

HLWYM PEmails

From: John Trapp [JST@nrc.gov]
Sent: Wednesday, March 23, 2005 10:24 AM
To: Patrick Laplante; Roland Benke; Donald Hooper; Leslie, Bret; James Rubenstone; Timothy McCartin; bhill@swri.org
Cc: Campbell, Andy; Guttman, Jack; Stablein, King
Subject: ACNW
Attachments: April 13_15 CNWRA visit.doc

For those of you who for some reason have not seen the latest missive, a copy is attached.

In going thru the list, I will first say that I think many of the questions are out of line, worded in a very inflammatory way, and directed at the wrong group. I think this oversteps ACNW bounds by a lot. That said:

If the ACNW questions as listed are to be responded to in a technical fashion this is going to take a lot of time and effort to get all the information together. While Brit and Don are quite capable of handling most of the questions (provided they spend a lot of time that could be used for something worthwhile instead of preparing for this), there are several questions which will require input from other people. This is just a heads-up to people who either need to know, or will need to be involved (and I know I don't have everyone). After I talk to Brit, I will get back on this subject.

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From: John Trapp

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Draft Agenda: April 14-15 Visit to CNWRA----Revised 3/21/05 ---- AM; Rev. Weiner and Hinze, 3/22

Please note: the time is divided according to the number and detail of questions. Please feel free to suggest changes.

April 13: Tour of CNWRA Experimental Facilities and Discussion of Models for Complex Decommissioning Sites (Attended by J. Clarke and R. Savio)

8:00AM -10:00am

- _ Tour of CNWRA Experimental Facilities

10 :00 AM -12:00 NOON

- _ The Center is currently evaluating a set of multimedia environmental models for complex decommissioning sites (GENII, MEPAS, RESRAD-OFFSITE, and GOLDSIM). Recognizing that the Center's work is not still ongoing:
 - _ What model or models best represent physical situations encountered at decommissioning sites? What models should be used and why?

12:00 NOON -1:00PM LUNCH

1:00PM -3:30PM (Attended by R. Weiner, J. Clarke, R. Savio, and S. Steele)

- _ Demonstration of the capabilities of the GOLDSIM code

April 14: Igneous Activity and Related Topics

8:AM-5:00PM (Lunch & ACNW Member/Consultant Discussion from 12:00 NOON to 1:00PM) (Attended by R. Weiner, W. Hinze, J. Clarke, P. Shewmon, B. Marsh, R. Savio, J. Gallo, and S. Steele)

12:00 Noon to 1:00 PM - Working Lunch with Patrick, Sagar, Weiner, Hinze, Clarke, and Savio - Discussion of critical CNWRA expertise applicable to other NRC activities.

This is the most important area for the ACNW visit to the Center. It is the area for which the Committee has the most outdated information and the largest number of questions and concerns. During this visit, the issues of the analysis of consequences are much more important that probability of the event. Please describe the technical accomplishments of the CNWRA igneous activity program since the ACNW member visit in February 2004 related to improved modeling of the probably of igneous events, consequence modeling, evaluation of alternate models, and modeling of health effects. The most important questions are how the consequences of an igneous event are modeled, what assumptions are made regarding particle size, solubility and respirability, how dispersion and resuspension are modeled, and all of the

factors included in calculating the dose to a receptor.

The ACNW members and consultants are interested in assumptions and parameter selection at each step in the process, the basis for selection, and how the parameters will be treated in a risk-informed way through the calculations. These discussions should address but not be limited to the following illustrative questions.

- Considering the various igneous activity scenarios, list the key physical and chemical processes hierarchically in terms of their impact upon risk along with an assessment of the present state of understanding, including uncertainties of the basic science of these processes? What specific efforts are being carried out to better understand these key processes?
- What investigations have been conducted by the Center's contractors and consultants on igneous activity issues over the past year and what future activities are planned? What have been the goal, rationale, and results to date of these studies? What is the level of the effort by contractors and consultants to the Center?
- What tradeoffs have been made in igneous processes parameters involved in both probability and consequence scenarios such that conservative estimates have been made to compensate for absence of significant information? What is the status of research underway to determine the needed information?
- The NRC is not taking performance credit for the waste container once it is entrained in an igneous intrusion. What is the basis for this decision? What evidence is there to assume that waste container's integrity is lost due to thermal effects when the container is engulfed by an intruding magma?
- What is the progress of studies underway to estimate the effect of eruptions from a bocca on the consequences of a magma intrusion into the potential repository? Why is this important?
- Since the predominant movement of any airborne pollutant is downwind (crosswind diffusion is orders of magnitude less) the Center should be able to apply a wind rose and calculate the centerline air concentrations and deposition readily with greater realism. What has the Center done with regard to applying variable wind direction and speed to the analysis of the distribution of contaminated ash around an eruption through the proposed repository? Explain the impact on consequences of assuming a realistic distribution of wind speed and direction.
- What evidence is being used to estimate the size distribution of the waste being incorporated into the tephra? How does this size affect the tephra particle size in which the waste is incorporated? What evidence is being used to determine the particle size distribution (PSD) of the ejecta and how is this validated using the ejecta of nearby volcanic materials? How does the nature of the PSDs change with

the nature of the physical fragmentation process (e.g., vesiculation, ash formation, chemical weathering, etc.), the nature of the source material (magma, wall rock types, chemically weakened canister materials including fuel pellets), and the effect of man (e.g., agricultural practices, construction)? What is the evolution of the PSD as a result of geomorphic, chemical, aeolian, and other processes after the ash is deposited? What is the distribution of waste as a function of ash particle size used in the analyses and what is the supporting evidence for this distribution? What is the impact of this distribution on the consequences of a volcanic event?

