January 13, 2004

Joseph D. Ziegler, Director
Office of License Application and Strategy
U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Office of Repository Development
1551 Hillshire Drive
North Las Vegas, NV 89134-6321

SUBJECT: PRE-LICENSING EVALUATION OF TOTAL SYSTEM PERFORMANCE ASSESSMENT AND INTEGRATION (TSPAI) KEY TECHNICAL ISSUE (KTI) AGREEMENTS 2.05 AND 2.06

Dear Mr. Ziegler:

The U.S. Nuclear Regulatory Commission (NRC) has completed its evaluation of the U.S. Department of Energy's (DOE's) August 29, 2003, submittal on the Total System Performance Assessment and Integration (TSPAI) Key Technical Issue (KTI) Agreements 2.05 and 2.06. NRC found that the response provided in DOE's "KTI Letter Report Response to Additional information Needs on TSPAI 2.05 and TSPAI 2.06," to be satisfactory. Therefore, NRC considers the TSPAI KTI Agreements 2.05 and 2.06 complete.

DOE's initial response ("the Enhanced Plan for Features, Events, and Processes (FEPS) at Yucca Mountain, April 15, 2003) to address TSPAI KTI Agreement 2.05 and 2.06 partially addressed many of the concerns originally identified in the two agreements. However, NRC was not confident that the proposed changes to the Enhanced FEP Plan would, if fully implemented, result in a comprehensive and transparent methodology for the identification and documentation of the feature, events, and processes considered as part of DOE's scenario analysis. Further, NRC concluded that the Enhanced FEP Plan by itself would not allow NRC to conduct a thorough and detailed review of the DOE'S scenario analysis at the time of license application. NRC identified 9 Additional Information Needs (AINs) for KTI Agreement TSPAI 2.05 and 5 AINs for KTI Agreement TSPAI 2.06 based on the remaining concerns with the methodology outlined in the Enhanced FEP Plan.

DOE provided responses for each of the AINs in its August 29, 2003, submittal. The NRC found that the information provided in the TSPAI 2.05 and 2.06 AIN response to be satisfactory. DOE has provided answers for all of the AINs, and NRC review found the DOE responses for each of the AINs adequate.

Revisions to the Enhanced FEP Plan along with the other changes and clarifications identified in DOE's responses to the AINs, provide sufficient information to complete these agreement items. If you have any questions regarding this matter, please contact Gregory Hatchett, of my staff at 301-415-3315 or by e-mail to GXH@nrc.gov.

Sincerely,

/RA/

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

Enclosure: NRC Review

cc: See attached distribution list

Letter to J. Ziegler from J. Schlueter, dated: January 13, 2004
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Revisions to the Enhanced FEP Plan along with the other changes and clarifications identified in DOE's responses to the AINs, provide sufficient information to complete these agreement items. If you have any questions regarding this matter, please contact Gregory Hatchett, of my staff at 301-415-3315 or by e-mail to GXH@nrc.gov.

Sincerely,

/RA/

Janet R. Schlueter, Chief
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Office of Nuclear Material Safety
and Safeguards

Enclosure: NRC Review

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REVIEW BY THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS OF THE DEPARTMENT OF ENERGY'S AGREEMENT RESPONSE RELATED TO THE PROPOSED GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NEVADA "TOTAL SYSTEM PERFORMANCE ASSESSMENT AND INTEGRATION" KEY TECHNICAL ISSUE AGREEMENTS 2.05 AND 2.06 (PROJECT NO. WM-00011)

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission's (NRC's) issue resolution goal during the pre-licensing period is to assure that the U.S. Department of Energy (DOE) has assembled enough information on a given issue for NRC to accept a license application for review. Resolution by the NRC during pre-licensing does not prevent anyone from raising any issue for NRC consideration during the licensing proceedings. Also, and just as important, resolution of an issue by NRC during pre-licensing does not prejudge the NRC evaluation of the issue during the licensing review. Issues are resolved by the NRC during pre-licensing when the staff has no further questions or comments about how DOE is addressing an issue. Pertinent new information could raise new questions or comments on a previously resolved issue.

