Appendix C

SRD Review Team Questions

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Appendix C
SRD Review Team Questions

Question # 1

Description

Description (Basis): Per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to include all requirements of applicable laws and regulations. Per DOE/RL-96-0004 (Section 2.2), applicable laws and regulations specifically include the DOE nuclear safety regulation 10 CFR 835, Occupational Radiation Protection.

A comprehensive review of the set of radiological, nuclear and process safety standards documented in the SRD, Vol. II, was performed against the requirements specified in 10 CFR 835. The SRD, Vol. I, Attachment E, Compliance with Applicable Laws and Contract Requirements, was used to assist in the review. The following discrepancies were identified.

10 CFR 835 requirements not adequately addressed or missing from the documented standards set: Sections 835.3(a), .3(d), .101(e), .101(l), .401(a), .401(b), .401(c)(1), .404(c)(4), .403(b), .404(d)(2), .404(d)(6), .404(e), .603, .702(c)(1), .702(c)(2), .702(c)(3), .704(a), .801(a), .801(c), .901(a), .902, .903, .1003(b) and .1101(d).

10 CFR 835 requirements for which the recommended standards set changes the scope or intent of the requirement: Sections 835.102, .203(a), .204(a), .204(d), .207, .402(b), .403(a)(1), .403(a)(2), .404(c), .404(d)(3), .502(b), .601(a), .602(a), .701(a), .701(b), .702(e), .702(h), .703, .704(c), .704(e), .801(e), .901(b) and .1001(a).

10 CFR 835 requirements for which the recommended standards set has provided a contradictory statement (thereby ensuring noncompliance) to the requirement: Sections 835.702(a) and .702(b).

10 CFR 835 requirements for which the recommended standards set changes key words or phases that could change the intent of the requirement: Sections 835.702(f), .702(g) and .703.

Based on the discrepancies identified above, it appears that 10 CFR 835 is not adequately included and that compliance to the requirements is not adequately assured. Please explain your basis for determining compliance with 10 CFR 835 using the recommended set of radiological, nuclear and process safety standards documented in the SRD

Contractor Response

BNFL is committed to full compliance with 10 CFR 835, absent the granting of an exemption to a specific section. To this extent, a Safety Criterion (1.0-10) will be added to Volume II of the SRD stating this.

Proposed Safety Criterion:

"Safety Criterion: 1.0-10
In addition to the Safety Criteria contained herein, compliance with all requirements of 10 CFR 830.120 and 10 CFR 835 shall be achieved absent the granting of an exemption request to any specific requirement therein."

Compliance to 10 CFR 835 will be demonstrated through the activities performed under the approved Radiation Protection Program (to be submitted in Part B as an outline in support of the Initial Safety Assessment, a draft in support of the Construction Authorization Request and a final in support of the Operating Authorization Request, per the scheduled deliverables provided in DOE/RL-96-0003 Section 4.2.2, 4.3.2, and 4.4.2).

As a part of overall TWRS-P Project, the SRD was developed in a manner most appropriate to the specific phase of the project in the most consistent, safe, and cost-effective manner. Included in this approach is the formal development and implementation of requirements and standards applicable to the life cycle stage of the facility. In addition, the review and consideration of proposed revisions to 10 CFR 835 requirements, expected to be in effect during later stages of the facility life cycle, was performed. This review of proposed

changes to 10 CFR 835 provided a forward thinking viewpoint which will help ensure the facility is in compliance with the rules and regulations expected to be in effect during the operating phase of the facility lifecycle opposed to demonstrating compliance to the regulations in effect today. However, regardless of whether the proposed changes occur, BNFL will be in compliance with the requirements of 10 CFR 835 in effect at the time the regulated activities occur.

Perceived discrepancies in detailed paragraphs 3, 4, 5, and 6 of the Observation will be addressed in Attachment 1 to Question 1.

Disposition

The BNFL response is responsive but unacceptable for reason indicated below:

A follow-on question is needed to ensure a comprehensive review of this issue. The BNFL response addressed and resolved the issue of whether compliance to 10 CFR 835 is required by the selected set of standards. A commitment of compliance to 10 CFR 835 will appear in the set of selected standards with the addition of a new Safety Criterion 1.0-10. However, DOE/RL-96-0004 states that "the SRD shall also contain, as a subset, the nuclear safety requirements that are enforceable under 10 CFR 820" (Section 1.0, p. 1 of 12), which includes the requirements of 10 CFR 835. At present, the SRD does not contain all of the requirements of 10 CFR 835, because many of the existing safety criteria reword the requirements of the rule. For this reason, a new concern exists that a potential contradiction may exist in the BNFL standards set between Safety Criterion 1.0-10, which requires compliance to 10 CFR 835 and the SRD does not currently contain all of the explicit requirements of 10 CFR 835 as required.

The appropriate follow-on question to ensure comprehensive review and resolution of this issue is: Where in the SRD are the explicit nuclear safety requirements of 10 CFR 835 contained?

[During a meeting on November 14, 1997, among BNFL and RU representatives, several acceptable approaches to resolving this new issue were identified. It is expected that BNFL will choose one of the acceptable approaches discussed. During a meeting on November 19, 1997, BNFL representatives indicated that the Safety Criterion containing wording that is potentially contradictory with 10 CFR 835 would be deleted from the set of selected standards presented in the SRD, Vol. II, Sections 1-9. It was further discussed that Safety Criterion 1.0-10 needed to indicate (by reference) that the nuclear safety requirements are contained in the SRD. BNFL representatives appeared to accept this resolution to this issue.]

Supplemental Response

Chapter 5.0 of the SRD Volume has been revised to reflect this disposition. See Attachment-Question 1 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997.

Supplemental Disposition

The supplemental response is acceptable. Safety criteria potentially contradictory to 10 CFR 835 have been removed. Safety Criterion 5.0-1 has been added and states that the RPP shall be developed and submitted compliant with 10 CFR 835 and the content of the RPP shall address all items in 10 CFR 835. The term "items" is considered to mean explicit nuclear safety requirements in this context. This standard provides adequate conformance with DOE/RL-96-0004 that the SRD contain the nuclear safety requirements of 10 CFR 835.

Question # 2

Description

The Safety Requirements Document (SRD) does not include an adequate standard for environmental and public radiation protection. The Safety Criteria selected for inclusion as standards do not provide sufficient depth and scope to protect the environment and the public against the hazards associated with construction and operation of the proposed waste treatment facility.

For example:

a) The SRD does not contain a standard to limit radiation exposure to the public with respect to taking into account public exposure from other radiation sources. The other sources of exposure to the public are associated with operations at U.S. Ecology, WNP-2 nuclear power station, and other Hanford facilities.

Due to the geographical layout of DOE facilities at Hanford (i.e. multiple facilities in close proximity within the site), there is a risk that the public may receive radiation exposure from

multiple facilities resulting in exposures in excess of requirements. The draft rule 10 CFR 834 recognized this nuance and included a proposed standard in 834.102(a) to protect the public. Although the contractor chose not to include draft rule 10 CFR 834 as a standard, no other comparable standard was chosen to protect the public when multiple sources of radiation must be considered.

b) The SRD does not contain a standard that will assure public dose estimates will account for any changes in radiation source dispersion patterns, location of members of the public in the vicinity of the DOE activity, and dose pathways.

Although SRD Section 9.0, Safety Criterion 2, states that "Reports on dose estimates to the public shall include relevant site-specific information, including the locations of members of the public subject to the greatest potential exposures, the population distribution subject to exposures from TWRS-P activities, and exposure pathways germane to the site," there is no assurance that the information will be current.

An example of this type of safety standard is found in draft rule 10 CFR 834.102(d).

c) The ALARA standard chosen does not contain sufficient depth and scope to assure adequate protection of the public and the environment. The standard does not address several important factors, including the ALARA process that will be used to document the societal, environmental, technological, economic, and public policy factors considered in decision making. An example of these factors, taken from draft rule 10 CFR 834.104(c), which may be considered, include the maximum dose to members of the public, the collective dose to the population, doses to workers, applicable alternative processes such as alternative treatments of discharge streams, operating methods, or controls, doses for each alternative evaluated, cost for each alternative evaluated, an examination of the changes in cost among alternatives, societal and environmental (positive and negative) impacts associated with alternatives.

The preceding examples were only identified to substantiate the apparent lack of depth and scope of the standards selected for protection of the public and the environment. There are numerous other examples that were not discussed for the sake of brevity.

Please address this apparent deficiency in the SRD.

Contractor Response

BNFL will include "WAC 246-247 Appendix B" as an Implementing Codes or Standards to SRD Safety Criterion 5.0-3. Specific question are addressed in the following.

a. BNFL was provided the Public Dose Standards as a part of the TWRS-P Contract. These Standards were supplemented with Worker and Public Exposure Standards and are included in the SRD as Safety Criterion 2.0-1. Additionally, allocation of BNFL's portion of the Site wide air emissions standards (primary pathway to the public for BNFL emissions) under normal operations is required to be included as a part of the Air Operating Permit.

b. Once operational, changes in the assumptions used in developing the TWRS-P Safety Basis are required to be reviewed under the USQ process (see SRD Volume II Section 7.4). These changes would include changes in the bases used in determining dispersion patterns, locations of members of the public, exposure pathways, and other information. In addition, this information is required to be current (e.g., latest census data) as a part of the Safety Basis.

c. The standards selected for ALARA as documented in SC 5.0-2 adequately reflect BNFL's commitment to maintaining doses ALARA; these standards have been and are currently

Disposition

The BNFL response is responsive but unacceptable for reason(s) indicated below:

The contractor did not address the overall issue raised by this question - failure to select adequate standards to address compliance with the Radiation Protective Objective of ensuring that radiation exposure and environmental impact due to any release of radioactive material from the facility is kept as low as is reasonably achievable (ALARA) and within prescribed limits. The contractor's response merely stated that "BNFL will include WAC 246-247 Appendix B as an implementing standard to Safety Criterion 5.0-3. (Note: WAC 246-247-120 Appendix B—"BARCT compliance demonstration" states that the purpose of a BARCT demonstration is to choose control technologies for the mitigation of emissions of radioactive material from new emission units or significant modifications to emission units.)

Examples of general areas not covered by standards include free release of contaminated property, ground water protection, radioactive waste management, and free release of bulk

material (soil, sediment, etc.), and radon. These elements may be addressed in the required Environmental Radiological Protection Program, however, the scope and content of the contractor's ERPP has not been defined in the SRD.

Supplemental Response

Safety Criterion 5.3-2 Of the SRD Volume II has been revised to identify the elements required to be included in the ERPP. See Attachment-Question 1 to BNFL's Response to RU Disposition, Letter # 5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's collective supplemental response was acceptable. The initial supplemental response was not acceptable because the process used to select some environmental radiation protection safety criteria resulted in cases where standards were selected which were less stringent, or did not meet State regulations. These standards would not be in compliance with applicable regulations. The safety criteria in question adopted portions of text from WAC 246-247-040.

BNFL provided additional information to their supplemental response in a document (that was added to the BNFL Docket) which expanded on the standards selected in the SRD. Specifically, BNFL added WAC 173-480-040, -050, and -060 as standards. Also included in the table of "TWRS-P Exposure Standards" was 40 CFR 61.92-10 and 40 CFR 61 Subparts H and I. For additional detail, refer to the BNFL supplemental response document that was entered into the BNFL docket.

The added standards are sufficient to ensure that the BNFL selected standards will comply with applicable regulations.

Question # 3

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:
Question 1(a) - 1 Scope of Hazard Evaluation Studies [ref: HAR Section 5.1] — The HAR states that electrical and control systems were not the subject of separate hazard evaluation studies, since these support systems were considered in the review of each process system. The HAR also states that loss of services and the domino effect of this loss is a check list item. However, the check list is not included in the report. The review team is concerned that failure of electrical and control systems may effect multiple process systems and that the severity of such domino effects may not have been thoroughly evaluated. Please explain in more detail the domino effects associated with failure of electrical and control systems.

Contractor Response

1(a)-1 Response.

The domino (cascade) effect was considered explicitly by the PHA study for each area of the process. A copy of the guide word list based on the procedure is attached for

information. Considering the cascade effect from loss of services (e.g., power, water, air), identified process-effects such as loss of cooling and valve closures. Where there was an impact on safety identified, the team examined these effects in more detail. For example, there was the generic concern that valve closures could result in a reduction of safety. An action was given to the Process Team Member to ensure that valve closures on loss of service (e.g., air or power) would result in the facility failing to a safe state. This requirement has been incorporated into the BOD (Appendix 5), which includes the following:

The detailed design phase of the project will consider the failure position for control valves. Structures, systems, and components shall be designed to provide adequate safety on loss of motive power to control valves.

These design requirements are independent of the consequences of any potential hazard arising from valve closures after loss of services. The BOD document was provided to the RU on September 26, 1997.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

General Question: The contractor's response is unacceptable because it indicated that the domino effect from loss of services has been analyzed in the PHA. The response states that no credit was taken for the availability of ventilation system as well as the backup power. The response also states that the backup power will not perform a safety function. However, it is not clear from the HA that such a conclusion can be drawn. It is conceivable that a design basis seismic event can cause a loss of offsite power. The onsite backup power is also assumed to be lost if it is not being built as a safety class system. Under this condition, the function of the off-gas system could be impaired to the extent such that exposure to the public could exceed the established limits.

The HA should address the consequence of Natural Phenomenon Hazards (NPH). This is usually the most demanding design consideration for a facility. The domino effect starts at NPH causing multiple coincident failures including the backup power supply source. The HA provided in this submittal does not appear to contain sufficient detail to allow the reviewer (or the designer at this time) to draw definitive conclusions on the design classification of

Supplemental Response

Responses to detailed questions were found to be acceptable. The unacceptable response was to the general question. Since the general question is identical in Questions. 3 and 123, they can be considered as one.

The reviewer has three concerns:

1. "The response also states that the backup power will not perform a safety function. However it is not clear from the PHA that such a conclusion can be drawn."

2. NPH should have been explicitly addressed in the PHA in order that the cascade effects from the event(s) are considered. In his mind, the consequences may lead to the requirement for DC I, II systems (e.g. backup power).

3. The identification of Standards in the SRD for DC I power supplies do not appear to be linked to the PHA, i.e. are not hazards based.

Each of these is addressed.

1. The PHA does not draw conclusions regarding the need for particular safeguards to perform a specific safety function. Such conclusions are dependent on a quantitative determination as to whether or not public or worker exposure standards are challenged. The response makes no judgement (except against specific events identified by the reviewer in his specific questions) on whether or not backup power performs a safety function. Its need to do so (or otherwise) is entirely dependent on assessed consequences of potential hazards and the choice of the specific preventative or mitigative function (which may or may not require power).

2. The PHA has identified a seismic event as a condition that could lead to unacceptable consequences if seismically-induced failures of some systems and components containing radioactive materials are not prevented or the consequences not mitigated. The accident analysis will quantitatively address the multiple coincident failures for such a seismic event. The accident analysis will initially take no credit for prevention or mitigation. If the consequences to the public or the worker exceed the radiological or chemical exposure standards, then Seismic Category I engineered features will be designated until the

exposure standards are satisfied. As these Seismic Category I features will be designed to withstand the design basis earthquake, credit is taken for their operation in the re-analysis of the event. The analysis for NPH initiated events will be addressed in the Initial Safety Analysis Report (to be submitted in January 1998).

3. The Hazard Analysis Report (HAR) listed several potential safeguards that would require electrical power. The need for Design Class I or II electrical systems for accident prevention or mitigation will be identified in the accident analysis. As the HAR and the Safety Requirements Document (SRD) were submitted before the Initial Safety Analysis Report (which contains the accident analysis), the SRD makes the conservative assumption that Design Class I or II electrical power might be required.

Although specific responses (against specific scenarios identified by the reviewer) led to the conclusion that power supplies are not required to perform a safety function, this does not preclude the results of the accident analysis work discussed above. If the accident analysis concludes that for any scenario loss of power leads to consequences that challenge public or worker exposure standards, then those power supplies will be designated DCI or II as appropriate, i.e. they would perform a safety function.

Supplemental Disposition

The contractor's supplemental response was acceptable. The BNFL supplemental response adequately addressed the concerns regarding the safety function of backup power and considerations of NPH in the PHA, and DC I power supplies.

Question #

4

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

Question 1(a) - 2 LAW Feed Receipt Evaporator [ref: HAR Event Identifier 2100/14 ; Page 5-31] — States that backup power may be available during loss of normal power. This implies that the backup power source would be required to perform safety functions and appropriate codes and standards would follow. However, based on the severity of consequence ranking, the review team could not determine the linkage between codes and standards and hazard controls. Please explain the linkage between this event, its related hazards control strategies the selected codes and standards in the SRD.

Contractor Response

1(a)-2 Response

The consequences identified for this event (Fault Schedule Event Identifier 2100/14, HAR page 5-31) were considered by the Hazard Evaluation Team to be negligible, reflected in the worker/public consequence rating of 1. None of the consequences identified, taking no credit for mitigation (e.g., ventilation or filtration), lead to DCI or DCII protection requirements. Although the event description states backup power may be available, it was not required as a mitigator. Therefore, there is no requirement for the back-up power to perform a safety function or the need for standards from the SRD.

Disposition

The BNFL response is considered to be responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because the consequence from the event is considered negligible and no backup power is needed for this event.

Supplemental Response

Supplemental Disposition

Question # 5

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

Question 1(a) - 3 Entrained Solids Removal [HAR Event Identifier 1/45, Page 5-46] — During loss of power the in-feed valve will close. This implies the valve will perform a safety function. However, based on severity of consequence the review team could not determine the linkage between codes and standards and hazard controls. Please explain the linkage between this event, its related hazards control strategies the selected codes and standards in the SRD.

Contractor Response

1(a)-3 Response

The consequences identified for this event (Fault Schedule Event Identifier 1/45, HAR page 5-46) were considered by the Hazard Evaluation Team to be negligible, reflected in the worker/public consequence rating of 1. None of the consequences identified, taking no credit for mitigation (e.g., ventilation or filtration), lead to DCI or DCII protection requirements. Although the event description states the in-feed valve will close, it was not required as a mitigator. Therefore, there is no requirement for the in-feed valve to perform a safety function or the need for standards from the SRD.

Disposition

The BNFL response is responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because the consequence from this event is negligible and no credit is taken for the in-feed valve closure.

Supplemental Response

Supplemental Disposition

Question # 8

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

(a) - 5 HLW Melter Feed Receipt and Pretreatment [HAR Event Identifier 1614666/128, Page 5-60] — During loss of normal power source the operation would rely on high integrity power supplies. However, based on severity of consequence the review team could not determine which codes and standards were selected to ensure the integrity of the power source. Please explain the linkage between this event, its related hazards control strategies the selected codes and standards in the SRD.

Contractor Response

1(a)-3 Response

The consequences identified for this event (Fault Schedule Event Identifier 1614666/128, HAR page 5-60) were considered by the Hazards Evaluation Team to be negligible, reflected in the worker/public consequence rating of 1. None of the consequences identified, taking no credit for mitigation (e.g., ventilation or filtration), lead to DCI or DCII protection requirements. Although the event description states back-up power may be available, it was not required as a mitigator. Therefore, there is no requirement for the back-up power to perform a safety function or the need for standards from the SRD.

Disposition

The BNFL response is responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because the consequence from this event is negligible and backup power is not required.

Supplemental Response

Supplemental Disposition

Question # 9

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

(a) - 8 LAW Vitrification Off-Gas Treatment [HAR Event Identifier 1614672/218, Page 5-179] — During loss of power this operation would rely on diesel back-up. However, based on severity of consequence the review team could not determine the linkage between specific codes and standards for the diesel backup and hazard controls. Please explain the linkage between this event, its related hazards control strategies the selected codes and standards in the SRD

Contractor Response

1(a)-8 Response

The consequences identified for this event (Fault Schedule Event Identifier 1614672/218, HAR page 5-178) were considered by the Hazards Evaluation Team to be minor, reflected in the worker/public consequence rating of 2. Taking no credit for mitigation (e.g., ventilation or filtration), DCI or DCII protection is unlikely to be required. Although the event description states back-up diesels may be required, it was not required as a mitigator. There is no requirement for the diesel to perform a safety function and no standards are included in the SRD for this requirement.

Disposition

The BNFL response is considered to be responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because the consequence from this event is negligible and diesel backup power is not required.

Supplemental Response

Supplemental Disposition

Question # 10

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:

DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

Question 1(a) - 9 LAW Vitrification Emergency Off-Gas System [HAR Event Identifier 1614687/176, Page 5-192] — The HAR states emergency supplies are provided by Bechtel. Please provide an explanation of the emergency supplies provided by Bechtel.

Contractor Response

In this context, the term "emergency" reflects back-up supplies. The back-up supplies are electric power, instrument air and water services supplied from out-cell systems which may be required in the event that normal supplies are lost. The requirement identified for the Fault Schedule Event Identifier 1614687/176 (HAR page 5-192) would be an operational requirement only; the consequences of the loss of power event were considered to be "minor" (see Question 11). The consequence rating of 2 is applied to the potential for loss of filter efficiency. Progressive water challenge to a filter will lead to blinding (indicated by an increase in differential pressure) across the filter bank and eventual rupture.

Disposition

The BNFL response is responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because the consequence from this event is negligible and backup power is not required.

Supplemental Response

Supplemental Disposition

Question # 11

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1a - Codes and Standards for Electrical and Control Systems

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

Question 1(a) - 10 LAW Vitrification Emergency Off-Gas System [HAR Event Identifier 1614687/197, Page 5-192] — No safeguard has been identified for the loss of power event, especially based on the fact that it had worker and public consequences of 2, which is greater than Event Identifier 1614687/176. Please explain why safeguards not identified at

this time for this event.

Contractor Response

The Fault Schedule Event Identifier 1614687/197 should not exist; the initiating event quoted is identical to those given in the preceding event on this page, (event 1614687/176). The event refers to the same process area. The hazard/worker/public consequences quoted against 1614687/197 should have been combined with 1614687/176. This "double counting" of the initiating event was an error in transcription between the Study Meeting Records and the Fault Schedule. The Fault Schedule will be revised. A mark-up of the revision to be included in the HAR revision at the end of Part A is attached.

Disposition

The BNFL response is responsive and acceptable.

General Question: See disposition for Question Number 3.

Detailed Question: The contractor's response is acceptable because an error has been identified and corrected. The consequence from this event is negligible and backup power is not required.

Supplemental Response

Supplemental Disposition

Question # 12

Description

Theme #1: The connection between the HAR and standards selection is unclear
Subordinate Theme #1c - Natural Phenomena Hazards (NPH)

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

GENERAL QUESTION: How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

Question 1(c) - 1 In SRD, Vol. II, Section 4.1, "General Design," page 4-3, the NPH design criteria and loads for Design Class I and II have been prescribed. The bases for the selection of the criteria and loads have not been justified adequately. For example, why are equal hazard response spectra more appropriate to use than say a more broad band standard spectrum such as Newmark-Hall given the perceived shortcomings of equal hazard spectra. Also, why is it acceptable to design SSC's to life safety standards only (PC-2 per DOE Standard 1020 or UBC) if such SSC's are required to mitigate the consequences of hazards to co-located workers? Additionally, the lack of any requirement for tornado design loading is essentially based on the DOE Standard 1020 tornado hazard estimates which were performed over ten years ago. Has this been reviewed against other or more current tornado hazard characterization to ensure that the deletion of tornado hazard for the TWRS facility is appropriate and conservative.

Contractor Response

Question 1(c) -
The justification for the selection of the NPH criteria and loads is based upon DOE-STD-1020-94, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities. The adequacy of DOE-STD-1020-94 as the basis for the TWRS-P facility design was demonstrated by BNFL for earthquakes and tornadoes, the two

most significant natural phenomena hazards, in a presentation to the DOE Regulatory Unit on June 25, 1997. Letter 5193-97-0328-SQA summarized this meeting and was sent to the RU on July 31, 1997 confirming BNFL Inc.'s understanding.

The equal hazard response spectra shapes are used because they most accurately represent the seismic hazard at the Hanford Site and the TWRS-P Facility Site. The equal-hazard response spectra represent the seismicity (source, distance, and magnitudes) and site soil response as developed in the seismic hazard assessment of the Hanford Site (Geomatrix 1996). This approach is in accordance with DOE-STD-1020-94, which states that the Design Basis Earthquake (DBE) spectra shall be a site-specific shape anchored to the appropriate ground motion parameters, and that when a site-specific response spectrum is unavailable, a standardized spectrum shape (such as Newmark-Hall) is acceptable.

An SSC is designated as Design Class II only when it is required to satisfy the radiological or chemical accident exposure standards for the facility or co-located workers. Once an SSC has been designated as Design Class II, then SRD Safety Criterion 4.1-4 defines the NPH loads for that SSC. As shown in Table 4-2 of Safety Criterion 4.1-4, if seismic is the initiating event, the Design Class II SSC is designed to withstand the effects of the DBE. This is the same design requirement that is applied to a Design Class I SSC-protecting a member of the public. Only when the initiating event is not a DBE, or when the SSC has no safety function during the DBE, is a Design Class II SSC designed to life safety standards, (i.e., to UBC seismic requirements).

A tornado missile hazard analysis was performed recently for the Spent Nuclear Fuel Canister Storage Building, which is located in the same area of the Hanford Site (200 East Area) as the TWRS-P Facility site. Application of this analysis to the TWRS-P Facility concluded that neither tornado missiles nor tornado wind need be considered for the facility design since the probability of occurrence is less than 10-6/year. This information was also presented to the DOE RU on June 25, 1997 and confirmed by letter 5193-97-0328-SQA sent

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

"The standards selected for NPH represent an adequate and acceptable set for NPH characterization provided associated standards for DOE 1020 (i.e., DOE-STD-1023) are appropriately referenced in the SRD. However, use of these standards to develop the specific NPH loads and design criteria in the SRD documents are unacceptable because of the following reasons:

(a) Justification for the selection of NPH criteria and loads based on DOE-STD-1020-94 for the design of all classes of SSC's needs to be documented with all backup information (studies, reports, etc.) appropriately summarized and referenced. The justification needs to consider NPH hazards with appropriate severity and occurrence frequency, associated consequences and mitigation necessary to meet appropriate Safety Criteria. As indicated in the HAR, seismic hazards (and for that matter other NPH hazards) have not been addressed as yet in the hazard/accident analysis. The subject justification will have to be developed upon completion of the hazard/accident analysis.

(b) Contrary to the justification put forth in the BNFL response for the use of equal hazard spectra for seismic design of SSC's, DOE-STD-1020 (and DOE-STD-1023) referred to therein) clearly delineates how design basis earthquake spectra should be developed from equal hazard spectra developed from a probabilistic seismic hazard study. Note that even for SSC's designed as essential facilities per DOE-STD-1020, a case has to be made for not using site seismic spectra instead of UBC if the former would be more conservative.

(c) The cited tornado and tornado missile analyses will have to be documented as indicated above in (a). However, the Contractor needs to be cognizant that tornado hazard methodology and results in DOE-STD-1020 is an ongoing review at the present time in DOE.

(d) It is not clear if the recommendations of ASCE 4-85 standard, which is referenced in the SRD, will also be considered in addition to DOE Standard 1020 in the design basis spectra development and also in the seismic analysis of the SSCs. If there are differences between these two standards (and for that matter between any other implementing standards referenced in the SRD), it is necessary to clarify how such differences will be resolved. Note that a new revision of the ASCE 4 (i.e. 1997) will be available in the near future (out for public comments by mid January, '98) and this will replace ASCE 4-1986 listed in the SRD. Since this later revision of ASCE 4 will reflect the current state of the knowledge in seismic analysis and design of nuclear structures, it should be clarified if this 1997 standard will be adopted if it becomes available prior to the start of the design.

(e) There are no discussions of NPH standards that will be applied to the modification of the existing double shell tank (DST) to be used for waste receipt.

However, resolution of these questions/issues can be provided to the RU either before or concurrent with the ISA submittal by providing additional information and explanation/justification for the loads and criteria selected."
to the RU on July 31, 1997.

Supplemental Response

The NPH criteria are based upon DOE-STD-1020-94 and sited specific studies at the Hanford Site which will be addressed in the Initial Safety Analysis Report (ISAR). The following lists site specific documents which are important to the justification of the NPH criteria.

(a) Seismic values are based upon Geomatrix Consultants, Inc., 1996, "Probabilistic Seismic Hazard Analysis DOE Hanford Site Washington", WHC-SD-W236A-TI-002. This study has been reviewed and approved by DOE-HQ. The results of this study will be summarized in the ISAR. The application of DOE-STD-1023-94 will also be addressed.

Wind Hazard criteria are based on DOE-STD-1020-94 and the application of NUREG/CR-4492, "Methodology for Estimating Extreme Winds for Probabilistic Risk Assessments", Ramsdell et al, 1986 for straight and tornadic wind hazards. Ramsdell (personal communication, 1996) said that the methodology has not changed nor would the additional years of data (~4 years) change the hazard

Volcanic Hazard is based on USGS hazard studies (Scott et al, 1995, "Volcanic Hazards in the Mount Adams Region, Washington", Open-File Report 95-492), which includes the ashfall hazard of all Cascade volcanoes. Another study, Salmon, 1996, "Volcano Ashfall Loads for the Hanford Site", also supports the ash load criteria.

Flood Hazard is based on DOE-STD-1020-94 and "Probable Maximum Precipitation - Pacific Northwest", Hydrometeorological Report No. 57, by Hansen et al, 1994. River flooding will be shown in the ISAR to not be a hazard at the elevation of the TWRS-P Facility.

Snow Load is based upon ASCE-7-95 and 50+ years of site specific data.

The HAR has identified a seismic event as a condition that could lead to unacceptable consequences if seismically-induced failures of some systems and components containing radioactive materials are not prevented or the consequences not mitigated. The accident analysis to be included in the ISAR will quantitatively address the multiple coincident failures from a seismic event. The accident analysis will initially take no credit for prevention or mitigation. If the consequences to the public or the worker exceed the radiological or chemical exposure standards, then Seismic Category I engineered features will be designated until the exposure standards are satisfied. As these Seismic Category I features will be designed to withstand the design basis earthquake, credit will be taken for their operation in the reanalysis of the event. Other natural phenomena events will be addressed in a similar manner. However, for most other NPH events the buildings will shown to provide adequate protection for the systems and components they contain.

