater shall not exceed the EPA MCL of 5 µg/L (U.S. EPA, 2003)
6	PCE migrates through the vadose zone to the groundwater	• PCE concentrations in groundwater shall not exceed the EPA MCL of 5 µg/L (U.S. EPA 40 CFR 141.61; U.S. EPA, 2003

MCL = Maximum Contaminant Level

[a]The point of compliance is taken at the boundary of the waste site. The period of performance was specified as 1,000 years in the regulations for some of the performance metrics, but for many of the performance metrics, the period of performance was not specified. In this study, a 1,000 -year period was simulated.

Key Assumptions:

The key assumptions regarding the models and input parameters used in the performance assessment of the MWL are summarized below:

- Receptor located adjacent to MWL
    - Tritium dose caused by continuous inhalation and exposure of tritium flux directly above MWL.
    - Groundwater dose calculated based on concentrations in aquifer directly beneath MWL. Water intake assumed to be 10 L/day (five times EPA standard of 2 L/day for drinking water).
- Maximum waste inventory set equal to at least twice estimated values based on historical records.
- All constituents (except for Ra-226) assumed to be uncontained.
- Sealed sources of radium-226 allowed to degrade in 1,000 years (emanation factor for radon-222 allowed to increase).
- Cover allowed to completely erode in 1,000 years.
- No dilution of groundwater concentration in the aquifer
- 1-D model: yields maximum transport to surface and groundwater.
- Bounding tortuosity coefficients: yields maximum diffusion rates.