By letter dated August 29, 2003, DOE submitted a report entitled, "KTI Letter Report Response to Additional Information Needs on TSPAI 2.05 and 2.06," (Bechtel SAIC Company, LLC, 2003, ADAMS Accession Number ML032460701) responding to additional informational needs for Total System Performance Assessment and Integration (TSPAI) Key Technical Issue (KTI) Agreements 2.05 and 2.06. These agreements address the transparency and comprehensiveness of DOE's methodology for the identification and documentation of feature, events, and processes (FEPs) considered as part of their scenario analysis. DOE considers the NRC information needs regarding both agreements as being fully addressed by this and previous DOE responses.

2.0 WORDING OF THE AGREEMENTS

NRC review of the DOE response to the subject agreements is based upon DOE providing the requested information identified in NRC letter (ADAMS Accession No. ML 012410202) which summarizes the TSPAI Technical Exchange and Management Meeting held August 6-10, 2001. The agreements are as follows:

TSPAI Agreement 2.05: It is not clear to the NRC that the current list of FEPs [Features, Events, and Processes] (i.e., the list of FEPs documented in TDR-WIS-MD-000003, 00/01) is sufficiently comprehensive or exhibits the necessary attribute of being auditable (e.g., transparent and traceable). As discussed in the two TSPAI technical exchanges, there are unclear aspects of the approach that DOE plans to use to develop the necessary documentation of those features, events, and processes that they have considered. Accordingly, to provide additional confidence that the DOE will provide NRC with: (1) auditable documentation of what has been considered by the DOE, (2) the technical basis for excluding FEPs, and (3) an indication of the way in which included FEPs have been incorporated in the performance assessment; DOE will provide NRC with a detailed plan (the Enhanced FEP Plan) for comment. In the Enhanced FEP Plan, DOE will address the following items: (1) the

approach used to develop a pre-screening set of FEPs (i.e., the documentation of those things that DOE considered and which the DOE would use to provide support for a potential license application), (2) the guidance on the level-of-detail that DOE will use for redefining FEPs during the enhanced FEP process, (3) the form that the pre-screening list of FEPs will take (e.g., list, database, other descriptions), (4) the approach DOE would use for the ongoing evaluation of FEPs (e.g., how to address potentially new FEPs), (5) the approach that DOE would use to evaluate and update the existing scope and description of FEPs, (6) the approach that DOE would use to improve the consistency in the level of detail among FEPs, (7) how the DOE would evaluate the results of its efforts to update the existing scope and definition of FEPs, (8) how the Enhanced FEP process would support assertions that the resulting set of FEPs will be sufficiently comprehensive (e.g., represents a wide range of both beneficial and potential adverse effects on performance) to reflect clearly what DOE has considered, (9) how DOE would indicate their disposition of included FEPs in the performance assessment, (10) the role and definition of the different hierarchical levels used to document the information (e.g., "components of FEPs" and "modeling issues"), (11) how the hierarchical levels used to document the information would be used within DOE's enhanced FEP process, (12) how the Enhanced FEP Plan would result in documentation that facilitates auditing (i.e., lead to a process that is transparent and traceable), (13) DOE's plans for using configuration management controls to identify FEP dependencies on ongoing work and design changes. DOE will provide the Enhanced Plan to NRC by March 2002.

TSPAI Agreement 2.06: DOE proposes to meet with NRC periodically to provide assessments of the DOE's progress, once it has initiated the enhanced FEP process, and on changes to the approach documented in the Enhanced FEP Plan. During these progress meetings DOE agrees to provide a justification for their approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the set of FEPs initially considered.

3.0 BACKGROUND INFORMATION ON TSPAI KTI AGREEMENTS 2.05 AND 2.06

Early reviews of DOE's approach to the identification and documentation of features, events, and processes in the documentation supporting the Total System Performance Assessment for Site Recommendation, the NRC staff identified a number of concerns, including that DOE's scenario analysis does not provide NRC with: (1) auditable documentation of what has been considered by the DOE, (2) the technical basis for excluding FEPs, and (3) an indication of the way in which included FEPs have been incorporated in the performance assessment. These concerns were discussed during two NRC/DOE technical exchanges on the TSPAI Key Technical Issue (KTI) in 2001 (ML011510147 and ML012410202). During these technical exchanges, aspects of the DOE approach remained unclear to the NRC staff. Seven agreements were reached during the second technical exchange.