(b) Further justification of the response spectral shape will be included in the ISAR. The ISAR will discuss the use of DOE-STD-1020 and 1023-94 in the preparation of the response spectra.

(c) We are aware of the ongoing review and revision of the tornado/wind portion of DOE-STD-1020-94. It is not apparent, however, that these revisions would result in the need to consider tornadoes for the Hanford Site. The ISAR will discuss to tornadoes.

(d) We are aware that this document is in 'final' review and will be released very soon. The revised ASCE-4 standard will be reviewed when available and addressed as appropriate.

(e) The SRD Volume II Safety Criteria and Implementing Codes and Standards applies to modifications to be made by BNFL to tank 241-AP-106. This will be made clear in a revision that states "the Safety Criteria and codes and standards of the SRD are also applied to the BNFL Inc modifications for Tank 241-Ap-106." to ISMP Section 1.3.3, "Safety Requirements Document"

Supplemental Disposition

The Contractor's supplemental response was acceptable. However, as indicated in the original disposition, the entire NPH design criteria will be reviewed when all the required documentation has been provided either before or concurrent with the ISA submittals. The final determination of acceptability for the Contractor's response to part (e) of the questions had been postponed until the ISA review since the issue of design analysis for the types of tanks containing radioactive materials used in this system was not specifically addressed. The contractor should consider researching applicable reports specific to this design

applicable to tanks containing radioactive materials and providing references as appropriate.

Question # 13

Description

Theme #2: Hazards analysis should have been done using unmitigated consequences in order to define standards.

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles
Section 5.2.2 Process Hazard Analysis: "The Contractor should perform a process hazards analysis using acceptable industry practices...."

SRD REVIEW GUIDE:
Section 8.2; Hazards Assessment. Attribute 7; Assessment Basis: "...assumed barriers to delivery of hazards to a designated receptor,..."

Section 8.2; Hazards Assessment. Attribute 3; Hazards Characterization: "The Contractor's hazards assessment results permit risk-informed judgments to be made on the need for and importance of hazards controls."

OBSERVATION:

Pages 3-2 and 3-3 of the HAR state:

"More specifically, ISA development establishes the necessity of compliance with the requirements of Draft NUREG-1520....The requirements of hazard identification are stated in Section 4.5.3.7 of Draft NUREG-1520...."

b. ".....The description should list deviations from normal operations, the causes of such deviations, the unmitigated consequences of the resulting accidents and....."

Further, the Contractor's Safety Criterion 3.1-4 states that "The hazard analysis shall be performed in accordance with the following requirements: (1) The consequences of unmitigated releases of radioactive material and/or highly hazardous chemicals shall be evaluated." (2) The Hazard Analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility."

Some analyses referred to as "unmitigated releases" take account of the quantity of material at risk, the form (soluble/insoluble, powder or lump, etc.) of the material, the distance to potential receptors, dispersion factors (atmospheric stability/wind speed), the duration of exposure, and the duration of release.

Page 3-11 of the HAR goes on to state: "The hazard evaluation team assigns a consequence value based on qualitative or semi-quantitative scale to each accident." Finally, page 6-1 of the HAR states: "The hazard evaluation teams assigned consequence categories based on the assumption that certain mitigating design features (e.g., cell ventilation systems) were functioning as intended."

The assumptions used with regard to hazard control features assumed as part of the consequence estimation (e.g., shielding, confinement, ventilation system filters) are not explicitly cited in the HAR. In a briefing to the RU on 10/2/97, BNFL stated that mitigating features were generally assumed in the analysis, as indicated above. Hence, it is not possible to tell from the fault schedules what absolute consequence potential exists for

each hazard or group of hazards. Even though protection from passive features such as shielding and confinement can generally be counted upon in "low energy" events (liquor spillage, etc.), the potential exists for failure of such passive devices during such an accident (i.e., maintenance of doors or filters during the accident).

GENERAL QUESTION:

What are the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for worker and the public ? Does the severity ranking reflect an unmitigated event or a mitigated event?

DETAILED QUESTIONS:
Question 2 - 1 How is "unmitigated" defined for the purposes of SRD, Volume II, Safety Criterion 3.1-4, pp 3-2?

Contractor Response

Response to General Question.

Credit was taken for mitigative features of the design which would not be affected by the hazardous situation. For example, credit was taken for ventilation and filtration features after an in-cell liquor spillage (see HAR page 5-39, event identifier 1/44 for one example) since the event does not impact those active systems. Where mitigative features could be affected by the hazardous situation then no credit was taken. For example, credit was not taken for ventilation and filtration features after a fire/explosion event. (See HAR page 5-72, event identifier 2200/12.) The public/worker consequence ratings assigned reflect this approach.

However, the observation section(s) of the questions point out a concern (final paragraph in observation section in Questions 13, 15) not expressed in the general question. The reviewer concludes that even if the event itself does not affect the active system, failure of that system could still occur during the event due to some other coincident activity (example given is maintenance activities). Coincident failure modes were not considered for the binning process in the HAR. In carrying out the binning process, the Hazards Evaluation Team used a consistent approach (i.e., to consider only the hazardous situation). This is in accordance with:

1) The Top Level Safety Standards (DOE/RL-96-0006) which in defining event frequencies do so on a per event basis, co-incident events are not included.
2) The AIChE guidelines: binning of hazardous situations does not include coincident events which may occur during the hazardous situation.

Response to Detailed Question 2-1.

Unmitigated releases as used in SC 3.1-4 and means that no credit is taken for active features or for passive features in which the initiator compromises the mitigative function of the passive feature.

Disposition

The BNFL response is considered to be responsive and acceptable.

The general question asks the Contractor for the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for workers and the public, and whether the severity rankings reflected an unmitigated event or a mitigated event. The Contractor responded that credit was taken for mitigative features of the design which would not be affected by the hazardous situation. The detailed question asked the Contractor to define "unmitigated" for the purposes of BNFL's Safety Criterion 3.1-4 on page 3-2 of the SRD, Volume II. The Contractor's response indicated that unmitigated releases as used in SC 3.1-4 means that no credit is taken for active features or for passive features in which the (accident) initiator compromises the mitigative function of the passive feature.

Supplemental Response

Supplemental Disposition

Question # 14

Description

Theme #2: Hazards analysis should have been done using unmitigated consequences in order to define standards.

SUBMITTAL CRITERIA:
DOE/RL-96-0003

Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles
Section 5.2.2 Process Hazard Analysis: "The Contractor should perform a process hazards analysis using acceptable industry practices...."

SRD REVIEW GUIDE:
Section 8.2; Hazards Assessment. Attribute 7; Assessment Basis: "...assumed barriers to delivery of hazards to a designated receptor,..."

Section 8.2; Hazards Assessment. Attribute 3; Hazards Characterization: "The Contractor's hazards assessment results permit risk-informed judgments to be made on the need for and importance of hazards controls."

OBSERVATION:

Pages 3-2 and 3-3 of the HAR state:

"More specifically, ISA development establishes the necessity of compliance with the requirements of Draft NUREG-1520....The requirements of hazard identification are stated in Section 4.5.3.7 of Draft NUREG-1520...."

b. ".....The description should list deviations from normal operations, the causes of such deviations, the unmitigated consequences of the resulting accidents and....."

Further, the Contractor's Safety Criterion 3.1-4 states that "The hazard analysis shall be performed in accordance with the following requirements: (1) The consequences of unmitigated releases of radioactive material and/or highly hazardous chemicals shall be evaluated." It also states that "The hazard analysis shall be performed in accordance with the following requirements: .... (2) The Hazard Analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility."

GENERAL QUESTION:

What are the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for worker and the public ? Does the severity ranking reflect an unmitigated event or a mitigated event?

DETAILED QUESTIONS:

Question 2 - 2 How are "highly hazardous chemicals" defined for the purposes of SRD, Volume II, Safety Criterion 3.1-4, pp 3-2?

Contractor Response

Response to General Question.
Credit was taken for mitigative features of the design which would not be affected by the hazardous situation. For example, credit was taken for ventilation and filtration features after an in-cell liquor spillage (see HAR page 5-39, event identifier 1/44 for one example) since the event does not impact those active systems. Where mitigative features could be affected by the hazardous situation then no credit was taken. For example, credit was not taken for ventilation and filtration features after a fire/explosion event. (See HAR page 5-72,

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor response to the general question is acceptable. The general question in question 14 is the same as that in question 13, and the Contractor's response is also identical.

The Contractor response to the detailed question is unacceptable. The detailed question asks the Contractor for the definition of "highly hazardous chemical" for the purposes of Safety Criterion 3.1-4 on page 3-2 of the SRD, Volume II. The Contractor responded with the definition for "highly hazardous chemical" provided in DOE/RL-96-0006, i.e., a substance possessing toxic, reactive, flammable, or explosive properties in Appendix A of 29 CFR 1910.119. However, Safety Criterion 3.1-4 is confusing because subsection (1) of the SC says that consequences of unmitigated releases of ...highly hazardous chemicals shall be evaluated, but subsection (2) says that the hazard analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility. Therefore, subsection (2) of SC 3.1-4 embraces a very large class of materials, because all substances are poisons and therefore hazardous; there is none which is not a poison. (The right dose differentiates a poison and a remedy.) Subsection (1) of SC 3.1-4 covers only a limited subset of those chemicals, namely those chemicals specifically identified by 29 CFR 1910.119 Appendix A. Although the Contractor is using the same definition for "highly hazardous chemical" as that provided by the RU in DOE/RL-96-0006, the directions for performing hazard analyses provided by SC 3.1-4 are made unclear as a result of this limiting definition of "highly hazardous chemical".

The Contractor's response to question 166 (general question) states that "as the TWRS-P facility will contain both radiological and chemical materials, the incident investigation will treat both of these hazards equally." No distinction is to be made between "highly hazardous" chemicals and those not so designated for purposes of incident investigation. It appears to the RU that BNFL's approach to hazard analysis of chemical hazards in TWRS-P should be consistent with BNFL's approach to investigation and reporting of incidents involving releases of chemicals from TWRS-P, i.e., no distinction should be drawn between "highly hazardous" chemicals and any others for the purposes of hazard analysis and incident investigation and reporting. The designation of chemicals as "highly hazardous" affects only the requirements imposed by OSHA on BNFL through OSHA's Process Safety Management Standard.

An acceptable response will offer (1) a commitment to modify the language in Safety Criterion 3.1-4, deleting the distinction between chemicals that are designated "highly hazardous" and those that are merely "hazardous" for the purposes of hazard analysis, or (2) provide cogent arguments justifying why chemical hazards not designated as "highly hazardous" (as defined by OSHA and BNFL) should escape the necessity for hazards analysis.

Supplemental Response

Safety Criterion 3.1-4 will be revised to read as follows:

"The consequences of unmitigated releases of radioactive material and process chemicals considered to pose a hazard shall be evaluated."
event identifier 2200/12.) The public/worker consequence ratings assigned reflect this approach. Wherever else the term "highly hazardous chemicals" is found in the Safety Criteria (e.g. SC 3.1-2) the words "process chemicals considered to pose a hazard..." will be substituted.
However, the observation section(s) of the questions point out a concern (final paragraph. in observation section in Questions 13, 15) not expressed in the general question. The This substitution is intended to clarify that analyses are not restricted to only "highly hazardous chemicals" as defined by OSHA but consider all process chemicals considered to pose a hazard.

Supplemental Disposition

The Contractor's supplemental response to the detailed question is acceptable. BNFL has revised Safety Criteria 3.1-4 (and other safety criteria, e.g., SC 3.1-2) to clarify that analyses are not restricted to only highly hazardous chemicals as defined by OSHA but consider all process chemicals considered to pose a hazard.
reviewer concludes that even if the event itself does not affect the active system, failure of that system could still occur during the event due to some other coincident activity (example given is maintenance activities). Coincident failure modes were not considered for the binning process in the HAR. In carrying out the binning process, the Hazards Evaluation Team used a consistent approach (i.e., to consider only the hazardous situation). This is in accordance with:

1) The Top Level Safety Standards (DOE/RL-96-0006) which in defining event frequencies do so on a per event basis, co-incident events are not included.
2) The AIChE guidelines: binning of hazardous situations does not include coincident events which may occur during the hazardous situation.

Response to Detailed Question 2-2.

As defined in DOE/RL-96-0006 - Highly hazardous chemical - a substance possessing toxic, reactive, flammable, or explosive properties and is specified in Appendix A of 29 CFR 1910.119.

Question # 15

Description

Theme #2: Hazards analysis should have been done using unmitigated consequences in order to define standards.

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles
Section 5.2.2 Process Hazard Analysis: "The Contractor should perform a process hazards analysis using acceptable industry practices...."

SRD REVIEW GUIDE:
Section 8.2; Hazards Assessment. Attribute 7; Assessment Basis: "...assumed barriers to delivery of hazards to a designated receptor,..."

Section 8.2; Hazards Assessment. Attribute 3; Hazards Characterization: "The Contractor's hazards assessment results permit risk-informed judgments to be made on the need for and importance of hazards controls."

OBSERVATION:

Pages 3-2 and 3-3 of the HAR state:

"More specifically, ISA development establishes the necessity of compliance with the requirements of Draft NUREG-1520....The requirements of hazard identification are stated in Section 4.5.3.7 of Draft NUREG-1520...."

b. ".....The description should list deviations from normal operations, the causes of such deviations, the unmitigated consequences of the resulting accidents and....."

Further, the Contractor's Safety Criterion 3.1-4 states that "The hazard analysis shall be performed in accordance with the following requirements: (1) The consequences of unmitigated releases of radioactive material and/or highly hazardous chemicals shall be evaluated." It also states that "The hazard analysis shall be performed in accordance with the following requirements: .... (2) The Hazard Analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility."

Some analyses of so-called "unmitigated releases" take account of the quantity of material at risk, the form (soluble/insoluble, powder or lump, etc.) of the material, the distance to potential receptors, dispersion factors (atmospheric stability/wind speed), the duration of exposure, and the duration of release.

Page 3-11 of the HAR goes on to state: "The hazard evaluation team assigns a consequence value based on qualitative or semi-quantitative scale to each accident." Finally, page 6-1 of the HAR states: "The hazard evaluation teams assigned consequence categories based on the assumption that certain mitigating design features (e.g., cell ventilation systems) were functioning as intended."

The assumptions used with regard to hazard control features assumed as part of the consequence estimation (e.g., shielding, confinement, ventilation system filters) are not explicitly cited in the HAR. In a briefing to the RU on 10/2/97, BNFL stated that mitigating features were generally assumed in the analysis, as indicated above. Hence, it is not possible to tell from the fault schedules what absolute consequence potential exists for each hazard or group of hazards. Even though protection from passive features such as shielding and confinement can generally be counted upon in "low energy" events (liquor spillage, etc.), the potential exists for failure of such passive devices during such an accident (i.e., maintenance of doors or filters during the accident).

GENERAL QUESTION:

What are the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for worker and the public ? Does the severity ranking reflect an unmitigated event or a mitigated event?

DETAILED QUESTIONS:

Question 2 - 3 How will the consequences of unmitigated releases be evaluated by BNFL Inc. for hazard controls selection — qualitatively or quantitatively?

Contractor Response

Response to General Question.

Credit was taken for mitigative features of the design which would not be affected by the hazardous situation. For example, credit was taken for ventilation and filtration features after an in-cell liquor spillage (see HAR page 5-39, event identifier 1/44 for one example) since the event does not impact those active systems. Where mitigative features could be affected by the hazardous situation then no credit was taken. For example, credit was not taken for ventilation and filtration features after a fire/explosion event. (See HAR page 5-72, event identifier 2200/12.) The public/worker consequence ratings assigned reflect this approach.

However, the observation section(s) of the questions point out a concern (final paragraph of observation section in Questions 13, 15) not expressed in the general question. The reviewer concludes that even if the event itself does not affect the active system, failure of that system could still occur during the event due to some other coincident activity (example given is maintenance activities). Coincident failure modes were not considered for the binning process in the HAR. In carrying out the binning process, the Hazards Evaluation Team used a consistent approach (i.e., to consider only the hazardous situation). This is in accordance with:

1) The Top Level Safety Standards (DOE/RL-96-0006) which in defining event frequencies do so on a per event basis, co-incident events are not included.
2) The AIChE guidelines: binning of hazardous situations does not include coincident events which may occur during the hazardous situation.

Specific question 2-3 response.

The consequence evaluation of unmitigated releases is primarily quantitative. This approach uses source term data such as vessel inventories and activity content from design and contract information, release fractions from established data sources such as DOE-HDBK-3010-94, dispersion models based on NRC Reg. Guide 1.145, and dose uptake information from ICRP data sources. This will result in a conservative estimation of doses to public and co-located workers which will allow direct comparison with worker and public exposure standards and so allow identification of appropriate DCI and DCII items if those standards are challenged. Where several hazardous situations give rise to the same mechanisms for consequences, they are evaluated as one (for the purposes of the accident analysis) using conservative, bounding estimates.

Disposition

The BNFL response is considered to be responsive and acceptable.

The general question is the same general question asked in question 13, and the Contractor's response is also identical and appropriate. The detailed question asks whether BNFL's analysis of consequences of unmitigated releases for hazard control selection would be performed qualitatively or quantitatively. The response states that the consequence evaluation of unmitigated releases is primarily quantitative. The response

provides pertinent details of the approach that BNFL intends to use for the selection of hazard controls.

Supplemental Response

Supplemental Disposition

Question # 16

Description

Theme #2: Hazards analysis should have been done using unmitigated consequences in order to define standards.

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles
Section 5.2.2 Process Hazard Analysis: "The Contractor should perform a process hazards analysis using acceptable industry practices...."

SRD REVIEW GUIDE:
Section 8.2; Hazards Assessment. Attribute 7; Assessment Basis: "...assumed barriers to delivery of hazards to a designated receptor,..."

Section 8.2; Hazards Assessment. Attribute 3; Hazards Characterization: "The Contractor's hazards assessment results permit risk-informed judgments to be made on the need for and importance of hazards controls."

OBSERVATION:

Pages 3-2 and 3-3 of the HAR state:

"More specifically, ISA development establishes the necessity of compliance with the requirements of Draft NUREG-1520....The requirements of hazard identification are stated in Section 4.5.3.7 of Draft NUREG-1520...."

b. ".....The description should list deviations from normal operations, the causes of such deviations, the unmitigated consequences of the resulting accidents and....."

Further, the Contractor's Safety Criterion 3.1-4 states that "The hazard analysis shall be performed in accordance with the following requirements: (1) The consequences of unmitigated releases of radioactive material and/or highly hazardous chemicals shall be evaluated." It also states that "The hazard analysis shall be performed in accordance with the following requirements: .... (2) The Hazard Analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility."

Some analyses of so-called "unmitigated releases" take account of the quantity of material at risk, the form (soluble/insoluble, powder or lump, etc.) of the material, the distance to potential receptors, dispersion factors (atmospheric stability/wind speed), the duration of exposure, and the duration of release.

Page 3-11 of the HAR goes on to state: "The hazard evaluation team assigns a consequence value based on qualitative or semi-quantitative scale to each accident." Finally, page 6-1 of the HAR states: "The hazard evaluation teams assigned consequence categories based on the assumption that certain mitigating design features (e.g., cell

ventilation systems) were functioning as intended."

The assumptions used with regard to hazard control features assumed as part of the consequence estimation (e.g., shielding, confinement, ventilation system filters) are not explicitly cited in the HAR. In a briefing to the RU on 10/2/97, BNFL stated that mitigating features were generally assumed in the analysis, as indicated above. Hence, it is not possible to tell from the fault schedules what absolute consequence potential exists for each hazard or group of hazards. Even though protection from passive features such as shielding and confinement can generally be counted upon in "low energy" events (liquor spillage, etc.), the potential exists for failure of such passive devices during such an accident (i.e., maintenance of doors or filters during the accident).

The hazards analysis should have documented the results of unmitigated events. This will lead to the proper identification of hazard control strategies (or safeguards) to mitigate the hazard. Further analysis will show the effectiveness of the various safeguard measures. This will serve as the basis for the selection of codes and standards for the design of those plant structure, systems and components.

If the hazard analysis used results of a mitigated event without any explanation of what assumptions were used, first it will be very difficult to ascertain how much credit has been given to which safety system and secondly, it will present a very confusing picture to the reviewers if additional safeguards are needed to mitigate the event. The process leading to the identification and selection of standards become disjointed. Detailed questions manifesting this problem for reviewers follow.

GENERAL QUESTION:

What are the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for worker and the public ? Does the severity ranking reflect an unmitigated event or a mitigated event?

DETAILED QUESTIONS:

Question 2 - 4 HAR, Section 6, Table 6-3 (page 6-5) event # 1614775/431 is listed as an event that could produce serious or major consequences to the public and yet in the hazard analysis (HAR, page 5-291) the consequence to the worker and the public are all categorized as one (1). What is the consequence of the unmitigated event , and what mitigation features were assumed to derive a Consequence Category of 1?

Contractor Response

Response to General Question.

Credit was taken for mitigative features of the design which would not be affected by the hazardous situation. For example, credit was taken for ventilation and filtration features after an in-cell liquor spillage (see HAR page 5-39, event identifier 1/44 for one example) since the event does not impact those active systems. Where mitigative features could be affected by the hazardous situation then no credit was taken. For example, credit was not taken for ventilation and filtration features after a fire/explosion event. (See HAR page 5-72, event identifier 2200/12.) The public/worker consequence ratings assigned reflect this approach.

However, the observation section(s) of the questions point out a concern (final paragraph of observation section in Questions 13, 15) not expressed in the general question. The reviewer concludes that even if the event itself does not affect the active system, failure of that system could still occur during the event due to some other coincident activity (example given is maintenance activities). Coincident failure modes were not considered for the binning process in the HAR. In carrying out the binning process, the Hazards Evaluation Team used a consistent approach (i.e., to consider only the hazardous situation). This is in accordance with:

1) The Top Level Safety Standards (DOE/RL-96-0006) which in defining event frequencies do so on a per event basis, co-incident events are not included.
2) The AIChE guidelines: binning of hazardous situations does not include coincident events which may occur during the hazardous situation.

Response to Detailed Question 2-4

This was an error in the original Section 6 of the HAR which gave rise to the inclusion of this event in Table 6-3. A revised Section 6.0 was transmitted to the RU on October 16, 1997, with this error corrected.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

General question: The Contractor's response is unacceptable because one of the hazards namely, the Natural Phenomenon Hazard (NPH) has not been adequately addressed. NPH are required to be analyzed as part of the HA and they are hazards that can introduce multiple or coincident failures. NPH usually create the most limiting design challenges for a facility. They also become the hazards that necessitate the selection of certain standards to address defense-in-depth and design margin issues. The Contractor should provide the RU with a plan for addressing NPH in the HAR.

Detailed question: The Contractor's response is acceptable because an error in the original HAR (Section 6) submitted to the RU was corrected. The revised HAR, transmitted on October 16, corrects the error.

Supplemental Response

Responses to detailed questions were found to be acceptable. The unacceptable response was to the general question. Since the general question is identical in both Questions. 16, 17, they can be considered as one.

The same general question was asked in Question 13. The same response (as given to Questions 16 and 17) was given and considered as acceptable. How BNFL deals with NPH is addressed by supplementary responses to Questions 3 and 123.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The BNFL response provided for Question #13 defined "unmitigated" for the purpose of the SRD satisfy the concerns raised by this question.

Question # 17

Description

Theme #2: Hazards analysis should have been done using unmitigated consequences in order to define standards.

SUBMITTAL CRITERIA:
DOE/RL-96-0003
Section 4.1.2, Item 3, The hazard assessment used to facilitate the selection of the standards
Section 4.1.2, Item 4, The hazard control strategy implemented in the design and proposed operations
Section 4.1.2, Item 7, The rationale for the selection of the standards and the adequacy of the set

APPROVAL CRITERIA:
DOE/RL-96-0003
Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles
Section 5.2.2 Process Hazard Analysis: "The Contractor should perform a process hazards analysis using acceptable industry practices...."

SRD REVIEW GUIDE:
Section 8.2; Hazards Assessment. Attribute 7; Assessment Basis: "...assumed barriers to delivery of hazards to a designated receptor,..."

Section 8.2; Hazards Assessment. Attribute 3; Hazards Characterization: "The Contractor's hazards assessment results permit risk-informed judgments to be made on the need for and importance of hazards controls."

OBSERVATION:

Pages 3-2 and 3-3 of the HAR state:

"More specifically, ISA development establishes the necessity of compliance with the requirements of Draft NUREG-1520....The requirements of hazard identification are stated in Section 4.5.3.7 of Draft NUREG-1520...."

b. ".....The description should list deviations from normal operations, the causes of such deviations, the unmitigated consequences of the resulting accidents and....."

Further, the Contractor's Safety Criterion 3.1-4 states that "The hazard analysis shall be performed in accordance with the following requirements: (1) The consequences of unmitigated releases of radioactive material and/or highly hazardous chemicals shall be evaluated." It also states that "The hazard analysis shall be performed in accordance with the following requirements: .... (2) The Hazard Analysis shall be based on an inventory of all radioactive and hazardous nonradioactive materials that are stored, utilized, or may be formed within the facility."

Some analyses of so-called "unmitigated releases" take account of the quantity of material at risk, the form (soluble/insoluble, powder or lump, etc.) of the material, the distance to potential receptors, dispersion factors (atmospheric stability/wind speed), the duration of exposure, and the duration of release.

Page 3-11 of the HAR goes on to state: "The hazard evaluation team assigns a consequence value based on qualitative or semi-quantitative scale to each accident." Finally, page 6-1 of the HAR states: "The hazard evaluation teams assigned consequence categories based on the assumption that certain mitigating design features (e.g., cell ventilation systems) were functioning as intended."

The assumptions used with regard to hazard control features assumed as part of the consequence estimation (e.g., shielding, confinement, ventilation system filters) are not explicitly cited in the HAR. In a briefing to the RU on 10/2/97, BNFL stated that mitigating features were generally assumed in the analysis, as indicated above. Hence, it is not possible to tell from the fault schedules what absolute consequence potential exists for each hazard or group of hazards. Even though protection from passive features such as shielding and confinement can generally be counted upon in "low energy" events (liquor spillage, etc.), the potential exists for failure of such passive devices during such an accident (i.e., maintenance of doors or filters during the accident).

The hazards analysis should have documented the results of unmitigated events. This will lead to the proper identification of hazard control strategies (or safeguards) to mitigate the hazard. Further analysis will show the effectiveness of the various safeguard measures. This will serve as the basis for the selection of codes and standards for the design of those plant structure, systems and components.

If the hazard analysis used results of a mitigated event without any explanation of what assumptions were used, first it will be very difficult to ascertain how much credit has been given to which safety system and secondly, it will present a very confusing picture to the reviewers if additional safeguards are needed to mitigate the event. The process leading to the identification and selection of standards become disjointed. Detailed questions manifesting this problem for reviewers follow.

GENERAL QUESTION:

What are the assumptions used in the hazard analysis that lead to the determination of the consequence rankings for worker and the public ? Does the severity ranking reflect an unmitigated event or a mitigated event?

DETAILED QUESTIONS:

Question 2 -5 HAR, Event # 1614665/128, pp. 5-244, deals with compromise of shielding potentially exposing the workers to unacceptable level of radiation. The consequence ranking shows a 1 and credit was taken for shielding. This contradicts with the assumed initiating event which is the compromise of shielding. What is the consequence of the unmitigated event?

Contractor Response

Response to General Question.

Credit was taken for mitigative features of the design which would not be affected by the hazardous situation. For example, credit was taken for ventilation and filtration features after an in-cell liquor spillage (see HAR page 5-39, event identifier 1/44 for one example) since the event does not impact those active systems. Where mitigative features could be affected by the hazardous situation then no credit was taken. For example, credit was not taken for ventilation and filtration features after a fire/explosion event. (See HAR page 5-72, event identifier 2200/12.) The public/worker consequence ratings assigned reflect this approach.

However, the observation section(s) of the questions point out a concern (final paragraph

of observation section in Questions 13, 15) not expressed in the general question. The reviewer concludes that even if the event itself does not affect the active system, failure of that system could still occur during the event due to some other coincident activity (example given is maintenance activities). Coincident failure modes were not considered for the binning process in the HAR. In carrying out the binning process, the Hazards Evaluation Team used a consistent approach (i.e., to consider only the hazardous situation). This is in accordance with:

1) The Top Level Safety Standards (DOE/RL-96-0006) which in defining event frequencies do so on a per event basis, co-incident events are not included.
2) The AIChE guidelines: binning of hazardous situations does not include coincident events which may occur during the hazardous situation.

Response to Detailed Question 2-5

The worker/public consequence rating does not take credit for shielding. The consequences of this event were considered to be negligible by the Hazards Evaluation Team which found that activity levels in this process area will be low and would therefore present negligible consequences to worker/public. Indeed, two of the safeguard statements (3, 5) refer to low activity and minimal (or no) shielding requirements.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

General Question: The contractor response is unacceptable because it did not address multiple or coincident failures covered by such hazards as NPH or loss of power. NPH characterization is required to be analyzed as part of the HAR because NPH usually creates the most limiting design challenges for a facility. Mitigating such hazards may necessitate selection of certain additional standards for design of SSCs to address confinement, defense in depth or design margin issues.

However, resolution of these issues can be provided to the RU either before or concurrent with the ISA submittal by providing additional information, explanation and justification, or identification of additional standards to address these types of postulated failures.

Detailed Question: The Contractor's response is acceptable because clarification is provided on the fact that mitigation from shielding was not credited in the consequence estimation.

Supplemental Response

Please See Supplemental Response to Question 16.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The BNFL response provided sufficient information to adequately address the shielding issue and additional information on NPH is expected in the ISA submittal. This will be adequate for the closure of this question.

Question # 18

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3a - General

SUBMITTAL CRITERIA:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:

The lack of detail and definitions in the fault schedules of the HAR make them difficult to

review. The calculations and results in the hazards analysis cannot be reproduced by the reviewer(s) with the information provided. There are several details that need clarification so that a thorough review can be conducted.

A better description of the development process for the fault schedules is necessary. The level of mitigation is not explained for the overall process. It is not clear how or when mitigation was introduced to the process. Are mitigating factors (i.e., safeguards) taken into account when determining the frequency and consequences for the initiating events?

There should only be one initiating event for each fault schedule.