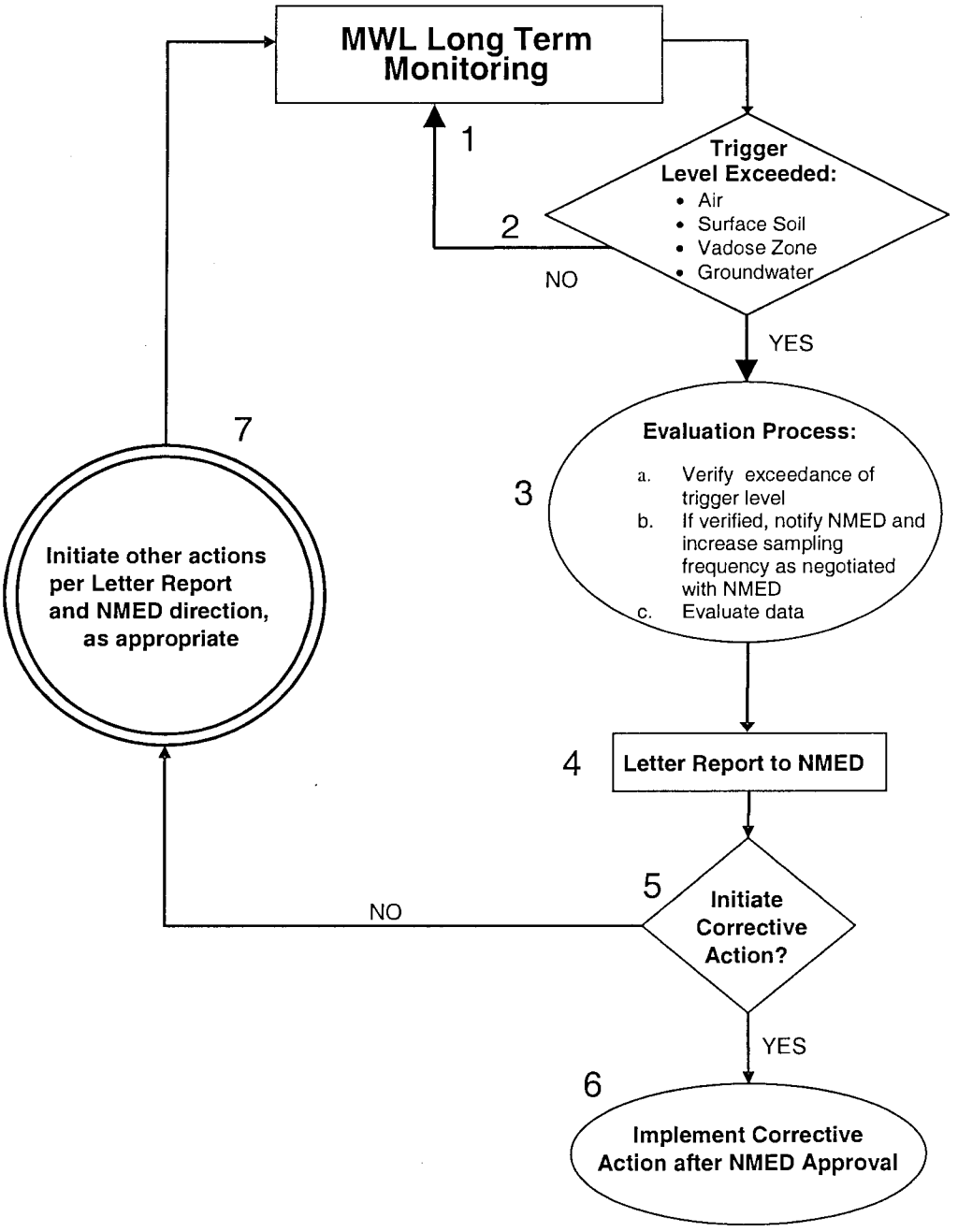

Figure 1. Trigger evaluation process for the Mixed Waste Landfill.

Table 2. Proposed monitoring triggers for the Mixed Waste Landfill.

Trigger Parameter	Medium	Proposed Trigger Value	Point of Compliance	Performance Objective	Applicable Regulation
Tritium	Soil	20,000 pCi/L tritium in soil moisture at Environmental Monitoring locations along MWL perimeter	MWL Perimeter	Dose to the public via the air pathway shall be less than 10 mrem/yr.	DOE Order 5400.5; 10 CFR 61 Subpart H; 40 CFR 141.66
Radon	Air	4 pCi/L (measured by Track-Etch radon detectors)	MWL Perimeter	Average flux of radon-222 gas shall be less than 20 $pCi/m^2/s$ at the landfill surface (design standard).	EPA Action Threshold for radon in air (U.S. EPA 2005)
Infiltration	Vadose Zone	25 percent volumetric moisture content in vadose zone beneath the MWL (measured by neutron probe)	Linear depths of 10 ft to 100 ft along neutron probe access holes beneath the MWL	Infiltration through the cover shall be less than the EPA-prescribed technical equivalence criterion of 31.5 mm/yr [10E-7 cm/s]	RCRA 40 CFR Part 264.301
Uranium	Ground water	15 µg/L	Downgradient monitoring well locations	Uranium concentrations in groundwater shall not exceed the EPA MCL of 30 µg/L.	EPA Primary Drinking Water Standard
1,1,1-Trichloroethane (1,1,1-TCA)	Ground water	100 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
1,1-Dichloroethene	Ground water	3.5 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
Benzene	Ground water	2.5 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
Ethyl benzene	Ground water	350 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
Methylene chloride	Ground water	2.5 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
Styrene	Ground water	50 ug/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
PCE	Ground water	2.5 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard

Trigger Parameter	Medium	Proposed Trigger Value	Point of Compliance	Performance Objective	Applicable Regulation
Toluene	Ground water	500 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
TCE	Ground water	2.5 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard
Xylenes (Total)	Ground water	5,000 µg/L	Downgradient monitoring well locations	VOC concentrations in groundwater shall not exceed EPA MCLs.	EPA Primary Drinking Water Standard

Good News, Bad News in Study of Lab's Dump

Contamination Will Be Minor

BY JOHN FLECK
Journal Staff Writer

A new study has provided ammunition for both sides in the ongoing debate over the future of an old Sandia Labs landfill.

Activists say the study shows the dump "will contaminate Albuquerque's drinking water," threatening groundwater supplies for the Mesa del Sol development south of Kirtland Air Force Base.

Under a wide range of scenarios, traces of the potentially cancer-causing solvent PCE were likely to reach ground water, the study found.

"This study demonstrates that contamination from the dump is inevitable," Sue Dayton, head of the group Citizen Action, said in a statement issued Feb. 9.

Sandia officials say Dayton's broadside omits one of the study's key findings: Any contamination that does spread will almost certainly be so slight that it poses no health threat.

"You have to put everything into context," said Clifford Ho, the Sandia scientist who did the new study on the chances the landfill might leak. "What levels are you talking about here?"

