September 17, 2003

Joseph D. Ziegler, Acting Director
Office of License Application and Strategy
U.S. Department of Energy
Office of Repository Development
P.O. Box 364629 M/S 523
North Las Vegas, NV 89036-8629

SUBJECT: COMMENTS REGARDING FREQUENCY ANALYSIS HAZARDS FOR LICENSE APPLICATION REPORT FOR THE PROPOSED REPOSITORY AT YUCCA MOUNTAIN RELATED TO KEY TECHNICAL ISSUE (KTI) AGREEMENT PRECLOSURE 3.01

Dear Mr. Ziegler:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing the U.S. Department of Energy's (DOE's) July 16, 2003, Key Technical Issue (KTI) agreement response related to preclosure (PRE) 3.01. During the review of the frequency analysis of aircraft hazards report, NRC staff identified specific concerns that may need to be addressed within DOE's license application for the proposed repository at Yucca Mountain. Comments related to the NRC staff concerns are enclosed. This information is being provided in advance of the Technical Exchange on Aircraft Hazards on September 30, 2003, to enhance the interaction between our staffs.

Based on discussions that NRC has had with representatives from DOE, to the extent practicable, NRC comments related to the frequency analysis report will be incorporated into the technical exchange discussions. The NRC staff will complete its review and status agreement PRE 3.01 following the technical exchange. If you have any questions regarding the NRC comments, please contact Mr. Greg Hatchett of my staff at 301-415-3315.

Sincerely,

/RA/

Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: See attached list

Letter to J. Ziegler from J. Schlueter dated: September 17, 2003
cc:

A. Kalt, Churchill County, NV
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S. Lynch, State of NV
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J. Pegues, City of Las Vegas, NV
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M. Corradini, NWTRB
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cc: (Continued)

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S. Kraft, NEI
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R. Craig, USGS
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G. Hernandez, Las Vegas Paiute Tribe
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C. Bradley, Kaibab Band of Southern Paiutes
R. Joseph, Lone Pine Paiute-Shoshone Tribe
L. Tom, Paiute Indian Tribes of Utah
E. Smith, Chemehuevi Indian Tribe
D. Buckner, Ely Shoshone Tribe
V. Guzman, Walker River Paiute
D. Eddy, Jr., Colorado River Indian Tribes
H. Jackson, Public Citizen
J. Wells, Western Shoshone National Council
D. Crawford, Inter-Tribal Council of NV
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NRC On-Site Representatives
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September 17, 2003

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U.S. Department of Energy
Office of Repository Development
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North Las Vegas, NV 89036-8629

SUBJECT: COMMENTS REGARDING IDENTIFICATION AND ESTIMATION OF AIRCRAFT HAZARDS FOR THE LICENSE APPLICATION OF THE PROPOSED REPOSITORY AT YUCCA MOUNTAIN RELATED TO KEY TECHNICAL ISSUE (KTI) AGREEMENT PRECLOSURE 3.01

Dear Mr. Ziegler:

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing the U.S. Department of Energy's (DOE's) July 16, 2003, Key Technical Issue (KTI) agreement response related to preclosure (PRE) 3.01. During the review of the frequency analysis of aircraft hazards report, NRC staff identified specific concerns that may need to be addressed within DOE's license application for the proposed repository at Yucca Mountain. Comments related to the NRC staff concerns are enclosed. This information is being provided in advance of the Technical Exchange on Aircraft Hazards on September 30, 2003, to enhance the interaction between our staffs.

Based on discussions that NRC has had with representatives from DOE, to the extent practicable, NRC comments related to the frequency analysis report will be incorporated into the technical exchange discussions. The NRC staff will complete its review and status agreement PRE 3.01 following the technical exchange. If you have any questions regarding the NRC comments, please contact Mr. Greg Hatchett of my staff at 301-415-3315.

