

memorandum

Idaho Operations Office

Date: August 17, 2006

Subject: CSSG Review

To: Jerry McKamy, NNSA
DOE-HQ, NA-171, OFO

The purpose of this memorandum is to provide a summary of the CSSG review of "Pre-closure Criticality Safety Analysis Process Report", TDR-DSO-NU-000001, Rev.0, dated August 2006. A working group consisting of Tom Mc Laughlin, Adolf Garcia and Bob Wilson reviewed the transmitted report and selected portions of the two documents referenced in the tasking memo. The CSSG held a teleconference to discuss the results from the working group's review. Most of the report is a recital of and commentary upon various regulatory requirements. We note that the Pre-closure report is the latest in a string of communications between representatives of the Yucca Mountain Project (YMP) and the Nuclear Regulatory Commission over the last decade. As we came in very late in the conversation, we are not privy to all that came before and may not know what controversy or clarification is being addressed in various sections of the report. We can, however, comment on the criticality safety practices and principles discussed as written.

The report discusses the federal regulations and national standards the YMP considers relevant to criticality safety at Yucca Mountain but the standard that is generally considered the most important is conspicuous by its absence. ANSI/ANS-8.19 provides the requirements for an administrative structure to assure the elements necessary to maintain an acceptable risk. We recommend this standard be added and that the facility safety analysis discuss how it will be implemented.

The report reviews various other ANSI/ANS-8 national consensus standards and we note one major issue: Under the discussion of ANS-8.1 there is a stated intention to exempt the YMP from adherence to the Double Contingency Principle, a core safety philosophy. Although little rationale is given for this startling intent, it may be inherent in the statement on page 3: "The pre-closure criticality analysis is a derivative of the criticality analysis methodology presented in Disposal Criticality Analysis Methodology Topical Report." The disposal criticality analysis would presumably be post-closure and we understand that this is driven by probability-based arguments related to hydrology and geological considerations. On the other hand, the pre-closure criticality safety issues would focus on personnel protection and would be addressing rather different criticality accident scenarios. We recommend that the restrictions imposed by the problems of the closed system be disregarded and double contingency be retained as a core principle. We note that this fundamental principle works well with such analysis tools as logic trees, HAZOP, probabilistic methods or any other method the analysis team is comfortable with. We further note that the principle is fully consistent with any competent "Risk Informed" approach.

The report states that the project will take safety credit for the burn-up of spent fuel pieces but will not conform to the regulatory expectation of confirmation of burn-up credit taken. The stated intent is to simply accept shipper records. We note that shipper records on expected fuel burn-up are the product of a plethora of complicated calculations, fuel accountability records and other basically administrative chores. If the simple acceptance of records of dozens of shippers is accepted, the dependence on this vulnerability must be factored into the risk equation.

The Methodology Approach section states “The probability-screening criterion for the pre-closure duration is set to one chance in 10,000 over the pre-closure duration...” We interpret this statistic to mean that the sum of the operation being screened over the life of the facility has a one in 10,000 chance of resulting in a criticality event. If the operational rollup fails the screening test, then apparently the goal is to analyze further to show the probability is more accurately at least 100 times lower or to apply barriers or controls to reduce the likelihood to at most one in 1,000,000. Although an admirable goal, given the scope and complexity of Yucca Mountain operations and the many unknowns, it is unlikely that a one in a million chance of a criticality accident over a fifty year life can be competently assured and an attempt to document this would be fraught with peril.

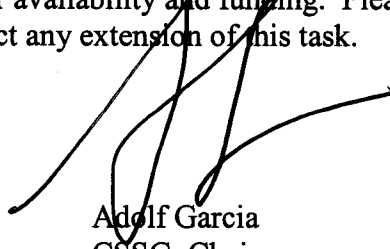
In the discussion of ANSI/ANS-8.21 (fixed neutron absorbers) the report states that verification and inspection requirements for credited fixed neutron poisons cannot be implemented due to “the long time period of concern”. We note that the time period discussed in the report is 50 years and that an appropriate inspection schedule for this time can surely be specified. We also note that if the safety analysis affirms that no credible mechanism will reduce the effectiveness of the credited neutron poison material during the period of concern, then no future inspection would likely be required. The verification step would be before installation or before use and a future time period is not relevant.

The group expressed concern with the expectation to review thousands of pages in a short time. The sheer size of some of the referenced documents made it impossible to print at work for a proper review at home, after hours. We understand that the document we were asked to review is fairly new, but many of the referenced documents have been around for years. It would have been helpful to have these ahead of time, and carefully reviewed by the time the “official” request came in. A teleconference, perhaps with video, would have been ideal for this type of review. These comments are provided to help better coordinate this type of work in the future.

Jerry McKamy

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The reviewers are willing to discuss this report with YMP staff, and to extend their review to the supporting documents, subject to their availability and funding. Please advise the CSSG of the YMP response and whether you expect any extension of this task.



Adolf Garcia
CSSG, Chairman

cc: CSSG Members
J. Felty, SAIC-HQ, NA-171, OFO