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JUL 29 2002

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**TRANSMITTAL OF REPORT ADDRESSING KEY TECHNICAL ISSUE (KTI)
AGREEMENT ITEMS CONTAINER LIFE AND SOURCE TERM (CLST) 5.06 AND 5.07**

This letter transmits a report entitled *Agreements CLST 5.06 and 5.07*, which the U.S. Department of Energy (DOE) believes provides the basis for completion of the subject agreements. These agreements are as follows:

CLST 5.06 - "Provide a 'what-if' analysis to evaluate the impact of an early criticality assuming a waste package failure."

"DOE stated that it would provide the requested analysis prior to LA. Actual schedule to be provided pending DOE planning process."

CLST 5.07 - "Provide sensitivity analyses that will include the most significant probability/consequence criticality scenarios."

"DOE stated that it would provide the requested analyses prior to LA. Actual schedule to be provided pending DOE planning process."

CLST Subissue 5 focuses on the methodology and modeling used by DOE in the evaluation of the potential for criticality events internal to the waste package during the postclosure period. Agreements CLST 5.06 and 5.07 concern information regarding the consequences of a potential postclosure criticality event. Resolution of these agreements was originally planned to be addressed through Analysis and Model Reports prepared in support of the License Application. However, as discussed during the April 15-16, 2002, U.S. Nuclear Regulatory Commission (NRC)/DOE Technical Exchange and Management Meeting on KTIs, the information in the enclosure, addressing the basis for closure of these agreement items, is being submitted to facilitate an early NRC staff review. This approach for addressing these agreement items has been discussed with your staff.

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Consistent with the methodology documented in the *Disposal Criticality Analysis Methodology Topical Report* (YMP/TR-004Q, Revision 01), DOE plans to address these two KTI agreements by demonstrating that the probability of criticality is below the regulatory threshold and that based on 10 CFR 63.114(d), consequence evaluation of criticality can be screened out in the same manner as other low probability events.

CLST 5.06 is also included as part of the DOE response to NRC comments General 1.01 (Items 21 and 64). The information presented in the enclosure also addresses this issue as it pertains to CLST 5.06.

This letter contains no new regulatory commitments. Please direct any questions concerning this letter and its enclosure to Timothy C. Gunter at (702) 794-1343 or Paige R.Z. Russell at (702) 794-1315.



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OL&RC:TCG-1523

Enclosure:

Agreements CLST 5.06 and 5.07

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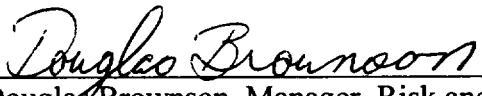
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KTI LETTER REPORT
AGREEMENTS CLST 5.06 and 5.07
REVISION 01

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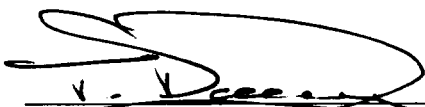
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ENCLOSURE

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CLST	Container Life and Source Term
DOE	U.S. Department of Energy
EBS	Engineered Barrier System
FEPs	Features, Events, and Processes
GEN	General, Agreement item from the NRC/DOE Technical Exchange and Management Meeting on Range of Thermal Operating Temperatures (DOE 2001)
KTI	Key Technical Issue
NRC	U.S. Nuclear Regulatory Commission
OCRWM	Office of Civilian Radioactive Waste Management (DOE)
TSPA	Total System Performance Assessment
WP	Waste Package

AGREEMENTS CLST 5.06 and 5.07

This letter report provides information to address two Key Technical Issue (KTI) agreements related to Subissue 5 of the Container Life and Source Term (CLST) KTI. Specifically, this letter report addresses KTI agreements CLST 5.06 and 5.07 [also see GEN 1.01 (21, 64)]. Both KTI agreements address consequence issues related to a potential postclosure criticality event.

The methodology for evaluating the potential for postclosure criticality at Yucca Mountain is outlined in the *Disposal Criticality Analysis Methodology Topical Report* (DOE 2000a), and follows the requirements of 10 CFR 63. Based on 10 CFR 63 requirements and the Topical Report, criticality consequence evaluations are not required unless the total probability of criticality (as defined in Section 3.2.2 of the Topical Report) exceeds the event screening threshold established in 10 CFR 63.114(d) [i.e., probability of one chance in 10,000 of occurring over 10,000 years]. Based on analyses done to date, it is the Department of Energy's (DOE) expectation that the total probability of criticality will be demonstrated to be below the event screening threshold, subsequently rendering the performance of CLST 5.06 and 5.07 not required, pending the completion and formal documentation of the detailed criticality probability analysis, consistent with that outlined in the Topical Report.