Each initiating event may have a different frequency and consequence. When there is more than one initiating event, it is impossible to tell the frequency and consequence for that event. When there is more than one initiating event, it is unclear which safeguards apply to what initiating event.

The initiating events need further description. Some of the initiating event descriptions are too short to understand.

The assumed release/exposure must be stated for each event so that the consequence can be evaluated.

The flowcharts, Figs 2-7 and 2-8, included in BNFL-5193-HAR-01 Hazard Analysis Report, do not appear to match Sect. 2.3 Process Description. The PFDs provided as part of another document (BNFL Engineering Ltd's TWRS Outline Process Description) may provide a better match to the process description in the submittal, but are not part of the Standards Approval Package (SAP).

Table 4-1 Major Radioactive Streams on page 4-2 of the Hazard Analysis Report (HAR) provides activities of various radionuclides in the Feed Receipt Tank, CST/cesium canisters, and High Level Melter, but radionuclide inventories of intermediate process components are not shown in the HAR.

The material-at-risk basis of the Hazard Analysis Report appears to be in error. The inventory and mass balances for 137Cs in the HAR appear to be inconsistent between Contract Specifications and the HAR.

Table 4-1. Major Radionuclide Streams in the HAR shows activities of various radionuclides stored in the LAW Feed Receipt Tank for Envelope A, Envelope B, and Envelope C feed materials. When the inventories of 137Cs in Table 4-1 are compared with TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content the 3,600 TBq of 137Cs for Envelope B in Table 4-1 appears to be a gross underestimate. Assuming the 137Cs ratios in Table TS-7.2 are representative (4.3E+09, 6.0E+10, 4.3E+09 for Envelopes A, B, and C, respectively.) the inventory of 137Cs in Envelope B shown in Table 4-1 of the HAR should be ~ 2.5E+05 TBq instead of 3.6E+03 TBq.

Table 4-2 of the HAR indicates that cesium recovery as a solid (Low-activity Waste only) will be in 35 canisters/batch from Envelope B feed and 7 canisters/ batch from Envelopes A and C; Table 4-1 indicates that each canister will contain 6,000 TBq 137Cs on crystalline silicotitanate. Therefore, by calculation, each batch of Envelope B feed will contain ~ 2.1 E+05 TBq 137Cs, close to what the reviewer calculated from the Contract Specifications (~ 2.5 E+05 TBq).

In Table 4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), on page 25, waste envelope B is shown containing 9.06 E+03 TBq/d 137Cs; the daily batch size is stated at 57.6 m3 on page 23. Scaling to a 200 m3 batch size (as indicated in Table 4-1 of the HAR), the 137Cs inventory in the LAW Feed Receipt Tank will be 3.15 E+04 TBq (vs. the 3.6 E+03 TBq shown in Table 4-1 of the HAR).

Initial review of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) shows that the simple flow diagrams (Figures 2-7 and 2-8 in the Hazards Analysis Report) do not contain sufficient relevant detail to support review of the hazards identification and assessment. Specifically, the descriptions of the process steps provided in section 5.2 of the submission refer to process flow diagrams (e.g. the reference to PFD DW-200-100 at the beginning of Section 5.2.1.1 on page 5-3) and equipment designations (e.g. the plant receipt tanks designated as V2101/V2102 on page 5-3) that are not included, or defined in, the SAP submission. These process flow diagrams, together with other relevant process information, appear to be available and to have been provided to the hazards evaluation

teams as needed to comply with Safety Criterion 3.1-2 (BNFL-5193-SRD-01, Rev.0, page 3-1).

DETAILED QUESTIONS:

Question 3(a) - 2 When there is more than one initiating event for a fault schedule, are the frequency and consequences for the worst case initiating event (each initiating event could have a difference)?

Contractor Response

3(a)-2 response.

Yes. Where there is more than one initiating event considered to lead to the hazardous situation, the binning considered the worst case (frequency/consequence) event as bounding the others. The intention of the PHA study on concept design is to identify hazards and hazard potential in order to ensure that the design could address them; only what were considered to be the more significant initiating events (causes) were identified. This is consistent with the AIChE guidelines:
"Usually the team does not attempt to develop an exhaustive list of causes; rather they list a sufficient number of them to judge the credibility of the accident." (Section 6.4, page 114. AIChE Guidelines for Hazard Evaluation Procedures.)

Disposition

The BNFL response is considered to be responsive and acceptable.

The clarification of the BNFL approach allows the reviewer to make a qualitative assessment of the evaluation methods used when more than one initiating event is used on a single fault schedule. The approach used by BNFL will result in the worst case events being evaluated.

Supplemental Response

Supplemental Disposition

Question # 19

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3a - General

SUBMITTAL CRITERIA:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:

The lack of detail and definitions in the fault schedules of the HAR make them difficult to review. The calculations and results in the hazards analysis cannot be reproduced by the reviewer(s) with the information provided. There are several details that need clarification so that a thorough review can be conducted.

A better description of the development process for the fault schedules is necessary. The level of mitigation is not explained for the overall process. It is not clear how or when mitigation was introduced to the process. Are mitigating factors (i.e., safeguards) taken into account when determining the frequency and consequences for the initiating events?

There should only be one initiating event for each fault schedule.

Each initiating event may have a different frequency and consequence. When there is more

than one initiating event, it is impossible to tell the frequency and consequence for that event. When there is more than one initiating event, it is unclear which safeguards apply to what initiating event.

The initiating events need further description. Some of the initiating event descriptions are too short to understand.

The assumed release/exposure must be stated for each event so that the consequence can be evaluated.

The flowcharts, Figs 2-7 and 2-8, included in BNFL-5193-HAR-01 Hazard Analysis Report, do not appear to match Sect. 2.3 Process Description. The PFDs provided as part of another document (BNFL Engineering Ltd's TWRS Outline Process Description) may provide a better match to the process description in the submittal, but are not part of the Standards Approval Package (SAP).

Table 4-1 Major Radioactive Streams on page 4-2 of the Hazard Analysis Report (HAR) provides activities of various radionuclides in the Feed Receipt Tank, CST/cesium canisters, and High Level Melter, but radionuclide inventories of intermediate process components are not shown in the HAR.

The material-at-risk basis of the Hazard Analysis Report appears to be in error. The inventory and mass balances for 137Cs in the HAR appear to be inconsistent between Contract Specifications and the HAR.

Table 4-1. Major Radionuclide Streams in the HAR shows activities of various radionuclides stored in the LAW Feed Receipt Tank for Envelope A, Envelope B, and Envelope C feed materials. When the inventories of 137Cs in Table 4-1 are compared with TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content the 3,600 TBq of 137Cs for Envelope B in Table 4-1 appears to be a gross underestimate. Assuming the 137Cs ratios in Table TS-7.2 are representative (4.3E+09, 6.0E+10, 4.3E+09 for Envelopes A, B, and C, respectively.) the inventory of 137Cs in Envelope B shown in Table 4-1 of the HAR should be ~ 2.5E+05 TBq instead of 3.6E+03 TBq.

Table 4-2 of the HAR indicates that cesium recovery as a solid (Low-activity Waste only) will be in 35 canisters/batch from Envelope B feed and 7 canisters/ batch from Envelopes A and C; Table 4-1 indicates that each canister will contain 6,000 TBq 137Cs on crystalline silicotitanate. Therefore, by calculation, each batch of Envelope B feed will contain ~ 2.1 E+05 TBq 137Cs, close to what the reviewer calculated from the Contract Specifications (~ 2.5 E+05 TBq).

In Table 4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), on page 25, waste envelope B is shown containing 9.06 E+03 TBq/d 137Cs; the daily batch size is

stated at 57.6 m3 on page 23. Scaling to a 200 m3 batch size (as indicated in Table 4-1 of the HAR), the 137Cs inventory in the LAW Feed Receipt Tank will be 3.15 E+04 TBq (vs. the 3.6 E+03 TBq shown in Table 4-1 of the HAR).

Initial review of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) shows that the simple flow diagrams (Figures 2-7 and 2-8 in the Hazards Analysis Report) do not contain sufficient relevant detail to support review of the hazards identification and assessment. Specifically, the descriptions of the process steps provided in section 5.2 of the submission refer to process flow diagrams (e.g. the reference to PFD DW-200-100 at the beginning of Section 5.2.1.1 on page 5-3) and equipment designations (e.g. the plant receipt tanks designated as V2101/V2102 on page 5-3) that are not included, or defined in, the SAP submission. These process flow diagrams, together with other relevant process information, appear to be available and to have been provided to the hazards evaluation teams as needed to comply with Safety Criterion 3.1-2 (BNFL-5193-SRD-01, Rev.0, page 3-1).

DETAILED QUESTIONS:

Question 3(a) - 4 What are the assumed release/exposure rates for each initiating event? These must be quantified so that the consequence can be evaluated.

Contractor Response

3(a)-4 response.

The consequence rating for an initiating event (or suite of events) against a hazardous scenario is evaluated qualitatively by the Hazards Evaluation Team, quantitative data were not used. This approach is described in the BNFL PHA procedure which was provided to the RU on October 8, 1997. The use of qualitative consequence assessment based on Hazards Evaluation Team experience for binning purposes is in accordance with AIChE guidelines where qualitative categories for hazard severity are defined (Section 6.4, page 114, AIChE Guidelines for Hazard Evaluation Procedures.) This aids the process by which hazards are either designed out or assessed quantitatively to determine protection needs. Quantitative assessment is the next stage of hazards treatment, taking place after the identification of hazardous situations documented in the HAR.

Disposition

The BNFL response is considered to be responsive and acceptable.

While the Contractor's approach is not a quantitative review of the hazards, it meets the requirements of the contract. The reviewer's concerns were that hazards identified as having a low consequence in the current qualitative review would not be carried forward to the quantitative review of the HAZOPS. During meetings with the Hazards Control Group on November 14, 1997, BNFL stated that all of the fault schedules reviewed in this submittal would be revisited in the HAZOPS, thereby providing resolution to this concern.

Supplemental Response

Supplemental Disposition

Question # 20

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3a - General

SUBMITTAL CRITERIA:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:

The lack of detail and definitions in the fault schedules of the HAR make them difficult to review. The calculations and results in the hazards analysis cannot be reproduced by the reviewer(s) with the information provided. There are several details that need clarification so that a thorough review can be conducted.

A better description of the development process for the fault schedules is necessary. The level of mitigation is not explained for the overall process. It is not clear how or when mitigation was introduced to the process. Are mitigating factors (i.e., safeguards) taken into account when determining the frequency and consequences for the initiating events?

There should only be one initiating event for each fault schedule.

Each initiating event may have a different frequency and consequence. When there is more than one initiating event, it is impossible to tell the frequency and consequence for that event. When there is more than one initiating event, it is unclear which safeguards apply to what initiating event.

The initiating events need further description. Some of the initiating event descriptions are too short to understand.

The assumed release/exposure must be stated for each event so that the consequence can be evaluated.

The flowcharts, Figs 2-7 and 2-8, included in BNFL-5193-HAR-01 Hazard Analysis Report, do not appear to match Sect. 2.3 Process Description. The PFDs provided as part of another document (BNFL Engineering Ltd's TWRS Outline Process Description) may provide a better match to the process description in the submittal, but are not part of the Standards Approval Package (SAP).
Table 4-1 Major Radioactive Streams on page 4-2 of the Hazard Analysis Report (HAR) provides activities of various radionuclides in the Feed Receipt Tank, CST/cesium canisters, and High Level Melter, but radionuclide inventories of intermediate process components are not shown in the HAR.

The material-at-risk basis of the Hazard Analysis Report appears to be in error. The inventory and mass balances for 137Cs in the HAR appear to be inconsistent between Contract Specifications and the HAR.

Table 4-1. Major Radionuclide Streams in the HAR shows activities of various radionuclides stored in the LAW Feed Receipt Tank for Envelope A, Envelope B, and Envelope C feed materials. When the inventories of 137Cs in Table 4-1 are compared with TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content the 3,600 TBq of 137Cs for Envelope B in Table 4-1 appears to be a gross underestimate. Assuming the 137Cs ratios in Table TS-7.2 are representative (4.3E+09, 6.0E+10, 4.3E+09 for Envelopes A, B, and C, respectively.) the inventory of 137Cs in Envelope B shown in Table 4-1 of the HAR should be ~ 2.5E+05 TBq instead of 3.6E+03 TBq.

Table 4-2 of the HAR indicates that cesium recovery as a solid (Low-activity Waste only) will be in 35 canisters/batch from Envelope B feed and 7 canisters/ batch from Envelopes A and C; Table 4-1 indicates that each canister will contain 6,000 TBq 137Cs on crystalline silicotitanate. Therefore, by calculation, each batch of Envelope B feed will contain ~ 2.1 E+05 TBq 137Cs, close to what the reviewer calculated from the Contract Specifications (~ 2.5 E+05 TBq).

In Table 4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), on page 25, waste envelope B is shown containing 9.06 E+03 TBq/d 137Cs; the daily batch size is stated at 57.6 m3 on page 23. Scaling to a 200 m3 batch size (as indicated in Table 4-1 of the HAR), the 137Cs inventory in the LAW Feed Receipt Tank will be 3.15 E+04 TBq (vs. the 3.6 E+03 TBq shown in Table 4-1 of the HAR).

Initial review of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) shows that the simple flow diagrams (Figures 2-7 and 2-8 in the Hazards Analysis Report) do not contain sufficient relevant detail to support review of the hazards identification and assessment. Specifically, the descriptions of the process steps provided in section 5.2 of the submission refer to process flow diagrams (e.g. the reference to PFD DW-200-100 at the beginning of Section 5.2.1.1 on page 5-3) and equipment designations (e.g. the plant receipt tanks designated as V2101/V2102 on page 5-3) that are not included, or defined in, the SAP submission. These process flow diagrams, together with other relevant process information, appear to be available and to have been provided to the hazards evaluation teams as needed to comply with Safety Criterion 3.1-2 (BNFL-5193-SRD-01, Rev.0, page 3-1).

DETAILED QUESTIONS:

Question 3(a) - 6 How did the hazard evaluation team estimate consequence levels for potential accidents involving process stages between the Feed Receipt Tank and the High Level Melter?

Contractor Response

3(a)-6 response.

The only major process stage (glass former blending vessel) between the Feed Receipt Tank and the High Level Melter was covered in Section 5.2.13.2 of the HAR. Estimates of consequence levels are included in the Fault Schedules of this section. At this stage of design, hazard identification results in bounding hazardous situations from major process areas, which is considered adequate to cover all elements of those areas. In this way, maximum use is made of the available design information.

Disposition

The BNFL response is responsive and acceptable.

The detailed question asked the Contractor how the hazard evaluation team estimated

consequence levels for potential accidents involving process stages between the Feed Receipt Tank and the High Level Melter. The Contractor's response indicated that potential accidents for which consequences had been estimated were limited by the present level of design to accidents involving process areas (rather than process stages), which is an acceptable response. Furthermore, in presentations and discussions with the RU, the Contractor stated that hazard analysis of individual process stages would be performed in the ISAR.

Supplemental Response

Supplemental Disposition

Question

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Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3a - General

SUBMITTAL CRITERIA:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:

The lack of detail and definitions in the fault schedules of the HAR make them difficult to review. The calculations and results in the hazards analysis cannot be reproduced by the reviewer(s) with the information provided. There are several details that need clarification so that a thorough review can be conducted.

A better description of the development process for the fault schedules is necessary. The level of mitigation is not explained for the overall process. It is not clear how or when mitigation was introduced to the process. Are mitigating factors (i.e., safeguards) taken into account when determining the frequency and consequences for the initiating events?

There should only be one initiating event for each fault schedule.

Each initiating event may have a different frequency and consequence. When there is more than one initiating event, it is impossible to tell the frequency and consequence for that event. When there is more than one initiating event, it is unclear which safeguards apply to what initiating event.

The initiating events need further description. Some of the initiating event descriptions are too short to understand.

The assumed release/exposure must be stated for each event so that the consequence can be evaluated.

The flowcharts, Figs 2-7 and 2-8, included in BNFL-5193-HAR-01 Hazard Analysis Report, do not appear to match Sect. 2.3 Process Description. The PFDs provided as part of another document (BNFL Engineering Ltd's TWRS Outline Process Description) may provide a better match to the process description in the submittal, but are not part of the Standards Approval Package (SAP).

Table 4-1 Major Radioactive Streams on page 4-2 of the Hazard Analysis Report (HAR) provides activities of various radionuclides in the Feed Receipt Tank, CST/cesium canisters, and High Level Melter, but radionuclide inventories of intermediate process components are not shown in the HAR.

The material-at-risk basis of the Hazard Analysis Report appears to be in error. The

inventory and mass balances for 137Cs in the HAR appear to be inconsistent between Contract Specifications and the HAR.

Table 4-1. Major Radionuclide Streams in the HAR shows activities of various radionuclides stored in the LAW Feed Receipt Tank for Envelope A, Envelope B, and Envelope C feed materials. When the inventories of 137Cs in Table 4-1 are compared with TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content the 3,600 TBq of 137Cs for Envelope B in Table 4-1 appears to be a gross underestimate. Assuming the 137Cs ratios in Table TS-7.2 are representative (4.3E+09, 6.0E+10, 4.3E+09 for Envelopes A, B, and C, respectively.) the inventory of 137Cs in Envelope B shown in Table 4-1 of the HAR should be ~ 2.5E+05 TBq instead of 3.6E+03 TBq.

Table 4-2 of the HAR indicates that cesium recovery as a solid (Low-activity Waste only) will be in 35 canisters/batch from Envelope B feed and 7 canisters/ batch from Envelopes A and C; Table 4-1 indicates that each canister will contain 6,000 TBq 137Cs on crystalline silicotitanate. Therefore, by calculation, each batch of Envelope B feed will contain ~ 2.1 E+05 TBq 137Cs, close to what the reviewer calculated from the Contract Specifications (~ 2.5 E+05 TBq).

In Table 4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), on page 25, waste envelope B is shown containing 9.06 E+03 TBq/d 137Cs; the daily batch size is stated at 57.6 m3 on page 23. Scaling to a 200 m3 batch size (as indicated in Table 4-1 of the HAR), the 137Cs inventory in the LAW Feed Receipt Tank will be 3.15 E+04 TBq (vs. the 3.6 E+03 TBq shown in Table 4-1 of the HAR).

Initial review of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) shows that the simple flow diagrams (Figures 2-7 and 2-8 in the Hazards Analysis Report) do not contain sufficient relevant detail to support review of the hazards identification and assessment. Specifically, the descriptions of the process steps provided in section 5.2 of the submission refer to process flow diagrams (e.g. the reference to PFD DW-200-100 at the beginning of Section 5.2.1.1 on page 5-3) and equipment designations (e.g. the plant receipt tanks designated as V2101/V2102 on page 5-3) that are not included, or defined in, the SAP submission. These process flow diagrams, together with other relevant process information, appear to be available and to have been provided to the hazards evaluation teams as needed to comply with Safety Criterion 3.1-2 (BNFL-5193-SRD-01, Rev.0, page 3-1).

DETAILED QUESTIONS:

Question 3(a) - 7 Please explain the apparent discrepancies in 137Cs inventories and concentrations between Table 4-1 Major Radioactive Streams of the HAR, Table 4.2 Process Chemicals of the HAR, Table-4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), and TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content.

Contractor Response

The 3,600 TBq is a typo. It should have been 36,000 TBq based on the information provided in the BOD, but not the approximately 250,000 TBq in the question. Envelope B from the contract has about 14 times the cesium concentration as does Envelope A and Envelope C.

The inventories in the HAR for 137Cs and 90Sr take the maximum concentration of these radionuclides at 3.0 M Na, not 14 M Na. Three molar sodium requires the maximum volume of vessel to process the waste and the vessels are sized to accommodate this feed.

The inventory for 99Tc uses the current estimate for the entire tank inventory (all 177 tanks) for this radionuclide.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The question asks how 137Cs, 90Sr, and 99Tc inventories in Table 4-1 of the HAR were calculated. The Contractor has calculated the radionuclide inventories based on 7M Na feed and explains that the inventories in the HAR take the maximum concentration for 137Cs and 90Sr at 7M Na, not 14M Na, because the Contractor's I/X processes cannot operate at Na concentrations higher the 7M. Many of the radionuclide inventories shown in BNFL-5193-HAR-01, Rev.1 DRAFT, Table 4.1 (submitted with the Contractor's responses to questions, but on a page headed "BNFL-5193-HAR-01, Rev. 0") have been revised. The

Contractor's response is acceptable, because on November 25, 1997, telcon with R. Cullen, BNFL committed to revise the HAR to include the recalculated 137Cs and 90Sr inventories.

Supplemental Response

An updated Table 4.1 to the HAR is submitted as Attachment-Question 21 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL has included an updated Table 4.1 to the HAR as an attachment to Question 21 to BNFL's Response to RU Disposition, Letter # 5193-97-0554, December 8, 1997.

Question # 22

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3a - General

SUBMITTAL CRITERIA:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:

The lack of detail and definitions in the fault schedules of the HAR make them difficult to review. The calculations and results in the hazards analysis cannot be reproduced by the reviewer(s) with the information provided. There are several details that need clarification so that a thorough review can be conducted.

A better description of the development process for the fault schedules is necessary. The level of mitigation is not explained for the overall process. It is not clear how or when mitigation was introduced to the process. Are mitigating factors (i.e., safeguards) taken into account when determining the frequency and consequences for the initiating events?

There should only be one initiating event for each fault schedule.

Each initiating event may have a different frequency and consequence. When there is more than one initiating event, it is impossible to tell the frequency and consequence for that event. When there is more than one initiating event, it is unclear which safeguards apply to what initiating event.

The initiating events need further description. Some of the initiating event descriptions are too short to understand.

The assumed release/exposure must be stated for each event so that the consequence can be evaluated.

The flowcharts, Figs 2-7 and 2-8, included in BNFL-5193-HAR-01 Hazard Analysis Report, do not appear to match Sect. 2.3 Process Description. The PFDs provided as part of another document (BNFL Engineering Ltd's TWRS Outline Process Description) may provide a better match to the process description in the submittal, but are not part of the Standards Approval Package (SAP).

Table 4-1 Major Radioactive Streams on page 4-2 of the Hazard Analysis Report (HAR) provides activities of various radionuclides in the Feed Receipt Tank, CST/cesium canisters, and High Level Melter, but radionuclide inventories of intermediate process components are not shown in the HAR.

The material-at-risk basis of the Hazard Analysis Report appears to be in error. The inventory and mass balances for 137Cs in the HAR appear to be inconsistent between

Contract Specifications and the HAR.

Table 4-1. Major Radionuclide Streams in the HAR shows activities of various radionuclides stored in the LAW Feed Receipt Tank for Envelope A, Envelope B, and Envelope C feed materials. When the inventories of 137Cs in Table 4-1 are compared with TWRS Privatization Contract No. DE-RP06-96RL13309 Part 1 Section C, Table TS-7.2 LAW Radionuclide Content the 3,600 TBq of 137Cs for Envelope B in Table 4-1 appears to be a gross underestimate. Assuming the 137Cs ratios in Table TS-7.2 are representative (4.3E+09, 6.0E+10, 4.3E+09 for Envelopes A, B, and C, respectively.) the inventory of 137Cs in Envelope B shown in Table 4-1 of the HAR should be ~ 2.5E+05 TBq instead of 3.6E+03 TBq.

Table 4-2 of the HAR indicates that cesium recovery as a solid (Low-activity Waste only) will be in 35 canisters/batch from Envelope B feed and 7 canisters/ batch from Envelopes A and C; Table 4-1 indicates that each canister will contain 6,000 TBq 137Cs on crystalline silicotitanate. Therefore, by calculation, each batch of Envelope B feed will contain ~ 2.1 E+05 TBq 137Cs, close to what the reviewer calculated from the Contract Specifications (~ 2.5 E+05 TBq).

In Table 4 Maximum Radionuclide Content of LAW Feeds (Pre-enhanced Throughput) of BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only), on page 25, waste envelope B is shown containing 9.06 E+03 TBq/d 137Cs; the daily batch size is stated at 57.6 m3 on page 23. Scaling to a 200 m3 batch size (as indicated in Table 4-1 of the HAR), the 137Cs inventory in the LAW Feed Receipt Tank will be 3.15 E+04 TBq (vs. the 3.6 E+03 TBq shown in Table 4-1 of the HAR).

Initial review of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) shows that the simple flow diagrams (Figures 2-7 and 2-8 in the Hazards Analysis Report) do not contain sufficient relevant detail to support review of the hazards identification and assessment. Specifically, the descriptions of the process steps provided in section 5.2 of the submission refer to process flow diagrams (e.g. the reference to PFD DW-200-100 at the beginning of Section 5.2.1.1 on page 5-3) and equipment designations (e.g. the plant receipt tanks designated as V2101/V2102 on page 5-3) that are not included, or defined in, the SAP submission. These process flow diagrams, together with other relevant process information, appear to be available and to have been provided to the hazards evaluation teams as needed to comply with Safety Criterion 3.1-2 (BNFL-5193-SRD-01, Rev.0, page 3-1).

DETAILED QUESTIONS:

Question 3(a) - 8 How were the inventories of 137Cs, 90Sr, and 99Tc in Table 4-1 of the HAR calculated?

Contractor Response

The estimate for the radionuclides listed in the HAR comes from the BOD. For solutions delivered to Tank 241-AP-106, the Contract has the Na concentration range set between 3 and 14 molar. The ion exchange processes cannot operate at a Na concentration above 7 M Na. Operations in Tank 241-AP-106 control the concentration for solution delivered to the facility to 7 M Na or lower.

The inventories in the HAR for 137Cs and 90Sr take the maximum concentration of these radionuclides at 7 M Na, not 14 M Na. Three molar sodium establishes the maximum volume for the vessel to process the waste per the Contract.

The inventory for 99Tc uses the current estimate for the entire tank inventory (all 177 tanks) for this radionuclide.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The question asks how 137Cs, 90Sr, and 99Tc inventories in Table 4-1 of the HAR were calculated. The Contractor has calculated the radionuclide inventories based on 7M Na feed and explains that the inventories in the HAR take the maximum concentration for 137Cs and 90Sr at 7M Na, not 14M Na, because the Contractor's I/X processes cannot operate at Na concentrations higher the 7M. Many of the radionuclide inventories shown in BNFL-5193-HAR-01, Rev.1 DRAFT, Table 4.1 (submitted with the Contractor's responses to questions, but on a page headed "BNFL-5193-HAR-01, Rev. 0") have been revised. The Contractor's response is acceptable, conditional on revisions to the HAR showing the recalculated 137Cs and 90Sr inventories.

Supplemental Response

An updated Table 4.1 to the HAR is submitted as Attachment-Question 21 to BNFL's

Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL included an updated Table 4.1 to the HAR as an attachment to Question 21 to BNFL's Response to RU Disposition, Letter # 5193-97-0554, December 8, 1997.

Question # 23

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3b - Equipment Qualification and Criticality
APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

SRD REVIEW GUIDE:

8.1 Process Element Description, attribute 1 - process descriptions, RL/REG-97- 08, pg. 22.

DETAILED QUESTION:

Question 3(b) - 3 The geometry and radionuclide contents of several vessels of possible concern for criticality have been omitted from the descriptions in the HAR (specifically the HLW evaporator feed tanks, the melter feed tanks). A rough estimate of these parameters is needed to facilitate initial review of the potential for criticality in these vessels. What are the radionuclide contents and geometries of the HLW evaporator feed tanks and melter feed tanks?

Contractor Response

3(b)-3 Response.

A criticality safety assessment has been carried out on the concept design, which covered all major process areas, including the HLW evaporator feed tanks. The basis of the assessment was based on the concentration of fissile material in a worst case batch of feed material (Envelope D) and demonstrating that the safe infinite sea concentration (taken as 5.9g/l Pu equivalent which is 75% of the minimum critical limit of 7.8g/l Pu) is never reached. The safe infinite sea concentration is that concentration at or below which there is insufficient fissile material in any geometry (assuming full water reflection - optimum moderation) to give rise to the potential for a criticality. The assessment covered both normal and fault conditions; the fault conditions considered were overconcentration, settling out, and drying out (of fissile material). Even under worst case conditions, the concentrations from Envelope D material were conservatively estimated as 1.3g/l Pu equivalent. In summary, criticality safety was determined, not on a vessel by vessel approach, but by taking worst case material (with respect to fissile content) and demonstrating that the safe infinite sea concentration was never reached. This approach precludes the need to identify every vessel in the HAR.

Disposition

The BNFL response is responsive and acceptable.

The contractor's response is acceptable. The response refers to a criticality safety report that was not provided as part of the submittal. It is expected that the inventory and geometry data requested by the reviewer will be provided in chapter 6 of the ISAR. This information is necessary for even a qualitative assessment of criticality hazards.

Comment: The response stated, "In summary, criticality safety was determined, not on a vessel by vessel approach...." Criticality safety must be determined on a vessel by vessel basis since all parameters relevant to criticality are determined by processing parameters (chemistry, Pu concentration, etc.) at points where fissile material accumulates.

Supplemental Response

Although marked as acceptable in the formal issue the following response is added to clarify the BNFL position.
1. Fissile material control.

The current criticality assessment for the Part A concept design is based on a conservative

estimate of the process and the proposed feed material as per the contract. This assessment has determined that a criticality in the TWRS-P Facility is not a credible event. Therefore, the only controls needed are those that ensure that material specifications for any proposed feed to the facility are fully compatible with the process and are within the fissile material content bounds of the criticality assessment.

In summary, these controls are as follows:

Prior to transfer (which is under BNFL control) of any batch of feed to the BNFL TWRS-P facility:

- DOE takes a representative sample of the batch. DOE demonstrates that the sample taken is representative of the batch.
- DOE performs analyses on the sample to ensure material specification compatibility, e.g.

Supplemental Disposition

fissile content is within contract specifications.

- BNFL reviews and accepts or rejects the DOE analytical results. This acceptance or rejection would be based on BNFL's own confirmatory analysis.
- DOE initiates batch transfer to the BNFL facility based on established procedures.

These controls are deemed adequate to ensure the fissile material content of the feed remains within the Authorization Basis of the facility.

Question # 24

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3b - Equipment Qualification and Criticality

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

SRD REVIEW GUIDE:

8.2 Hazards Assessment, attribute 2 - comprehensiveness, RL/REG-97-08, pg. 24.

DETAILED QUESTION:

Question 3(b) - 4 Why were the melter feed tanks omitted from the criticality hazard evaluation?

