Comments on the Los Alamos Site Wide EIS

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1. The Department of Energy Site Wide Environmental Impact Statement on the Los Alamos National Laboratory (DOE/EIS-0380D, June 2006, referred to below as the SWEIS), contains some data on water and soil that should be of considerable concern to all those interested in the integrity of groundwater and surface water resources in the environs of the laboratory. There also appear to be significant issues with the quality of the data. The SWEIS does not address the problem of a 300 kilogram discrepancy in plutonium waste accounts and its implications for the environment and for security. Finally, the presentation of the data is done in a manner that is non-transparent, so that a detailed independent assessment of trends is not possible.

These comments focus on a few areas and a few radionuclides of concern, in large measure because the time allowed for comment on a vast topic was too short. They are presented in the form of issues to which IEER seeks response and recommendations in terms of implementation in the next version of the SWEIS. The recommendation in that regard is that this version of the Draft SWEIS should be scrapped and the process should be started anew with a new scoping document for the SWEIS.

The radionuclides on which we focus here are plutonium-238, plutonium-239/240, americium-241, and strontium-90. We will use drinking water standards as a benchmark, but want to make clear that their use does not indicate that there is a violation of the rules when the levels are exceeded, since the rules apply to public drinking water systems. The exception is uranium, where the data indicate that Santa Fe public water supply wells are in violation of the EPA drinking water rule.

Storm water

Table 1 shows data read from the graphs in Appendix F of the SWEIS relating to americium and plutonium isotopes for storm water runoff. The storm water samples even averaged over four years are very high – well above the drinking water standard of 15 picocuries per liter if each isotope were present alone and 5 picocuries per liter if all were present in equal amounts (which is approximately the case).

Table 1: Data from the SWEIS showing some storm water data for canyons

	Onsite Canyons, pCi/liter	Mortandad Canyon, pCi/liter	Drinking water standard, pCi/liter, alone	Drinking water standard, all 3 present equally
Americium-241			15	
Plutonium-238			15	
Plutonium-239/240			10	

Values estimated from graphs in the SWEIS, Appendix F, Figures F-13, F15, and F-16; Standard from 40 CFR 141.66 2005.

Storm water either seeps into the ground and the radionuclides in it would eventually pose a threat to the groundwater or, in intense storm events, the plutonium and other radionuclides would be washed into the Rio Grande. It is not possible to infer from the data presented whether (i) the high contamination values are due to colloidal or dissolved plutonium and americium or (ii) the sediment that is swept up in the storm water represents most of the contamination. If the former is true, some canyons would likely be much more contaminated than indicated by the sediment data. If the latter is the case, much of the contamination would settle out in the sediments of the Rio Grande or Cochiti Lake when intense storms carry the water into the river.

Recommendation for revision: *Given the magnitude of the plutonium and americium mobilization in storm events, a careful canyon-by-canyon, storm event by storm event analysis is necessary to understand the pattern of transuranic radionuclide mobilization.*

When the Rio Grade does receive the storm water, it would be considerably diluted. Hence it is unlikely that the contamination levels measure by LANL would exceed present drinking water standards, which are annual averages. This is, however, cold comfort, since the present standards are too lax by a factor of about 100. This was shown in an analysis done by the Institute for Energy and Environmental Research and sent to the EPA in 2005. [1] In other words, the Maximum Contaminant Limit for each of the radionuclides listed above should be 0.15 picocuries per liter. We have asked the EPA to review its present Maximum Contamination Level of 15 picocuries per liter as part of its legally mandated review in 2006 of the drinking water standards. That request has been supported by Governor Richardson. The EPA has stated that it is considering the analysis in our report. Of course, if more than one radionuclide is present, then the MCL for each is reduced. For instance if all three items in Table 1 are present in equal amounts, the limit for each would be 0.05 picocuries per liter.

The contamination of storm water in the “onsite canyons” is about 300 times the level suggested by our analysis of drinking water standards. That analysis is based on the dose delivered to the maximally exposed organ, accepted and published by the EPA in its Federal Guidance Report No. 13. Hence a dilution of 300 times would be needed before the water could be used for drinking were the standard to be changed as we have recommended.

Recommendation for revision: *The SWEIS should analyze the impact upon surface water systems of high storm water content of transuranic radionuclides in light of the proposed reduction of the drinking water standard for long-lived alpha-emitting transuranic radionuclides to 0.15 picocuries per liter.*

Groundwater

Table 2 shows some of the groundwater data for the radionuclides that are of the greatest concern as indicated by the data.