Sincerely,
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Office of Nuclear Material Safety
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Enclosure: As stated
cc: See attached list

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NUCLEAR REGULATORY COMMISSION COMMENTS RELATED TO THE DEPARTMENT OF ENERGY'S KEY TECHNICAL ISSUE AGREEMENT PRECLOSURE 3.01 RESPONSE RELATED TO THE IDENTIFICATION OF AIRCRAFT HAZARDS AT THE PROPOSED REPOSITORY AT YUCCA MOUNTAIN, NEVADA

The NRC staff is reviewing the Department of Energy's agreement response to preclosure (PRE) 3.01 of July 16, 2003. During the review the NRC identified potential issues related to the frequency analysis of aircraft hazards that may need to be addressed in a license application. The following comments are provided by the NRC staff for further consideration by the DOE as it relates to aircraft hazards associated with the proposed repository facilities. The NRC staff's comments or information needs in a potential repository license application are as follows:

Crash Estimation Methodology

1. Clarify what events have been considered as "crash-initiation" events for military aircraft flying in Nevada Test and Training Range.

2. Justify why crash-initiation rate (rate of crash-initiation events, as assumed in Assumption 3.1 and used in developing the crash frequency estimation methodologies in Section 2) should be the same as the crash rate (number of crashes per flight mile), as used in NUREG–0800 and Kimura et al. (2002) and developed in Kimura et al. (1996). Provide plans that are in place to gather actuarial information of spatial distribution of crash-initiation events to be used in estimating the frequency of aircraft crashing onto a given facility.

3. Provide a basis, using historical data, to justify Assumption 3.1 that crash-initiation events are uniformly distributed throughout the flight area, defined as the area where an aircraft crash could originate. For example, the crash initiation event density has been assumed to be uniform in the airspace above the Nevada Test Site with perimeter 213 km [133 mi] and above the region surrounding the North Portal with perimeter 41 km [25.6 mi] (Section 5.5.1).

4. Clarify whether aircraft drifting out the fixed airway boundaries have been considered in deriving the methodology in Section 2.2. Flight path records in Figure IV-1 in Appendix IV show that even in one week of information, aircraft do violate these boundaries.

Mission Planning

5. Assumption 3.12 that states aircraft missions in EC South and in the Caesar Corridor are "an extension in space of the missions" over the Nevada Test Site. Provide a basis for the rationale that aircraft crossing the Nevada Test Site would also pass through EC South. For example, confirmatory information from the U.S. Air Force could be used to support the assumption that missions in EC South and in the Caesar Corridor are extensions of the airspace of the missions over the Nevada Test Site.

6. Clarify whether actual operational planning of the U.S. Air Force has been checked to conclude in Assumption 3.5 “Flying the shortest distance between two points is the most efficient way to cross the NTS.” The path taken by aircraft while flying in a restricted area depend on the mission with associated planning of the flight path(s).

Flight Characteristics

7. Provide a basis for Assumption 3.5 that flight paths near the proposed repository will be straight lines. The proposed repository lies underneath the restricted airspace R-4808E. Additionally, the proposed repository is close to other restricted airspaces, such as Electronic Combat Range South. Aircraft are known to engage in different maneuvering activities inside a restricted airspace. Bechtel SAIC (2002) did not provide sufficient information to establish the possible flight paths and mode of flight in the airspaces near the proposed repository. Flying characteristics (mode and paths of flights) in an area would depend upon flight planners who develop the flight plans and pilots who fly through that area. Specific information (e.g., from U.S. Air Force records) is necessary to justify this assumption.

8. Define what items are included in the “dropped objects” category in Section 2.4. If they include any objects that can explode (e.g., a bomb) or ignite (e.g., an external fuel tank), contribution of the air overpressure generated due to explosion and/or the thermal energy may need to be considered by appropriately enlarging the effective area of a ground structure. Clarify whether stressful activities such as maneuvers during combat training have been considered while making the assumption that the drop rate would be uniform along the flight path.

9. Clarify what is meant by “preferred altitude of ejection” (below about 10,000 ft AGL) in Assumption 3.11. Provide documented evidences to establish whether this preferred altitude is recommended by the aircraft manufactures or U.S. Air Force for ejection, or only preferred by pilots for ejection.

Crash Frequency Estimation

10. Provide the rationale, taking into account information on flight characteristics of the aircraft flying in the vicinity of the proposed surface facilities, for considering crash rates limited to aircraft flying only in normal in-flight mode (Section 5.3).