Contractor Response

Question 3(b)-4 Response.

A criticality safety assessment has been carried out on the concept design, which covered all major process areas, including the melter feed tanks. The assessment was based on the concentration of fissile material in a worst case batch of feed material (Envelope D) and demonstrating that the safe infinite sea concentration (taken as 5.9g/l Pu equivalent which is 75% of the minimum critical limit of 7.8g/l Pu) is never reached. The safe infinite sea concentration is that concentration at or below which there is insufficient fissile material in any geometry (assuming full water reflection - optimum moderation) to give rise to the potential for a criticality. The assessment covered both normal and fault conditions; the fault conditions considered were overconcentration, settling out, and drying out (of fissile material). Even under worst case conditions, the concentrations from Envelope D material were conservatively estimated as 1.3g/l Pu equivalent. In summary, criticality safety was determined, not on a vessel by vessel approach, but taking worst case material (with respect to fissile content) and demonstrating that the safe infinite sea concentration was never reached. This approach precludes the need to identify every vessel in the HAR.

Disposition

The BNFL response is responsive and acceptable.

The response refers to a criticality safety report that was not provided as part of the submittal. It is expected that criticality hazards in the melter feed tanks will be discussed in chapter 6 of the ISAR. The melter feed tanks should be included in the hazard analysis since they represent a major accumulation point for fissile material, which will be at a higher

concentration than the HLW feed stock.

Supplemental Response

Although marked as acceptable in the formal issue the following response is added to clarify the BNFL position.
1. Fissile material control.

The current criticality assessment for the Part A concept design is based on a conservative estimate of the process and the proposed feed material as per the contract. This assessment has determined that a criticality in the TWRS-P Facility is not a credible event. Therefore, the only controls needed are those that ensure that material specifications for any proposed feed to the facility are fully compatible with the process and are within the fissile material content bounds of the criticality assessment.

In summary, these controls are as follows:

Prior to transfer (which is under BNFL control) of any batch of feed to the BNFL TWRS-P facility:
- DOE takes a representative sample of the batch. DOE demonstrates that the sample taken is representative of the batch.
- DOE performs analyses on the sample to ensure material specification compatibility, e.g. fissile content is within contract specifications.
- BNFL reviews and accepts or rejects the DOE analytical results. This acceptance or rejection would be based on BNFL's own confirmatory analysis.
- DOE initiates batch transfer to the BNFL facility based on established procedures.

These controls are deemed adequate to ensure the fissile material content of the feed remains within the Authorization Basis of the facility.

Supplemental Disposition

Full details of the controls and administrative procedures are found in TWRS-P Interface Control Document (ICD) 20, a copy of which has been made available to the RU.

2. Performance of criticality assessments.

For any BNFL facility that handles, processes, or stores fissile material, the approach adopted for the assessment of criticality safety has been, and will continue to be, to assess

Question # 25

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3b - Equipment Qualification and Criticality

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

SRD REVIEW GUIDE:

8.3 Hazards control strategies, attribute 1 - selected control strategies, RL/REG- 97-08, pg. 26.
DETAILED QUESTION:

Question 3(b) - 5 The approach to criticality safety in the SAP was essentially to discount the possibility of criticality based on the claim that analyses show insufficient fissile material throughout the process. However, results of these analyses are not presented or referenced (it was stated that they will be in the ISER). In the absence of detailed analysis, what are the potential hazard controls on processing parameters (batch volume, Pu concentration, neutron absorber ratios...) which will ultimately be enveloped by a criticality evaluation? Why is an unreferenced criticality report cited as a "safeguard" (which the reviewer interprets as a hazard control) for all criticality hazards?

Contractor Response

Question 3(b)-5 Response.

The basis of the assessment is the Contract specification and sample results, whichever is considered to be the more conservative. No controls or constraints are called out in the

assessment in concluding that there is no criticality challenge to the facility. The only criticality controls that would need to be considered are those which result in the fissile content either within the Envelope D tanks (tanks AZ-101, 102) or those assumed in determining the Contract specification. These tanks are under DOE jurisdiction, outside the scope of the TWRS-P facility.

The basis of the assessment is: U-235 content; total U; Pu-239 content.
Enrichment (U-235 content) values were taken from tank characterization data for the most likely worst-case tanks (Envelope D material) 241-AZ-101 and 241-AZ-102 (WHC-HD-WM-ER-410/411) which gave an enrichment figure of 0.89%, marginally higher than the contract specification (DE-AC06-RL13308). The assessment used an enrichment figure of 1%. The total U figure (13.55g/l U) is taken from Table TS8.1 of the contract specification (DE-RP06-96L13308) which is the highest single value and therefore conservative. The Pu-239 content (92% according to Table TS8.3 of the Contract specification, DE-AC06-RL13308), is conservatively assumed to be 100% for the purposes of the assessment.

The criticality assessment should not have been called a safeguard, it is intended to be a note in the fault schedule to capture its importance.

Disposition

The BNFL response is responsive and acceptable.

The contractor's response is acceptable. The response states that the only criticality control is the concentration of fissile material in the feed stock. It is expected that this claim will be substantiated in the criticality safety assessment in chapter 6 of the ISAR. In teleconference with Bob Cullen, Mike Johnson and Kale Boomer on November 22, 1997, BNFL stated that a sample of the HLW feed stock will be analyzed independently by BNFL. BNFL stated that the ISAR would include this requirement.

The response also discusses an administrative program to maintain criticality safety. It is expected that this administrative program will be documented in the ISAR and will:

1) Maintain criticality expertise on staff throughout the lifecycle of the facility.
2) Implement any criticality safety controls identified by the criticality safety evaluation.
3) Review design and operation to ensure that changes do not occur which impact assumptions made in the criticality evaluation.

Supplemental Response

Although marked as acceptable in the formal issue the following response is added to clarify

Supplemental Disposition

the BNFL position.
1. Fissile material control.

The current criticality assessment for the Part A concept design is based on a conservative estimate of the process and the proposed feed material as per the contract. This assessment has determined that a criticality in the TWRS-P Facility is not a credible event. Therefore, the only controls needed are those that ensure that material specifications for any proposed feed to the facility are fully compatible with the process and are within the fissile material content bounds of the criticality assessment.

In summary, these controls are as follows:

Prior to transfer (which is under BNFL control) of any batch of feed to the BNFL TWRS-P facility:
- DOE takes a representative sample of the batch. DOE demonstrates that the sample taken is representative of the batch.
- DOE performs analyses on the sample to ensure material specification compatibility, e.g. fissile content is within contract specifications.
- BNFL reviews and accepts or rejects the DOE analytical results. This acceptance or rejection would be based on BNFL's own confirmatory analysis.
- DOE initiates batch transfer to the BNFL facility based on established procedures.

These controls are deemed adequate to ensure the fissile material content of the feed remains within the Authorization Basis of the facility.

Full details of the controls and administrative procedures are found in TWRS-P Interface Control Document (ICD) 20, a copy of which has been made available to the RU.

2. Performance of criticality assessments.

For any BNFL facility that handles, processes, or stores fissile material, the approach adopted for the assessment of criticality safety has been, and will continue to be, to assess all areas of plant where the potential for criticality exists. This includes processes vessels, transfer vessels (e.g. breakpots) and ventilation ductwork. Assessments include both normal and credible contingency conditions. Where appropriate, a conservative, bounding case is used to give confidence in the criticality safety of a number of vessels and plant areas.

The waste processed in the TWRS-P Facility may contain significant quantities of fissile material. Although multiple critical masses could be present, the fissile material is dilute and distributed homogeneously. As a consequence, the approach taken in the assessment evaluates the fissile material under both normal and contingency conditions (e.g. accumulation, loss of homogeneity etc.), to determine whether a significant fraction of the minimum critical concentration can be achieved. If it cannot, then k-infinity will always be less than unity, and even an infinite amount of the waste cannot be made critical. The validity of these process conditions will be confirmed via the feed batch sampling and analysis noted above as part of the interface control.

Once the TWRS-P Facility has begun hot operations, if the analytical results show that material is out of specification, then BNFL may choose not to receive the batch or, alternatively, invoke the Unreviewed Safety Question Determination (USQ-D) process to determine if the batch would really challenge safety. The same USQ-D process is used if there is a proposal to change the feed specification. Any assumptions (including those in the criticality assessment) would be examined in the light of the proposal to determine whether or not additional challenges to safety are present.

Criticality assessments are a documented part of the Safety Analysis Reports (SARs). BNFL will review and update the SARs as part of design and operational practice. The review and update process ensures that safety is always up to date, reflecting the current facility and process design and operations as appropriate.

3. Trained criticality expertise.

If a credible criticality potential is identified for TWRS-P, then a nuclear criticality safety function consisting of trained criticality safety experts will be established within the TWRS-P organization as per the guidance of RG 3.52. However if no credible criticality potential exists, as is currently the case, then criticality support from the corporate team of criticality experts will be provided. This includes the regular review and update of criticality assessments as part of SAR review and update, and also any analyses needed to support the USQ-D process.

Question # 26

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of

achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Drawing. No. O/BE/1614672 TWRS Project Process Flow Diagram PFD 3300, LAW Vitrification - Off-gas Treatment in BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only) shows the ammonia (liquid or gas?) is mixed with preheated melter off-gas before further heating in a oil-fired heater and injection into the selective catalytic reduction unit. The hazard analysis for melter offgas treatment and conversion of NOx with ammonia to nitrogen is examined in the HAR Fault Schedule: LAW Vitrification Off-Gas Treatment, page 5-177 with a comment that electrical heating has been examined and is the preferred option (eliminating oil as a fuel source and hazard). The HAR Fault Schedule, page 5-179 covering loss of ammonia supply which could permit discharge of NOx out of the stack has a comment that ammonia flowrate and NOx discharge concentration are measured.

DETAILED QUESTIONS:

Question 3(c) - 1 How will the flowrate of ammonia be controlled to prevent the discharge of excess or unreacted ammonia gas from the Off-gas Treatment System?

Contractor Response

Specific equipment selection occurs in Part B. BNFL intends to use best industrial practice to control the ammonia system.

Disposition

The BNFL response is responsive and acceptable.

The question asks the Contractor how the ammonia flowrate to the LAW melter offgas treatment system will be controlled to prevent discharge of excess or unreacted ammonia. The Contractor responds that BNFL intends to use best industrial practice to control the ammonia system, and that specific equipment will be selected during Part B.

Supplemental Response

Supplemental Disposition

Question # 27

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Drawing. No. O/BE/1614672 TWRS Project Process Flow Diagram PFD 3300, LAW Vitrification - Off-gas Treatment in BNFL Engineering Ltd's TWRS Hanford Basis of Design (LAW Services only) shows the ammonia (liquid or gas?) is mixed with preheated melter off-gas before further heating in a oil-fired heater and injection into the selective catalytic reduction unit. The hazard analysis for melter offgas treatment and conversion of NOx with ammonia to nitrogen is examined in the Fault Schedule: LAW Vitrification Off-Gas Treatment, page 5-177 with a comment that electrical heating has been examined and is the preferred option (eliminating oil as a fuel source and hazard). The Fault Schedule, page 5-179 covering loss of ammonia supply which could permit discharge of NOx out of the stack has a comment that ammonia flowrate and NOx discharge concentration are measured.

DETAILED QUESTIONS:

Question 3(c) - 2 Were other methods for removal of NOx from the LAW melter offgas stream considered as possible process options to avoid consumption and storage of liquid ammonia, and to avoid possible ammonia fires, energetic ammonium nitrate decompositions, and discharges of ammonia?

Contractor Response

In selecting the method for NOx removal, BNFL evaluated a variety of methods. The use of Selective Catalytic Reduction (SCR) is a safe, proven technology that meets the process requirements for TWRS-P. The process team also investigated scrubbing technologies and Selective Non-Catalytic Reduction to remove NOx from the off-gas.

Disposition

The BNFL response is but unacceptable for reasons indicated below:

The detailed question asks if alternative methods for removal of NOx from the LAW melter offgas stream had been considered as possible process options to avoid consumption and storage of liquid ammonia, with the risks of ammonia fires, energetic ammonium nitrate decompositions, and discharges of ammonia. DOE/RL-96-0006 Top-level Standard and Principle 4.1.1.2 Prevention (an SAP approval criterion listed in the question), requires that "principal emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release. Prevention of accidents can be achieved by eliminating a hazard entirely through process redesign, or by minimizing the magnitude of a hazard (reducing the quantity of material at risk). The SRD (BNFL-5193-SRD-01, Rev.0) incorporates Safety Criterion 1.0-2: "Principal emphasis should be placed on the prevention of accidents, particularly any that could cause an unacceptable release, as the primary means of achieving safety." However, the RU is unable to identify where this principle is implemented in the process design.

The Contractor's response to the question indicates that the Contractor believes that Selective Catalytic Reduction with anhydrous ammonia to convert NOx to N2 is a safe,

Supplemental Response

How did designers use Top Level Standard 4.1.1.2 or SC 1.0-2?

The designers applied this standard by not destroying NOx in the melter. The Preliminary Hazardous Analysis (PHA) and HAR have placed restrictions on the proposed destruction of NOx by control of melter conditions through the addition of urea. Until the designers can establish the safety of this method of destruction no further evaluation can occur. If ammonia is used in the final design, the prevention standard will be implemented by adding design features to prevent accidents from occurring as opposed to mitigating releases from potential accidents.

The application of the top level standard continued in the evaluation of methods for NOx control downstream of the melter. Evaluation of NOx removal remote from the melter was conducted. The work evaluated many alternatives to destroy or remove NOx from the off-gas stream. In addition, the study combined these alternatives into integrated options for off-gas treatment that considered process safety (i.e., the potential for an accident from the ammonia) as well as other criteria in the selection of the recommended option.

Finally, the top level standard states prevention of accidents particularly any that could cause an unacceptable release. By moving the NOx destruction from the melter to a separate unit reduces the radionuclide inventory by four orders of magnitude. Thus, the release from an accident downstream from the melter reduces the potential radioactive release.

Further analysis will continue to eliminate the use of bulk anhydrous ammonia as the source for ammonia for the process. At least, one alternative to this source is the use of urea that

decomposes on demand to avoid the hazard from ammonia storage.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL provided sufficient detail to demonstrate the implementation of Top-level Principle 4.1.1.2 Prevention in the Contractor's choice of Selective Catalytic Reduction process for removal of NOx from the LAW Melter off-gas.
proven technology. Additionally, the Contractor states that the process team also investigated scrubbing technologies and Selective Non-Catalytic Reduction to remove NOx from the off-gas. An acceptable response would describe in appropriate detail how the Contractor's TWRS-P process design team implemented Top-level Standard and Principle 4.1.1.2 (or SC 1.0-2) in selecting the technology for NOx removal from the LAW melter offgas stream.

Question # 28

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Hazard Analysis Report, Table 4-1 Major Radionuclide Streams shows 140,000 TBq 137Cs in the Cesium Product Storage Tank. Footnote a under the table indicates that quantities shown in the table are on a per batch basis, but presumably this doesn't apply to the 137Cs in the Cesium Product Storage Tank. If the value of 3,600 TBq of 137Cs in one batch of Envelope B waste feed material is correct (see question 3), approximately 39 batches of Envelope B waste could be processed before the inventory of 137Cs in the Cesium Product Storage Tank exceeded 140,000 TBq. The principle of minimizing risk by minimizing inventory of material-at-risk (intrinsically-safe design) is based on designing out hazardous materials or designing the process to function with a reduced volume and inventory of hazardous materials as far as practicable.

DETAILED QUESTIONS:

Question 3(c) - 3 What factors determined the design volumetric capacity and projected 137Cs inventory of the Cesium Product Storage Tank?

Contractor Response

3(c)-3 Response.

The Cs concentrate storage vessel V2710 is a 56 cu. meter vessel which takes both Cs and Tc concentrates for the LAW/HLW option only.

For the LAW option only, Cs concentrate is stored in a dedicated vessel of 1.5 cu. meters capacity. This provides storage capacity between the ion exchange process and the adsorption process.

The volumes of both storage vessels (depending on the option) have been appropriately sized for their duty and represent optimized process conditions. For the LAW/HLW option, the 56 cu. meters capacity represents a two year storage period, which is that time lag needed between the start of pre-treatment operations and initiation of HLW melter operations. This is considered to be the most efficient way of operating the process. Factors such as the programming of start-up, and testing for pre-treatment, HLW melters, and the progressive activity challenges to these areas during early operation, have determined the need for a storage vessel of this capacity. The Cs inventory quoted represents a realistic maximum based on DOE data.

The use of a 1.5 cu. meters concentrate storage vessel (LAW option only) prior to CST loading is a necessary step between Cs concentrate production and the CST loading and drying process. This provides storage capacity between the ion exchange process and the adsorption process.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The detailed question asks the Contractor to identify the factors determining the design volumetric capacity and projected 137Cs inventory of the Cesium Product Storage Tank. According to Table 4.1 accompanying the Contractor's response to questions, this tank may contain 2(1017 Bq 137Cs in aqueous solution, representing the largest radionuclide inventory in TWRS-P. DOE/RL-96-0006 Top-level Standard and Principle 4.1.1.2 Prevention (an SAP approval criterion listed in the question), requires that "principal emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release. Prevention of accidents can be achieved by eliminating a hazard entirely through process redesign, or by minimizing the magnitude of a hazard (reducing the quantity of material at risk). The SRD (BNFL-5193-SRD-01, Rev.0) incorporates Safety Criterion 1.0-2: "Principal emphasis should be placed on the prevention of accidents, particularly any that could cause an unacceptable release, as the primary means of achieving safety." However, the RU is unable to identify where this principle is implemented in the process design.

The Contractor's response indicates that two Cs storage vessels have been sized for their duty and represent "optimized process conditions". The larger, 56 m3 capacity, tank of Cs represents a two-year storage period; i.e., 137Cs will be separated from the waste stream over a two-year period and stored. An acceptable response would describe in appropriate detail how the Contractor's TWRS-P process design team implemented Top-level Standard and Principle 4.1.1.2 (or SC 1.0-2) in determining how many years of Cs production would be stored. In addition, an acceptable response would explain what the Contractor means by "optimized process conditions".

Supplemental Response

The concern of the reviewer is that such a large inventory of Cs-137 appears to conflict with the Safety Criteria 1.0-2, 4.1-1 (top level standard 4.1.1.2) in that it may present an unreasonable hazard.

The term "optimized process conditions" means:
a. Those inventories generated by receiving the maximum contract concentrations at the planned process throughput.
b. Achieving process conditions which ensure safe and efficient facility operation. To achieve these, assurance that the design intent of the facility is met, must be demonstrated. This is the rationale behind cold and hot start up. Prevention of hazards is not just about designing them out such that they can never occur. It is also the assurance that the preventative features of the design which protect against hazards occurring, will perform their intended function. Such assurance is gained from adequate testing during cold and hot start up.

For the LAW/HLW option, it is BNFL's intention to operate the low active melters prior to the high level waste melters. In this way, the direct experience gained from hot operations of the LAW melters can be applied to the HLW melter system during cold start up. Such a strategy is entirely in accordance with the Top Level Standard 4.1.1.2 of DOE/RL-96-0006 in that the testing of the protection systems specified for the HLW can take account of the experience gained with the LAW system.

BNFL considers that the risk from storing Cs concentrate during the early stages of operation (LAW/HLW option only) in order to apply the benefits gained from operating the LAW melters to the HLW melters is less than going for full operation of both sets of melters from the start. The two year period chosen represents a conservative estimate of the time it will take to progressively challenge the LAW melters with active material (hot start up and

early operations). To progressively challenge the SSCs means that the level of process material activity will start at the lower end of the required specification, moving up to maximum levels as defined by the specification as SSCs are proven under fully active conditions. Acute problems identified can thus be dealt with at the lower levels of activity. The need to progressively challenge the process with activity after cold testing is driven by the need to achieve safe and efficient operations (as noted above). This will ensure that protection against hazardous situations is adequately tested both during cold and hot start up. This strategy implements the requirements of Top Level Standard 4.1.1.2 of DOE/RL-96-0006

In considering the potential hazards from Cs. concentrate storage, the PHA team were aware of the rationale behind the proposal for storage. The team considered the benefits to the facility and process as noted above to be sufficient to drive the need for storage. Nevertheless potential hazards from Cs storage have been identified and, depending on the severity of the consequences, appropriate protection will be specified. It was recognized, for example, that Cs storage as an aqueous solution gives rise for the potential for radiolytic hydrogen generation and leakage of material. Non mobile (i.e. solid) storage of Cs (on CST for example) would obviate these hazards but give rise to others. In addition, interim storage of Cs in a solid form would exceed allowable contract values.

Designing out the need for Cs storage is not currently seen as adding value to safety. Superficially, it would remove the storage hazard, but may give rise to additional hazardous situations from the simultaneous early operation of both sets of melters. This is the current position. All hazardous situations are under review as the detailed design develops. If safe and efficient simultaneous LAW and HLW melter operations can be demonstrated, then there may be no need for interim Cs. concentrate storage.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL provided sufficient detail to demonstrate the implementation of Top-Level Principle 4.1.1.2, Prevention in their strategy for testing and operation of the HLW melter by operating the LAW melters first and providing interim storage for the separated 137Cs. The supplemental response explained how BNFL sought to minimize risks by weighing the risks in the alternative processing options in arriving at a process design for storing up to two years' production of separated cesium, and this approach implements Top-level Principle 4.1.1.2. The supplemental response provides the requested explanation of the term "optimized process conditions."

BNFL deleted the statement "In addition, interim storage of Cs in a solid form would exceed allowable contract values," from BNFL's supplementary response. The Contractor's response is therefore acceptable.

Question # 29

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Hazard Analysis Report, Table 4-1 Major Radionuclide Streams shows 140,000 TBq 137Cs in the Cesium Product Storage Tank. Footnote a under the table indicates that quantities shown in the table are on a per batch basis, but presumably this doesn't apply to the 137Cs in the Cesium Product Storage Tank. If the value of 3,600 TBq of 137Cs in one batch of Envelope B waste feed material is correct (see question 3), approximately 39 batches of Envelope B waste could be processed before the inventory of 137Cs in the Cesium Product Storage Tank exceeded 140,000 TBq. The principle of minimizing risk by minimizing inventory of material-at-risk (intrinsically-safe design) is based on designing out hazardous materials or designing the process to function with a reduced volume and inventory of hazardous materials as far as practicable.

DETAILED QUESTIONS:
Question 3(c) - 4 What operating and safety considerations would be affected if the capacity and 137Cs inventory of the Cesium Product Storage Tank were reduced?

Contractor Response

The Cs storage tank has the capacity to hold two years of Cs product. The capacity provides the flexibility necessary during the startup of the facility. To progressively challenge the facility, BNFL Inc. has opted to sequence the startup in which the LAW melter start first followed by the HLW melters. The Cs storage allows for this sequencing to occur over a two year period. Operating experience can be gained with the HLW melter before the more challenging material is introduced and the need to process the Cs concentrate arises.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The detailed question asks the Contractor to identify what operating and safety considerations would be affected if the capacity and 137Cs inventory of the Cesium Product Storage Tank were reduced. According to Table 4.1 accompanying the Contractor's response to questions, this tank may contain 2(1017 Bq 137Cs, representing the largest radionuclide inventory in TWRS-P. DOE/RL-96-0006 Top-level Standard and Principle 4.1.1.2 Prevention (an SAP approval criterion listed in the question), requires that "principal emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release. The SRD (BNFL-5193-SRD-01, Rev.0) incorporates Safety Criterion 1.0-2 "Principal emphasis should be placed on the prevention of accidents, particularly any that could cause an unacceptable release, as the primary means of achieving safety." Prevention of accidents can be achieved by eliminating a hazard entirely through process redesign, or by minimizing the magnitude of a hazard (reducing the quantity of material at risk). However, the RU is unable to identify where this principle is implemented in the TWRS-P process design.
The Contractor's response to the question indicates that the Cs storage tank has the capacity to hold two years of Cs product, and that the capacity provides the flexibility necessary during the startup of the facility. The Contractor's response continues by stating

Supplemental Response

See Supplemental Response to Question 28.

Supplemental Disposition

The Contractor's supplemental response is acceptable. In answering this question BNFL also refers to the supplemental response to Question 28. The supplemental response has provided sufficient detail to demonstrate the implementation of Top-level Principle 4.1.1.2 Prevention in the Contractor's strategy for testing and operation of the HLW melter by operating the LAW melters first and providing interim storage for the separated 137Cs.

The supplemental response provides an explanation of how the Contractor has sought to minimize risks by weighing the risks inherent in the alternative processing options in arriving at a process design for storing up to two years' production of separated cesium, and this approach implements Top-level Principle 4.1.1.2

that operating experience can be gained with the HLW melter before the more challenging material is introduced and the need to process the Cs concentrate arises. The response appears to indicate that programmatic concerns, not safety concerns, were paramount in determining the cesium inventory of the Cs Storage Tank.

An acceptable response would identify what safety considerations would be affected if the capacity and 137Cs inventory of the Cesium Product Storage Tank were reduced, and explain how Top-level Standard and Principle 4.1.1.2, an expression of intrinsically-safe process design philosophy, is implemented in the TWRS-P process design of the Cs Storage Tank.

Question # 30

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Hazard Analysis Report, Table 4-1 Major Radionuclide Streams shows 140,000 TBq 137Cs in the Cesium Product Storage Tank. Footnote a under the table indicates that quantities shown in the table are on a per batch basis, but presumably this doesn't apply to the 137Cs in the Cesium Product Storage Tank. If the value of 3,600 TBq of 137Cs in one batch of Envelope B waste feed material is correct (see question 3), approximately 39 batches of Envelope B waste could be processed before the inventory of 137Cs in the Cesium Product Storage Tank exceeded 140,000 TBq. The principle of minimizing risk by minimizing inventory of material-at-risk (intrinsically-safe design) is based on designing out hazardous materials or designing the process to function with a reduced volume and inventory of hazardous materials as far as practicable.

DETAILED QUESTIONS:
Question 3(c) - 5 Were the hazards associated with the separated cesium, for the LAW-only option, considered with the HLW melter systems?; the text in the HAR on page 5-2 suggests that " the incorporation of cesium storage Process Flow Diagram (PFD) information on the HLW melter PFD ..., eliminated the need to consider a separate PFD on storage."

Contractor Response

The LAW option has considerably less Cs material at risk. Thus, the hazardous situations identified for the HLW bound any hazardous situation for the LAW only option.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The reason is that the SAP be revised to clarify how the separated cesium is to be stored and to show that the hazards associated with the separated cesium were considered.

We agree that the hazards associated with the storage of the separated cesium for the LAW/HLW option bound those for the LAW-only option. However, the SAP needs to be revised to clarify the plans for, and hazards associated with, storage of the separated cesium for the LAW/HLW option. Based on discussions with BNFL (R. Cullen and K. Boomer) on 11/14 we understand that the separated cesium is to be stored in the tank designated as V2710 (PFD 2700, DRG. No. O/BE/1614667) which will be sized at 56 m3 and used to store separated cesium and technetium for the LAW/HLW option. For the LAW - only option the tank designated as V2710 (PFD 2700, DRG. No. O/BE/1614667) is to be sized at 227 m3 and used to store the separated technetium. We also understand that the hazards associated with storage of up to 200,000 TBq of separated cesium were considered in the Fault Schedules under Event Identifier 1614667/153 on page 5-102 of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0). The Contractor agreed to supply

PFD's showing how the separated cesium is to be stored and to revise the HAR accordingly.

An acceptable disposition would: 1. Provide PFDs that are consistent with the current plans for storage of separated cesium, 2. Describe the current plans for storage of the separated

Supplemental Response

The design of Tank V-2710 was originally specified for technetium storage for the LAW-only design. With design of the LAW-HLW facility, the tank was used to store both cesium and technetium. With this new dual use of the tank, the tank volume was reduced from 227 m3 to 56 m3. The higher volume was intended to store technetium for nine years. The reduced volume supports the processing of the technetium and cesium after start-up of the HLW melter.

The PFD containing V-2710 (BEL Drawing O BE 1614667) now designates the tank's dual use and the fault schedule (event 1614667/153) has been modified to show both technetium and cesium release from storage tank.

Supplemental Disposition

The supplemental response is acceptable. BNFL clarified how Tank V-2710 is to be used for interim storage of separated cesium and technetium in the LAW-HLW facility. The applicable PFD (DRG. No. O/BE/1614667) was changed to show the dual use of Tank V-2710 and the applicable fault schedule was modified to show that the potential release of both cesium and technetium were considered in the hazards evaluation.
cesium and 3. Update the Fault Schedules (specifically, Event 1614667/153 on page 5-102 of the Hazards Analysis Report) to show that the hazards associated with storage of the separated cesium were considered.

Question # 31

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Hazard Analysis Report, Table 4-1 Major Radionuclide Streams shows 140,000 TBq 137Cs in the Cesium Product Storage Tank. Footnote a under the table indicates that quantities shown in the table are on a per batch basis, but presumably this doesn't apply to the 137Cs in the Cesium Product Storage Tank. If the value of 3,600 TBq of 137Cs in one batch of Envelope B waste feed material is correct (see question 3), approximately 39 batches of Envelope B waste could be processed before the inventory of 137Cs in the Cesium Product Storage Tank exceeded 140,000 TBq. The principle of minimizing risk by minimizing inventory of material-at-risk (intrinsically-safe design) is based on designing out hazardous materials or designing the process to function with a reduced volume and inventory of hazardous materials as far as practicable.

DETAILED QUESTIONS:

Question 3(c) - 6 If the separated cesium storage hazards for the LAW-only option were considered by the HLW Melter Systems team what inventories were considered as a basis for the evaluation? Were these the "batch basis" inventories tabulated in HAR, Table 4-1 or were estimates of the inventories that would be accumulated and stored in the facility used?