Table 2: Groundwater contamination, picocuries/liter, 2001-2004

	Canyon alluvial ground water systems	Other springs	San Ildefonso Pueblo	Drinking Water standard
Americium-241	0.5			0.03
Plutonium-238	0.6			0.015
Plutonium-239/240	0.25			0.015
Strontium-90	20			50

Values estimated from graphs in the SWEIS, Appendix F, Figures F-1, F-3, F-4, and F-5 ; Standard from 40 CFR 141.66 2005.

Many of these values are considerably above the level of groundwater contamination to be expected from fallout. For instance, the level of plutonium-238 in Santa Fe water supply wells for 2001-2004 was reported as 0.00420 picocuries per liter, which is well over two orders of magnitude less than the contamination level for this radionuclide in the San Ildefonso well. Stronium-90 groundwater contamination is much higher than expected from nuclear bomb testing fallout (Santa Fe level reported as 0.147 picocuries per liter). [2] The data indicate that strontium-90 contamination of the water in the canyons is high – above the drinking water limit for the canyon alluvial groundwater systems and “other spring.” The strontium-90 may be migrating rapidly. The data reported indicate no clear trend between the aggregates for 1991-1996 and those for 2001-2004 for strontium-90.

The source of the high Sr-90 is unclear, especially as LANL does not have any reprocessing. There is an absence of characterization of the Sr-90 source term.

Recommendation for Strontium-90: *A clear and complete account of the source term for Sr-90 is needed. A detailed analysis of the migration of Sr-90 into groundwater is also needed. It is urgent to establish the full extent of the contamination, whether there is a plume, and the possible future evolution*

of that plume. The canyon and spring data are averages over many locations. Separate analyses, each connected to the major source terms for Sr-90 are needed for a clear understanding of groundwater contamination. The potential for Sr-90 to migrate into groundwater that could be used for drinking needs to be carefully assessed. This is also an environmental justice issue. The implications of the high levels of strontium-90 contamination in surface water outcrops for the surface water quality in the region needs to be addressed.

Data quality

The interpretation of groundwater data is complicated by problems that might affect sampling wells. Specifically, the bentonite clay used in well drilling may trap many of the radionuclides, including the ones discussed here. The use of organic solvents may also have a similar effect by more complex mechanisms. The problem appears to be pervasive. The DOE Inspector General's office concluded that there was a significant problem in this regard [3]). This report, as well as analyses by NGOs pertaining to this topic, should be cited and analyzed in the SWEIS. It is not possible at present to determine the extent of the underestimate, since that must be done on a well-by-well, year-by-year basis. That is impossible to do from the data presented in the SWEIS. Indeed, it is unclear if it can be done at all.

The problem is very serious for the four radionuclides discussed here and perhaps for others. Strontium-90 is already above the drinking water limit in several areas. Further, the San Ildefonso groundwater average for plutonium-238 is well above the maximum contaminant level recommended by Institute for Energy and Environmental Research.

Recommendation for SWEIS revision: *The SWEIS should clearly state that the data for groundwater radionuclide pollution are systematic underestimates. It should specify the radionuclides that may be significantly affected by the problem. It should also identify those wells where data are suspect or known to be underestimates. An attempt should be made to determine if scientifically defensible adjustment factors can be developed. These adjustment factors must be verified by data from new characterization that are drilled according to sound procedures. If adjustment factors that are scientifically defensible cannot be developed, new wells should be drilled and new, reliable data should be gathered before the SWEIS is revised.*

Recommendation for SWEIS revision: Since a large portion of critical groundwater data are basically flawed, this draft SWEIS should be discarded and a new scoping document followed by a new draft SWEIS with sound groundwater data should be published.

Santa Fe Water

The mean level of uranium contamination shown in Table F-19 (SWEIS, p. F-40) is considerably higher than the EPA drinking water standard. Table 3 shows the mean values and the standard deviations for the three uranium isotopes present in natural uranium.

Table 3: Uranium data for Santa Fe Water Supply Wells, 2001-2004	Mean, picocuries/liter	Standard Deviation
Uranium-234		22.6

	Mean, picocuries/liter	Standard Deviation
Uranium-235/236		1.58
Uranium-238		24.6

The total of all three mean values, representing total uranium contamination of these wells is about 49 picocuries per liter (rounded). This amounts to about 73 micrograms of uranium per liter (since natural uranium is indicated by the isotopic composition). This is about 2.4 times above the EPA drinking water standard of 30 micrograms per liter.