The latest dustup was triggered by a detailed new study, done for the state Environment Department, of the long-term risks that Sandia's Mixed Waste Landfill might leak.

Located in a remote area near Kirtland's southern edge, the unlined dirt landfill received radioactive and chemical wastes from 1959 to 1988.

Sandia wants to leave the waste where it is and monitor for leaks. Dayton's group wants the waste dug up and moved to a safer place.

Ho concluded there is little chance of dangerous amounts of waste leaking. That is consistent with four previous studies.

But the simple fact that Ho's study shows that PCE can reach ground water, regardless of the amount, is Ho's most important finding, said Paul Robinson of the Southwest Research and Information Center in Albuquerque.

"I think that the most important part is the trend," said Robinson, who worked with Dayton on Citizen Action's analysis of Ho's study.

Good New, Bad News on Sandia Dump

Contamination is on its way to Albuquerque's sole source aquifer from what officials at Sandia National Laboratories have long referred to as a "well-behaved" dump.

The dump is known as the Mixed Waste Landfill, a Cold War-era waste site containing an estimated 100,000 cubic ft. of radioactive and hazardous waste disposed of over a period of 30-years in unlined pits and trenches as a result of nuclear weapons research at Sandia.

A recent mathematical study conducted by Sandia has predicted that a man-made chemical called tetrachloroethane (also known as PCE) will transcend all 460-ft. to reach the aquifer below. The study, called a "fate and transport model," examines the movement of contaminants to the groundwater. One hundred out of one hundred tests conducted by Sandia confirmed that PCE from the Mixed Waste Landfill will reach the groundwater as early as the year 2010.

PCE is used in industry as a cleaning solvent and metal de-greaser. PCE and its decay products have been linked to various organ diseases and cancers including liver cancer, brain cancer, cancer of the kidney, liver, lymphatic system, prostate, and cervix, and angiosarcoma, a malignant tumor of the blood vessels in the liver.

The mathematical study was part of a requirement by the New Mexico Environment Department (NMED) in issuing a permit to Sandia that gives the lab the go-ahead to cover the toxic waste with 3 ft. of dirt instead of requiring excavation and clean up. Unfortunately, the new information about the PCE contamination came after the NMED gave Sandia its blessings to cover the dump.

But according to Sandia, there's still nothing to worry about. In an article recently published in the Journal, "Good News, Bad News in Study of Lab's Dump" by John Fleck, the good news is that Sandia officials say that any contamination that does spread from the dump "will almost certainly be so slight that it poses no health threat."

Dr. Clifford Ho, the principal investigator of the fate and transport study, claims there's "little chance" of dangerous amounts of waste leaking. However, Ho's study *only examines the movement of one chemical reportedly disposed of at the dump.* At least a dozen or so chemicals reportedly disposed of at the dump have already escaped their temporary grave and spread to the surrounding soil.

While Ho took great care to model what he felt might be the fastest moving chemical at the Mixed Waste Landfill he neglected to model the decay products of PCE, some of which are more dangerous than PCE and have lower clean up levels than the "safe" limit set for PCE. While the majority of PCE levels fall below the maximum contaminant level (the federal regulatory limit set for requiring clean up) they are very close to the regulatory limit and in one case exceed the limit.

More bad news not reported in the article is that Sandia used soil sampling data collected over a decade ago, which is likely to *underestimate* the actual amounts of PCE that have been released from the dump up until now, and subsequently lowballing the amounts of PCE predicted to reach the groundwater shown in the model.

The study also fails to examine what might happen if the drums, barrels, bottles, plastic bags, wooden crates, and other containers holding (or that once held) various wastes decay or break, releasing their contents into the surrounding soil. Nor does it model the movement of the complete inventory of radionuclides and their respective decay products disposed of at the dump

Studies have shown that animals living at waste sites are exposed to buried waste materials through burrowing activities, and plants growing on top of dumps take contaminants up into their root systems. Studies of plants and animals living at the Mixed Waste Landfill have shown they are contaminated with tritium and radon. These activities are likely to increase over time since an additional layer of rocks placed under the dirt cover to deter animals from digging into the dump *has not* been proven to be effective over the long-term. However, Sandia's study fails to consider the transport of contaminants through plant and animal activity.