Contractor Response

In the LAW-only option, the Hazards Evaluation Team estimate for Cs storage was one 600-liter batch for loading on to the CST from Cs ion exchange. From the flowsheet, a batch contains 3,650 TBq for Envelope B. This inventory gets stored in V2401, a 1.5 cu. meters tank. The Hazards Evaluation Team estimated the inventory for HLW to be 200,000 TBq in 56 cu. meters (a revised Table 4-1 of the HAR will be provided, as attached). The Hazards Evaluation Team assumed an unmitigated release.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The detailed question asks the Contractor to identify what operating and safety considerations would be affected if the capacity and 137Cs inventory of the Cesium Product Storage Tank were reduced. According to Table 4.1 accompanying the Contractor's response to questions, this tank may contain 2(1017 Bq 137Cs, representing the largest radionuclide inventory in TWRS-P. DOE/RL-96-0006 Top-level Standard and Principle 4.1.1.2 Prevention (an SAP approval criterion listed in the question), requires that "principal emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release. The SRD (BNFL-5193-SRD-01, Rev.0) incorporates Safety Criterion 1.0-2 "Principal emphasis should be placed on the prevention of accidents, particularly any that could cause an unacceptable release, as the primary means of achieving safety." Prevention of accidents can be achieved by eliminating a hazard entirely through process redesign, or by minimizing the magnitude of a hazard (reducing the quantity of material at risk). However, the RU is unable to identify where this principle is implemented in the TWRS-P process design.

Supplemental Response

Please See Supplemental Response to Question 30.

Supplemental Disposition

The Contractor's original response was acceptable. The original disposition of this question was copied from question # 29 and, therefore, this question was erroneously listed as unresponsive. The original BNFL response clarified the inventories of separated cesium that are to be stored in the LAW-only facility; question # 30 (listed in the supplemental response) addressed the separated cesium inventory for the LAW/HAW option.
The Contractor's response to the question indicates that the Cs storage tank has the capacity to hold two years of Cs product, and that the capacity provides the flexibility necessary during the startup of the facility. The Contractor's response continues by stating that operating experience can be gained with the HLW melter before the more challenging material is introduced and the need to process the Cs concentrate arises. The response appears to indicate that programmatic concerns, not safety concerns, were paramount in determining the cesium inventory of the Cs Storage Tank.
An acceptable response would identify what safety considerations would be affected if the capacity and 137Cs inventory of the Cesium Product Storage Tank were reduced, and explain how Top-level Standard and Principle 4.1.1.2, an expression of intrinsically-safe process design philosophy, is implemented in the TWRS-P process design of the Cs Storage Tank.

Question # 32

Description

Theme #3: The basis for technical conclusions in the HAR is not clear

Subordinate Theme #3c - Offgas Treatment and Cesium Handling

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERION:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

OBSERVATIONS:

Hazard Analysis Report, Table 4-1 Major Radionuclide Streams shows 140,000 TBq 137Cs in the Cesium Product Storage Tank. Footnote a under the table indicates that quantities shown in the table are on a per batch basis, but presumably this doesn't apply to the 137Cs in the Cesium Product Storage Tank. If the value of 3,600 TBq of 137Cs in one batch of Envelope B waste feed material is correct (see question 3), approximately 39 batches of Envelope B waste could be processed before the inventory of 137Cs in the Cesium Product Storage Tank exceeded 140,000 TBq. The principle of minimizing risk by minimizing inventory of material-at-risk (intrinsically-safe design) is based on designing out hazardous materials or designing the process to function with a reduced volume and inventory of hazardous materials as far as practicable.

DETAILED QUESTIONS:
Question 3(c) - 7 Were hazards associated with radiolytic hydrogen generation in the stored cesium canisters considered? More specifically what is the basis for the assumption that the CST drying step, as described in the HAR on pages 2-29 and 5-78, will remove the free and bound water that is a potential source of radiolytic hydrogen generation during storage?

Contractor Response

3(c)-7 Response.

The statement in the HAR on page 2-29 reads "The cesium-loaded bed is subsequently dried by a combination of its own heat generation and a slow passage of air." This is a process statement with no mention of safety implications or radiolysis. The statement on page 5-78 reads "The cesium loaded CST column is dried by using its own heat generation and by the circulation of 70 C (158 F) air at 6.7 kg/h (14.8 lb/h) flowrate through the bed. A side stream of the drying air is bypassed through an analyzer to monitor its moisture content." Nowhere in either statement are there any assumptions regarding the potential (or otherwise) of radiolytic hydrogen generation.

The potential hazardous situation of radiolytic gas generation in situ due to ineffective drying of the bed and leading to pressurization of the canister is considered in the Fault Schedule (HAR page 5-81, event identifier 1614662/121 and page 5-290, event identifier 1614775/439).

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The effectiveness of the proposed CST drying conditions for removing bound water is not addressed nor does it identify safeguards that address the potential for explosion/overpressure hazards due to radiolytic hydrogen generation from "bound water in the cesium - loaded CST.

The underlying concern is that the safeguards for event identifiers 1614662/121 and

Supplemental Response

The hazardous situation identified is "ineffective drying" of the CST after Cs loading. The information that bound water can only be driven off at elevated temperatures (around 300C) will be used in ensuring that the drying process will result in the removal of both unbound and bound water, thus removing the potential for in situ radiolytic gas generation during storage. Preliminary discussions with the vendors have indicated that for similar material, bound water does not give rise to radiolytic gas generation. This conclusion will be pursued during development work with CST to ensure its validity.

Supplemental Disposition

The supplemental response is acceptable. BNFL stated that the potential hazards associated with radiolytic hydrogen generation from bound water in the cesium-loaded CST

will be considered by using elevated temperature drying conditions capable of removing both the bound and unbound water. It also states that the potential for radiolytic hydrogen generation from bound water in the CST will be pursued during development work with CST. 1614775/439 do not address the "bound water" in the CST which may be a significant source of radiolytic hydrogen generation. Explicit consideration of the bound water is important to eliminate the "Explosion / Overpressure Hazard" associated with the Cs-CST storage.

How is the potential for explosion/overpressure hazards resulting from radiolysis of bound water in the Cs-CST canisters to be addressed?

Question # 33

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

OBSERVATIONS:

The scope of the hazards analysis, as presented in the Hazards Analysis Report appears to be limited to consideration of the "process steps". Initial review of the Hazards Analysis Report indicates that the organization and execution of the hazards analysis by "process step" may have caused other potentially significant hazards in the facility to be overlooked. For example, it appears that the hazards associated with treatment, handling and interim storage of solid secondary wastes (e.g. spent ion exchange resins) were not considered.

DETAILED QUESTIONS:

Question 4 - 1 In general, please clarify how facility hazards other than the "process hazards" were evaluated? Also, please identify which hazards evaluation teams considered these hazards and where the results are included in the Fault Schedules or other parts of the Standards Approval package.

Contractor Response

The hazards evaluation studies have covered all the major areas of the concept design (the current work activities) as detailed in the facility and process description (Chapters 2, 5). We are confident that major hazards associated with the current work activities have been adequately addressed. As the design develops (development of work activities), hazard evaluation studies will be carried out to ensure that the hazard potential of the work activity is always addressed.

With regard to the observation noted above, and as indicated in the response to Question

128, spent resins are fed to the LAW melter. The treatment of concerns regarding this process have been indicated in the response to Question 128. The statements on page 2-29 are in error and will be changed to reflect the current process intent (see HAR page 5-95) of feeding spent resins to the LAW melter. A mark up of the revision to page 2-29 is attached for information.

Disposition

The BNFL response is responsive and acceptable.

Errors on page 2-29 of the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0) will be corrected, as indicated, in the revised HAR. Correction of the errors addresses the concern regarding the apparent omission of consideration of hazards associated with treatment, handling and interim storage of spent ion exchange resins.

Supplemental Response

Supplemental Disposition

Question # 34

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

OBSERVATIONS:

The scope of the Hazard Analysis Report is inadequate; the hazard analysis for bulk chemical storage is lacking from the submittal. For example, the 34 MT of anhydrous, liquid ammonia stored in the Wet Chemical Storage Tank appears to be a significant cold chemical hazard (Table 4-2 Process Chemicals in the HAR). Ammonia is listed in Table 4-3 Hazardous Characteristics of Process Chemicals and Potential By-Products (Sheet 4), but the note indicates that the ammonia is a gas at 1 atm and standard temperature (true enough, but it's not the only state that ammonia is in at the facility). At 700F, liquid ammonia vapor pressure is ~6 barg. Safety issues of anhydrous ammonia storage involve single vs. double containment, materials of construction, tank fabrication methods, welding procedures, over-pressure relief, safe discharge from relief valves, and rail/roadtanker-to-tank transfers.

DETAILED QUESTIONS:

Question 4 - 2 Why were potential accidents involving bulk chemicals not examined in the Hazard Analysis Report? Please explain the hazards associated with these areas, the hazard controls (safeguards) envisioned, and any necessary standards associated with

those controls.

Contractor Response

Because level of design detail available on bulk chemical storage (outcell) for Part A design was not sufficiently developed to support the PHA study, a safety review has been carried out to approved BNFL procedures which has examined the schematics submitted on (cold) bulk chemical storage. The schematics (and the system design document) were used as basic data with facility layout drawings used in support. Each system was reviewed, hazards identified, and recommendations given to the designers for further design development work. These recommendations were not control strategies but were precursors to aid the designer in ensuring that suitable hazard control was being built into the design. For example, a potential hazardous situation of loss of concentrated nitric acid was identified; the recommendation in the safety review was that the diked (or bermed) area within which the nitric acid storage vessel is situated must be acid resistant, (i. e., the design was to incorporate suitable acid resistant areas).

Major hazards/hazardous situations identified:

Spillage/loss of containment.
Toxic fume.
Corrosion (caustic/acidic/NOx).

Disposition

The BNFL response is responsive and acceptable.

The detailed question asked why potential accidents involving bulk chemicals were not examined in the Hazard Analysis Report. The question also asked for an explanation of the hazards associated with these areas, the hazard controls envisaged, and any necessary standards associated with those controls. The Contractor responded that the design was not sufficiently developed to perform a PHA study for (outcell) chemical storage and concluded that a system review, carried out to approved BNFL procedures, was acceptable at this stage of design completion. The Contractor's response indicated that each system was reviewed, hazards identified, and recommendations given to the designers for further design development work. The response lists the major hazards/hazardous situations identified during the review, and notes that a "more detailed safety assessment of these systems will take place during design development in Part B."

This response is acceptable based on BNFL's commitment to include the results of the system review for bulk chemical storage in the HAR as committed to by R Cullen in a telcon on November 25, 1997, Mr. R. Barr and Mr. R Hardwick.

Supplemental Response

Although marked up as acceptable in the disposition, it is conditional upon BNFL supplying a mark up of the HAR with a paragraph that notes the existence of the Bulk (cold) chemical safety study with its major conclusions.

An addition to Section 5.1 of the HAR, Scope of Hazard Evaluation Studies, will be made and reads as follows:

"A separate study of the bulk (cold) chemical storage systems was undertaken. The maturity of design information for these systems precluded its inclusion in the PHA studies because only schematics and a basic process description were available. A preliminary safety review (to approved BNFL procedures) was carried out to indicate hazards and concerns that would need to be addressed in the design development of this area.

The study areas encompassed the seven bulk chemical storage systems:
Anhydrous ammonia
Effluent disposal (incompatibility.) Nitric acid
Chemical reaction (strong acid/caustic/ammonia) - fire/explosion risk. Sodium hydroxide
Manual handling. Ferric nitrate
Wrong reagent in wrong vessel may result in chemical reaction. Strontium nitrate
Sodium nitrite
The requirement made in the review: "This safety review should be used during the Ion exchange resins
development of the detailed design for the TWRS-P cold chemical bulk storage systems in For each area a systematic review of the schematic was undertaken and potential hazards order to address concerns at an early stage. Further, more detailed safety assessment of and further work identified.
these systems will take place during design development in Part B." Major hazards identified which are to be addressed in the design include loss of
confinement, adverse chemical reactions (fire/explosions) and manual handling operations."

indicates the pre-conceptual level of design detail.

The review has given sufficient information to the design team to carefully consider the siting requirements, vessel, pipework, and connection integrity in developing the design. For example, due to the potential severity of loss of confinement of ammonia and nitric acid standards such as those defined in the SRD in Sections 4.2-1 to 4.2-4 could be chosen for

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL provided a mark-up of the design of this equipment to demonstrate robustness against the potential hazards.
HAR (in Sect. 5.1) with a paragraph that notes the existence of the bulk (cold) chemical safety study with its major conclusions. The supplemental response provides the complete text of the addition to the HAR; the text is acceptable to the RU reviewers.
The safety review exercise is a standard BNFL approach to (pre) conceptual designs. A structured and systematic approach is used, carried out by an experienced reviewer who is a safety expert, and the results are reviewed by other safety experts. Approval of the document produced is in accordance with established project procedures.

The safety review of the TWRS-P cold bulk chemical storage systems was carried out and reviewed by safety experts on the BNFL Team . The safety review document is a project approved document within the project files.

Question # 35

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

OBSERVATIONS:

The simple flow diagrams (Figures 2-7 and 2-8 in the HAR) do not contain sufficient relevant detail to support review of the hazards identification and assessment.

DETAILED QUESTIONS:

Question 4 - 3 Please explain why the offgas treatment train is not shown in Figures 2-7 and 2-8. What hazards are associated with the offgas treatment train? What hazard control strategies are envisioned? What standards apply to the control strategies?

Contractor Response

All of Chapter 2 provides a top-level overview. Figure 2-7 and Figure 2-8 depict simplified flow diagrams of the process and do not depict any of the facility off-gas systems (e.g., vessel vent). HAR Sections 5.2.12 and 5.2.14 provide more detailed process descriptions

and address the hazards associated off-gas systems. The suite of controls and selected standards identified for these controls are provided in Attachment 4, Table 2 of October 23 letter [see #43]. PFDs for the off-gas system were transmitted as part of the technical information package. PFDs that show the off gas system are:

For LAW:
Duratek Drawing HFD-M-P-005
1614671 PFD 3600 LAW/HLW Secondary Offgas Treatment
1614672 PFD 3300 LAW Vitrification Offgas Treatment

For HLW:
Duratek Drawing HFD-M-P-006
1614671 PFD 3600 LAW/HLW Secondary Offgas Treatment
1614673 PFD 3300 HLW Vitrification Offgas Treatment

Disposition

The BNFL response is responsive and acceptable.

The PFDs, hazards control strategies and links to the standards are appropriately addressed in the response.

Supplemental Response

Supplemental Disposition

Question # 36

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

OBSERVATIONS:

The simple flow diagrams (Figures 2-7 and 2-8 in the HAR) do not contain sufficient relevant detail to support review of the hazards identification and assessment.

DETAILED QUESTIONS:

Question 4 - 4 Please explain why the plan to blend spent ion exchange resin with envelope C in the HLW feed is not shown in Figures 2-7 and 2-8. Was this part of the process considered in analyzing the process hazards? If so, what hazard control strategies are envisioned? What standards apply to the control strategies?

Contractor Response

The spent resins go to the LAW melters. Chapter 2 provides a top-level overview. Figure 2-7 and Figure 2-8 depict simplified flow diagrams of the process.

Disposition

The BNFL response is responsive and acceptable.

As pointed out in response to Questions 33 and 128, BNFL committed to revise the SAP to show that the spent ion exchange resins will be sent to the LAW melter. BNFL also addressed the hazards associated with their incineration in the LAW melter in Question 128.

Supplemental Response

Supplemental Disposition

Question # 37

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

OBSERVATIONS:

The scope of the Hazard Analysis Report is inadequate; the hazard analysis for bulk chemical storage is lacking from the submittal. For example, the 34 MT of anhydrous, liquid ammonia stored in the Wet Chemical Storage Tank appears to be a significant cold chemical hazard (Table 4-2 Process Chemicals in the Hazard Analysis Report). Ammonia is listed in Table 4-3 Hazardous Characteristics of Process Chemicals and Potential By-Products (Sheet 4), but the note indicates that the ammonia is a gas at 1 atm and standard temperature (true enough, but it's not the only state that ammonia is in at the facility). At 700F, liquid ammonia vapor pressure is ~6 barg. Safety issues of anhydrous ammonia storage involve single vs. double containment, materials of construction, tank fabrication methods, welding procedures, over-pressure relief, safe discharge from relief valves, and rail/roadtanker-to-tank transfers.

DETAILED QUESTIONS:

Question 4 - 5 Several places in the HAR (4-15, 4-18) indicate the potential for hydrogen was considered. Why is not considered in table 4-3 (byproducts) or 4-4 (Matrix of potential interaction of TWRS-P Facility Process Chemicals)?

Contractor Response

Radiolytic hydrogen gas generation in vessels is possible wherever radionuclides in solution are stored. It should have been included in Table 4-3 as a by-product. This will be revised. A mark-up of the revision to be included in the HAR revision at the end of Part A is attached.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

BNFL has agreed to add hydrogen to Table 4-3. However, the omission of hydrogen from Table 4-4 was not discussed in the response. BNFL needs to address why hydrogen was not included in Table 4-4.

Supplemental Response

It was believed that hydrogen, as a by-product, should be added to Table 4-3. It was not added to Table 4-4 because no potential interaction with the process chemicals had been identified.

The potential for hydrogen generation with the TWRS-P Facility process is under review as the design matures to ensure any additional concerns are identified and addressed in a timely manner.

Supplemental Disposition

BNFL's supplemental response was acceptable. The Contractor revised Table 4-3 to include hydrogen. BNFL stated that because no potential interaction between hydrogen and the process chemicals was identified, Table 4-4 did not require revision. BNFL also stated that the potential for hydrogen generation with the TWRS-P Facility process is under review as the design matures. If such concerns are identified, BNFL hazards process is sufficient to identify the hazard and incorporate additional hazard control strategies.

Question # 38

Description

Theme # 4: The scope of the Hazards Analysis Report is inadequate

SUBMITTAL CRITERION:

DOE/RL-96-0003

Section 4.1.2, Item 3, The hazards assessment used to facilitate the selection of the standards.

Section 4.1.2, Item 5, Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;
Section 3.3.1, Item 6, The set documented in the SRD will provide adequate safety if properly implemented.
Section 3.3.1, Item 2, The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL 96-0006

Section 4.2.1.1 The facility should be designed for a set of events such as normal operation, including anticipated operational occurrences, maintenance, and testing; external events; and postulated accidents.

DETAILED QUESTIONS:

Question 4 - 6 Page 1-4 states that the HAR focused on episodic events vs. hazards from normal operation or anticipated off-normal events. Some normal and off-normal events were addressed. When will DOE receive a full treatment of these events? (or an assessment that includes the bounding events for all types of accidents).

Contractor Response

Radiological and chemical releases for normal operation will be provided in Part B. Radiological emissions for normal operations are reported as part of the application for a Radiological Emission License (WAC-246-247). Non-radiological emissions are reported as

part of the Notice for Construction Approval (WAC-173-400, 173-401, and 173-460). Expected radiological effluents from the facility will be provided in the Part B FSAR as required by DOE/RL-96-003, Section 4.4.2, item 19.

Radiological and chemical releases for accident conditions will be provided in Section 4.7 "Results of the ISA," of the Initial Safety Analysis Report.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

BNFL has stated that it will supply radiological and chemical releases for normal operation in Part B. First, radiological and chemical releases are not the only hazards that will need to be addressed, particularly for workers. Second, BNFL's response did not address anticipated off-normal events. Third, the hazards from normal operation and off-normal anticipated events need to be assessed to ensure an adequate standards set has been identified for design and procurement. If these hazards are not identified, it is likely that design/procurement specifications will be inadequate. Furthermore, as BNFL has stated it will not qualify equipment for mild environments (normal operating environments) failure to identify the appropriate environments in design/procurement specification could result in equipment being purchased which will not operate properly in normal environments.

Follow-On Question:
BNFL needs to assure DOE that prior to procuring equipment and materials, (1) BNFL will identify the operating conditions and standards for the full range of events (including normal, off-normal and episodic); and (2) BNFL will include the full range of operating conditions, environments, and standards in the procurement specifications.

Supplemental Response

Revised Response to Specific Question.

The original BNFL response was incorrectly limited to radiological and chemical releases from the facility during normal operation. A full assessment of the hazardous situations that might present themselves during normal operation through extremely unlikely events will be provided to the RU in Part B as part of the Construction Authorization Request (CAR) submittal. For hazards to the facility workers, in particular for events occurring out of the process cells, the Hazard Analysis Report submitted as part of the CAR, will identify hazardous situations for the facility workers and the potential safeguards against these situations. Section Chapter 4.8, "Controls for the Prevention and Mitigation of Accidents," of the PSAR, also to be submitted with the CAR, will identify the specific safeguards selected for protection of the facility workers, as well as safeguards selected for protection of the co-located workers and the public. It is expected that the selected safeguards, be they engineered features or administrative controls, will confirm that the SRD has identified an adequate set of standards. For engineered features, this will include confirmation that the standards identified for design, procurement, maintenance, and testing of Design Class I and II engineered features are adequate to ensure these features will perform their specified safety function when called upon.

Follow-On Question

The operating conditions for which engineered features must function during normal operation and accidents will be included in the procurement specifications for Design Class I and II SSCs. While suppliers of Design Class II systems and components are not specifically required to provide test results relative to aging, the procurement specifications for these systems and components will specify the environmental conditions (e.g., temperature, humidity, and radiation field) to be expected during normal operation and the accident duration for which the system or component must function. Specifying Design Class II systems and components in this manner provides reasonable assurance that they will perform their required safety function when called upon. Also see the revised response provided for Question 87.

Supplemental Disposition

BNFL's supplemental response was acceptable. On November 11, 1997, BNFL 5193-97-0554-SQA, BNFL stated that it will supply an assessment of radiological and chemical releases for normal operation in Part B. In the December 7, 1997 response, BNFL supplemented the response by stating that a full assessment of the hazardous situations that might present themselves during normal operation through extremely unlikely events will be provided to the RU in Part B as part of the Construction Authorization Request (CAR) submittal. In addition, BNFL stated that it is expected that the selected safeguards, either engineered features or administrative controls, will confirm that the SRD has identified an adequate set of standards.

Given the early stage of design of the BNFL TWRS-P , BNFL's collective responses are acceptable considering that when the full range of unmitigated hazards are identified as part of the CAR submittal, BNFL will confirm that the identified standards, safeguards, and safety criteria are sufficient to ensure adequate protection given the full range of unmitigated hazards.

Question # 39

Description

Theme #5: Inadequate or ambiguous selection of Standards

Subordinate Theme #5a - Fire Safety

APPROVAL CRITERION:

DOE/RL-96-0003, Section 3.3.1, Item 6

The set documented in the SRD will provide adequate safety if properly implemented.

SRD REVIEW GUIDE:

Section 7.4; Identification of Standards. The identification of Standards involves the contractors integration of the results of hazards evaluation...into a standards selection process.

OBSERVATIONS:

The "Safety Criteria" for fire protection in Chapter 4, Section 4.5, of the SRD paraphrase, to a significant extent, the fire protection requirements delineated in DOE Order 420.1, "Facility Safety." As developed by DOE, this Order is intended to be applied in conjunction with its corresponding Implementation Guides (such as G-420.1/B-0, "Fire Safety Program") and related standards (such as DOE-STD-1066-97, "Fire Protection Design Criteria"). These supplemental guidance documents address fire safety issues, unique to DOE, that are not addressed or are insufficiently addressed in industry standards, such as those promulgated by the National Fire Protection Association (NFPA).

Also, The Hazards Analysis Report identifies a number of fire mitigation strategies such as: fire detectors, fire suppression systems, and emergency egress features. The design, installation, and maintenance of such fire protection measures are governed by specific NFPA Codes such as: NFPA 72, National Fire Alarm Code, and NFPA 101, "Life Safety Code."

DETAILED QUESTIONS:

Question 5(a) -1 Why were the above-referenced Guide and Design Standard not adopted as "Implementing Codes and Standards" in the SRD?

Contractor Response

BNFL believes that the adoption of NFPA 801, including the incorporation of those NFPA standards listed in Chapter 6, "Referenced Publications" of NFPA 801 provides an adequate set of standards for the TWRS-P facility. Also note, as explained in response to Question 178, reference to NFPA 801 should have also been included for SC 12 - 19. The SRD will be revised in this regard.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

A fire protection program for the proposed facility that is based solely on the "Safety Criterion" and NFPA 801 and related standards that are referenced in NFPA 801 would not be comprehensive or sufficient to assure an adequate level of safety. Specific aspects of the program that would be inadequate include, but are not limited to; the analysis of fire hazards, the provision of automatic fire suppression, water supply, protection of vulnerable safety systems, and the manual fire fighting capability.

Supplemental Response

Please See Attachment Question 39 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's response was acceptable. With the expansion of the Safety Criteria for Fire Protection and the inclusion of the Implementation Guide (G-420.1/B-0) to DOE 420.1, "Fire Safety Program," and DOE Standard 1066.97, "Fire Protection Design Criteria," in the

SRD, there is reasonable assurance that the Standards Set will provide an adequate fire safety program if properly implemented.

Question # 40

Description

Theme #5: Inadequate or ambiguous selection of Standards

Subordinate Theme #5a - Fire Safety

APPROVAL CRITERION:

DOE/RL-96-0003, Section 3.3.1, Item 6

The set documented in the SRD will provide adequate safety if properly implemented.

SRD REVIEW GUIDE:

Section 7.4; Identification of Standards. The identification of Standards involves the contractors integration of the results of hazards evaluation...into a standards selection process.

OBSERVATIONS:

The "Safety Criteria" for fire protection in Chapter 4, Section 4.5, of the SRD paraphrase, to a significant extent, the fire protection requirements delineated in DOE Order 420.1, "Facility Safety." As developed by DOE, this Order is intended to be applied in conjunction with its corresponding Implementation Guides (such as G-420.1/B-0, "Fire Safety Program") and related standards (such as DOE-STD-1066-97, "Fire Protection Design Criteria"). These supplemental guidance documents address fire safety issues, unique to DOE, that are not addressed or are insufficiently addressed in industry standards, such as those promulgated by the National Fire Protection Association (NFPA).

Also, The Hazards Analysis Report identifies a number of fire mitigation strategies such as: fire detectors, fire suppression systems, and emergency egress features. The design, installation, and maintenance of such fire protection measures are governed by specific NFPA Codes such as: NFPA 72, National Fire Alarm Code, and NFPA 101, "Life Safety Code."

DETAILED QUESTIONS:

Question 5(a) - 2 Why were these and other applicable NFPA Codes not adopted as "Implementing Codes and Standards" in the SRD

Contractor Response

The adoption of NFPA 801 includes the incorporation of those NFPA standards listed in Chapter 6, "Referenced Publications" of NFPA 801. This list includes NFPA 72 and 101. Also note, as explained in response to Question 178, reference to NFPA 801 should have also been included as an Implementing Code for SC 12 - 19. The SRD will be revised in this regard.

Disposition

The BNFL response is responsive and acceptable.

For this stage in the hazard identification/assessment process, the list of standards noted is satisfactory. When the ISA and subsequent analyses are submitted, it may be necessary to reassess the adequacy of the safety features in relation to these standards. (Note that this disposition does not address the issue raised in Question 39.) No further questions are necessary to address this issue.

Supplemental Response

Supplemental Disposition

Question # 41

Description

Theme #5: Inadequate or ambiguous selection of Standards
Subordinate Theme #5b - Missing Safeguards Could lead to Incomplete Identification of Standards

APPROVAL CRITERIA:

DOE/RL-96-0003

Section 3.3.1, Item 3, The hazards associated with the proposed facility and its operation are appropriately assessed;

OBSERVATIONS:
Safeguards are methods to mitigate the consequences of an event. They should also point to where potential standards and requirements could be used to preclude or lessen the effects of the event. The lack of safeguards may lead to less than a full set of codes and standards. This would also be the case where a full set of safeguards was not developed. An example of the later could be the addition of a nitrogen blanket or air purge safeguards option for the control of hydrogen for the page 5-72 event 2200/12.

Every attempt should be made to list the set of safeguards needed such that appropriate standards and requirements are identified.

DETAILED QUESTIONS:

Question 5(b) - 1 Why were there no safeguards identified for the following consequence level three events? The first event on page 5-163 (3200/193) does not have any safeguards listed. The event on page 5-168 (3200/165) does not have any safeguards identified. What safeguards are appropriate for these events, and what are the related codes and standards?

Contractor Response

Event 3200/193 (HAR page 5-163) should have indicated by reference that the issue of relief on the emergency off-gas was being covered by an action that requested the design team to consider how pressure relief on the system could be engineered. This action is still open (after having been reviewed) pending further design detail in Part B. It should be noted that the need for pressure relief on the emergency off-gas system assumes that the off-gas system itself has pressurized and the normal relief route and the emergency off-gas system has failed. The action review team concluded:

"Consideration will be given to the provision of the pressure relief valve as further design detail becomes available. At present, this "third" means of pressure relief, the first two being the normal off-gas route and the emergency off-gas route, does not seem to add significant safety value. To be further reviewed."

If analysis of the consequence of this hazard indicates that public or worker exposure standards are being challenged, then appropriate DCI or DCII items will be identified.

A mark up of the revision to be included in the HAR revision is attached.

Events 3200/165 (HAR page 5-168) and 3200/247 (HAR page 5-147) should have indicated cooling water system integrity and leak detection/control as safeguards against this event. System integrity would reduce the potential for component failure and leak detection/control would minimize water ingress into the melter (and hence steam challenge to the ventilation system). If the accident analysis work concludes that this hazardous situation could challenge public or worker dose standards then appropriate DCI or DCII items will be identified.

A mark up of the revision to be included in the HAR is attached.

Disposition

The BNFL response is responsive and acceptable.

Appropriate markups for revision of the HAR were attached to the response. These will then be considered during the accident analysis to be performed. The response is acceptable since BNFL has committed to revise the HAR , and that the accident analysis and any changes to the standards that result from the analysis will be incorporated in a revised SRD.

Supplemental Response

Supplemental Disposition

Question # 42

Description

The BNFL SRD (BNFL-5193-SRD-01, Rev 0, Volume I) discusses in Chapter 1.0 that the standards set when implemented, will ensure adequate protection of workers and the public, yet no mention is made of the environment. Yet elsewhere in the submittal (Section 1.0 of the ISMP) protection of the environment is included. Is environmental protection an element of the SRD?

Contractor Response

Environmental Protection is addressed in the SRD through protection against the normal and accidental releases of radioactive/hazardous material resulting in exceeding worker or public exposure standards and through programs including the radiological protection program and the environmental radiological protection program.

Disposition

The BNFL response is responsive and acceptable.

