3

LA-UR-97-85
Report-54G-013.R.2

Hollis et al. 1997
ER ID # 57523

97-Area G, 1

PERFORMANCE ASSESSMENT AND COMPOSITE ANALYSIS FOR LOS ALAMOS NATIONAL LABORATORY MATERIAL DISPOSAL AREA G

MARCH 1997

Diana Hollis, EM-SWO, Project Leader

Erik Vold, EM-SWO

Rob Shuman, RAE Corp.

Kay Birdsell, EES-5

Kathleen Bower, EES-5

Wayne Hansen, EES-15

Don Krier, EES-1

Patrick Longmire, CST-7

Brent Newman, EES-15

David Rogers, ESH-18

Everett Springer, EES-15

APR 1 3 1998

7408

- Maximum flux of radon gas (i.e., ^{220}Rn and ^{222}Rn) from the undisturbed disposal site of 20 pCi/m^2/s (1.9 pCi/ft^2/s).
- Maximum effective dose equivalent of 100 mrem/yr for continuous exposures of individuals who inadvertently intrude into the facility after the loss of active institutional control (100 years).
- Maximum effective dose equivalent of 500 mrem/yr for acute exposures of individuals who inadvertently intrude into the facility after the loss of active institutional control (100 years).
- Maximum effective dose equivalent of 4 mrem/yr to any member of the public from the consumption of drinking water drawn from wells outside of the land-use boundary.

The performance objective for the CA is the DOE primary annual dose limit of 100 mrem effective dose equivalent for members of the public. If the projected dose exceeds 30 mrem/yr, an options analysis must be prepared to consider actions that could be taken to reduce exposures, taking into account the cost of such actions. Compliance with performance objectives is evaluated over a 1,000-year post-closure period.

To model release and transport of radioactivity from MDA G, waste characteristics and natural processes were examined. Most waste disposed of at MDA G is slightly contaminated laboratory trash (e.g., paper, packaging materials, glassware, etc.) and debris from cleanup activities (e.g., building rubble, conduit, soil, etc.). The inventory includes large quantities of tritium, ^{60}Co (in activated metals), and ^{137}Cs (in irradiation sources); special nuclear materials (e.g., ^{239}Pu, ^{241}Am, and ^{235}U); and residues from medical radioisotope separations (e.g., ^{95m}Tc and ^{94}Nb).

The waste inventory for the PA and CA was divided into four segments, each of which was characterized separately according to availability of information. The four segments and the general method of characterization are:

- 1957 - 1970 Inventory: Radionuclide content extrapolated from records from the early 1970s;
- 1971 - September 25, 1988 Inventory: Radionuclide content obtained from electronic database;
- September 26, 1988 - 1995 Inventory: Radionuclide content obtained from electronic database; and

CA	All Pathways	Cañada del Buey	5.5 mrem/yr	30/100 mrem/yr
PA	Groundwater Protection	White Rock Pajarito Canyon	3.5×10^{-5} mrem/yr	4 mrem/yr
PA	All Pathways	White Rock Pajarito Canyon	1.0×10^{-4} mrem/yr	25 mrem/yr
CA	All Pathways	White Rock Pajarito Canyon	7.2×10^{-3} mrem/yr	30/100 mrem/yr
PA	Intruder	MDA G	12 to 30 mrem/yr	100 mrem/yr
PA	Radon Flux	MDA G	0.1 to 3.1 pCi/m^2/s	20 pCi/m^2/s

a. PA includes waste disposed of after September 26, 1988; CA includes all waste
b. Performance objective represents the maximum projected exposure from all releases at LANL.

Projected doses and radon fluxes were small in all cases considered, and well below the applicable performance objectives for the PA and CA. The peak PA dose for the air pathway analysis was a small contribution to the maximum annual dose of 3.5 mrem projected for other facilities at LANL. The projected doses for the CA were less than the 100 mrem/yr primary objective, as well as the 30 mrem/yr limit indicative of the need for an options analysis.

The uncertainties associated with the projected doses, and their impact on the ability of MDA G to comply with the performance objectives, are discussed. Uncertainties in inventory, environmental data, and modeling parameters are considered over a 10,000-year period to provide reasonable assurance that the performance objectives will be achieved. After accounting for the uncertainty in the dose analyses, all performance objectives are still likely to be met.

Analyses and field and experimental data will continue to be refined to support the maintenance of the site Performance Assessment, with an emphasis on reducing important uncertainties in the analysis. Waste Acceptance Criteria, waste characterization requirements, and waste disposal operations will be modified to reflect the results of the PA.