The contamination to groundwater from the Mixed Waste Landfill has potentially far reaching consequences, not only in terms of future contamination to the groundwater, but potential impacts on future land values as well.

Property owners who lived near Rocky Flats, Colorado, the former site of the nation's nuclear weapons plant, were recently awarded $352 million for damage to their property due to operations at the bomb plant. The families filed the class action lawsuit on the grounds that the "mishandling of toxic substances at the plant ate away at their property values."

The operator of the weapons plant, Rockwell International, argued that "only miniscule amounts of hazardous materials – far too small to harm anyone" had escaped into the environment. However, the jury decided otherwise, and found Rockwell and its predecessor, Dow Chemical Company, guilty for putting residents at increased risk to health problems due to exposure to toxic materials. It took families 15 years to receive compensation for damages.

Whether "miniscule," or "certainly so slight" the New Mexico Environment Department should carefully evaluate these new findings and require Sandia to go back to the drawing board to conduct a comprehensive "fate and transport model" that corrects the deficiencies in the current model and considers excavation and clean up of the dump at a specified future date. Clean up of this toxic waste site would protect the quality of water in Albuquerque's declining aquifer. It would also protect the health of communities located in close proximity to the dump such as the future residents of Mesa del Sol who will likely be drinking water from wells drilled into the same shared aquifer with the Mixed Waste Landfill.

On that same note it's time Governor Bill Richardson steps up to the plate to honor his commitment to communities to clean up the Mixed Waste Landfill and prevent another Rocky Flats scenario.

Sue Dayton is director for Citizen Action New Mexico. Comments from members of the public concerning the Sandia fate and transport study are available for review on the NMED website at: http://www.nmenv.state.nm.us/hwb/snlperm_comments.htm

Sue

NEWS RELEASE

Date: February 9, 2006

Contact: Susan Dayton, Director
Citizen Action New Mexico (505) 262-1862

Study predicts Sandia dump will contaminate Albuquerque's drinking water

Contamination from a Cold War-era waste dump will reach Albuquerque's drinking water aquifer as early as the year 2010, according to a new study conducted by Sandia National Laboratories. The dump, known as the Mixed Waste Landfill, contains an estimated 100,000 cubic ft. of radioactive and chemical waste from nuclear weapons research buried in unlined pits and trenches at Sandia.

The study conducted by Sandia, known as a "fate and transport" model, predicts the movement and releases of contaminants from the dump. The New Mexico Environment Department (NMED) ordered Sandia to conduct the study as a requirement of a permit the NMED issued to Sandia that, instead of clean up, allows Sandia to cover the dump with 3 ft. of dirt and monitor the site indefinitely. The news that the dump will eventually contaminate Albuquerque's sole source aquifer came after Ron Curry, NMED Secretary, issued a permit to Sandia to cover the waste.

Sandia's study predicts that tetrachloroethane, a man-made chemical commonly referred to as PCE, will reach Albuquerque's aquifer as early as the year 2010. PCE can persist in the groundwater for years, and has been classified as a "probable" human carcinogen linked with liver and kidney cancers. PCE decays and forms other chemical compounds that include trichloroethane (TCE); dichloroethane (DCE); and vinyl chloride (VC), all of which are linked to cancers of the brain, liver, stomach, lungs, prostate, cervix and endometrium.

Sue Dayton, Director for Citizen Action New Mexico, a public interest group advocating for clean up of the waste site, said that Sandia has consistently maintained it is highly unlikely that contaminants from the dump will ever reach the groundwater below.

Paul Robinson, Research Director for the Southwest Research and Information Center, who reviewed the study for Citizen Action, said, "Sandia's study only models for the movement of one chemical (PCE) to the groundwater, even though previous investigations by Sandia have shown that at least a dozen various chemicals have escaped the dump."

Robinson also said the study failed to model the movement of the PCE decay products, and the complete range of other metals and radioactive materials buried in the dump. Robinson's review submitted to the NMED also cited the failure of the study to model the release and transport of radioactive contaminants through plants and burrowing animals at the dump by Sandia. Sampling efforts by Sandia have shown deer mice and vegetation living at the dump to be contaminated with radon and tritium, two radioactive materials.