The response details BNFL's responsibility to environmental protection through normal and accidental releases of radioactive/hazardous material resulting form exceeding worker and public exposure standards.

Supplemental Response

Supplemental Disposition

Question # 43

Description

DOE/RL-96-0004, step 2 requires the identification of work to be accomplished as a precursor to hazards analysis and identification of standards. Chapter 2 of the SRD (BNFL-5193-SRD-01, Volume I) fails to provide any discussion (except Figure 2.1) regarding the work identification step nor does it identify who performed this step. It also does not discuss the iterative interactions between the identified work and the related hazards identification. In addition, Figure 2-1 of the SRD does not show any iterative interactions between these two steps. Who were the work activity experts that performed the work identification? What were the team staffing requirements and areas of expertise regarding work definition? What interactions did the work identification group have with the hazards analysis group?

Contractor Response

The identification of work was in the draft BOD developed in October 1996 in accordance with BNFL procedure E-01-TWRS by technical experts who also participated in the hazards evaluation and identification of the suite of controls. These experts were people with experience in nuclear chemical plants design and operations involving the processes of ultrafiltration, ion exchange, and vitrification.

As detailed in the BNFL letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter #97-RU-0307) the process explanation presented therein for Part A, as well as for Part B, and the example uses of BNFL design guides, traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The response is not complete enough to allow the RU to credibly evaluate the standards identification process used by BNFL to develop the standards set. Additional descriptive (text) details needs to accompany the process figure in the October 23, 1997, letter from BNFL (Letter #97-RU-0307) so that the RU can fully understand the process. (Also see disposition to Question 51)

Supplemental Response

Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The description of the process that BNFL used for standards identification and selection was adequate. Additional text provided by BNFL on December 8, 1997, acceptably described the standards identification process figure in the October 23, 1997 letter from BNFL (Letter #97-RU-0307).

Question # 44

Description

DOE/RL-96-0003, section 4.1.2, item 2 requires the SRD to contain the set of standards that when implemented will provide adequate safety, comply with laws and regulations, and conform to DOE/RL-96-0006, Top Level Standards and Principles. With respect to the above:
Attachment E of SRD Volume I states that tables showing where requirements are incorporated into the SRD are included. Yet the table for item 5 (DOE/RL-96-0006) is missing. Please provide the missing table or show how the Top Level Standards and Principles are incorporated into the SRD as required by the above contract requirement.

SUPPLEMENT TO QUESTION # 44

B. Where is the commitment made in the SRD to 10CFR835, 10CFR820, 10CFR830.120, 29CFR1910.119? While reference is made to these requirements in Attachments D & E of the SRD, Volume I, these are not listed in the set of selected standards in Chapter 5, section 5.1; or in tables 3-1, 3-2 or 3-3 (selected standards). What is the BNFL-recommended set of radiological, nuclear and process safety standards and requirements for which BNFL is seeking standards approval?

Contractor Response

Attachment E of the SRD Volume I was provided to the RU September 29, 1997.

Response to Supplemental Question

B. The commitment to 10 CFR 835, 10 CFR 830.120, 29 CFR 1910.119, and 40 CFR 68 are made in the SRD through the SRD Safety Criterion. Additionally a new Safety Criterion will be added to address compliance with 10 CFR 835 and 10 CFR 830.120 (see Response to Question # 1). 10 CFR 820 is addressed in the ISMP as discussed in the Response to Question 156. The Safety Criteria and Implementing Codes and Standards identified in Volume II are the recommended set of radiological, nuclear and process safety standards for which BNFL is seeking standards approval.

Disposition

The BNFL response is responsive and acceptable.

The response commits to providing the missing table from Attachment E of the SRD Volume I. The table was subsequently provided on September 29, 1997. The response to the Supplemental Question B identifies where the commitments to the cited regulations are found and identifies the set of standards for which BNFL is seeking approval.

Supplemental Response

Supplemental Disposition

Question # 45

Description

DOE/RL-96-0003 section 4.1.2 items 2 and 7 require the selected standards set to provide adequate safety, comply to laws, and conform to Top Level Standards and Principles, and that the set be justified. Attachment F of SRD Volume I states that for Attribute 6.1, the recommended standards set for radiological nuclear and process safety is contained in Volume II of the SRD. Volume II however, apparently only contains design codes and standards listed in bold under the title of Implementing Codes and Standards. The Implementing Codes and Standards in Volume II are also listed in Volume I, Section 5.1 (Selected Consensus Codes and Standards) and Table 3-2 and 3-3 (Selected Set and Justification for the Set) thereby implying that the Implementing Codes and Standards are the selected set. It is further stated in section 3.3 that safety criteria are in fact part of the set of selected standards, yet these standards are not listed as such in Section 5.1, or tables 3-1, 3-2 or 3-3 as selected standards. Are the Safety Criteria part of the selected set of standards? And if so, are the drivers listed in table 3-1 the rationale for the justification and adequacy of the set? If not, where can we find the justification and adequacy of the Safety Criteria standards as required by the contract if they are part of the selected set of standards?

Contractor Response

The Safety Criteria and Implementing Codes and Standards comprise the selected standards set.

The "drivers" in Table 3-1 and additional information provided in the letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter # 97-RU-0307) define the need for

the performance objectives (Safety Criteria). Tables 3-2 and 3-3 as well as the experience provided by the SRD, Design, and Hazards Analysis teams provide justification of the adequacy of the set of standards.

Additional information provided to the RU (Letter #97-RU-0307) confirmed that the set of standards adequately addresses the potential hazards identified in the HAR.

Disposition

The BNFL response is responsive and acceptable.

It clarifies the selected set of standards as being the Safety Criteria and the Implementing Codes and Standards from SRD Volume II and identifies where the justification and adequacy information is to be found.

Supplemental Response

Supplemental Disposition

Question # 46

Description

In SRD Volume II, section 3.3, several Safety Criteria (SC 3.3-3 & 3.3-6) reference in the discussion section ANSI/ANS standards (ANSI/ANS-8.10-1983 on pg. 3-7 and ANSI/ANS-8.3-1986 on pg. 3-8) yet these and other nuclear criticality standards were not included in the "Regulatory Basis" section nor in the "Equivalent Standards Reviewed" section of the respective safety criteria. Please provide an explanation of the layout and meaning of the Volume II submittal including a description of each section of the safety criteria as it relates to the standards set in the SRD. In your answer also please specifically address what is meant when a subordinate standard is cited in the Safety Criteria but is not included in the Basis, Standards Reviewed, or Implementing Standards sections of the safety criteria.

Contractor Response

The Safety Criteria and Implementing Codes and Standards comprise the selected standards set.

The Regulatory Basis and Other Equivalent Standards Reviewed are provided for information. This information documents the development of the Safety Criteria, but is not part of the standards set.

When a specific subordinate standard is identified in the Safety Criteria, the use of that standard is mandatory. For other implementing standards identified and committed to in the SRD, engineering judgement and suitability of the standard to TWRS-P was determined by team members responsible for design.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response provides clarifying details for the Safety Criteria and commits to mandatory use of standards identified in the Safety Criteria.

Supplemental Response

Supplemental Disposition

Question # 47

Description

DOE/RL-96-0003 section 3.3.1 requires the RU to determine that the set documented in the SRD was generated though the appropriate implementation of the standards process stipulated by DOE (DOE/RL-96-0004). However, the documents which provide this validation are not included in the SRD but are rather referenced in the SRD (Vol I, Section 2.1 and 4.0). Please provide the following references to the RU to facilitate the 96-0004 process evaluation:

-BNFL 1997a, Safety Approach to TWRS Privatization, BNFL Inc., Richland, WA

-BNFL 1997c, TWRS Privation Project Procedure manual, ESH-01-TWRS, "Independent Safety Review Team," BNFL Inc., Richland, WA

-BNFL 1997h, TWRS-P Privatization Project: TWRS-P Safety Requirements Document Development Procedure, BNFL Inc., Richland WA

Contractor Response

BNFL 1997a, "Safety Approach to TWRS Privatization," BNFL 1997c, "ESH-01-TWRS, "Independent Safety Review Team," and BNFL 1997h, "TWRS-P Privatization Project: TWRS-P Safety Requirements Document Development Procedure" were provided to the RU September 29, 1997.

Disposition

The BNFL response is responsive and acceptable.

The response committed to providing the referenced documents. Documents were subsequently provided on September 29, 1997.

Supplemental Response

Supplemental Disposition

Question # 48

Description

In a majority of the Safety Criteria listed in SRD Volume II, "should" statements that were taken from regulatory basis documents were converted to shall" statements, implying that recommendations in the regulatory basis documents have been converted to requirements. Is this a correct interpretation of the change in language? Also what was the rationale used for this conversion, for example why was this conversion of recommendation to requirement not done for Safety Criteria 1.0-2 and 4.0-3?

Contractor Response

"Should" statements that were converted to "shall" reflects BNFL's decision to clearly state the intent of the performance objective. This was done as appropriate based upon the early nature of the submittal and complexities in designing, constructing, and operating a facility of this type.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The answer is unresponsive regarding Safety Criteria 1.0-2 and 4.0-3. Restated, how does BNFL interpret and intend to show compliance to standards (Safety Criteria) that contain "should" statements as opposed to those that contain mandatory "shall" commitments?

Supplemental Response

The "should" used in SC 1.0-2, SC 1.0-3, SC 1.0-4, and 4.0-3 will be changed to "shall". Other should statements will remain to allow flexibility in design and operational considerations while affording protection to workers and the public. Compliance with the standards of Volume II of the SRD is addressed as described in the Supplemental Response to question 93.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response corrected the language in the associated safety criterion and provides a detailed description of how "should" and "shall" statements are to be treated (supplemental response to question 93).

Question # 49

Description

Several inconsistencies have been identified between the various lists of selected codes and standards and implementing codes and standards (SRD Vol I table 3-2, 3-3, and section 5.1; and Vol II):

a. IEEE-384 is selected for several safety criteria as an Implementing Code and Standard in Volume II (Safety Criteria 4.3-2, 4.3-5, 4.4-8, and 4.4-9) and is included in the tables of selected standards in Volume I (Tables 3-2 & 3-3), yet this standard is not listed in Section 5.1, Selected Consensus Codes and Standards in Volume I? Is this standard a selected standard?

SUPPLEMENT TO QUESTION # 49

B. IEEE-387 is listed in Volume I (Tables 3-2 & 3-3) as a selected standard but is not listed in Section 5.1, Selected Consensus Codes and Standards in Volume I. Further it does not appear that this standard is referenced anywhere in Volume II as an Implementing Code and Standard for any Safety Criteria. Is this standard a selected standard?

C. Please describe where in the SRD one can find the definitive list of the BNFL recommended set of radiological, nuclear and process safety standards and requirements for which BNFL is seeking standards approval as required by DOE/RL-96-0003, section 4.12, item 2?

Contractor Response

IEEE-384 was inadvertently omitted from Section 5.1 of Volume I and will be added. Section 5.1 was intended to contain reference information for the selected standards committed to in Volume II. Omission of a standard from the reference list of Section 5.1 for Volume I of the SRD does not impact the commitment to implement the standard as identified in Volume II of the SRD.

Response to Supplemental Questions

B. IEEE-387 is not a selected standard and will be deleted from Tables 3-2 and 3-3. At this time, there the need for DC-I/DC-II diesel generators has not been identified and thus IEEE-387 is not required as a selected standard.

C. The Safety Criteria and Implementing Codes and Standards identified in Volume II are the recommended set of radiological, nuclear and process safety standards for which BNFL is seeking standards approval.

Disposition

The BNFL response is responsive and acceptable.

It clarifies the various meanings and sections in the SRD (Volume I and II) and commits to correcting several discrepancies in the standards set between Volume I and II.

Supplemental Response

Supplemental Disposition

Question # 50

Description

Hazards Assessment Use in the Selection of Standards

Basis
DOE/RL-96-0003, Regulatory Process, section 3.3.1, pp. 4-5 of 35, states:

The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

4) The set documented in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE in the document titled Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented
DOE/RL-96-0003, Regulatory Process, section 4.1.2, p. 11 of 35, states:

The Standards Approval submittal package shall consist of the following documentation:

3) The hazards assessment used to facilitate the selection of the standards;

7) The rationale for the selection of the standards and the adequacy of the set.

DOE/RL-96-0004, Standards Process, section 3.0, p. 3 of 12, states:

A key feature of this process is that these standards for performance of work link directly to specific radiological, nuclear, and process hazards associated with that work.

DOE/RL-96-0004, Standards Process, Table 1, Step 4, p.5 of 12, states:

ESE [ESH Standards Experts] select appropriate standards based on the Step 2 [Identification of Work] & 3 [Hazards Evaluation] results and hazards control approaches.

Observations

Sections 1.0, "Introduction," 1.1, "Purpose," and 1.2, "Scope," of the BNFL HAR, submitted as part of BNFL's SA Package, do not refer to the use of the HAR to facilitate the selection of standards. Appendix D, "Management Response Letter," to the HAR also does not refer to the use of the HAR to facilitate the selection of standards. The events in HAR Tables 6-2, "Events of Potentially Serious or Major Consequences to the Co-Located Worker," and 6-3, "Events of Potentially Serious or Major Consequences to the Public," are not referenced in the BNFL "Safety Requirements Document."

In a meeting on October 2, 1997, between BNFL representatives and the RU Hazards Control Review subgroup of the BNFL standards approval review team, the BNFL representatives indicated that they were aware that certain standards were selected which were not based on hazards, laws, or conformance to top-level safety standards and principles (e.g., Design Class I Instrument Air standards). The BNFL representatives indicated that they were also aware that certain HAR "safeguards", such as minimizing lift heights during out-of-cell container lifts, did not have any associated standards selected. The BNFL representatives indicated that the hazards assessment and standards selection processes were performed in parallel, and that the HAR was used to verify that certain events identified in the HAR corresponded to certain classes of "Safety Criteria" in the Safety Requirements Document (SRD). It appears that only a small percentage, approximately 6%, of the event identifiers from the HAR were used for this verification based on the number of event identifiers referenced in the SRD.

Questions

How did BNFL generate the set of standards documented in the SRD with respect to linking these standards for performance of work directly to specific radiological, nuclear, and process hazards associated with that work?

SUPPLEMENT TO QUESTION # 50

B. How did BNFL environmental safety and health standards experts select appropriate standards based on the identification of work, hazards evaluation results and hazards control approaches?

C. How did BNFL determine that the set of standards documented in the SRD will provide adequate safety if properly implemented with respect to using the hazards assessment to facilitate the selection of the standards?

D. What rationale was used for the selection of the standards and the adequacy of the set with respect to selecting appropriate standards based on the identification of work, hazards evaluation results and hazards control approaches?

Contractor Response

The presentation and package of information presented to the RU on Thursday, October 23, 1997 has provided the elements of this response. The work activity is responding to the need to immobilize Hanford tank wastes. This is detailed in a series of documents and drawings which together provide a conceptual design package. This conceptual design package was provided to the RU on September 26, 1997 as part of the SAP. This conceptual design draws on the design and operational experiences of the BNFL Team in that it is similar to existing facilities (e.g., DWPF, Sellafield vitrification, Sellafield Enhanced Actinide Removal Plant). Other experience within the BNFL Team is with Hanford practices (e.g., radiological protection) and so the BNFL Team, at an early stage in the project, was able to draw on this combined experience to develop the SRD and the HAR for a vitrification facility to be built on the Hanford Site. This allowed the development of the SRD and hazards identification exercise to proceed in parallel, drawing upon the team experience as necessary. The link between standards identification, hazards identification, and work activity was established very early in the project life; team members who participated in the hazards identification studies (identification of specific radiological, nuclear and process hazards associated with the concept design - the work activity), also provided input to the SRD development (generation of the set of standards). For example, the SRD was reviewed on a regular basis by members of the design team who participated in the hazard

identification studies.

Response to Supplemental Questions

B. The selection of Standards was carried out from:

1. Knowledge of the work
2. Knowledge of the hazards
3. Knowledge of the control approach (suite of safeguards).
This fulfils our expectations:
· facility and performance-based
· The need to comply with applicable laws
· meeting regulatory requirements
· application of BNFL Corporate safety goals

As indicated in the main response above, the Standards experts had regular feedback from the design team (which was also the hazards evaluation team). Hence the selection of standards was based on knowledge of the work activity, the hazards identified and the suite of controls (safeguards) which the design offered.

C. Adequate safety is assured if identified hazardous situations are demonstrated to be suitably controlled. A measure of suitability is that radiological & chemical exposure Standards are satisfied and regulatory requirements, met. Hazardous situations which may challenge these Standards require robust controls such that the challenge is removed. A measure of robustness is that these controls are based on the set of standards documented in the SRD. The suitability of the set is determined:
1. By identifying those hazardous situations which challenge radiological and chemical exposure Standards.
2. By identifying potential controls for those hazardous situations
3. Linking identified controls to standards from the standards set in the SRD.
4. Assessing each hazardous situation (from 1 above), taking credit for the selected controls, and demonstrating that radiological exposure Standards are satisfied.
In this way adequate safety is demonstrated via the implementation of standards from the standards set identified in the SRD. The implementation is facilitated by the HAR in that major hazardous situations are identified from which the process (1 to 4 above) starts.

D. The rationale was based on the need to ensure that radiological and chemical exposure Standards are not exceeded for both public and workers. Hazardous situations which may challenge the radiological and chemical exposure standards require DCI or DCII protection. Application of the standards set from the SRD to protection allows credit to be taken for the performance of that protection. Standards are selected such that, when applied to DCI or DCII protection against hazardous situations, the credit that can be taken for the protection will ensure that those exposure Standards are not challenged. This is just part of the process by which BNFL ensures the ability to meet the exposure Standards by employing defense-in-depth as a safety margin.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

A. The BNFL response is inadequate in that it does not fully respond to the question. The response refers to the presentation and package of information presented to the RU on October 23, 1997. The presentation and package, as well as the direct BNFL response to this question, rely upon the assertion that operational experience with similar facilities and team knowledge, skills, and experience provided the basis for linking standards to hazards. This response does not address how the standards were linked directly to specific hazards. Additional detail is needed describing the process by which operational experience and team knowledge, skills, and experience were applied to link standards directly to specific hazards. (Also see disposition to Question 51.)

B. The BNFL response is inadequate in that it does not fully respond to the question. While the basis for the selection of standards was described, that basis being the knowledge of the Standards experts, the process used was not described. Additional detail is needed describing the process by which the BNFL environmental safety and health standards experts applied their knowledge to select appropriate standards based on the identification of work, hazards evaluation results and hazards control approaches. (Also see disposition to Question 51.)

C. The BNFL response is inadequate in that it is not clear whether the response refers to what was done, what is being done or what will be done. The intent of the question was to obtain a description of the process by which BNFL determined that the set of standards

documented in their SA Package would provide adequate safety. Additional detail is needed describing the process that was used. (Also see disposition to Question 51.)

D. The BNFL response is inadequate in that it does not fully respond to the question. The BNFL response appears to represent BNFL's overall rationale for the selection of the standards and the adequacy of the set, but it does not adequately address the basis of the rationale in terms of the identification of work, hazards evaluation results, and hazard control approaches. The response refers to "radiological and chemical exposure Standards" and requirements for "DCI or DCII protection," but does not relate the selection of

Supplemental Disposition

#5193-97-0554, December 8, 1997. # 43 to BNFL's response to RU disposition, letter # 5193-97-0554, dated December 8, 1997; control approaches. Additional detail is needed describing the rationale with respect to the identification of work, hazards evaluation results and hazards control approaches. (Also BNFL's letter 5193-97-0513, dated October 23, 1997; and BNFL's responses to Question # see disposition to Question 51.) 190 provided the additional detail on the linkage of hazards to standards for closure of this question.

Supplemental Response

43 to BNFL's response to RU disposition, letter # 5193-97-0554, dated December 8, 1997; BNFL's letter 5193-97-0513, dated October 23, 1997; and BNFL's responses to Question # 190 provided the additional detail on the linkage of hazards to standards for closure of this The Contractor's supplemental response was acceptable. The BNFL attachment to question these standards to the identification of work, hazards evaluation results, and hazard question. Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter

Question # 51

Description

DOE/RL96-0003 (section 3.3.1, item 4) requires the contractor to use the standards process stipulated in DOE/RL-96-0004 to generate the recommended set. This process provides an acceptable team-based approach to perform the steps of work identification, hazards evaluation and standards identification. DOE/RL-96-0004 also provides flexibility and allows the contractor to deviate from the acceptable approach if they assure that the process used meets the concepts of DOE M 450.3-1.

However, BNFL states in the SRD (BNFL-5193-SRD-01) section 2.1 that DOE/RL-96-0004 was used in development of the SRD Document Development Procedure (ESH-04-TWRS dated 9/19/97) which in turn was used to produce the SRD. BNFL further states in the SRD Document Development Procedure Section 5.0 that the basis for the SRD development was DOE/RL-96-0004 and that their process was consistent with DOE/RL-96-0004. Yet the process deviates from the DOE/RL-96-0004 process in several areas:

-DOE/RL-96-0004 cites the seven essential steps to be followed to identify safety standards and requirements (Process Initiation; Work Identification; Hazard Evaluation; Standards Identification; Standards Confirmation; Formal Documentation; and Recommendation). But the SRD Document Development Procedure in Section 5.3 outlines a process with the following steps: Identification of Applicable Requirements; Develop Safety Criteria; Review Draft Criteria; Identify Consensus Codes and Standards; Incorporate PHA Information; Confirm the Adequacy; Recommend for Approval; and Future SRD Revisions.

-DOE/RL-96-0004 cites having the PM prepare implementation plans including team staffing requirements, team operating procedures, outputs required and documentation required as part of the process initiation step, while the BNFL SRD process does not describe such processes and deliverables.

-DOE/RL-96-0004 cites having teams of Work Activity Experts (WAEs) to identify the work, Hazards Assessment Experts (HAEs) to evaluate the hazards, and Hazards Control Experts (HCEs) and ESH Standards Experts (ESEs) to identify the standards, while the BNFL SRD process development described in Chapter 2 and 3 utilizes only one team (The Requirements Identification Team) to perform all three steps;

-DOE/RL-96-0004 cites iterative interactions between the work identification step and the hazards evaluation step, while the BNFL SRD process does not discuss any interaction between these two steps in Chapters 2, 3 or Figure 2-2 nor is this interaction discussed in the SRD Document Development Procedure.

-DOE/RL-96-0004 cites the role of the Independent Review Team to perform the confirmation of standards, while the BNFL ISRT performed a process validation and oversight of the SRD process and other documents compromising the licensing basis. Additionally the ISRT

Procedure (ESH-01-TWRS) does not mention confirming the set of standards in the Scope, Responsibilities or Procedure sections.

In view of the above differences between the acceptable approach outlined in DOE/RL-96-0004 and the submittal, and the fact that DOE/RL-96-0004 was committed to in the SRD Document Development Procedure and in the SRD itself, please explain how the processes used by BNFL to develop the recommended set of safety standards and requirements in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE in DOE/RL-96-0004. In areas where BNFL has deviated from the "acceptable approach" in DOE/RL-96-0004, please explain how BNFL's process meets the concepts of DOE M 450.3-1?

Contractor Response

As detailed in the BNFL letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter #97-RU-0307) the process explanation presented therein for Part A, as well as for Part B, and the example uses of BNFL design guides, traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards.

Letter attachment "Part A Flowchart - Standards Approval" specifically identifies the seven steps of DOE/RL-96-0004 as they appear in the process that was used for Part A. The letter also contains an attachment consisting of two tables which show the linkage between the hazards in the HAR and the standards presented in the SRD. Finally, the letter places the standards set in context as the set of standards that correspond to a suite of controls (safeguards) for the hazardous situations identified for a conceptual design, the level of detail appropriate for Part A.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The response is not complete enough to allow the RU to credibly evaluate the standards identification process used by BNFL to develop the standards set. Additional descriptive (text) details needs to accompany the process figure, "Part A Flowchart - Standards Approval," transmitted in the October 23, 1997, letter from BNFL (Letter #97-RU-0307) so that the RU can fully understand the process and defend the process used by BNFL to the public.

(The following 3 requests for additional information were discussed with BNFL representatives on November 14, 1997.)

1. Please describe the roles and responsibilities of the team members. Please identify by name the WAEs, the HAEs, the ESEs, and the HCEs and describe the tasks that they performed. Please provide a detailed text description of the standards identification process figure, "Part A Flowchart - Standards Approval," in the BNFL letter of October 23, 1997, (Letter #97-RU-0307) in terms of the correspondence with the roles and responsibilities of the "Acceptable Approach" in DOE/RL-96-0004 or those identified in DOE M 450.3-1.

2. Please describe the purposes, functions and outputs for each of the BNFL steps (process initiation, work identification, hazards evaluation, etc.) as reflected in the standards identification process figure, "Part A Flowchart - Standards Approval," in the BNFL letter of October 23, 1997, (Letter #97-RU-0307) in terms of the correspondence with the purposes, functions and outputs of the "Acceptable Approach" in DOE/RL-96-0004 or those identified in DOE M 450.3-1.

3. Please list the reports, operational occurrences, events, incidents and hazards analyses used or relied upon to support the BNFL experience-based standards identification process. What information was used, and for what purpose(s)

Supplemental Response

Questions 1 and 2 . Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Question 3. BNFL experience from similar operating plant was incorporated into the PHA studies via two processes:
1. The knowledge base of the team members - professional experience
2. Information from existing similar plant regarding hazard potential and incident occurrences.

(1) Has been covered in the recognition of the knowledge base.

(2) In addition to the processes presented in Section 4.4.1 and 4.4.2 of the Hazards Analysis Report, the following discussion provides additional information of BNFL Corporate experience used in the development of standards. For an appreciation of potential hazards from similar plant which may apply to TWRS-P Facility, the safety documentation of that plant was reviewed prior to the PHA studies. Similar Sellafield operating plant which was considered relevant included:
The Windscale Vitrification Plant (WVP) - vitrification processes
Enhanced Actinide Removal Plant (EARP) - ultrafiltration/precipitation techniques
Site Ion Exchange Plant (SIXEP) - ion exchange technologies
For each of these plants, their Fully Developed Safety Cases (fdSCs) were reviewed to identify potential hazards and lessons learned which may have relevance to TWRS-P.

A fully developed safety case is the demonstration of the adequacy of safety of operations of a plant. It is the primary requirement in the application for a license to operate. Its major sections include:
Full description of plant and process
Normal operating parameters (worker and public exposures)
Identification of hazards and operability concerns
Accident analysis
Demonstration that safety requirements have been met
Justification of the adequacy of safety
Recommendations for plant and/or process modifications
Supporting information (e.g., results of development work in support of plant and process operations, assessment methodologies, and justification of the use of data in supporting consequence analysis)

The fdSCs were used to examine the potential hazards and their treatment in relevant areas to the TWRS-P Facility process. In the same way information from the Sellafield incident database (for these plants) was used to track lessons learned from incidents during actual operations.

The information gathered from the study of relevant fdSCs and incident databases was fed into the hazard study team discussions to ensure that lessons learned and potential hazards were addressed early in the TWRS-P Facility design and safety process.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The additional information that BNFL provided was sufficient for the Regulatory Unit reviewers to determine that the standards identification process was adequate. Responses to follow up questions addressed the roles and responsibilities of the various teams, the functions and outputs of each step of the process, and how related information was used to support the selection of standards.

Question # 52

Description

The ISRT team in the BNFL SRD Volume I, Attachment C includes resumes and applicable work experience for two individuals (Alan Kolaczkowski and Dave Mutter) but these individuals are not listed on the team on page C-3. What role if any, did these individuals play on the ISRT? Also, please provide Dave Mutter's resume, if he participated.

Contractor Response

Mr. Mutters and Mr. Kolaczkowski augmented the ISRT with respect to the areas of expertise identified in the matrix on page C-3. Mr. Mutters' resume was inadvertently included in the SRD Development Team Qualification Sheets page B-49 and will be moved to Attachment C.

Disposition

The BNFL response is responsive and acceptable.

The response clarifies the individuals roles and commits to correcting the omission of one resume from Attachment C.

Supplemental Response

Supplemental Disposition

Question # 53

Description

SRD approval criterion 5 (DOE/RL-96-0003, Section 3.3.1) is that "Appropriate expertise was employed in the standards selection and confirmation processes." Furthermore, the third bullet under the "Acceptable Approach" for "Essential Process Step 1. Process Initiation" from DOE/RL-96-0004 states, "PM prepares implementation plan including team staffing requirements . . . " Sections 2.3.1and 2.3.2 of Volume 1 of the BNFL SRD discuss team member qualifications, but these sections do not include team staffing requirements such as the number of staff needed in specific areas of expertise. What team staffing requirements were used to evaluate team credentials individually and collectively to assure that "Appropriate expertise was employed in the standards selection and confirmation processes?"

Attachment A, "SRD Process Management Team Staffing and Qualifications Requirements," to Volume 1 of the SRD, includes resumes for the Process Management Team (PMT). However, the resume for Timothy Mutters is missing. A Personnel Qualification Form (PQF) for Timothy Mutters is included in Attachment B that identifies him as a Requirement Identification Team (RIT) member but not as a PMT member. Please clarify Timothy Mutter's role and provide his resume if he was a PMT member. Also, the resume for Ramon Ashley indicates that he was the secretary of the Independent Safety Review Team (ISRT), but he is not listed as an ISRT member in Attachment C. Was Mr. Ashley a member of the PMT, the RIT, and the ISRT? Please clarify Mr. Ashley's role.

Attachment B, "SRD Requirement Identification Team Staffing and Qualification Requirements," to Volume 1 of the SRD, includes an "SRD Development Team Qualification Matrix" with 21 "SRD Topical Areas" cross-referenced to 22 team staff names. Does this matrix represent an evaluation of the Requirement Identification Team (RIT) against pre-selection team staffing requirements, or does it only show the selected RIT's collective areas of expertise? Please explain the purpose and use of this matrix. Why is no RIT member identified with the "SRD Topical Area" of "Deactivation and Decommissioning?" There are numerous discrepancies between the matrix and the information on the PQFs under "Expertise/Position," for example:

Mr. Cullen is identified with SRD Topical Areas "Nuclear Safety" and "Criticality" but these are not included under "Expertise/Position" on the PQF;

Ms. Eades is identified with SRD Topical Areas "Regulatory Compliance," "Conduct of Operations," and "Procedure Development" but these are not included under "Expertise/Position" on the PQF;

Mr. Harrington is identified with SRD Topical Areas "Radiological Protection," "Process Safety," "Regulatory Compliance," "Conduct of Operations," and "Emergency Preparedness" but these are not included under "Expertise/Position" on the PQF;

Ms. Kummerer is identified with SRD Topical Areas "Nuclear Safety," and "Process Safety" but these are not included under "Expertise/Position" on the PQF;

Mr. Larson has "Regulatory Compliance" listed under "Expertise/Position" on the PQF but this is not reflected in the matrix;

Mr. Saame is identified with SRD Topical Area "Radiological Compliance" but this is not included under "Expertise/Position" on the PQF;

Mr. Timothy Mutters' information on the PQF under "Expertise/Position" does not match any SRD Topical Area.

