Department of Energy
Carlsbad Area Office
P. O. Box 3090
Carlsbad, New Mexico 88221

ENTERED

APR 12 1995

Lindsay A. Lovejoy, Jr.
Assistant Attorney General
P.O. Drawer 1508
Santa Fe, N.M. 87504-1508

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APR 17 1995

Dear Mr. Lovejoy:

(12/14/94)

Thank you for your comments on the Actinide Source Term Position Paper. Your interest and participation in the Systems Prioritization Method (SPM) is greatly appreciated. Enclosed is the Carlsbad Area Office's response to the questions you have expressed regarding this paper.

If you have any questions regarding these responses, please contact Robert Bills of my staff at (505) 234-7481.

Sincerely,

for Michael H. McFadden
Assistant Manager
Office of Regulatory Compliance

Enclosure

cc w/enclosure:
J. Mewhinney, CAO
P. Sallani, CAO
C. Wayman, CAO
L. Shephard, SNL

950405

ACTINIDE SOURCE TERM POSITION PAPER
QUESTIONS AND RESPONSES

Question/Comment 1. It is common ground that none of the proffered models for mobile actinide concentrations other than the "inventory limits" model is defensible for SPM purposes. It is not at all clear that the "inventory limits" model is defensible. This subject is discussed further below.

Response. The term defensible as it has been used in the SPM Position Papers is something of a misnomer. It has been used in many papers to indicate that the answer can not possibly be expanded beyond the numbers presented. This is not scientifically sound and is not in accordance with the scientific principle that the prediction should be a close to what will actually happen as is possible. The term defensible has also been used differently by different Principle Investigators. Sandia National Laboratories and the Carlsbad Area Office are investigating how best to ensure that the Position Papers are scientifically sound and as consistent as possible. The next set of Position Papers you receive will represent the SPM-2 Baseline and are for information only. As new data is received the Position Papers will be sent to you for comment prior to the next revision of the baseline. We will ensure that these are as scientifically sound as possible and use consistent definitions. We appreciate your pointing out to us our inconsistent and inappropriate use of the term defensible and will correct the matter.

Question/Comment 2. The draft takes as given the repository inventory contained in the Baseline Inventory Report (the "BIR") (draft at 2). Whether the waste types and quantities stated in the BIR are accurate is an open question. We have been told, however, that issues of waste characterization are outside the SPM process as far as stakeholders are concerned. This is not appropriate and undermines the validity of the entire process.

Response. Characterization of the waste inventory is outside the SPM process. The SPM will define an acceptable envelope of waste. Only waste which meets this envelope will be accepted at the WIPP. The stakeholders can have a far greater impact on the possible waste to be accepted at the WIPP through the SPM process.

Question/Comment 3. The draft states that brine volumes will be calculated based upon Salado brine inflow assumptions, said to be described in the position paper on that subject

(draft at 3). There is more than one conceptual model of Salado brine inflow under discussion. Which Salado brine inflow assumptions are referred to? I would question the use of any model which does not incorporate far-field flow.

Response. While the conceptual model for fluid flow in the Salado formation has three potential mechanisms, the numerical model for performance assessment is based on far-field flow. The hydrologic modeling issues for the Salado are discussed further in the CAO response to Question/Comment 5(a) on the Salado Position Paper. With regard to actinide source term modeling, the volume of brine inflow is an input parameter, so the source term model doesn't depend on the selection of a brine inflow model.

Question/Comment 4. The draft should justify its focus upon eight actinide isotopes that dominate the radioactivity of TRU waste (draft at 4). It has previously been explained that certain actinides are of concern because they make the most difference in the location of the mean CCDF, based upon 1992 PA modeling. However, that selection may not be fully defensible for SPM purposes, and whether it is defensible must be shown.

Response. The eight actinide isotopes were selected on the basis of the 1992 PA sensitivity analyses. It is possible that other actinides may be important, but it is unlikely based on our current state of knowledge. The importance of the eight actinides will be revisited as part of SPM-2, after which we will have a better basis for determining whether other actinide isotopes are important. See comment 1 regarding use of the term "defensible".

Question/Comment 5. The 1992 PA model does not distinguish among dissolved and colloidal actinides (draft at 8). In such situation, is the selection of sensitive actinides valid?