The information in this letter report is provided in four parts. Part 1 provides the background related to the technical issues of interest to the U.S. Nuclear Regulatory Commission (NRC) and the DOE that preceded the KTI agreements. Part 2 provides the wording of the agreements, their status, and associated requirements. Part 3 provides a summary. Part 4 lists references.

1. BACKGROUND FOR AGREEMENTS CLST 5.06 AND 5.07

CLST Subissue 5 KTIs are focused on evaluating the adequacy of the methodology and modeling used by DOE in investigations related to the potential for criticality events internal to the waste package.

The technical bases for the criticality subissues and the rationale behind each subissue are explained in detail in NRC's *Issue Resolution Status Report (Key Technical Issue: Container Life and Source Term, Revision 3)* (NRC 2001). KTI agreements CLST 5.06 and 5.07 seek information concerning the consequences of a potential criticality event on the Waste Package (WP) and Engineered Barrier System (EBS) performance, and on the Total System Performance Assessment (TSPA). These agreement items were reached during the NRC/DOE Technical Exchange and Management Meeting on Subissues Related to Criticality on October 23 – 24, 2000 (DOE 2000b).

2. NRC REQUIREMENTS AND PROPOSED KTI RESOLUTION

NRC requirements are listed in Section 2.1. The text of the relevant KTI agreements is provided in Section 2.2. The status of the agreements and DOE's approach for closure of these KTI agreements are provided in Section 2.3.

2.1 APPLICABLE REQUIREMENTS

10 CFR 63, *Disposal of High-level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada*, Subpart B, Licenses, provides the requirements for preapplication review. These preapplication reviews constitute informal conference between a prospective applicant and the NRC staff, as described in 10 CFR Part 2, *Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders*, paragraph 2.101(a)(1). Consistent with these requirements and in accordance with the memorandum of understanding between the DOE and NRC, *Agreement between DOE/OCRWM and NRC/NMSS Regarding Prelicensing Interactions* (Barrett et al. 1999), a series of interactions was undertaken to identify information needed for a prospective license application. At these meetings, agreements by DOE to provide NRC with information were recorded as Key Technical Issue agreements.

2.2 KTI AGREEMENTS

The two KTI agreements that are the subject of this letter report are quoted below. The purpose of the KTI agreements is to ensure that sufficient information is available on an issue to enable the NRC to docket a proposed license application. Wording of CLST KTI agreements are based on *Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Subissues Related to Criticality* (DOE 2000b).

CLST 5.06

“Provide a ‘what-if’ analysis to evaluate the impact of an early criticality assuming a waste package failure. DOE stated it would provide the requested analyses prior to LA. Actual schedule to be provided pending DOE planning process.”

CLST 5.07

“Provide sensitivity analyses that will include the most significant probability/consequence criticality scenarios. DOE stated it would provide the requested analyses prior to LA. Actual schedule to be provided pending DOE planning process.”

Also note that CLST 5.06 was discussed as part of the NRC/DOE Technical Exchange and Management Meeting on Range of Thermal Operating Temperatures on September 18-19, 2001 (DOE 2001). Specifically, CLST 5.06 was included as part of the DOE response to NRC comments identified as GEN 1.01 (items 21, and 64). These NRC comments are concerned with discrepancies in the approach to screening of criticality between the postclosure performance assessment and the *FY01 Supplemental Science and Performance Analyses* (BSC 2001a). Therefore, CLST 5.03 was modified during the NRC/DOE Technical Exchange and Management Meeting on Range of Thermal Operating Temperatures (DOE 2001), and will address GEN 1.01 (21, 64) in lieu of CLST 5.06.

2.3 STATUS OF AGREEMENTS

Based on preliminary scoping evaluations documented in Appendix J of the *Technical Update Impact Letter Report* (BSC 2001b), DOE expects that criticality events (for all waste forms) will

be screened from the performance assessments on the basis of low probability (i.e., less than one chance in 10,000 of occurring over 10,000 years). The detailed information needed to support this screening argument is currently being developed. This information includes, but is not limited to, the following:

- Presence of water (including seepage into emplacement drifts, condensation under drip shield, and the free volume within waste package)
- Probability of early (before 10,000 years) waste package and drip shield failure (including coincidence of early waste package and drip shield failures)
- Probability that water will enter the waste package failure location
- Probability that sufficient water will enter the waste package to initiate waste form and waste package internals degradation
- Probability of waste form and waste package internals degradation into a critical configuration
- Removal/segregation of waste package and waste form degradation products
- Removal/segregation of neutron absorber materials
- Criticality potential of radionuclide inventory
- Accumulation of fissile radionuclides into a critical configuration.