Please explain these discrepancies and the use of the PQFs with respect to the matrix.

Attachment C, "Independent Safety Review Team Staffing and Qualifications Requirements," to Volume 1 of the SRD, includes an "ISRT SRD Qualification Matrix" with 21 "SRD Topical Areas" cross-referenced to 8 team staff names. Why are the 21 "SRD Topical Areas" not the same as for the RIT ("Human Factors" is listed twice, and "Process Management Team" is not included)? On page C-3, the ISRT is identified as consisting of five individuals, but eight individuals are included in the "ISRT SRD Qualification Matrix;" please explain this discrepancy. Does this matrix represent an evaluation of the ISRT against pre-selection team staffing requirements, or does it only show the selected ISRT's collective areas of expertise? Please explain the purpose and use of this matrix. Why are no ISRT members identified with the "SRD Topical Areas" of "Fire Protection," "Civil/Structural Systems," "Mechanical Systems," "Electrical Systems," "Control Systems," "Conduct of Operations," "Emergency Preparedness," or "Startup?"

Contractor Response

Attachment A. Mr. Mutters is not a member of the PMT. Mr Mutters was used to augment the ISRT Review of the SRD in the area of Maintenance. Mr. Ashley was a member of the PMT, and served as secretary to the ISRT (non-member).

Attachment B. Matrix shows the RIT collective areas of expertise (expertise requires five years experience in the subject area) as documented in the PQFs. Mr. Grumme's qualification form omitted Deactivation and Decommissioning.

Detailed Comments - Accepted, see revised qualification sheets. Mr. Mutter' resume will be moved to Attachment C.

Attachment C. Matrix allowed verification of adequate competency of the integrated ISRT. It was used in accordance with ESH-01-TWRS "Independent Safety Review Team" to determine areas where membership needed to be augmented based upon internal review. For the areas of "Fire Protection," "Civil/Structural Systems," "Mechanical Systems," and "Electrical Systems," the ISRT was not charted to perform a one over one review. As noted, the areas of "Conduct of Operations," "Emergency Preparedness," and "Startup" do not require ISRT review during Part A activities.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The BNFL response is inadequate in that it does fully respond to all parts of the question, and it does not provide sufficient detail to support all statements made in the response.

No responses were provided for the following parts of the question:

What team staffing requirements were used to evaluate team credentials individually and collectively to assure that "Appropriate expertise was employed in the standards selection and confirmation processes?"

With respect to Attachment C:

Why are the 21 "SRD Topical Areas" not the same as for the RIT ("Human Factors" is listed twice, and "Process Management Team" is not included)?

On page C-3, the ISRT is identified as consisting of five individuals, but eight individuals are included in the "ISRT SRD Qualification Matrix;" please explain this discrepancy.

Responses to the above parts of the question are needed.

The response, with respect to Attachment C, states that the ISRT SRD Qualification Matrix "allowed verification of adequate competency of the integrated ISRT." This statement is not sufficiently supported because it does not describe the methodology used to perform such verification. The response also states that for certain areas the ISRT was not chartered to perform a one over one review, and that other areas did not require ISRT review during Part A activities. These statements are also insufficiently supported because they do not adequately describe BNFL's reasoning for excluding these areas. Additional detail is needed to support these statements.

Supplemental Response

(Please see Supplemental Responses to Questions 41 and 54 also.)

Adequacy of the Requirement Identification Team composition as a whole was based upon ISRT review and approval of the recommended topical areas as presented in Attachment B. The fundamental qualification criterion for subject matter experts was a minimum of 5 years experience in the nuclear or process chemical industry relative to a particular area of discipline. Individual RIT SME's Company responsible line management assigned qualified personnel as to serve as members on the RIT. The RIT SME qualifications were reviewed and verified by the ISRT Chair. Staffing of the ISRT was conducted in accordance with ESH-01-TWRS, Independent Safety Review Team. Staffing of the PMT was based upon the PMT Lead and Contract Representative determination of the PMT being capable of performing its specified functions as identified in ESH-04-TWRS, Safety Requirements Document Development Procedure.

Attachment C.
The Qualification Matrix for the ISRT does not include a column for identifying PMT members as the IST is independent of the PMT and a person can not serve on both the PMT and ISRT. PMT members were; however, utilized as subject matter experts in their respective disciplines as noted in Attachment B. Duplication of the column for Human Factors was

unintentional and the first occurrence will be deleted. With this change there is no discrepancy between the disciplines identified in Attachments B and C.

The ISRT is comprised of the five individuals noted and page C-3. The ISRT qualification matrix notes these individual and three others. Mr. Cullen was an original member of the ISRT but was replaced by Mr. Spencer to ensure adequate independence on the ISRT from the actual preparation of documents be reviewed. Mr. Kolaczkowski and Mr. Mutters were used to augment the ISRT in the areas of Human Factors and Maintenance respectively. This augmentation was necessary to ensure the ISRT contained sufficient expertise to review the identified disciplines. (See response to Question 52.)

Verification of adequate team competency for the ISRT was determined by ensuring that an appropriate understanding of the subject area was reflected in the ISRT or augmenting the ISRT for the subject area. The Chair of the ISRT was responsible for determining those areas in which it was believed the ISRT, as a whole, required augmentation. The personnel evaluations (ranking as shown on ISRT Qualification Matrix) provided the ISRT Chair with additional information on which to base this decision.

For the areas of Fire Protection, Civil/Structural Systems, Mechanical Systems, Electrical Systems, and Control Systems, the ISRT was not Chartered or expected to perform a one-over-one review. For these areas the ISRT ensured the responsible RIT subject matter experts as noted on the RIT MATRIX (Registered Professional Engineers) were involved in the preparation and review of the selected standards.

For the areas of Conduct of Operations, Emergency Preparedness, and Startup, The ISRT did not conduct a formal review of the selected standards as these areas were determined not to have a significant impact on Part A activities. It was expected the ISRT would formally review these areas later in the life cycle of the facility as design matures, but prior to conducting activities governed by these areas. However, in response to RU a comment on the identification of subordinate standards (Question 157) BNFL developed standards demonstrating implementation of the Safety Criteria are being provided for these areas (ISMP sections). The ISRT will review these sections of the SRD prior to submittal of the Revised SRD in support of the Authorization for Construction. The ISRT did review the subordinate standards selected and this review, along with ISRT verification of the standards development process implementation, and familiarity with the Safety Criteria provided adequate review and acceptability of the Safety Criteria contained in these areas.

Supplemental Disposition

The Contractor's supplemental response was acceptable. This BNFL response, together with the supplemental responses to Questions # 43 and 54, provide the additional information regarding the ISRT and the RIT composition, qualifications, and function for closure of this question.

Question # 54

Description

Basis:

a) SRD, Vol 1, Section 2.3.2 states that, "The RIT comprises subject matter experts (SMEs) with demonstrated knowledge and expertise in nuclear, radiological, and process safety, process engineering, facility operations, and facility/balance of plant designs," and that "Members of the RIT are required to have a minimum of five years experience in the nuclear or process chemical industry."

b) The Tank Waste Remediation System Privatization Project Quality Assurance Program, BNFL-5193-QAP-01, Rev 2, Section 2.2.2 states "Indoctrination and training activities shall be completed before performing the assigned work."

c) Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004; Revision 0, Section 3.0, Standards Process Description, states:
"Additionally, the use of experts and participation by stakeholders will ensure credibility, completeness, and adequate protection of workers, the public, and the environment"

Comments:
a) What measures were used to assure that the RIT members were appropriately knowledgeable of radiological, nuclear, and process safety standards?
b) What measures were used to assure the RIT members were qualified for the job?
c) What measures were used to assure the RIT was ready to perform its function?

Contractor Response

a. Qualifications were established and personnel assigned were based on those

qualifications.
b. Responsible line management assigned RIT members as qualified personnel. ISRT chairperson review of RIT member qualification forms against the qualification requirements.

c. The SRD development procedure was reviewed by the ISRT. The Process Management Team was assembled. Responsible line management assured RIT members would be available.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The qualifications referred to in the response to Question 54 parts a and b do not require experience, knowledge, or skills regarding codes and standards. What methods and criteria were used for assigning RIT members that assured team members possessed appropriate experience, knowledge, or skills for the standards they were tasked to evaluate and select? (Also see dispositions to Questions 51 and 53.)

The Contractor response to question 54, part c, is acceptable.

Supplemental Response

(See Also Attachment Question 43 to BNFL's Transmittal of Responses to RU Dispositions.)

The fundamental qualification criterion for RIT SME was a minimum of 5 years experience in the nuclear or process chemical industry relative to a particular area of discipline. Such experience necessarily includes familiarization with applicable standards. Individual RIT SME's Company responsible line management assigned qualified personnel as to serve as members on the RIT. The RIT SME qualifications were reviewed and verified by the ISRT Chair.

Supplemental Disposition

The Contractor's supplemental response was acceptable. Based on the information provided and BNFL's commitment to modify the SRD to incorporate the corrections that would clarify that RIT members were knowledgeable in safety standards this question is closed.

Question # 55

Description

ISRT Credentials Section

Basis:
a) SRD, Vol 1, Section 2.2 states that Qualification requirements for personnel participating in the SRD development process are presented in sections 2.3.1 ... and 2.3.3, Independent Safety Review Team Credentials."

Comments:
a) Where is Section 2.3.3?

Contractor Response

The Section Heading for 2.3.3 was inadvertently deleted and will be added. The referenced information is included on page 2-5 under Section 2.3.2, the second paragraph which states:
"For the SRD, the ISRT roles and responsibilities are defined in accordance with the technical expertise required for the review of the subject material."

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on BNFL's commitment to revise the SRD to incorporate the correction noted in the response. This incorporation will correct a technical error in the SRD.

Supplemental Response

Supplemental Disposition

Question # 56

Description

SRD Development Charter

Basis:

a) The SRD, Vol 1, Section 2.1, SRD Development Process Description, states, "The SRD development process is described in the charter used to develop the SRD: TWRS-P Privatization Project: TWRSP- Safety Requirements Document Development Procedure (BNFL 1997h)."

b) The document provided to the RU, upon request, was TWRSP- Safety Requirements Document Development Procedure, ESH-04-TWRS, Revision 0. The effective date provided on the document was 9/19/97.

c) In the Charter provided, Section 5, Safety Requirements Document Development, states "The process is consistent with that defined in DOE/RL-96-0004, Rev 0, Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization (DOE-RL 1996d)."

d) Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004; Revision 0, Section 3.1, Steps of the Process, states:
"Table 1 lists the steps of the process necessary to develop a recommended set of radiological, nuclear, and process safety standards. The Essential Process Steps listed in the first column shall be performed by the Contractor to ensure that the process is performed in a manner consistent with DOE's Standards Program."

e) Also provided to the RU, upon request, was Independent Safety Review Team, ESH-01-TWRS, Revision 1. The effective date provided on the document was 9/19/97.

Comments:
a) What documents were in effect during the SRD development that established the charter for the standards identification process including: work identification, hazards evaluation, standards identification, and confirmation?
b) How is TWRSP-Safety Requirements Document Development Procedure consistent with DOE/RL-96-0004, Rev 0? What measures assured that the 7 essential process steps described in DOE/RL-96-0004, Rev 0, were followed? What describes the process followed for the 7 essential process steps described in DOE/RL-96-0004, Rev 0?

Contractor Response

a. During development of the SRD, the SRD development Team performed its work in accordance with the Draft Procedure ESH-04-TWRS. The PHA Team conducted its work under the PHA Plus Procedure K0104-RER-007-SAF. The BOD (work identification) was developed in accordance with E-01-TWRS.

b. As detailed in the BNFL letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter #97-RU-0307) the process explanation presented therein for Part A, as well as for Part B, and the example uses of BNFL design guides, traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards. Letter attachment "Part A Flowchart - Standards Approval" specifically identifies the seven steps of DOE/RL-96-0004 as they appear in the development process that were used for Part A, as addressed by the aforementioned procedures.

Disposition

The BNFL response is responsive but unacceptable based on the comments below:

The Contractor response is acceptable based on BNFL's commitment to revise the SRD to incorporate the correction noted in the response. This response identifies the controls for the standards identification activities.

The Contractor response to question 56, part b, is unacceptable.
The Contractor response to question 56, part b, refers to the BNFL letter of October 23, 1997. This letter provides a chart and an overview of the SRD development process used for Part A. This letter does not describe the process in sufficient detail to assure that the SRD development procedure and process was consistent with DOE/RL-96-0004, Rev 0. Each SRD activity should be described in sufficient detail to facilitate the evaluation that DOE/RL-96-0004, Rev 0, was followed. Please provide more detail. (Also see disposition to Question 51.

Supplemental Response

Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response included in the attachment to question # 43 on the seven essential process steps included sufficient material to satisfy the concerns of this question. Additionally, BNFL's commitment to modify the SRD to incorporate the changes addressed in the supplemental response provide adequate grounds for closure of this issue.

Question # 57

Description

Work Definition

Basis:
a) SRD, Vol 1, Attachment B, SRD Requirement Identification Team Staffing and Qualifications Requirements, includes an "SRD Development Team Qualification Matrix" that lists 22 team members.

b) SRD, Vol 1, Section 3.1 states that "Key to appropriately tailoring the SRD to the work hazards are definitive descriptions of the work to be performed and the processes proposed to accomplish the work." It also states that expected work activities and the structures, systems, and components (SSCs) required to accomplish these activities safely ... were used to develop the SRD Safety Criteria (including exposure standards) that must be met by the facility design and operation.

c) The SRD Development Procedure, Section 4.4, "Requirement Identification Team," states that the RIT "is responsible for the identification and development of the SRD criteria, and identification of consensus codes and standards implementing the SRD criteria, ..."

e) The Tank Waste Remediation System Privatization Project Quality Assurance Program, BNFL-5193-QAP-01, Rev 2, Section 2.2.2 states "Indoctrination and training activities shall be completed before performing the assigned work."

Comments:

e) Given the RIT was not chartered to define the work and perform hazards evaluation, who was, what was their charter, and what were the qualification and training requirements?

Contractor Response

As detailed in the BNFL letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter # 97-RU-0307) the process explanation presented therein for Part A, as well as for Part B, and the example uses of BNFL design guides, traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The Contractor response to Question 57 refers to the letter of October 23, 1997, to Dr. Gibbs, and the fact that processes described therein traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards. This does not answer question 57. The interest is in the measures provided by the initiation step to assure that the work identification was planned prior to the performance of work and that adequate measures were in place to assure that this activity provided the necessary results. (Also see dispositions to Questions 51 and 53.)

Supplemental Response

Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response included in the attachment to question # 43 on the planning work prior to the performance of work included sufficient material to satisfy the concerns of this question. Additionally, BNFL's commitment to modify the SRD to incorporate the changes addressed in the supplemental response provide adequate justification for closure of this issue.

Question # 58

Description

Work Definition

Basis:
a) SRD, Vol 1, Attachment B, SRD Requirement Identification Team Staffing and Qualifications Requirements, includes an "SRD Development Team Qualification Matrix" that lists 22 team members.

b) SRD, Vol 1, Section 3.1 states that "Key to appropriately tailoring the SRD to the work hazards are definitive descriptions of the work to be performed and the processes proposed to accomplish the work." It also states that expected work activities and the structures, systems, and components (SSCs) required to accomplish these activities safely ... were used to develop the SRD Safety Criteria (including exposure standards) that must be met by the facility design and operation.

c) The SRD Development Procedure, Section 4.4, "Requirement Identification Team," states that the RIT "is responsible for the identification and development of the SRD criteria, and identification of consensus codes and standards implementing the SRD criteria, ..."

d) Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004; Revision 0, Section 3.0, Standards Process Description, states:
"Additionally, the use of experts and participation by stakeholders will ensure credibility, completeness, and adequate protection of workers, the public, and the environment"

e) The Tank Waste Remediation System Privatization Project Quality Assurance Program, BNFL-5193-QAP-01, Rev 2, Section 2.2.2 states "Indoctrination and training activities shall be completed before performing the assigned work."

Comments:
a) What measures were taken to assure appropriate participation of members who were knowledgeable in the Tank Waste Remediation System Privatization Project work?

Contractor Response

Training and indoctrination was conducted prior to personnel performing TWRS-P work. Records of this training and indoctrination are available as part of the QA records.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor response is acceptable based on BNFL's commitment to revise the SRD to reflect the response to question 58. (Also see dispositions to Questions 51 and 53.)

Supplemental Response

Supplemental Disposition

Question # 59

Description

Work Definition

Basis:
a) SRD, Vol 1, Attachment B, SRD Requirement Identification Team Staffing and Qualifications Requirements, includes an "SRD Development Team Qualification Matrix" that lists 22 team members.

b) SRD, Vol 1, Section 3.1 states that "Key to appropriately tailoring the SRD to the work hazards are definitive descriptions of the work to be performed and the processes proposed to accomplish the work." It also states that expected work activities and the structures, systems, and components (SSCs) required to accomplish these activities safely ... were used to develop the SRD Safety Criteria (including exposure standards) that must be met by the facility design and operation.

c) The SRD Development Procedure, Section 4.4, "Requirement Identification Team," states that the RIT "is responsible for the identification and development of the SRD criteria, and identification of consensus codes and standards implementing the SRD criteria, ..."

d) Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004; Revision 0, Section 3.0, Standards Process Description, states:
"Additionally, the use of experts and participation by stakeholders will ensure credibility,

completeness, and adequate protection of workers, the public, and the environment"

e) The Tank Waste Remediation System Privatization Project Quality Assurance Program, BNFL-5193-QAP-01, Rev 2, Section 2.2.2 states "Indoctrination and training activities shall be completed before performing the assigned work."

Comments:

b) What measures were taken to assure adequate definition of the work and appropriate consideration of the work in the hazards evaluation?

Contractor Response

The BOD (work identification) was developed in accordance with BNFL Procedure E-01-TWRS. The initial definition of the work came from the BOD. BNFL used material from its proposal and additional safety and technical information to prepare the BOD. Designers used this information to prepare the PFDs and process descriptions. The design team conducted a review of the PFDs and descriptions to ensure that process requirements were met. As detailed in the BNFL letter of October 23, 1997 to Dr. Gibbs, Director of the Regulatory Unit, (Letter #97-RU-0307) the process explanation presented therein for Part A, as well as for Part B, and the example uses of BNFL design guides, traces the process connection between work activity, hazard identification, safeguards identification, and the associated standards.
.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The response is acceptable based on BNFL's commitment to revise the SRD to reflect the response to question 59. This response identifies measures to assure adequate definition of work and its consideration in the hazards evaluation. (Also see disposition to Question 51.)

Supplemental Response

Supplemental Disposition

Question # 60

Description

Work Definition

Basis:

SRD, Vol 1, Section 3.1 states that "Key to appropriately tailoring the SRD to the work hazards are definitive descriptions of the work to be performed and the processes proposed to accomplish the work." It also states that expected work activities and the structures, systems, and components (SSCs) required to accomplish these activities safely ... were used to develop the SRD Safety Criteria (including exposure standards) that must be met by the facility design and operation.
Comments:

c) What project documentation provides the "definitive descriptions of the work" ? Please identify more clearly what is meant by "expected work activities." Where are the expected work activities described that were used as the basis for hazards evaluation?

Contractor Response

The initial definition of the work came from the BOD. Designers used this information to prepare the PFDs and process descriptions. The design team conducted a review of the PFDs and descriptions to ensure that process requirements were met. The PFDs and descriptions provided the basis for description of work in the hazard evaluation. After completion of the hazards evaluation, the designers updated the PFDs and descriptions. The Hazard Evaluation Team reviewed the updated PFDs and process descriptions during preparation of the Fault Schedules.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on their commitment to revise the SRD to reflect the response to question 60, including clarification of the meaning of "definitive description of the work" and "expected work activities." (Also see disposition to Question

51.)

Supplemental Response

Supplemental Disposition

Question # 61

Description

Basis:
a) SRD, Vol 1, Section 2.3.1 states that "The Process manager will have a minimum of 3 years in the NRC regulatory arena and a minimum of 3 years in the DOE regulatory arena."

Comments:
a) A minimum of 3 years of what specific experience was required?

Contractor Response

Specific experience relevant to the Process Manager role in TWRS-P SRD Development Process, including regulatory interfaces, requirement identification, project management, standards identification.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on their commitment to revise the SRD to reflect the more specific Process Manager qualifications described in the response to this question. This response adequately clarifies what is meant by "a minimum of 3 years in the NRC and DOE arenas."

Supplemental Response

Supplemental Disposition

Question # 62

Description

SRD Development Process

Basis:
a) SRD, Vol 1, Section 3.0 identifies Figure 3-1 as the overall BNFL Inc. Tank Waste Remediation System-Privatization (TWRS) Project Safety Approach.

Comments:
a) Figure 3-1 contains elements not employed in the development of the submitted SRD. For example it includes accident analysis. The September 26, 1997, BNFL briefing to the RU informed the attendants that accident analysis was specifically not used for the SRD. What specifically was the process that was used to develop the submitted SRD?

Contractor Response

Figure 3-1 shows the overall TWRS-P Safety Approach which includes activities that will occur after the submittal of the SRD. This figure is necessary to put the SRD development process in context with the overall safety analysis process. The principal activities leading to the development of the SRD, as submitted, are shown in the top third of the figure and include "Identification of Work Activities," "Initial Process/Facility Concept/Hazards Identification," and "Laws/Regulations, Top-Level Safety Requirements, Best Industry Practices."

The SRD Development Procedure provided to the RU on September 29, 1997 contains the process used to develop the SRD.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on their commitment to revise the SRD to reflect the response to question 62 by clearly identifying and describing the process used to develop the SRD submitted in the Standards Approval Package. (Also see disposition to Question 51.)

Supplemental Response

Supplemental Disposition

Question # 63

Description

Identification of Safety Criteria

Basis:
a) SRD, Vol 1, Section 3.3.2, Identification of Safety Criteria, states ‘ ... the sources of criteria as identified in Section 3.3.1, "Sources of Standards for Safety Criteria" are screened against to expected hazards posed by the TWRS-P Facility, ...’

b) The same section also states that "The initial set of Safety Criteria Developed using this approach encompasses all identified hazards and complies with the applicable laws ..."

Comments:
a) Please explain fully the screening process.

Contractor Response

The screening process ensured that the requirements reviewed to develop the Safety Criteria were applicable to the TWRS-P Facility, based upon the process and hazards analysis information available.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The screening process was not fully explained. To be dispositioned as acceptable, please identify the personnel involved and their roles and responsibilities. Please describe the specific inputs and outputs of the screening process and all intermediate or intervening steps.

The screening process, as described in the answer to question 63, assured that the requirements to develop the Safety Criteria were applicable to the TWRS-P Facility based upon the process and hazards analysis information available. This is understood to mean that a set of candidate requirements were reduced to a smaller set based on the applicability of individual requirements reviewed. The effect of this process is to eliminate requirements that were not applicable. Given the candidate or the screened set of requirements, what process was used to identify additional requirements, not yet included, based upon the process and hazards analysis information available?

Supplemental Response

The screening of potential criteria was performed by the RIT SMEs (Attachment B of the SRD Volume I). The inputs were the proposal, the BOD, the hazards analysis (fault schedules) particularly the identification of potential controls, and expert knowledge. The screening process consisted of evaluation of performance expectations (standards) contained in the SRD Development Basis Documents (Attachment D of the SRD Volume I) against the above inputs (TWRS-P Facility specific information). Non-applicable standards were discarded enabling development of a set standards applicable and specifically tailored to TWRS-P Facility.

Implementing Consensus Codes and Standards in response to hazards analysis information (e.g. controls) were identified by RIT SMEs based upon technical expertise (nominally professional registration/license) and past relevant experience in the design of similar facilities or controls.

Supplemental Disposition

The Contractor’s supplemental response was acceptable. The process described in the supplemental response identified additional (safety) criteria that were based upon the hazards and controls.

Question # 64

Description

Basis:
a) SRD, Vol 1, Section 3.3.2, Identification of Safety Criteria, states ‘ ... the sources of criteria as identified in Section 3.3.1, "Sources of Standards for Safety Criteria" are screened against to expected hazards posed by the TWRS-P Facility, ...’

b) The same section also states that "The initial set of Safety Criteria Developed using this approach encompasses all identified hazards and complies with the applicable laws ..."

Comments:
b) What specifically are "expected hazards posed by the TWRS-P Facility"?

SUPPLEMENT TO QUESTION 64

c) What is the basis for the assertion that the initial set of Safety Criteria developed encompasses all identified hazards? Is the "initial set of Safety Criterion" the same as those identified in SRD, Vol 2?

Contractor Response

The expected hazards are those identified based upon team members' previous experience dealing with vitrification and nuclear facilities, lessons learned from similar facilities, and hazards identified during the process hazards analysis as documented in the Hazard Analysis Report.

Response to Supplemental Questions

The bases for the assertion that the initial set of Safety Criteria developed encompasses all identified hazards included involvement of SRD PMT members in the hazards analysis, the involvement of design of experts and personnel performing the hazards analysis in the selection of standards, ISRT review of the SRD and PHA development, and confirmation that the SRD adequately addressed the initial suite of controls as identified in the PHA as was further presented to the RU on October 23, 1997 and transmitted via Letter #97-RU-0307.

Yes, the Safety Criteria contained in Volume II are the initial Safety Criteria as identified in Volume I Section 3.3.2.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The Contractor response is acceptable with the condition that the SRD will be modified so that the definition of "expected hazards" is clearly expressed in the SRD as described by the response and that the bases of the elements of "expected hazards" are described. (Also see disposition to Question 51.)

The Contractor response to the question 64 supplement is acceptable with the understanding that the SRD will be modified to effectively incorporate the substance of the Contractor response to the question 64 supplement.

Supplemental Response

Supplemental Disposition

Question # 65

Description

Table 3-1
Basis:
a) SRD, Vol 1, Table 3-1, Drivers for the SRD Safety Criteria (Sheet 1) , last table row, page 3-6, references "preliminary accident analyses."

Comments:
a) Specifically what are the preliminary accident analyses? If they were part of the basis for Table 3-1, please provide the results as supporting information, or identify where this information is located in the SA package submittal.

Contractor Response

The preliminary accident analyses were not formal analyses, but simply scoping evaluations used solely to identify potential Design Class I and II items for the purposes of the SRD. These then became events for which standards in Volume II of the SRD were developed. Table 3-1 of Volume I reflects these events as drivers.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on their commitment to revise the SRD such that the use of "preliminary safety analyses" is replaced by "scoping evaluations" as described in the response. If the scoping evaluations are documented, the appropriate references should also be cited. This action would more properly characterize the status of

evaluations that were the basis of the referenced Table 3-1 location.

Supplemental Response

Supplemental Disposition

Question # 66

Description

Rationale and Justification of Adequacy

Basis:
a) SRD, Vol 1, Section 3.5, Rationale and Justification of Adequacy, states "Implementation of the controls committed to in the SRD through the use of recognized industry standards and practices, ensures the controls can be implemented and will perform their specified safety functions, ..."

b) SRD, Vol 1, Section 3.4.1 Structures, systems, and Components Important to Hazards Control, page 3-11, paragraph 2 notes the "... process results initially in a suite of controls ..." and "... the initial suite of controls is contained in section 6.2, Controls.

c) HAR, Section 6.2 describes controls "... that were proposed by the hazard evaluation teams ..."

Comments:
a) What are the controls that were committed to in the SRD and where is that commitment stated?

Contractor Response

The sentence in Section 3.5 will be modified to read "Once selected, implementation of the controls will be through the use of recognized industry standards and practices as identified in the SRD, ..."

Note: Specific controls will be selected in Part B.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The Contractor response is unacceptable because of continued lack of clarity and consistency regarding the identity of controls that are the basis of the SRD. The Contractor commitment to modify the language in SRD, Vol. I, Section 3.5 is appropriate. This action is necessary but not sufficient to clarify specifically what controls are the basis of the SRD. Nor does it establish consistency in the terminology used to reference the controls that are the basis of the SRD. Please define the term "controls" as used in the BNFL SA package. Please specify the scope and use of "controls" as a basis for the standards submitted in the SA package. (Also see disposition to Question 51.)

Supplemental Response

Please See Attachment Question 43 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response was acceptable. BNFL provided the necessary definitions and clarifications via fax on 12/12/97.

Question # 67

Description

SRD Configuration Control

Basis:
a) SRD, Vol 1, Section 3.6, Maintenance of the SRD, states 'After issuance of the construction approval, but prior to issuance of the SRD Operating Authorization Request package, the SRD will be controlled through the configuration management process provided in the ISMP Section 1.3.16, "Configuration Management."'

Comments:
a) With respect to DOE/RL-96-0003, what regulatory action is being referred to as the "SRD Operating Authorization Request" step?

SUPPLEMENT TO QUESTION # 67

B. What measures will be used to maintain configuration control of the SRD after approval of the Standards Approval Package and before an SRD Operating Authorization Request?

Contractor Response

Sentence will be changed to read "... of the SRD as a part of the Operating Authorization Request package..."

The Operating Authorization Request Package is identified in Section 3.3.4 of DOE/RL-96-0003.

Response to Supplemental Question

B. The configuration management program described in ISMP Section 1.3.16 "configuration Management" will control Part B activities including changes made to the approved SAP package. The process by which DOE will be involved in changes to the SAP is described in response to Questions 81, 169, 177.

Disposition

The BNFL response is responsive and acceptable.

The Contractor response is acceptable based on their commitment to revise the SRD with the details included in the response to this question.