Response. Yes. While its true that the 1992 PA did not distinguish among dissolved and colloidal actinides, such a distinction is not required to determine which actinides are important for performance assessment. The key fact here is that dissolved and colloidal actinides behave differently only during transport in the Culebra, so the 1992 PA computed the initial part of the transport process (from repository to Culebra) appropriately. The 1992 PA can then be used to determine which actinides reach the Culebra and hence are important for PA.

In the Culebra, retardation processes may further restrict the number and relative importance of specific actinides. The 1992 PA did not address the question of whether and how actinide transport through the Culebra and elsewhere might be affected by chemical and physical retardation processes. Future calculations which incorporate retardation processes will further refine the set of sensitive actinides.

Question/Comment 6. It is stated that the inventory limits model includes no information about the form of actinides, i.e., whether dissolved or colloidal (draft at 9). In fact, the apportionment between dissolved and colloidal actinides is dictated by a sampling process (draft at 20). At the stakeholders' meeting the lack of scientific justification for such sampling was brought out and conceded. In the absence of data justifying another choice, SPM analyses must assume that apportionment which causes the greatest release of contaminants. Sandia conceded as much at the stakeholders meeting.

Response. We have changed the inventory limits model so that it now assumes that actinides will go into colloidal form before they go into dissolved species. This apportionment will cause the greatest release of contaminants in the SPM analyses. In the future, experimental data from the Source Term Test Program (STTP) will be used to refine this exceptionally conservative apportionment and model.

Question/Comment 7. There are few comments herein on the chemical modeling of mobile actinide concentrations, because the work is currently in progress, and the model is not currently advanced as defensible (draft at 11)

Response. DOE/CAO believes that we can best answer the stakeholders' concerns by conducting an open and scientifically sound process, incorporating stakeholder comments and questions on work that is in progress. We encourage you to review work that is in progress by requesting any data that you need and by utilizing the excellent scientific expertise available to the State of New Mexico.

Question/Comment 8. There must be a question as to statistical sampling over potential oxidation state distributions of actinides, without data to support the probability distributions (draft at 15).

Response. We anticipate that data from the STTP experiments will give us values for oxidation state distributions.

Question/Comment 9. How data from the source term test program will be used to provide "confidence" in the chemical modeling effort is not explained. The draft does not explain the tests in detail, but clearly there are basic questions as to the time required to reach an "equilibrium" level which may be taken as representative of long-term conditions (see draft at 22) and the test of "agreement" with model predictions. At the meeting there was reference to an order-of-magnitude standard, and the draft does also (draft at 20). Is that the test? What is the source of that standard?

Response. Confidence in chemical modeling of actinide concentrations will come from comparing model predictions with actual test results. We are developing a chemical model based on properties measured in the laboratory for colloidal and dissolved actinides. We will use this model to predict concentrations for experiments being performed at Los Alamos National Laboratories as part of the STTP. If our prediction is within an order of magnitude -- that is, if it varies by a factor of 10 on either side of the measured values - then we will have confidence that the chemical model can describe those experiments and, by extension, is a reasonable description of the WIPP chemical processes.

The order-of-magnitude standard is one that has received acceptance throughout the scientific community in cases with large ranges of possible results. Here, we're looking at a potential range of 10 or 11 orders of magnitude. Under these circumstances, a one order-of-magnitude difference is considered a good result within the scientific community.

Question/Comment 10. *A description of the inventory limits model requires a full list of the variables, if any, which govern the concentrations. (See draft at 28-29).*

Response. The inventory limits model requires only two input variables. The first is the total amount of each actinide in the waste. The second is the total brine volume that comes into contact with the waste. Both of these variables are determined by models and data that are outside the scope of the actinide source term program.

Question/Comment 11. It is not clear when a further draft of this position paper will be available, but given the unfinished nature of the work, more must be written. New drafts must be sent to stakeholders, and a meeting must be held to discuss their contents.

Response. We are currently working on the third revision of the Actinide Source Term Position Paper describing the SPM-2 baseline and will provide this for information only, as it is only useful for that one purpose. A new draft, containing new information, will be provided to stakeholders prior to a revision of the baseline. A stakeholder meeting to discuss this revision and provide for stakeholder input will be held, as described in the transcripts of the previous stakeholder meetings.