TSPAI Agreement 2.05 is one of the three agreements addressing DOE's overall scenario analysis approach. From the perspective of the NRC, this thirteen-part agreement was reached with DOE to give the NRC confidence that DOE had an appropriate plan for developing the information necessary to enable the NRC to conduct a risk-informed review of the potential license application.

TSPAI Agreement 2.05 addresses a plan that the DOE would develop to clarify its approach and to provide confidence that, at the conclusion of the process of conducting and documenting the scenario analysis, DOE would be able to provide the NRC with the information necessary to conduct a detailed review of this part of the potential license application. The agreement asks for DOE to provide their plan for the Enhanced FEP Process to the NRC for comment.

TSPAI Agreement 2.06 was also developed to ensure that the NRC staff would have the information necessary to conduct a detailed review of the scenario analysis portion of the potential license application. NRC review of the Enhanced FEP plan concluded that the plan did not provide the information or detail necessary to enable a detailed review of DOE's initial (or pre-screening) list of FEPS. Based on the information contained in the Enhanced FEP Plan, additional information is needed, before the intent of TSPAI Agreement 2.06 is satisfied. DOE needed to provide the justification for their approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the set of FEPs initially considered (i.e., that a complete pre-screening list of FEPs has been identified).

3.1 Summary of Information Provided in Previous DOE Agreement Responses for TSPAI KTI Agreements 2.05 and 2.06

DOE submitted a letter report entitled, "The Enhanced Plan for Features, Events, and Processes (FEPs) at Yucca Mountain," (the Enhanced FEP Plan), by letter dated April 5, 2002. The intent of the Enhanced FEP Plan was to address the regulatory requirements in 10 CFR Part 63; identify and, where possible, implement the specific enhancements identified in the FEP reviews, especially TSPAI KTI Agreements 2.05 and 2.06; and support any DOE license application.

3.2 Summary of NRC Response to Information Provided in Previous DOE Responses for TSPAI KTI Agreements 2.05 and 2.06

NRC 's review of DOE'S Enhanced FEP Plan and the status of the two TSPAI agreements were transmitted by letter dated, August 2, 2002. In summary, with respect to TSPAI Agreement 2.05, the NRC determined that the Enhanced Plan did not fully satisfy the intent of the TSPAI Agreement 2.05. The Enhanced FEP Plan did partially address each of the thirteen items listed in the agreement. However, the Enhanced FEP Plan did not clarify a number of aspects of DOE's approach, nor did it provide the necessary information and detail to give the NRC confidence that DOE's approach would result in the information necessary to allow a detailed review of this part of a potential license application. Therefore, TSPAI Agreement 2.05 was listed as "need additional information." Each of the additional information needs (AINs) identified for TSPAI Agreement 2.05 are included in the Section 4 of this enclosure.

Regarding TSPAI Agreement 2.06, the NRC found that the Enhanced FEP Plan did not provide the necessary information or detail to allow a detailed review of DOE's initial (or pre-screening) list of FEPs. As such, TSPAI Agreement 2.06 was listed as "need additional information." Each of the AINs identified for TSPAI Agreement 2.06 are also included in the Section 4 of this enclosure.

The terms “additional information need” and AIN are synonymous with the terms “need additional information” or NAI, and are being used to ensure consistency of terminology between this and previous NRC and DOE correspondence.

4.0 SUMMARY OF INFORMATION PROVIDED IN THE DOE AGREEMENT RESPONSE

By letter dated August 29, 2003, DOE submitted a report entitled, “KTI Letter Report Response to Additional Information Needs on TSPAI 2.05 and 2.06,” in response to the NRC’s review of the Enhanced FEP Plan and the subsequent NRC request for additional information. The report summarizes previous DOE/NRC interactions on these two agreements. It also summarizes NRC’s comments on the Enhanced FEP Plan and the NRC’s AINs. Further the report identifies proposed changes to the Enhanced FEP Plan and DOE’s approach for the identification and documentation of FEPs considered as part of DOE’s scenario analysis, and provides a basis for closure of TSPAI KTI Agreements 2.05 and 2.06.