Dayton added: "This new study demonstrates that contamination from the dump is inevitable and raises serious concerns about the potential for contamination from the Mixed Waste Landfill to Albuquerque's drinking water, from new wells drilled to provide drinking water for the future residents of Mesa del Sol, and future groundwater development by Sandia's neighbors including the Pueblo of Isleta. We are calling on Governor Richardson to step up to the plate and take action on this matter."

For more information contact *Citizen Action New Mexico*: (505) 262-1862. To read Citizen Action's comments on Sandia's Fate and Transport Model visit the *Citizen Action* website at www.radfreenm.org.

Fact Sheet PCE

PCE (tetrachloroethane) is a manufactured compound widely used as a metal de-greaser. PCE has been linked with liver and kidney damage and various cancers in lab animals.

The decay products of PCE include TCE (trichloroethane) which degrades to DCE (dichloroethane) which degrades to VC (i.e., vinyl chloride).

TCE is a solvent that, cited by the EPA, is "highly likely" to cause cancer in humans which includes cancer of the kidney, liver, lymphatic system, prostate, and cervix. The MCL for TCE in water is 5 ug/L. IN air it is 0.016 micrograms/ppb per cubic meter of air.

VC is used in the manufacturing of plastic products and has been linked with liver cancer, brain cancer and angiosarcoma, a malignant tumor of the blood vessels in the liver. The MCLG for VC is ZERO. The EPA's MCL for VC in drinking water is 2 ppb. Exposures to VC at levels above the MCL for relatively short periods of time have resulted in damage to the nervous system; exposures to VC at levels above the MCL for longer periods of time have resulted in damage to the liver, nervous system and cancers.

DCE is used in the manufacturing of VC. In animal studies DCE has been linked with disorders of the nervous system, liver, kidney and lung. It has also been linked with cancers of the stomach, mammary glands, liver, lungs, and endometrium. The DHHS has determined that 1,2-dichloroethane "may reasonably be expected to cause cancer" while the FACR considers DCE to be a "possible human carcinogen." The EPA's MCL for DCE is 0.005 mg/L. OSHA's MCL for DCE in the workplace is 50ppm for a 40-hr. work week.

TCEQ TECHNICAL FACT SHEET-
Tetrachloroethylene (perchloroethylene, PCE, "perc")

What is PCE?

- PCE is a man-made chemical used as a solvent and dry cleaning agent.
- PCE is a common environmental contaminant that may be found in up to 25% of U.S. drinking water supplies.
- PCE can persist in groundwater for years due to slow environmental breakdown.

How can I be exposed to PCE in my water?

- Ingestion of the water (likely the main route of exposure)
- Volatilization of PCE from water during household uses
- Skin contact with PCE in water

What are the health concerns with PCE?

- Work-related exposures to PCE may result in dizziness, headaches, irritation, and other health effects. These primarily occur when breathing high levels of PCE vapors. These types of health effects <u>are not</u> relevant to the PCE situation with the Jones Road plume which involves low levels of PCE in drinking water.

- Long-term exposure to PCE in drinking water can be a health concern. At high enough levels, exposure to PCE may lead to an increased likelihood of liver or kidney disease and other effects. PCE is considered a "probable" human carcinogen based on studies where animals exposed to very high levels of PCE developed liver/kidney cancers. Humans exposed to the relatively low levels of PCE typical of the Jones Road plume are much less likely to be at risk of cancer.

- Daily exposures to PCE for dry cleaner workers are often thousands of times higher than exposures related to the Jones Road PCE plume. Studies designed to determine if PCE has affected the health of these workers have been inconclusive. In some cases health effects were noted, although it was not possible to determine whether PCE or other chemicals were the cause.

- The highest acceptable level of PCE in drinking water is 5 parts per billion (ppb). This is referred to as the maximum contaminant level (MCL) for PCE, and it is set at a stringent level to minimize the amount of PCE present in drinking water. Most Jones Road wells were below the 5 ppb MCL. Of those wells above the MCL, most exceedances were slight (5-10 ppm). However, all wells with PCE concentrations above the MCL received household water filters that can effectively address PCE concerns.

Are there medical tests that can be used to evaluate PCE exposures?

- Yes. In exposed persons, PCE may be measured in breath samples, blood, or urine. However, time is a big factor with low level exposures, and tests more than several days from the time of exposure are unlikely to be accurate or conclusive.