- What pathways of exposure were included or excluded in the models used by CNWRA and what was the technical basis for these choices?

- What studies are underway to reduce the uncertainties concerning the respirable fraction of waste-contaminated ash? In what way are the current assumptions conservative and what can be done to decrease their uncertainties?

- What particle size distributions (in the respirable range of 0.01 to 10 micron) are derived from the CNWRA analysis? What fractions of radioactive materials involved in an igneous event are sequestered and what fraction will be available for potential inhalation? How are the radioactive materials assumed to be distributed in the respirable fraction of the aerosols?

- What are the specific parameters that the CNWRA scientists are using in the inhalation and exposure scenario for the receptor? Why are particles up to 100 microns assumed to be respirable? What is the justification?

- What Dose Conversion Factors were used and in particular what solubility class was assumed for an inhaled species? How were these selections justified?

- At the September, 2004 ACNW Working Group meeting Dr. Harper of Sandia reported on studies of creation of aerosols from ceramics and metals by explosions. Are these results applicable to the CNWRA work on consequences? If not, why not?

- What resuspension model is the CNWRA using in calculating dose? Dr. Anspaugh reported at the September, 2004 ACNW Working Group meeting on Nevada test site weapons test work that showed resuspension of aerosols occurs over time periods of days rather than years? Why is resuspension characterized as occurring over a period of years in the CNWRA's consequence work? If Dr. Anspaugh's assertion is wrong or not applicable to basaltic ash, why is it wrong or not applicable?

- What consideration have you given, in light of the comments that were made during the September, 2004 Working Group meeting on igneous activity, to using a less deterministic overall approach to the fate and transport modeling? For example, in addition to wind direction, other model inputs could (and should) be handled through distributions, especially source term estimates (emission rates) and atmospheric

stability-related dispersion coefficients (as well as resuspension). Have you incorporated any of this thinking into your models and if not, why not?

- With respect to modeling an igneous event, what changes, if any, have you contemplated to your atmospheric dispersion model as a result of discussions at the ANCW November, 2004 meeting? What changes will be made to make the current models more risk-informed?
- A variety of tectonic models have been suggested for the Yucca Mountain region. How are they being evaluated and used in determining the probability of future volcanism at Yucca Mountain?
- Bayesian statistical methods are useful in incorporating geologic variables into probability studies, but to date the only geologic information used by the NRC has been gravity anomalies. What other geologic and physical attributes of the Yucca Mountain region could be employed to increase the realism of the probability estimates?
- How is the Center using volcanic clustering in probability analyses? Are the short-term high recurrence rates within clusters being used as an extreme upper bound on long-term average probability? If so, is the level of conservatism such that it leads to incorrect conclusions and insights?
- How is the Center using the spatial and temporal clustering of volcanic events in estimating the probability of an igneous intrusion into the proposed repository? What assumptions are made? Are they conservative or realistic? Are any Miocene basaltic events incorporated into the present probability determinations? If so, what is the basis of this assumption?
- The NRC has stated that their current estimate of the probability of an igneous intrusion into the proposed Yucca Mountain repository is 10^{-7} /yr over the next 10,000 years. This is stated as an average value. What values are used to determine this average and what is the distribution of the values used in determining the average?

April 15:

8:00 AM to 12 Noon: Container Life, Source Term, Near-Field Environment, and Radionuclide Retardation

Please describe the major technical accomplishments from these CNWRA programs since the ACNW member visit in February 2004. The discussions should address the following questions.

- What has been the progress in your corrosion and humidity deliquescence studies during CY 2004 and 2005? What conclusions have you been able to draw regarding the stability of the waste package?
- Has CNWRA (or DOE) examined meteor corrosion in desert sites as a source of analogue data on the corrosion of iron based alloys over periods of 100,000 years?
- The probability of a container failure/leaking in the first 10,000 years may be determined by the probability of seal failure. Please describe what is known as to the design of this seal and what would be the relative corrosion rate of the seal relative to the rest of the container? (Residual stresses are the source of the problem here and perhaps bimetal galvanic effects, depending on the weld design.)
- What has CNWRA accomplished in its work on radionuclide transport modeling in CY 2004 and 2005?
- What studies are contemplated on the solubilities and mobilities of spent fuel constituents in the presence of free water? What additional studies will be required if the period of performance assessment were to extend beyond 10,000 years?
- Have you incorporated spatial variations in water chemistry into K_d determinations and usage in the TPA and if so how are you doing this?

12 NOON - 1:00 PM: Lunch & ACNW Member/Consultant Discussion

1:00 PM - 3:30 PM Total System Performance Assessment

- Please provide a description of the changes being incorporated into Version 5 of the TPA code and, where applicable, the physical phenomena modeling that these changes address.

- What insights are currently available as to how these model changes will alter perceptions of repository performance and the risk significance of the individual components?
- What information is available at this time as to the capability (code stability and adequacy of models and input parameters) of the TPA code to model repository performance and to provide a tool for assessing uncertainty for periods substantially longer than 10,000 years? Are there identified conservatisms in the TPA code that will significantly limit its use as a regulatory tool in evaluating repository performance for periods substantially longer than 10,000 years?
- Please describe what processes will be used to provide a scientific validation (peer review, publication in refereed journals, etc) for the TPA code and the basis by which these processes will provide adequate confidence that the TPA code can be used in a regulatory decision-making process.

3:00 PM -Close of Business

- Closed discussion involving ACNW Members and Consultants

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