4.1 NRC Requests for Additional Information and DOE Responses for TSPAI 2.05

Each of the NRC AINs for TSPAI KTI Agreement 2.05 and the associated DOE responses are presented in the following discussion.

NRC AIN 1: The schedule for making the significant decisions identified in the Enhanced FEP Plan; including those identified in Section 3.3 (e.g., configuration control, when AMR Authors will have the list of FEPs that they will need to address, FEP AMR updates, organization of the FEP matrix).

DOE’s Response to AIN 1: The tasks listed in the Enhanced FEPs Plan, as modified by the general changes above, are the steps to develop the FEPs for TSPA-LA. The following tasks are complete at the time of this letter report:

- The process has been discussed with the AMR authors in a number of meetings.
- The database structure has been selected.
- The process and subsystem hierarchies are complete.
- The list of SR FEPs has been modified to produce a draft LA FEP list. Modifications include splitting "broad FEPs" and mixed included/excluded FEPs into multiple FEPS, removing some "broad FEPs" that were completely addressed in multiple more specific FEPs, and identifying new candidate FEPS.
- A draft LA FEP list was distributed in January 2003 and has been updated twice since then.
- Software development of the database application is complete, and the software has been submitted for independent verification and validation.
- FEP AMR authors are aware of the screening process and documentation requirements.

- The FEP AMRs are being checked for concurrence with the Enhanced FEP Plan and the process changes identified herein, during the formal AMR review process.

- FEP configuration control includes reviews of Interface Exchange Documents (pertaining to the interface between the products of the repository design and performance assessment organizations), with the reviews being used to identify needed changes to the FEP database and reconsideration of FEP screening arguments based on design changes.

- FEP configuration control includes use of the FEP database features to track changes to the proposed FEPs and the associated screening arguments.

- Designers and AMR authors are being consulted on the need for additional candidate FEPs to be screened as the database is populated.

The following milestones are scheduled:

- The FEP database will be available in the Technical Management Database System, and the supporting software will be available in the Software Configuration Management System in March 2004.

- The technical report documenting the FEP development process for TSPA-LA and the database origins and contents will be available in the Controlled Document System in June 2004.

NRC AIN 2: Information supporting the assertion that the approach of using key words to describe FEP components will provide sufficient information on what has been considered or a description of the approach that DOE will use to document what has been considered. As previously discussed, a general example may help to illustrate the proposed approach.

DOE's Response to AIN 2: Figure 2 herein provides an example of how keywords can describe and, in some cases, define the FEPs to be considered for screening. The keywords help to identify specific details of FEPs and facilitate navigation within the database. A FEP is defined by the combination of the third-levels of the physical system and process hierarchies (i.e., a FEP matrix intersection) and the keywords; these are the basis for the FEP description in the AMRs and the FEP database. The FEP screening arguments will be documented at the level of detail necessary to isolate the subprocesses or subsystems individually involved in the screening argument at the temporal and spatial scales of interest for TSPA-LA. The keywords are the vehicle for summarizing the level of detail at which a particular FEP is developed. FEP components will no longer be used.

NRC AIN 3: Additional detail describing how DOE will apply its criteria on level-of-detail for redefining FEPs, so that it is clear how DOE will balance the competing goals of coarseness and specificity when defining FEPs. As previously discussed, a general example may help to illustrate the proposed approach.

DOE's Response to AIN 3: The three-level subsystem and process hierarchies provide a description of the system and its performance that can be comprehended in a single view. Each subsystem process matrix intersection defines the upper limit of coarseness for a FEP. The FEP screening arguments will be documented in the FEP AMRs at the level of detail necessary to isolate the subprocesses or subsystems individually involved in the screening argument at the temporal and spatial scales of interest for TSPA-LA. This will result in multiple FEPs for some matrix cells, corresponding to those technical areas with complex processes that need more detailed screening. Inspection of the variations in the level of detail will be facilitated by the navigation features of the database that will allow moving between the single high-level matrix view and views of the individual FEPs and screening arguments within a single matrix cell. Figures 1 and 2 herein illustrate the level of detail and the balance of coarseness and specificity.

NRC AIN 4: Adequate justification for DOE's approach to limit *a priori* the number of FEPs to several hundred.

