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Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Benito J. Garcia, Bureau Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044 Galisteo St., Bldg. A
P. O. Box 26110
Santa Fe, New Mexico 87505

Dear Mr. Garcia:

Subject: Los Alamos National Laboratory Follow-up Report on Potable Water Release - Technical Area 21, Building 61, Container Storage Area

The purpose of this letter is to submit analytical data for and to report follow-up activities resulting from a potable water release at Los Alamos National Laboratory (LANL), Technical Area 21, Building 61 (TA-21-61), on December 24, 1996. This incident was originally reported by telephone to Robert S. Dinwiddie of the Hazardous and Radioactive Materials Bureau (HRMB) on December 24, 1996, and by a subsequent letter from this office on December 27, 1996.

On December 24, a potable water pipe inside TA-21-61 broke due to freezing weather. The pipe flooded the interior of the building including the inactive mixed waste container storage area undergoing closure. After filling the secondary containment of the storage area, water flowed out of the building for short distances on the east and west sides. The total amount of water involved has been estimated at approximately 5,000 gallons. Upon discovery, the water pipe break was repaired and the water collected in the storage area was sampled. These events were reported in more detail in the December 27 letter.

The water samples were analyzed for toxicity characteristic metals, volatile organic compounds, semi-volatile organic compounds and polychlorinated biphenyls. The attached sample results demonstrate that none of these hazardous constituents were determined to be present in the collected water with the exception of trace levels of acetone, a volatile organic compound (Attachment A). Specifically, a duplicate sample exceeded the limit of quantitation for acetone by one part per billion. The source of this contamination is unknown. The historical waste inventory for this container storage area lists two drums containing mixed waste materials with acetone that were stored for several months in 1990 but there were no associated spills. Additional sample quality assurance review (included in Attachment A) does not indicate laboratory contamination

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or other statistical basis to qualify the data. However, this level of acetone is less than the risk-based concentrations presented in the latest version of the U. S. Environmental Protection Agency (EPA) Region III Risk-Based Concentration Table (January 31, 1995) and the Human Health Standards for Groundwater of 10,000 mg/L TDS Concentration or Less as contained at the New Mexico Administrative Code, Title 20, Chapter 6, Part 2 (20 NMAC 6.2), Subpart III, Section 3-103. Therefore, this release does not endanger human health or the environment and did not require a formal report as described in Module II, Section K.2.b of the LANL Hazardous Waste Facility Permit.

The maximum capacity of the storage area is approximately 3,000 gallons. Several days after the initial flooding event, the water retained in the storage area froze. After approximately a week, the ice thawed and the storage area retained a variable mixture of water and a small amount of ice depending on weather conditions. The water level was observed to be slowly lowering over this period but no visual evidence of leakage was seen. Plans were made to pump the remaining water into the facility sanitary waste line system in order to conservatively dispose of the water if this was determined to be appropriate based on the analytical results. However, it was discovered during a routine inspection on February 3, 1997 that the remaining water had evaporated or leaked from the storage area before the plan could be implemented.

Visual examination of the storage area has not revealed cracking of the containment area concrete floor or curbs that would explain the loss of the water. There is no gross evidence of leakage from the building's concrete foundation or around the edges of the containment area. There has been minor deterioration or flaking of the epoxy covering on the concrete leading to a possibility of some level of absorption by the underlying concrete.

The potential evaporation rate for the retained water has been estimated by examining the record of soil and atmospheric conditions for the relevant time period at LANL. The method (Viessman, 1989) and calculations for evaluating evaporation rates associated with TA-21-61 are included in this report (Attachment B). Based on meteorological data provided by LANL Environment, Safety, and Health Division, Air Quality Group (ESH-17), an estimated 1,430 gallons or approximately 47 percent of the retained water may have evaporated from the secondary containment area.

Temperature, wind speed, relative humidity, solar radiation, vapor pressure, water quality, and heat storage capacity are all variables that affect the theoretical rate of evaporation (Meinzer, 1942). A conservative approach based on soil temperature, water quality, vapor pressure, wind speed, and humidity was used to analyze evaporation rates associated with TA-21-61. The following variables were not taken into consideration in calculating the rate of evaporation:

- Wind - Air movement tends to increase evaporation rates by removing water vapor from contact with the water surface (Meinzer, 1942). Wind speed data for the interior of TA-21-61 has not been obtained or extrapolated. Therefore, wind speed

was assumed as zero for the purposes of evaporation rate calculations. However, there is noticeable air current present in the building due to roof vents and several holes in the walls that once housed facility/utility piping. This evidence suggests that the assumption was made conservatively and that actual evaporation rates at the site may have been higher than calculated.

- Heat Storage Capacity - The heat storage capacity could not be calculated because relevant LANL atmospheric data is not available for the release period. Heat storage capacity associated with the area of the release could contribute to an increase in actual evaporation rates because of the warmer conditions associated with radiated heat transfer occurring from the ground surface (and the secondary containment base) to the contained water. The surface area to depth ratio of the contained water was high, which would also increase the amount of heat capacity available to initiate evaporation. Deeper waters tend to use stored energy (produced from radiated heat transfer) for warming the body of water instead of using the energy for evaporation.

- Solar Energy - The calculations performed for estimating the evaporation rate at the TA-21-61 spill site did not include solar radiation as a possible source of evaporation. Again, no atmospheric data was collected during the release period. As with heat storage capacity and increased wind speed, solar energy contributes to an increase in the rate of evaporation. Solar radiation is transferred through the windows and walls at TA-21-61 and is stored inside the building because of the temperature gradient that has been observed between the outside and inside environments. Not accounting for the degree of solar heating present contributing to evaporation rates provides another conservative factor to the calculated total.

The loss of this retained water cannot be currently explained in its entirety. However, the analysis of the chemical composition of this water sampled at the time of the spill has been determined to be basically consistent with its source, i.e., potable water. Two previous soap and water washdowns of the container storage area performed as part of the mixed waste container storage area closure project had shown only trace amounts of contamination. Specifically, levels of approximately two hundred parts per billion mercury (found only in the first washdown) and approximately three hundred parts per billion toluene (second washdown) had been detected. These constituents were not present at detectable levels in the spill water retained in the containment area. Therefore, based on the low levels of contaminants present in the rigorous soap and water washdowns and the lack of significant contaminants in the spill water itself, the potential for harm to the public or environment from any released water is below the risk based and health standards discussed above and is of minimal, if any, impact in terms of contaminant migration.

The present approach is to proceed with the closure of this area as described in the closure plan submitted to HRMB on March 22, 1996. Sampling and analytical results from a third soap and water washdown performed February 27, 1997, were not procedurally adequate to demonstrate decontamination. A fourth washdown procedure is

currently scheduled for later this month. If you have further questions or concerns regarding this matter, please contact me at (505) 665-5042.

Sincerely,

H. L. "Jody" Plum
Office of Environment and Projects

LAAMEP:2JP-078

References:

Veissman, Warren Jr., Gary L. Lewis, and John W. Knapp, 1989. Introduction to Hydrology, Third Edition, Harper and Row Publishing, Inc., New York, New York.

Meinzer, Oscar E. ed, 1942. Physics of the Earth, Vol. IX, Hydrology, First Edition, McGraw-Hill Book Company, New York, New York and London, England.

Enclosure

cc w/enclosure:
R. Dinwiddie
Permits Program Manager
Hazardous and Radioactive Materials Bureau
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2044 Galisteo St., Bldg. A
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