Recommendation: *It appears that the groundwater component of Santa Fe water is being contaminated by natural uranium – at least, this is the common assumption among those who are familiar with the problem. However, it is necessary for the SWEIS to do an analysis to ensure that none of the uranium pollution can be traced to LANL.*

Accounting for plutonium in waste

The SWEIS summary refers to a 1996 memorandum regarding plutonium accounting problems at LANL. [4] This memorandum is almost beside the point, since EPA has prepared a more up-to-date figure of WIPP waste and since there is now a comprehensive analysis of the whole issue that was prepared by IEER. [5]

In the 1996 memorandum, the retrievable TRU waste inventory for WIPP was estimated at 1323.70 kilograms. Currently, the EPA WIPP accounts indicate a total of only about 200 kilograms (rounded to the nearest 10 kilograms). The IEER report, *Dangerous Discrepancies*, referenced here and published in 2006, provided a detailed analysis not of book-physical inventory differences in plutonium accounts, but of the plutonium that is supposedly accounted for in waste streams. There is a discrepancy of about 300 kilograms between the national security plutonium account (the “NMMSS” account) and the waste accounts. The report further showed that either the WIPP account is wrong or the NMMSS account is wrong. It also raised the possibility that both may be wrong. It is also possible that the account of buried TRU waste is wrong. Both the WIPP account and the buried TRU waste amounts have huge implications for LANL environmental management and remediation. Yet, the DOE, NNSA, and LANL responses have not substantively addressed the issues raised – that is, no analysis of the 300 kilogram discrepancy has been provided to show that it does not exist, or at least that the buried waste and WIPP accounts are correct (in which case the NMMSS waste account would be wrong by about 300 kilograms).

Recommendation: *LANL cannot be a considered a suitable site for existing weapons-grade plutonium work, much less expanded work. The SWEIS should substantively address the analysis in Dangerous Discrepancies. It should also explore other sites for the work proposed for LANL, since LANL has ostensibly failed to maintain its plutonium accounts by an amount equivalent to about 60 nuclear bombs and also failed to respond with a substantive analysis once the problem was pointed out.*

Data Transparency

The SWEIS is seriously deficient both in the manner of presentation of the data and in its failure to

acknowledge the problems with groundwater data. Moreover, the limits of detection, the measurement uncertainties, and the 95 percent confidence intervals are not presented.

Recommendation: *The data should be presented on an annual rather than a multiyear average basis. Measurement uncertainties, limits of detection, and 95 percent confidence intervals should be shown for each radionuclide.*

Recommendation regarding Alternatives to Be Considered and Context

The SWEIS proposes to greatly expand pit production at LANL. This expansion is inappropriate given that problems for surface and groundwater from past pollution are considerable. A new draft SWEIS should include a full and scientifically defensible analysis of the source terms for plutonium, americium, and strontium-90 and the migration of these radionuclides, and a clear analysis with documentation of the 300 kilogram discrepancy in plutonium waste accounts. It should analyze other sites where all national security work now done at LANL and any proposed expansion of work could be relocated or located. Such an analysis is especially needed in view of LANL's failure to maintain proper plutonium accounts to the tune of 60 nuclear bombs worth of plutonium. Specifically, the SWEIS should assess the environmental and proliferation risks of continuing plutonium activities at a site where LANL has failed to substantively address large problems in plutonium waste accounts even after these problems have been repeatedly called to its attention. The alternatives of (i) not pursuing expansion, (ii) carrying out all nuclear weapon related activities that involve significant amounts of plutonium (more than a kilogram) at another site, and (iii) carrying out proposed additional activities at another site should also be examined in the revised SWEIS.

Notes:

1. Arjun Makhijani, *Bad to the Bone*, Institute for Energy and Environmental Research, Takoma Park, Maryland, 2005 at http://ieer.org/reports/badtothebone/ ? Return
2. Data for Santa Fe water supply wells are reported in Table F-19 of the SWEIS. ? Return
3. Office of Inspections and Special Inquiries, Office of the Inspector General, *Characterization Wells at Los Alamos National Laboratory*, DOE-IG/0703, September 2005. On the web at http://energy.gov/sites/prod/files/igprod/documents/CalendarYear2005/ig-0703.pdf ? Return
4. Richard J. Guimond and Everet H. Beckner, "Plutonium in Waste Inventories," DOE Memorandum, January 30, 1996. ? Return
5. Arjun Makhijani and Brice Smith, *Dangerous Discrepancies: Missing Weapons Plutonium in the Los Alamos National Laboratory Waste Accounts*, Institute for Energy and Environmental Research, Takoma Park, Maryland, April 21, 2006, p. 15. The report and other documents related to this analysis can be accessed from http://ieer.org/reports/lanl/weaponspureport.pdf ? Return