DOE's Response to AIN 4: There is, no *a priori* limit on the number of FEPs. The 328 primary SR FEPs are the starting point, and that number will increase as some FEPs are split to eliminate broad FEPs and eliminate combined included/excluded FEP situations.

NRC AIN 5: DOE should clarify whether their Enhanced FEP Process will, or will not, lead to instances where FEPs are considered both included and excluded. DOE should clarify where it believes this may be appropriate, why it believes that this result is appropriate, and provide examples illustrating this.

DOE's Response to AIN 5: The Enhanced FEPs Process will not lead to instances of single FEPs that have both included and excluded elements. FEPs will be re-organized and subdivided where necessary, so that each FEP has a single screening decision.

NRC AIN 6: Additional detail regarding the methods that DOE will use to evaluate their approach against the Yucca Mountain Review Plan criteria (as excerpted) and the principles that will be used to guide the subjective evaluation that DOE plans to conduct. For example, it is unclear whether audits of the pre-screening list of FEPs will be conducted to support the "subjective" decision.

DOE's Response to AIN 6: The YMRP acceptance criteria inform the DOE about the metrics that NRC reviewers will use to evaluate the License Application. These criteria will be considered as the FEP database and screening arguments are developed. The FEP database is the top level of a pyramid that includes the set of FEP AMRs and the larger set of process level AMRs. All three levels undergo formal checking and technical discipline review as part of the product development process including review against the YMRP acceptance criteria. This work, combined with the prior work to develop the SR product, documents the evolution of the FEP list from the generic international database to the list that will be part of the License Application documentation.

NRC AIN 7: Clarify how DOE will address the completeness of the "FEP components" considered in the screening of FEPs or the modeling of FEPs and clarify how

FEP components will be addressed in the screening arguments for their associated FEPs.

DOE's Response to AIN 7: FEP components will no longer be used. However, there will be improved clarity of the FEP database provided through the FEP-matrix-based organizational structure and the capability to view it at a high enough level to comprehend its entirety. This will facilitate the FEP organization's evaluation of completeness and the subject matter experts' identification of subprocesses or subsystems not included in their modeling and screening arguments. Similarly, the clarity of the database will assist oversight bodies in developing independent assessments of completeness. The mapping of the NEA classification list to the LA FEPs and the cross referencing of the SR FEP list to the LA FEPs will also facilitate evaluation of completeness.

NRC AIN 8: Clarify how the approach outlined in the Enhanced FEP Plan will not result in FEPS being designated FEP components issues nor will it lead to sufficient ambiguity as to make the FEP list incapable of being audited.

DOE's Response to AIN 8: The software view of the subsystem-process hierarchy will facilitate development of a FEP database free of ambiguities and omissions. Elimination of secondary FEPs, FEP components, and combined include/exclude FEPs will reduce ambiguities and result in a database that is transparent.

NRC AIN 9: Additional information clarifying how the Enhanced FEP Process will address questions of auditability, such as: (1) mutual exclusivity of FEPs (e.g., overlapping of FEPs) and (2) how auditability will be preserved with the proposed approach (i.e., the varying level-of-detail in defining FEPs and use of Hierarchical Level 4).

DOE's Response to AIN 9: The separation of the subsystem axis from the process axis in the hierarchical views of the database will highlight the mutual exclusivity of most of the boxes in a two-dimensional view of the database. For those subsystem-process combinations with some overlap (e.g., a thermal process column could overlap with several other process columns), the two-dimensional database view will identify the set of FEPs (through highlighting and/or listing related FEPs) that support the overlapping columns for a given subsystem row. This will make evaluation of potential overlap more straightforward. The balance of the high level view and the FEP screening at the appropriate level of detail for the individual situation, combined with the elimination of FEP components, will also improve clarity. The traceability features included in the LA FEP database will be an independent cross check back to the SR FEP list and to the NEA classification list.

4.2 NRC Requests for Additional Information and DOE Responses for TSPAI 2.06

Each of the NRC AINs for TSPAI KTI Agreement 2.06 and the associated DOE responses are presented in the following discussion.

