

## DRAFT COMMENTS

June 26, 1995

### MEMORANDUM

**SUBJECT:** Natural Background Geochemistry,  
Geomorphology, and Pedogenesis of Selected  
Soil Profiles and Bandelier Tuff, Los Alamos,  
NM: Draft (dated: January 1995)

**FROM:** Maria Martinez *mbm*  
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**TO:** Barbara Driscoll  
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I have reviewed the above cited report and my comments follow. The geology portions of the document need independent review from the review of the risk and statistics.

#### Page 1. First paragraph.

Background concentrations that exceed risk-based soil action levels (SALs) should not be used to determine a release from a unit. In order for background concentrations to be used for a risk screen the concentrations should be well below their respective SALs. If background concentrations exceed SALs, it is necessary to allow EPA a thorough review of the background study prior to the application of those concentrations. In situations where the investigated unit could have contributed the same chemical, it will be necessary to carry the specific unit into a baseline risk assessment. In either case, the risk due to the background concentrations should be calculated when the concentrations are in exceedance of the SALs.

Unless LANL can provide supporting evidence and/or the review of the geology portion of this report yields a different recommendation, I strongly question whether a UTL statistical procedure is appropriate. This suspicion is further accentuated by the fact that different soil types are mentioned throughout the report. Whether the chemistry of these soil types may be the reason for the wide range of chemical concentrations reported should be a question that LANL must answer in support of their proposed statistical approach.

#### Page 10. Sample Digestion and Analytical Techniques. Second sentence.

See comment to page 1, first paragraph.



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*JL/cm*

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General

**Page 11. Table 2. 1994 Screening Action Levels for Selected Elements in Soil**

The non-radionuclide concentrations listed are slightly over expected residential values with the exception of nickel. Additionally, the lead screening value recommended by OSWER is 400 ppm as of July 1994. Radionuclide concentrations were not evaluated.

**Page 12. Second paragraph.**

The report states that for different compounds, different acid solutions used for the digestion step of the analytical procedure may yield higher concentrations, i.e., Al, Ba, Na, K, U, and Th. It is unclear what acid solutions were used for the reported concentrations for these compounds. Additionally, it is not known what is the recommended acid solution as per SW-846.

**Page 15.**

A discussion and graphical presentation of the concentration distributions per soil horizon is presented in this section. A presentation of the individual data points should have accompanied the figures in order to fully evaluate the distribution of the data points. Figures 5 - 7, which are the graphical presentations of the concentration distributions were evaluated based on the spread of the numbers and they were compared to risk-based SALs. The following compound concentrations' variation present a concern in respect to risk: As, Ba, and Cr. Al and Fe were not evaluated since they were presented in % weight. *Range is too big > upper range a concern for human health.*

**Page 34. Table 5. Background Elemental Concentrations in Soils at Los Alamos, New Mexico**

The ranges reported in this table were compared with SALs and of those compounds listed, the ranges for As and Be are of concern. Fe was not evaluated since it was presented in % weight.

**Page 47. Statistical Analysis of Background Elemental Concentrations in Soils**

The facility has proposed their background concentrations based on a calculated Upper Tolerance Limit (UTL). The UTL statistical procedure is an applicable procedure to the estimation of background concentration distribution. However, it does make various assumptions that warrant caveats in order to receive EPA concurrence. At a minimum, all of the following criteria and/or requirements that apply to the calculation and use of background Upper Tolerance Limits (UTLs) should be specifically listed in the document and applied:

- The assumption of homogenous soil types should be verified. This assumption is a very important assumption and a demonstration

Verifying its appropriateness should be presented as part of the background study.

- The data set must be comprised of an adequate sample size (at least 8 data points).
- Both ecological and human health relevance of the UTLs obtained should be addressed, i.e., comparison to ecological and human health screening values.
- The number of non-detects will be a determining factor in the application of the UTL procedure to a data set.
- All background data points should be submitted for review.
- Variability within each data set should be addressed.
- A test for normality should be applied to the data set prior to the derivation of a UTL.
- The data set should be comprised of representative samples.
- Outliers should be addressed.
- No constituents of potential concern (COPCs) should be eliminated based on background.
- No organic compound should be considered in the risk screening phase.
- Risk due to background UTLs should be calculated for inorganic background compounds above screening values and for organic "anthropogenic" background values.
- The UTL is defined:

$$UTL = x + KS$$

UTL = upper tolerance limit

x = mean of the data set

K = tolerance factor at the 95th percentile, 95% confidence level, 95% coverage.

Note: The 99th percentile is not <sup>acceptable</sup> recommended since the resulting UTL could be close to 3 standard deviations from the mean. This could present a serious problem with variable data sets.

● In the case where the UTL procedure does not yield defensible background numbers, other statistical approaches should be proposed for EPA concurrence.

**Page 48. Table 8. List of Upper Tolerance Limits (UTL) for LANL (Laboratory) Background Soil Data collected from A, B, and C Horizons.**

The UTLs should be recalculated using the 95th percentile at the 95% confidence level. Raw data utilized for the calculations should be presented in a "reader friendly" format.

**Page 57. Part II. Natural Background Geochemistry, Geomorphology, and Pedogenesis of Selected Soil Profiles, Los Alamos, New Mexico, 1995**

The facility makes an extensive effort to present information on the geology of the installation. However, presentation of the data vary from concentrations in ppm units of measure to % weight. It is difficult to assess the relation of the concentrations with this inconsistent form of presenting the data.

**Page 151. Conclusions**

It appears that the variations in soil types and depositional distributions alone provide enough information to support the recommendation against the use of the UTL statistical procedure for the calculation of background concentrations at the Los Alamos National Laboratory facility.

the derivation of a UTL.

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- Risk due to background UTLs should be calculated for inorganic background compounds above screening values and for organic "anthropogenic" background values.
- The UTL is defined:

$$UTL = x + KS$$

UTL = upper tolerance limit

x = mean of the data set

K = tolerance factor at the 95% confidence level, 95% coverage

Note: The 99th percentile is not recommended since its use essentially allows for the use of almost 3 standard deviations from the mean. This will create inflated UTLs in the presence of variable data.

- In the case where the UTL procedure does not yield defensible background numbers, other statistical approaches should be utilized.

All background concentrations should be compared to the both human health and ecological screening values prior to conducting a screening risk assessment. Those inorganic background concentrations which are well below the screening values may be considered, however, background concentrations which approximate their respective screening value should be addressed on a case by case basis.

Only inorganic constituents that are well below the risk screening values and are considered to be naturally occurring should be used in the screening risk assessment. All organic constituents should be carried forward to the baseline risk assessment.

**Page 14. Table 2 - List of UTLs for LABORATORY soil background data.**

See comments to page 6 above.