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M E M O R A N D U M

TO: Benito J. Garcia, Chief HRMB

FROM: Steve Yanicak, NMED DOE OB Site POC

DATE: June 20, 1995

SUBJECT: Review of the Los Alamos National Laboratories draft report, **Natural Background Geochemistry, Geomorphology, and Pedogenesis of Selected Soil Profiles and Bandelier Tuff, Los Alamos, New Mexico, January 1995**

The DOE Oversight Bureau (DOE OB) has reviewed the subject document. The following comments are provided for the purpose of communicating the results of the DOE OB review. These comments are not provided or intended for the purpose of representing the regulatory position of the New Mexico Environment Department.

The pages of this document which are applicable to environmental restoration activities at Los Alamos are: Table 2 **Screening Action Levels for Selected Elements in Soil** (page 11); **Statistical Analysis of Background Elemental Concentrations in Soils** (page 47); and Table 8 **List of Upper Tolerance Limits (UTL) for LANL (Laboratory) Background Soil Data collected from A,B, and C Horizons** (page 48). Of the elements investigated, only arsenic and beryllium have background concentrations greater than their corresponding Screening Action Levels. Based on this, further *background sampling* is warranted only for the evaluation of these elements. If *site sampling* shows concentrations of these elements to be greater than the expected background, then either the site is contaminated or the site has anomalously high background levels. The facility may attempt to show that the site has anomalously high background levels by two methods: (1) by additional *background sampling* at locations near the unit but demonstrably free of contamination, and/or (2) by comparing site soil data to soil data from morphogenetically similar soil types from distant, uncontaminated locations which also have high background levels.

Perhaps the primary purpose of this report is to provide data so that the facility can show naturally high background levels using method

two (morphogenetically similarity). If this is true, then the DOE OB suggests that the report could be improved if it provided an example of how the data presented might be used to make such a comparison. If this kind of comparison cannot be made, or if the report is not intended to provide data for this sort of comparison, then the report should so state.

Generally, it appears that further investigation of background elemental concentrations should only be conducted at locations where historical information, process knowledge, or previous sampling data indicate that arsenic or beryllium may be present above background levels.

If there are any questions, please contact me or Tim Michael (827-4355) of the DOE Oversight Bureau Technical Support staff.

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SY:TM:tm

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Abstract:

Cannot combine results of tuff with soil.

Page 1 - Soil concentrations differ from the Bandalier tuff and different metals may have higher concentrations in the soil than tuff and vice-versa.

Page 2 - Report indicates that this data set is not necessarily representative of the full suite of soils and tuff present at the lab.

Page 5 - indicates comparison to another soil study; while samples were collected 6 of the same areas, the sample sitesare not typical of soils within each series as described by Nyhan et.al.

Page 10 - Only one soil profile was sampled from each sampling location, the natural background variability in soils occurring in similar settings has not yet been evaluated.

Page 12 - Should indicate which sample were digested using HF or HNO3

A comparison of the results of the different soil horizons should be conducted to determine if the horizons can or cannot be lumped.

Page 47-48 LANL lumped all soil data from A, B and C horizons.

Summary of General Soil and Bandelier Tuff Characteristics, p. 55- Soils have higher concentrations of Al, As, Ba, Ca, Co, Cr, and Fe relative to Bandelier Tuff samples. The Bandelier Tuff, however, is characterized by higher concentrations of Be, Pb, Na, K, Th and U than in soils.

Site 1, Lower Los Alamos Canyon: eroded bank, developed fan deposit.A and C horizons Be range 3.2-4.4ppm; As 1.2-1.68ppm

Site 2, Gully, East Raod: valley fill from mesa: A, B and C horizons: Be 2.4 to 3.4ppm acid digested Be 0.69 to 1.3ppm As 1.5 to 5ppm (from bar graph)

Site 3, Upper Los Alamos Canyon, Los Alamos Reservoir Road - representative of canyon bottoms in the western part of the laboratory:Soil profile A,B, and C: Total Be 1.8 to 2.4ppm Acid digested Be 0.4 to 0.8 ppm Total As 2.03 to 3.98 and digested As 1.0 to 2.5ppm

Site 4, Twomile Mesa, TA-69 - Mesa top well developed soil: As and Be highest in B horizons: Total Be 1.0 to 3.1ppm: digested Be 0.54 to 2.2 ppm: Total As 3.71 to 7.3 digested As 4.7- 9.3

Site 5, Water Tanks Trench, West Jemez Road - colluvial and loess deposits with El Cajete pumice, well developed soil: Soil profile A,B,C,and K: Total Be 2.0-3.3 Digested Be 0.77-2.6: Digested As 3.6-5.4

Site 6, Frijoles Mesa, State Route 4, El Cajete Pumice - mesa top representative of Ponderosa pine blet covered by pumice west side of lab. poorly developed soil: Total Be 2.0-2.5 digested BE 1.2-1.7ppm: As 4.8-5.9

Site 7, Ancho Canyon Mesas (Ta-39) State Route 4 - pinion-juniper woodland; significant soil erosion; Soil well developed. Total Be 1.6-3.9; digested Be 0.8-4.0 As not calculated

Site 8. Fracture fill (TA-46) - loess associated with weakly developed A horizon containing organic matter.