NRC AIN 1. Justification for the level of detail used to define FEPs that reflects the FEPs that comprise the pre-screening list of FEPs, where the justification includes an appropriate discussion of the mutual exclusivity or overlapping of FEPs. If the

number of FEPs in the pre-screening list of FEPs is limited because of a criterion used by DOE, justification for the use of this criterion needs to be provided. Justification for considering FEPs as both included and excluded needs to be provided, if this approach is used by DOE.

DOE's Response to AIN 1: There is no limit on FEPs in the screening list (which is the sum of the included and excluded FEPs). The number of LA FEPs will be developed from the SR FEPs, the splitting of some broad FEPs and mixed included/excluded FEPs (see AIN-4 for TSPAI-2.05), and from discussions with subject matter experts. The SR FEPs were developed iteratively using international FEP databases, site-specific literature, and discussions and reviews within the project. FEPs will only be aggregated if the screening argument applies across the range of the aggregation at the temporal and spatial scales of interest for TSPA-LA. The development of the LA FEPs will be documented in an AP-3.11 Q technical report. See the response to AIN-9 for TSPAI-2.05 for a discussion of exclusivity and overlap.

NRC AIN 2. Justification for the degree of consistency among FEPs reflecting the FEPs that comprise the pre-screening list of FEPs needs to be provided. The basis for why the FEP components identified by the DOE should not be considered FEPs also needs to be provided.

DOE's Response to AIN 2: The FEPs components will be eliminated. The scope of each screening argument will define the scope of the FEP it supports. See the response to AIN-3 for TSPAI- 2.05 for a discussion of the balance between FEPs level of detail and the capability to view the FEP database globally.

NRC AIN 3. If DOE uses the criteria of multiple reviews by subject matter experts and external reviewers as a basis for the completeness of the FEP list (pp. 37, 40), then DOE will need to provide the documentation about the organization and nature of the reviews and how the review applies to the list of FEPs initially considered (i.e., the pre-screening list of FEPs arising from the Enhanced FEP Process), describe the process used to conduct the review, and the results of each review.

DOE's Response to AIN 3: Pages 37 and 40 of the Enhanced FEPs Plan referred to the reviews conducted in support of the SR, which are applicable to the LA FEP effort as well. In addition, the development of the LA FEPs includes technical staff review of prior work. As the LA FEP database is populated and the AMR screening arguments are confirmed or modified, the completeness will be evaluated based on the overall database and its predecessors, including the NEA database. The LA FEP database will facilitate a review of the NEA FEPs (and their mapping to the LA FEPS) and the SR FEPs (and their cross-referencing to the LA FEPs) by providing electronic access to and searching of the FEPs in a single location. The formal review of the FEP list will be the review of the FEP technical report, which is prepared in accordance with AP-3.1 lQ and reviewed in accordance with AP-2.14Q. The organization and nature of the review process is prescribed by AP- 14Q.

NRC AIN 4. DOE should provide a rationale for why reviews of different FEP lists would apply to the completeness of the actual list, because there may be changes in level of detail, etc. DOE should clarify how previous reviews of different FEP lists will

support assertions that the FEP list arising from the Enhanced FEP Process is sufficiently complete. This should include a discussion of the role of FEP components and how they pertain to completeness of DOE's consideration of features, events, and processes.

DOE's Response to AIN 4: As noted in the Enhanced FEP Plan (BSC 2002, Section 2.3.1), the NEA states that, "comprehensiveness ... will have to be judged against a record of continuous and open reviews ... ". The past reviews of FEP lists are part of this continuous review process and support the completeness of the LA FEP list. The FEP Team has the responsibility to evaluate the populated LA FEP database and to interact with subject matter experts, to ensure the completeness of the FEP list. The clarity features of the enhanced process are designed to enable the completion of this task. As stated above, the simplifications described in this letter report, such as the elimination of FEP components, will support assessment of completeness. In addition, event trees and interface diagrams will be considered to support the demonstration of completeness.

NRC AIN 5. If DOE uses the FEP matrix to support an assertion that its list of FEPs initially considered is complete, then DOE needs to provide additional information that supports the appropriateness of the FEP matrix for this purpose. This additional information should describe how the organization and content of the FEP matrix, and its use, supports the assertion of completeness FEPs. If Hierarchical Level 4 is to be used to provide part of the technical basis for the completeness of the initial list of FEPs and it is not implemented uniformly, then additional information justifying the appropriateness of DOE's approach towards Hierarchical Level 4 will be needed.