11. Provide rationale for the statement in Assumption 3.12 that “because EC South is at least several miles from the North Portal, the aircraft crash hazard is insensitive to flight activity in EC South.” Provide detailed information, at a minimum, on the flight activities, flight mode, and aircraft type(s) flying in EC South that have been considered to arrive at the assumption. Clarify whether crash range of each type of aircraft, type(s) of aircraft that fly in EC South, and missions conducted have been taken into account.

12. Provide a basis for the assumption (Assumption 3.13) that a general aviation pilot would at all times steer away from the Yucca Mountain facilities.

13. Provide basis for the statement in Assumption 3.14 that “an impact into a support area would not jeopardize the integrity of the process zone” and, therefore, the support areas of the buildings need not be considered in estimating the effective areas of the buildings. Information should include whether skid of the aircraft involving “ploughing” the support facilities was considered.

14. Provide basis for neglecting the effective areas in Assumption 3.14 represented by the “transportation casks inside the Transporter Receipt Building or in transit between buildings, and waste packages in shielded transporters heading underground.” Information should include whether frequency of shipment of waste packages for emplacement has been considered along with the skid of the aircraft. Additionally, information should clarify why the transportation casks inside the Transporter Receipt Building would provide insignificant effective area for estimation of the annual crash frequency when the Transporter Receipt Building itself was not considered.

15. Clarify whether the rail yard or the area used for casks waiting to be processed have been considered in estimating the annual crash frequency.

16. Provide a basis for Assumption 3.15 that aircraft on Nevada Test and Training Range flying near the proposed surface facility would be represented by “small attack, fighter, trainer aircraft.” Clarify whether trainer aircraft fly routinely near the proposed repository and identify their missions. Clarify also why the category “small military aircraft” (all small attack, fighter, and trainer aircraft) would be “more conservative” when crash rates for F-16s, all single-engine, and all attack and fighter aircraft are higher (Section 5.5.1). Clarify whether uncertainties associated with the determination of the aircraft type flying in the vicinity of the proposed surface facilities have been appropriately considered in estimating the effective area of the buildings and in selecting the appropriate crash rate for the aircraft in the analysis.

17. Provide a basis for using one week flight data (3/30/2002 through 4/5/2002, given in Table 9) to establish the annual number of flights and conclude that the restricted airspace R-4808S is not heavily used by civilian air traffic (Assumption 3.16). Moreover, justify how the average of one week flight data would be the representative of flights through this corridor (Assumption 3.19). Additionally, clarify whether uncertainties in flight information through this corridor have been appropriately considered in the analysis.

18. Explain the rationale for assuming the width of the aviation corridor to the southwest of Yucca Mountain to be equal to 38.4 km [24 mi]. Clarify whether this assumed width belongs to federal airway V105-135, J86, J92, VR1214, or IR286 (see Figure 16 of Bechtel SAIC, 2002). Clarify whether the assumed width of the airway is same as used by the Federal Aviation Administration. The methodology presented in this report points to a scenario where the airway width is significantly larger than the crash range of an aircraft. Generally the width of federal flight corridors have a width smaller than the crash range used in this report (40 km [25 mi] for air carriers and 48 km [30 mi] for military aircraft in Assumption 3.17).

19. Provide the source of information presented in Assumption 3.16 that “air traffic near and with R-4808S tends toward the very high frequency omnidirectional range and tactical air navigation station (VORTAC) south of Beatty.”

20. Provide the basis for assuming that military aircraft flying on the military training routes and low-altitude tactical navigation areas pose a negligible hazard to proposed surface facilities (Assumption 3.20). Clarify whether the “zooming” maneuvers conducted by the military pilots facing in flight emergencies were considered in developing this assumption, which, by its very nature, takes the aircraft to a higher altitude before beginning the glide and results in a potentially larger crash range.

21. Provide the rationale for assuming civilian aircraft flying at [1,200 ft] above ground level (AGL) (Assumption 3.20) and below [10,000 ft] above mean sea level (MSL) (Assumption 3.21), irrespective of distance from the proposed surface facilities, will not pose a credible hazard to the proposed surface facilities. Additionally, provide the conversion from MSL to AGL for flights near the proposed repository.

22. Provide the rationale why the average number of flights in years 1999 through 2002 would be representative for estimating the annual crash frequency onto the proposed surface facilities (Section 5.5.1). Clarify whether uncertainties in number of annual flights have been appropriately considered in the analysis.