This information will be documented in a Features, Events and Processes (FEPs) screening report that is the subject of another KTI Agreement, CLST 5.03. The development of this screening argument will be based on the methodology documented in the *Disposal Criticality Analysis Methodology Topical Report* (DOE 2000a) and its applicable process report [i.e., *Configuration Generator Model Validation Report* (in progress)]. Accordingly, if the total probability of criticality is less than the event screening threshold in 10 CFR 63.114(d), no criticality consequence evaluations need to be performed, and the activities described in KTI agreements CLST 5.06 and 5.07 are not necessary to support a potential license application.

However, if the probability is not below the event screening threshold established in 10 CFR 63.114(d), then criticality consequence evaluations would be required, and a TSPA estimate of the dose increment due to criticality would be performed. The criticality consequence evaluations and the TSPA estimate would be performed to include the effects of radiological release resulting from the identified criticality scenarios to the individual dose. The approach for the performance of consequence evaluations is presented in Section 3.7 of the Topical Report (DOE 2000a).

3. SUMMARY

DOE has presented information pertaining to CLST KTI agreements on criticality. CLST 5.06 and 5.07 were made before promulgation of NRC's final regulation that allows screening of low probability events including criticality [10 CFR 63.114(d)], and that specifies a standard of reasonable expectation (10 CFR 63.304). DOE believes that the agreements are inconsistent with that regulation if DOE is able to demonstrate that the total probability of criticality for the 10,000 years following permanent closure is less than one chance in 10,000 [10 CFR 63.114(d)]. If DOE is able to demonstrate compliance with 10 CFR 63.114(d), criticality would be screened from further evaluation and no consequence evaluations would be required. If screening of criticality cannot be demonstrated in accordance with 10 CFR 63.114(d), then criticality consequence evaluations and TSPA estimates including criticality risk (in terms of criticality probability/consequence pairs) would be performed.

DOE believes the information submitted herein is sufficient for closing KTI agreements CLST 5.06 [including its reference in GEN 1.01 (21, 64)] and CLST 5.07.

4. REFERENCES

4.1 DOCUMENTS CITED

Barrett, L.; Virgilio, M.J.; Dyer, J.R.; Greeves, J.T. 1999. *Agreement Between DOE/OCRWM and NRC/NMSS Regarding Prelicensing Interactions*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: HQO.19990811.0016.

BSC (Bechtel SAIC Company) 2001a. *FY01 Supplemental Science and Performance Analyses, Volume 1: Scientific Bases and Analyses*. TDR-MGR-MD-000007 REV 00 ICN 01. Las Vegas, Nevada: Bechtel SAIC Company. ACC: MOL.20010801.0404; MOL.20010712.0062; MOL.20010815.0001.

BSC 2001b. *Technical Update Impact Letter Report*. MIS-MGR-RL-000001 REV 00, ICN 02. Las Vegas, Nevada: Bechtel SAIC Company. ACC: MOL.20011211.0311.

DOE (U.S. Department of Energy) 2000a. *Disposal Criticality Analysis Methodology Topical Report*. YMP/TR-004Q REV 01. September 2000. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20001214.0001.

DOE 2000b. *Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Subissues Related to Criticality*. October 23-24, 2000. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20001208.0097.

DOE 2001. *Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Range of Thermal Operating Temperatures*. September 18-19, 2001. Las Vegas, Nevada; Rockville, Maryland; and San Antonio, Texas. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20020107.0162.

NRC 2001. *NRC Issue Resolution Status Report (Key Technical Issue: Container Life and Source Term, Revision 3)*. Rockville, Maryland: U.S. Nuclear Regulatory Commission. ACC: MOL.20010808.0024.

4.2 CODES, STANDARDS, REGULATIONS, AND PROCEDURES

10 CFR 63. Energy: *Disposal of High-level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada*. Readily available.

10 CFR 2. Energy: *Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders*. Readily available.