DOE's Response to AIN 5: The responses to AIN-7 for TSPAI-2.05 and AIN-4 for TSPAI-2.06 discuss the approach to evaluating completeness of the FEP list. FEP screening will be at the level of detail for which the screening logical argument is applicable, for each situation.

5.0 NRC EVALUATION AND COMMENTS ON THE INFORMATION PROVIDED FOR TSPAI KTI AGREEMENTS 2.05 AND 2.06

TSPAI KTI Agreements 2.05 and 2.06 are pertinent to the staff's understanding of DOE's methodology for the id entification and documentation of the feature, events, and processes considered for DOE'S scenario analysis. The information provided by DOE has been reviewed in that context. NRC's comments regarding DOE's submittal are as follows:

TASPAI 2.05

DOE's response to AIN 1, provided an updated list of completed tasks, and scheduled tasks supporting the development of the FEP list for TSPA-LA. DOE has indicated that most of the tasks originally identified in Section 3.3 of the Enhanced FEP Plan have been addressed with the remainder scheduled to be completed by June 2004. DOE'S response addressed staff concerns related to the scheduling of activities identified in the Enhanced FEP Plan and as such, adequately addresses AIN 1. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 1, acceptable.

DOE's response to AIN 2, provides supporting information for an example illustrating how keywords can be used to describe and define FEPS. The response elaborated on the three levels of the physical system and process hierarchies are used to define FEPs (i.e., FEP matrix interactions). DOE's indicated that FEP screening arguments will be documented at the level necessary to isolate the sub-processes or subsystems individually invoked in a particular screening argument. The response provided examples of how keywords could be used to navigate throughout the database. DOE also indicated that they will no longer be using FEP components, further addressing earlier staff concerns. DOE'S response addressed staff concerns related to transparency and sufficiency of using keywords to FEPs to describe/document what was considered during the screening process. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN, acceptable. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 2, acceptable.

DOE's response to AIN 3, indicated that the third level process hierarchies provide a high level description of the interaction of the different systems and system performance. Further, DOE indicated that the screening arguments will be documented in the FEP Analysis and Model Reports AMRs at the level of detail necessary to isolate the sub-processes or subsystems individually involved in the screening arguments for TSPA-LA. DOE'S response addressed staff concerns related to the consistency and level of detail being considered when redefining FEPs. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 3, acceptable.

DOE's response to AIN 4, indicated that there is no set or *a priori* limit to the number of FEPs. This response addresses staffs concerns that DOE may have been considering an *a priori* limit to the number of FEPs under consideration. DOE's response addressed the NRC concerns. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 4, acceptable.

DOE's response to AIN 5, indicated that the Enhanced FEP Plan has been changed and that there will not be any instances in which a FEP is both included and excluded. DOE's response addressed NRC concerns. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 5, acceptable.

DOE's response to AIN 6, indicated that they will consider the acceptance criteria outlined in the Yucca Mountain Review Plan (YMRP) during the development of the FEP database and screening arguments. DOE further indicated that the FEP database and the FEP and process level AMRs will each be going through technical discipline reviews, including reviews against the YMRP. DOE's response addressed NRC concerns. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 6, acceptable.

DOE's response to AIN 7, indicated that FEP components will no longer be used. DOE's response addressed NRC concerns. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 7, acceptable.

DOE's response to AIN 8, indicated that they were no longer considering the use of secondary FEPs, FEP Components, or FEPs that would be considered both "included/excluded. DOE'S response addressed the NRC concerns related to the ambiguity and traceability of the FEP database. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 8, acceptable.

DOE's response to AIN 9, indicated that the FEP database will allow the identification of associated, related, or supporting FEPs for combinations for the hierarchical systems and

process overlaps. Additionally, the LA FEP database will also have a cross-reference feature back to the SR FEP List and the NEA Classification List. DOE'S response addressed staff concerns on the auditability of the FEP database, particularly for overlapping FEPs. Therefore, the NRC finds DOE's response to TSPAI 2.05 - AIN 9, acceptable.

TSPAI 2.06

DOE's response to AIN 1, indicated that the development of the LA FEPs will be documented in a technical report scheduled to be delivered in June 2004. They also indicated that FEPs will only be aggregated if all of the screening arguments apply across the range of the aggregation for the temporal and spacial scales of interest for the TPSA LA. Additionally, the number of LA FEPs is not fixed and will/was initially be developed from the SR FEP List. This list was developed iteratively using site-specific and international information. Additionally, DOE indicated that they will no longer be identifying include/excluded FEPs. DOE'S response generally addressed NRC concerns associated with the process used to determine the degree of aggregation used to define those FEPs appearing on the initial FEP List. Therefore, the NRC finds DOE's response to TSPAI 2.06 - AIN 1, acceptable.

DOE's response to AIN 2, pointed to the responses for TSPAI 2.06 AIN 3. That response addressed NRC concerns related to the consistency and level of detail being considered when redefining FEPs. This response generally addresses NRC concerns. Therefore, the NRC finds DOE's response to TSPAI 2.06 - AIN 2, acceptable.

DOE's response to AIN 3, indicated the a formal review (AP-2.14Q) of the LA FEP list will be conducted as part of the review for the FEP Technical Report scheduled to be delivered in June 2004. Additionally, the completeness of the FEP database will be evaluated routinely as the database is developed. DOE's response generally addressed NRC concerns about the completeness of the FEP list and the organization and nature of the supporting review. Therefore, the NRC finds DOE's response to TSPAI 2.06 - AIN 5, acceptable.

DOE's response to AIN 4, that the FEP Team has the responsibility to evaluate the populated LA FEP database and to interact with subject matter experts, to ensure the completeness of the FEP list. As part of this review process, the team will also consider/evaluate historical FEP lists. However, consideration of the historical FEP lists will not preclude consideration of any site-specific technical information or FEPs. DOE's response generally address staff concerns relating to the use of the completeness of a FEP list developed using other FEP lists and the Enhanced FEP Plan. Therefore, the NRC finds DOE's response to TSPAI 2.06 - AIN 4, acceptable.

DOE's response to AIN 5, pointed to discussion TSPAI 2.05 AIN 7, and TSPAI AIN 4, to address staff concerns with the process for evaluating the completeness of the FEP list. Responses provided in the referenced AINs, generally, addressed staffs concerns relating to the appropriateness of using the FEP matrix and its applications for measuring the completeness of the initial list of FEPs. Therefore, the NRC finds DOE's response to TSPAI 2.06 - AIN 5, acceptable.

6.0 SUMMARY

Based on the above evaluations the NRC found the additional information provided for TSPAI KTI Agreements 2.05 and 2.06 to be acceptable. DOE has provided responses for all of the AINs, and NRC review found the DOE responses for each of the AINs to be acceptable. Revisions to the Enhanced FEP Plan along with the additional changes and clarifications identified in DOE's responses to the AINs, provide sufficient information to complete these agreement items. Additionally, DOE's response to the additional information needs for TSPAI KTI Agreements 2.05 and 2.06 will be evaluated further as part of the NRC's review of the implementation of the Enhanced FEP Plan, which will be addressed by DOE in their response to TSPAI KTI Agreement 2.07.

7.0 STATUS OF THE AGREEMENTS

Notwithstanding the identification of any new information that could raise additional questions or comments concerning TSPAI Agreements 2.05 and 2.06, based upon the above review, NRC agrees with DOE that the information provided in the Enhanced FEP Plan and letter report satisfies the intent of the agreement items. Therefore, the NRC considers TSPAI Agreements 2.05 and 2.06 complete, and NRC has no further questions at this time.

8.0 REFERENCES

Bechtel SAIC Company, LLC. "The Enhanced Plan for Features, Events, and Processes (FEPs) at Yucca Mountain." TRD–WIS–PA–000005. Rev. 00. North Las Vegas, Nevada: Bechtel SAIC Company, LLC. March 2002. [ADAMS Accession Number ML02101399]

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Reamer, C. W. "Summary Highlights of NRC/DOE Technical Exchange and Management Meeting on Total System Performance Assessment and Integration Features, Events, and Processes (May 15-17, 2001)." Letter (2001) to D. R. Williams, DOE. Washington, DC: NRC. 2001. [ADAMS Accession Number ML011510147]

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