Supplemental Response

Supplemental Disposition

Question # 68

Description

Stakeholder Involvement

Basis:
a) SRD, Vol 1, Section 3.7, Stakeholder Involvement, discusses requests for review of the SRD and the SRD development procedure.

Comments:
a) What input was provided by the stakeholders?

SUPPLEMENT TO QUESTION # 68

B. How was the stakeholder input taken under consideration and dispositioned?

Contractor Response

Stakeholder Involvement
a) BNFL Inc. has obtained and incorporated stakeholder input. Examples of the stakeholders' input is as follows.
-The safety approach lays out a reasonable way for integrating work processes.
-BNFL needs to address the bulk of safety issues relevant to workers by using a safety approach that controls physical or chemical hazards.
-The ISMP should demonstrate awareness of industrial hygiene and safety.
-The iterative approach is involving careful attention to the design phase is excellent ..
-The plan spends a good deal of effort with off-normal events; does not address hazards associated with routine plant operations.
-Have a knowledgeable workforce; don't tie the workers up in meaningless training sessions. If workers receive worthwhile training and they don't demonstrate trained, replace them, rather than degrade the safety of operations.
I'm not sure that I see any real added-value to the ISRT.

Response to Supplemental Question.

BNFL Inc. reviewed the SRD to ensure stakeholder comments were addressed.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor response is unacceptable because it does not include sufficient detail. The

Contractor provided examples of stakeholder input and stated that BNFL reviewed stakeholder comments to ensure they were addressed. More detail is needed regarding the form of stakeholder input, the method for tracking and dealing with the input, including identification of the team responsible for the review of the comments, the approach for disposition, and the significant actions taken as a result of the input. (Also see disposition to Question 51.)

Supplemental Response

The stakeholders provided input in written form, in telephone calls, and in direct dialog. As stated in SRD Volume I, BNFL has an active program for maintaining a relationship with the HAB, its Committees, the Native American Tribes, and interested members of the public.

BNFL Inc. has taken personal responsibility for working with these interested parties to keep them informed of the TWRS-P Project and support their interests and concerns. The General Manager sent a formal request to the Chairman and members of the HAB HSWM Committee to review BNFL's safety approach, ISMP, and SRD development procedure. BNFL Inc. also sent ccmail messages to several members of the public requesting comment on our safety approach. BNFL staff meet with interested stakeholders through informal meetings, public meetings, and telephone conversations to acknowledge stakeholder input and explain methods of addressing their questions; Project updates were also provided.

Stakeholder comments were recorded on Document Review Records and dispositioned during the development of the safety deliverables, i.e., industrial safety was addressed in the ISMP; chemical safety was addressed in the SRD safety criteria and ISMP; and the ISMP and SRD describes measures for controlling hazards during normal routine operations; training is described in the ISAR as based on the performance requirements of the job.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response provided adequate information regarding "stakeholder" input to sufficiently address the concerns of this question.

Question # 69

Description

Confirmation Process

Basis:
a) SRD, Vol 1, Section 4.1, Confirmation Process Description, states that "The ISRT verified the SRD development process for implementation of DOE/RL-96-0004, Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization (DOE-RL-1996c)."

b) Section 4.1 paragraph 2 states "... the ISRT reviews the hazards identified in the process hazards analysis and ensures that the SRD contains appropriate controls ..."

c) TWRSP- Safety Requirements Document Development Procedure, ESH-04-TWRS, Revision 0, Section 5.3.6, Confirmation of Adequacy, states that "the ISRT reviews the SRD to confirm it addresses applicable laws and regulations and that, when implemented via the selected consensus codes and standards and administrative controls, the SRD forms an acceptable safety basis for proceeding into Part B activities."

d) The Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004; Revision 0, states:

"The recommendation of the standards set by the Contractor Representative to the Director of the Regulatory Unit constitutes a two-fold certification:

1) That the set, when properly implemented, will ensure adequate radiological, nuclear, and process safety, compliance with applicable laws and regulations, and conformance to the DOE-stipulated top-level standards and principles, and
2) That this process was employed with integrity."

Comments:

a) Please provide the documentation (or identify where it is located in the SA package submittal) that is the basis of the ISRT verification of the SRD development process for implementation of DOE/RL-96-0004, Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization (DOE-RL-1996c)

b) Please provide the basis (or identify where it is located in the SA package submittal) for

the ISRT determination that the SRD contains appropriate controls.
c) What measure was used to assure the process was employed with integrity?

Contractor Response

The ISRT is comprised of experts familiar with the identification and use of standards as demonstrated in Appendix C of Volume I of the SRD. The ISRT was involved throughout the SRD and PHA development processes.

Responses to specific comments are as follows:

a. The SRD Development Procedure was reviewed by the ISRT with consideration for conformance to all contract requirements and incorporation of the intent of DOE M 450.3-1. ISRT review of the SRD Development Procedure is recorded in ISRT Meeting Minutes.

b. The basis for the determination that the SRD contains the appropriate controls included: Conformance to the process prescribed in DOE/RL-96-0004 (see answer to question c below , the assignment of experts in the selection of standards, review of the SRD and PHA development, and confirmation that the SRD adequately addressed the initial suite of controls as identified in the presentation given to the RU (Letter #97-RU-0307, Attachment 4 Table 2). ISRT findings and recommendation are documented in ISRT Meeting Minutes and were provided to the SRD Development Team.

c. Measures used to assured the SRD Development process was employed with integrity included the ISRT involvement in all stages of the SRD process from process initiation (procedure development, identification of required expertise (See Attachment B of Volume I of the SRD), and verification personnel qualification) through development and review of the SRD. As well as review of the PHA Process and HAR.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor response is unacceptable because it does not include sufficient detail. Also, additional related issues are identified based on the response.

Supplemental Response

The ISRT members were not direct participants in the preparation of the material to be reviewed. The ISRT Chairman signed the "prepared by" block of the procedure to provide a recommendation of approval to the General Manager. The ISRT "comments and direction" on SRD development were isolated to requesting more information or emphasis on steps of the process that needed explaining. This limited involvement was described in SRD Vol. I, Section 4.2.

Also, the ISRT review assessed conformance to all contract requirements. The BNFL initial response incorrectly stated "consideration for conformance." Please omit "consideration for" in the BNFL submittal. The contract requirements relevant to the review are contained in the "J" document DOE/RL-96-0004, Rev. 0.

Conformance was demonstrated through (1) assured implementation of the procedure (refer to supplemental response to Q#51); (2 use of the BNI and BEL lead engineers to review the SRD V. II; and (3) the requested review of SRD safety criteria and regulatory basis by ISRT members and additional experts as subject matter experts. The following is a list of the ISRT members and the respective area of expertise each assessed.

G. Kaiser - PSM and chemical safety
A. Kolaczkowski - Training & Human Factors (ISRT Alternate, subject expert)
A. Larson - radiological safety (ISRT Alternate, subject expert)
R. Smith - radiological safety & natural phenomena hazards
J. Kisalu - formal comparison of design to SRD Safety Criteria (ISRT Alternate, subject expert)
T. Mutters - maintenance & operations (subject expert)
R. Cullen - radiological process & nuclear safety (subject expert)

Further information on the process used to assure DOE/RL-96-0004 was followed can be found in the Supplemental Response to Question 43, Attachment Question 43 BNFL's Response to RU Disposition..

Supplemental Disposition

The Contractor’s supplemental response was acceptable. The supplemental response provides adequate information regarding the role and function of the ISRT to sufficiently address the concerns of this question.

The Contractor response to question 69 states that the SRD Development Procedure was

Question # 70

Description

Basis:
Approval Criterion: "4) The set documented in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE...", DOE/RL-96-0003, pg. 4.

SRD review guide: 8.4 Hazards control standards, attribute 2 - justification basis, RL/REG-97-08, pg. 28.

Question:
The safety criteria should make more specific commitments regarding criticality concerns identified in the hazard analysis. Standards for criticality evaluation are largely process independent. Where are the implementing standards which identify process components subject to a) criticality evaluation and b) process parameter sampling and analysis (in the case of chemical makeup or concentrations) or monitoring (in the case of geometry)? What are the explicit standards by which criticality evaluations will be performed (i.e., moderator assumptions, neutron absorber assumptions, conservative assumptions regarding the presence of neutron reflectors, methods for applying Monte-Carlo calculations, etc.)?

Contractor Response

The criticality safety criteria in Section 3.3 of the SRD are examples of the conservative nature of the SRD. Based on team experience, it was a reasonable early supposition that the vitrification facility would involve the potential for criticality. Hence the criteria were specified before the hazards identification and criticality assessment of the concept design were concluded. That is not to say that concerns from the hazard identification studies were not taken into consideration. (e.g., Table 1, Attachment 4-page 2, October 23, 1997 information package to the RU). Later feedback to the SRD development was that there currently is no criticality potential, hence there was no need to identify additional standards for criticality concerns identified early in the hazards identification study. The current SRD criticality safety criteria are being retained until such time when either they may be required or dispensed with depending on the detailed design conclusions.

The process components important to criticality evaluation, (material characterization, geometry, fissile concentration) were considered explicitly by the criticality assessment in a conservative manner, yet no potential for criticality has been identified at this stage of concept design.

For completeness, the assumptions made in the assessment with regards to these process components is reproduced in the following and form the response to Question 25.

The basis of the assessment is:
- U-235 content.
- Total U.
- Pu-239 content.

Enrichment (U-235 content) values were taken from tank characterization data for the likely worst-case tanks (Envelope D material) 241-AZ-101 and 241-AZ-102 (WHC-HD-WM-ER-410/411) which gave an enrichment figure of 0.89%, marginally higher than the Contract specification (DE-RP06-96L13308). The assessment used an enrichment figure of 1%. The total U figure (13.55g/l U) is taken from Table TS8.1 of the contract specification (DE-RP06-96L13308) which is the highest single value and therefore conservative. The Pu-239 content (92% according to Table TS8.3 of the contract specification, DE-RP06-96L13308), is conservatively assumed to be 100% for the purposes of the assessment.

The basis of the assessment is, therefore, the contract specification and sample results, whichever is considered to be the more conservative. No controls or constraints are called out in the assessment in concluding that there is no criticality challenge to the facility. The only controls that would need to be considered are those which result in the fissile content either within the Envelope D tanks (AZ-101, 102) or those assumed in determining the Contract specification. If these controls exist, they are under DOE jurisdiction, outside the scope of the TWRS-P facility.

Hence there is currently no requirement for the selection of standards.

Disposition

The BNFL response is considered to be responsive and acceptable.

The contractor's response is acceptable. The response states, "The process components

important to criticality evaluation,... were considered explicitly by the criticality assessment...." The response refers to a criticality safety report that was not provided as part of the submittal. It is expected that all process components identified as a potential

Supplemental Response

Although marked as acceptable in the formal issue the following response is added to clarify the BNFL position.

1. Fissile material control.

The current criticality assessment for the Part A concept design is based on a conservative estimate of the process and the proposed feed material as per the contract. This assessment has determined that a criticality in the TWRS-P Facility is not a credible event. Therefore, the only controls needed are those that ensure that material specifications for any proposed feed to the facility are fully compatible with the process and are within the fissile material content bounds of the criticality assessment.

In summary, these controls are as follows:

Prior to transfer (which is under BNFL control) of any batch of feed to the BNFL TWRS-P facility:

- DOE takes a representative sample of the batch. DOE demonstrates that the sample taken is representative of the batch.
- DOE performs analyses on the sample to ensure material specification compatibility, e.g. fissile content is within contract specifications.
- BNFL reviews and accepts or rejects the DOE analytical results. This acceptance or rejection would be based on BNFL's own confirmatory analysis.
- DOE initiates batch transfer to the BNFL facility based on established procedures.

These controls are deemed adequate to ensure the fissile material content of the feed remains within the Authorization Basis of the facility.

Full details of the controls and administrative procedures are found in TWRS-P Interface Control Document (ICD) 20, a copy of which has been made available to the RU.

2. Performance of criticality assessments.

For any BNFL facility that handles, processes, or stores fissile material, the approach adopted for the assessment of criticality safety has been, and will continue to be, to assess all areas of plant where the potential for criticality exists. This includes processes vessels, transfer vessels (e.g. breakpots) and ventilation ductwork. Assessments include both normal and credible contingency conditions. Where appropriate, a conservative, bounding case is used to give confidence in the criticality safety of a number of vessels and plant areas.

The waste processed in the TWRS-P Facility may contain significant quantities of fissile material. Although multiple critical masses could be present, the fissile material is dilute and distributed homogeneously. As a consequence, the approach taken in the assessment evaluates the fissile material under both normal and contingency conditions (e.g. accumulation, loss of homogeneity etc.), to determine whether a significant fraction of the minimum critical concentration can be achieved. If it cannot, then k-infinity will always be less than unity, and even an infinite amount of the waste cannot be made critical. The validity of these process conditions will be confirmed via the feed batch sampling and analysis noted above as part of the interface control.

Once the TWRS-P Facility has begun hot operations, if the analytical results show that material is out of specification, then BNFL may choose not to receive the batch or, alternatively, invoke the Unreviewed Safety Question Determination (USQ-D) process to determine if the batch would really challenge safety. The same USQ-D process is used if there is a proposal to change the feed specification. Any assumptions (including those in the criticality assessment) would be examined in the light of the proposal to determine whether or not additional challenges to safety are present.

Criticality assessments are a documented part of the Safety Analysis Reports (SARs). BNFL will review and update the SARs as part of design and operational practice. The review and update process ensures that safety is always up to date, reflecting the current facility and process design and operations as appropriate.

3. Trained criticality expertise.

If a credible criticality potential is identified for TWRS-P, then a nuclear criticality safety function consisting of trained criticality safety experts will be established within the TWRS-P organization as per the guidance of RG 3.52. However if no credible criticality potential exists,

as is currently the case, then criticality support from the corporate team of criticality experts will be provided. This includes the regular review and update of criticality assessments as part of SAR review and update, and also any analyses needed to support the USQ-D process.

Supplemental Disposition

Question # 71

Description

Basis:
Approval Criterion: "4) The set documented in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE...", DOE/RL-96-0003, pg. 4.

SRD review guide: 8.4 Hazards Control Standards, attribute 1 - justification scope, RL/REG-97-08, pg. 28.

Question:
The criticality safety criteria are general principles extracted verbatim from the regulatory basis documents. As such, they do not contain enough detail to perform a process-specific review of how the hazard analysis and control strategies impacted the selection of standards. Within the safety criteria there no statements concerning applicability to specific process components which were identified by the hazard analysis. How did the hazard analysis and control strategies identified for criticality impact the selection of criticality safety criteria?

Contractor Response

As indicated in the response to Question 70, the selection of the criticality safety criteria were not based solely on a review of the hazards analysis and control strategies. However, Table 1, Attachment 4-page 2, October 23, 1997 information package to the RU indicates clearly how the safety criteria are linked to the hazards analysis.

Their selection was based on team experience of criticality control requirements for nuclear chemical facilities. Control of fissile concentration, accumulation, and moderation (reflection) are the basis for criticality control and this is reflected in the safety criteria. These controls are aimed at criticality prevention rather than mitigation (DOE/RL-96-0006 Section 4.2.2.5).

In summary, although the link can be made between control strategies called out in the HAR, the selection of criticality safety criteria was based on knowledge and experience of the BNFL Team and the need to comply with the DOE/RL-96-0006 (Section 4.2.2.5).

See also response to Question 23.

Disposition

The BNFL response is responsive and acceptable.

The contractor's response is acceptable. The response states, "criticality safety criteria were not based solely on a review of the hazards analysis...". The reviewer interprets these statements to indicate that there was no link between the HAR and the criticality safety criteria beyond the general recognition that criticality was a potential hazard.

Supplemental Response

Although marked as acceptable in the formal issue the following response is added to clarify the BNFL position.
1. Fissile material control.

The current criticality assessment for the Part A concept design is based on a conservative estimate of the process and the proposed feed material as per the contract. This assessment has determined that a criticality in the TWRS-P Facility is not a credible event. Therefore, the only controls needed are those that ensure that material specifications for any proposed feed to the facility are fully compatible with the process and are within the fissile material content bounds of the criticality assessment.

In summary, these controls are as follows:

Prior to transfer (which is under BNFL control) of any batch of feed to the BNFL TWRS-P facility:
- DOE takes a representative sample of the batch. DOE demonstrates that the sample taken is representative of the batch.
- DOE performs analyses on the sample to ensure material specification compatibility, e.g. fissile content is within contract specifications.

- BNFL reviews and accepts or rejects the DOE analytical results. This acceptance or rejection would be based on BNFL's own confirmatory analysis.
- DOE initiates batch transfer to the BNFL facility based on established procedures.

These controls are deemed adequate to ensure the fissile material content of the feed remains within the Authorization Basis of the facility.

Full details of the controls and administrative procedures are found in TWRS-P Interface Control Document (ICD) 20, a copy of which has been made available to the RU.

2. Performance of criticality assessments.

For any BNFL facility that handles, processes, or stores fissile material, the approach

Supplemental Disposition

Question # 72

Description

Commitments Made in the BNFL Inc. QAP Regarding the BNFL Inc. QA Program Implementation Plan

Section 1.4 of the BNFL Inc. QAP, third paragraph (page 4 of 14 of Section 1), states: "Until the Implementation Plan is developed, BNFL Inc. and its subcontractors will perform the work in accordance with approved implementing procedures covering the specific activities (e.g., preparation, review, and approval of documents, PFD). These procedures constitute elements of the Implementation Plan, which will be part of the ISMP." Appendix A to Section 1 of the BNFL Inc. QAP provides a listing of the "Elements [titles of both current procedures and procedures to be developed] of the TWRS-P QAP Implementation Plan associated with 10 CFR 830.120 criteria."

Section 1.6 of the BNFL Inc. QAP, fifth paragraph (first paragraph on page 6 of 14 in Section 1) states: "The TWRS-P QAP Implementation Plan, integrated with the ISMP, shall describe how the principle subcontractors meet each of the applicable criteria of 10 CFR 830.120 through a system for quality policies, procedures, and instructions described in their own QAP for the TWRS-P Project."

Contrary to the above-stated commitments made in the BNFL Inc. QAP, (a) no approved implementing procedures covering the specific activities performed by BNFL Inc. and its subcontractors, were included as elements of the BNFL Inc. QA program Implementation Plan and (b) the BNFL Inc. QA program Implementation Plan did not describe how the principal subcontractors meet each of the applicable criteria of 10 CFR 830.120. Please provide the information specified in these commitments.

Please provide the committed to elements and documents so proper verification and evaluation can be completed.

Contractor Response

a) The DOE technical standard DOE-STD-1082-94 "Preparation, Review, and Approval of Implementation Plans for Nuclear Safety Requirements" used for the preparation of the TWRS-P Implementation Plan for Part A QAP, does not require inclusion of the approved implementing procedures into the Implementation Plan. All implementing procedures covering specific activities during Part A of the project are available for DOE/RL Regulatory Unit (RU) review at BNFL's office in Richland and at the location of subcontractors.

b) Each principal subcontractor has developed and implemented a TWRS-P specific QAP in compliance with the requirements of 10 CFR 830.120. The subcontractors QAPs have been reviewed and approved by BNFL. In addition, BNFL has conducted audits of its principal subcontractors to verify compliance with all aspects of their QAP and implementing procedures. Audits reports are available for RU's review.

A typical quality document system for Part A is shown in the Attachment 72-A1.

The implementation of quality assurance criteria, as applicable for Part A work, by BNFL and each principal subcontractor is shown in the attachments to this question, as follows:

Attachment 72-A2.1: BNFL Inc.
Attachment 72-A2.2: BNFL Engineering Ltd. (BEL)
Attachment 72-A2.3: Bechtel National Inc. (BNI)
Attachment 72-A2.4: Science Applications International Corporation (SAIC)

Attachment 72-A2.5: GTS Duratek

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The BNFL Inc. response to this question included Attachments 72-1 to 72-6 which provide tabular summaries showing how BNFL Inc. and its principal subcontractors meet each of the applicable criteria of 10 CFR 830.120 for Part A work. However, Attachment 72-A2.1 does not identify the BNFL Inc. implementing procedure that addresses the 10 CFR 830.120 requirement regarding records (Ref. 4, "Documents and Records"). Also, Attachment 72-A2.5 does not identify the GTS Duratek implementing procedure that addresses the 10 CFR 830.120 requirement regarding corrective action (Ref. 3, "Quality Improvement").

Please revise Attachments 72-A2.1 and 72-A2.5 in a manner that ensures the requirements of 10 CFR 830.120 are addressed.

Supplemental Response

Project procedure QA-06-TWRS "QA Records" was added under Criterion Number 4 in the Attachment 72-A2.1

The following implementing policy was added under the Criterion Number 3 in the Attachment 72-A2.5: GTS Duratek TWRS-P Project Quality Assurance Plan, Rev. 2, Section 3.0, paragraph 3.3 "Corrective Action".

Supplemental Disposition

The Contractor's supplemental response was acceptable. The BNFL response adds: (a) project procedure QA-06-TWRS "QA Records" under Criterion Number 4 in the Attachment 72-A2.1 and (b) implementing policy GTS Duratek TWRS-P Project Quality Assurance Plan, Revision 2, Section 3.0, paragraph 3.3 "Corrective Action" under Criterion Number 3 in the Attachment 72-A2.5. This response is acceptable since Attachments 72-A2.1 and 72-A2.5 have been revised in a manner that ensures the requirements of 10 CFR 830.120 were addressed.

Question # 73

Description

Compliance With DOE/RW-0333P (QARD)

(1) Section 3.3.1.5 of the BNFL Inc. ISMP (page 3-5) states in part: "The TWRS-P Facility high-level waste production, storage, and transportation will comply with DOE/RW-0333P, Quality Assurance requirements and Descriptions for the Civilian Radioactive Waste Management Program (QARD), (DOE 1995b)."

Section 3.5 of the BNFL Inc. ISMP (fifth paragraph; page 3-10) states in part: "TWRS-P Project high-level waste production, canister storage, and transportation will comply with DOE/RW-0333P, Quality Assurance requirements and Descriptions for the Civilian Radioactive Waste Management Program (QARD), (DOE 1995b)."

As worded, the BNFL Inc. ISMP appears to limit the application of DOE/RW-0333P to "high-level waste production, storage, and transportation." Please explain the extent to which DOE/RW-0333P will be applied to the design of the high-level waste (HLW)-affected activities.

Commensurate with the current level of design, please identify the boundaries that constitute the process envelope for the BNFL Inc. HLW facility, within which DOE/RW-0333P will be applied.

Please explain the process BNFL Inc. will apply to ensure that the QA measures and controls that are specifically responsive to DOE/RW-0333P for the HLW-affected activities are, in fact, implemented (e.g., separate QAP, separate section of the QAP, etc.).

(2) Appendix A of the BNFL Inc. ISMP, TWRS Privatization Project Implementation Plan for Part 1A Quality Assurance Program, states in Section 2.4: "Implementation guides and technical standards in the context of commercial and DOE practice are adopted to meet DOE requirements as set out in the contract. BNFL Inc. is committed to address other quality assurance requirements, as applicable during the execution of the project. These requirements include:

QARD.DOE/RW/0333P, Rev 5, October 2, 1995. ...."

Since DOE/RW/0333P is an existing requirement of the contract, why is it included in this list of "other quality assurance requirements" to be employed only "as applicable"?

Contractor Response

Because "High-Level Waste services" is currently an option for Part B (see contract DE-AC06-RL-13308, Table 4-2, page C-11), DOE/RW/0333P is not an existing requirement of the contract. However, BNFL is planning to revise the TWRS-P Project QAP for Part B to incorporate the additional requirements that must be satisfied when HLW services and DOE/RW/0333P are included in the contract. The provisions of the Quality Assurance Requirements and Description document DOE/RW/0333P will be applied to all activities associated with HLW services from design through production and acceptance.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response explained that the provisions of the RW QARD will be applied to all activities associated with HLW services from design through production and acceptance. Responsive?: The answers to the remaining parts of this question (e.g., process for ensuring the RW QARD is implemented) can be deferred until the Part B QAP is submitted to the RU.

Supplemental Response

Supplemental Disposition

Question # 74

Description

Frequency of Performing Compliance Audits

Section 7.3 within Volume II of the BNFL Inc. SRD, "Quality Assurance Program," presents a series of safety criteria relating to the BNFL Inc. QA program. Safety Criterion 7.3-10 (page 7-11) states in part: "Compliance audits shall be performed at least every three years to verify that the procedures and practices developed to ensure nuclear and process safety are adequate and are being followed." The regulatory bases cited for this safety criterion are: 29 CFR 1910, "Occupational Safety and Health Standards" (Location: 119 (o)); 40 CFR 68, "Chemical Accident Prevention Provisions" (Location: 58); and DOE/RL-96-0006, "Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors" (Location: 5.2.12).

Section 10.2.3 of the BNFL Inc. QAP, "Independent Assessment," states in part: "Independent assessments include performance of QAP audits, system audits, verification, surveillances, and laboratory performance evaluation audits."

Section 10.2.5 of the BNFL Inc. QAP, "Assessment Performance," states in part: "The maximum period between independent assessments should not exceed 12 months."

The standard adopted by BNFL Inc. for the frequency of compliance audits ("at least every three years") is less stringent than the commitment stated in the BNFL Inc. QAP for performing independent assessments, of which audits are included as one of the methods listed ("should not exceed 12 months"). Please clarify this apparent discrepancy.

Contractor Response

There is no discrepancy. Both requirements indicated are valid. Two types of audits will be conducted:

- compliance audits to certify that the process safety management is adequate; these audits are based on 29 CFR 1910 requirements (OSHA). These audits shall be performed at least every three years.

- quality assurance audits or independent assessments to verify compliance with all aspects of the quality assurance program and to determine its effectiveness; these audits and independent assessments are based on 10 CFR 830.120 requirements. These audits or independent assessments shall be performed annually.

Disposition

The BNFL response is responsive and acceptable.

BNFL Inc. clarified the scope of compliance audits versus QA audits/independent

assessments in a satisfactory manner.

Supplemental Response

Supplemental Disposition

Question # 75

Description

BNFL Inc. Commitment tracking System

The first paragraph of Section 2.13 in Appendix A ("TWRS Privatization Project Implementation Plan for Part 1A Quality Assurance Program") within the BNFL Inc. ISMP states: "BNFL Inc. has established and implemented an Action Item Status System which includes the identification and monitoring of commitments with regard to meeting the nuclear safety requirements."

As discussed in Question QA-1, several instances were identified during the Regulatory Unit's review of Appendix A of the ISMP where commitments made in the BNFL inc. QAP regarding promised content of the BNFL Inc. QA program Implementation Plan were not addressed. The absence of this information in the Implementation Plan raises a concern regarding the effectiveness of BNFL Inc.'s commitment tracking system. Please explain why BNFL Inc. did not capture, track, and meet these commitments. Please also explain what measures BNFL Inc. will employ to ensure that commitments made by BNFL Inc. to the Regulatory Unit are addressed in a timely, effective manner in the future.

Contractor Response

There was no problem with the commitment tracking system; no commitments were missed. As noted in the response to the question #72, the information specified in the referenced commitments was available and now is provided in the attachments to the response #72. The current Action Item Status System (for Part A activities) is used for project controls and performance management process; this process includes the establishment of the project baseline, the forecasting of the project completion schedule and costs, the reporting of progress, Part A deliverables.

Radiological, nuclear, and process safety deliverables constitute the nuclear safety requirements during the Part A and they are identified and monitored by the current tracking system.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response to this question, in conjunction with their response to question #72, adequately addresses this concern, at least for this point in time.

Supplemental Response

Supplemental Disposition

Question # 76

Description

BNFL Inc. QA Program for Part B

The last paragraph of the section of the BNFL Inc. QAP entitled "Introduction" states: "This Quality Assurance Program (QAP) has been prepared to support Part A activity performance of the contract by BNFL Inc. as prime contractor to DOE."

The third paragraph of the section of the BNFL Inc. QAP entitled "Project Quality Policy" states: "The provisions of this Tank Waste Remediation System Privatization (TWRS -P) Project QAP apply to all BNFL Inc. activities that may affect radiological, nuclear, or process safety within the scope of work for Part A of the contract."

The first paragraph of "Scope" within Section 1.0 ("Quality Program") of the BNFL Inc. QAP states: "This QAP was developed to support performance of Part A of the TWRS-P

Contract. Part A activities are limited by the contract to design and design-related activities."

Section 1.3.9 of the BNFL Inc. ISMP (first paragraph of 1.3.9 on page 1-14) states in part: "The application of the requirements of the QAP continues during design, procurement, construction, startup, testing, inspections, operations, maintenance, modifications, and deactivation of the facility."

The second paragraph of Section 1 ("Introduction") of RL/REG-97-01, "Evaluation Report for the British Nuclear Fuels, Inc. Initial Quality Assurance Program," states in part: "BNFL Inc. is required to revise the TWRS-P QAP and submit it for review and approval to the TWRS Regulatory Unit (RU) prior to initiation of Part B activities."

Please provide the schedule and milestones for submitting the Part B QAP and its Implementation Plan.

Contractor Response

The milestone schedule for submitting the Part B QAP and its Implementation Plan is proposed as follows:

- Develop and issue Part B QAP for internal review: 90 days prior to Part B contract award
- Internal review and comments resolution: 60 days prior to Part B contract award
- Issue final revision and internal approval: 45 days prior to Part B contract award
- Issue Part B QAP to DOE: 30 days prior to Part B contract award

These milestones were selected to provide ample time for review and comments by the Regulatory Unit before the QAP is established and approved for Part B activities.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

(a) The BNFL Inc. response indicated that the Part B QAP would be sent to the RU 30 days prior to Part B contract award. 30 days does not allow sufficient time for an adequate review of the Part B QAP by the RU, especially considering the time required for resolution of any comments. (b) The BNFL Inc. response did not address the schedule for the Part B implementation plan. The first sentence of the BNFL Inc. response to this question states: "The milestone schedule for submitting the Part B QAP and its implementation Plan is proposed as follows:" However, the four milestones that follow this sentence only discuss the Part B QAP.

(a) Please propose an alternate schedule for the submittal of the Part B QAP to the RU that would allow sufficient time for the review and the resolution of any comments. (b) Please provide the schedule and milestones for submitting the Part B QA implementation plan to the RU. (c) Please provide a schedule for the revision of the ISMP to incorporate the Part B QA implementation plan.

Supplemental Response

The milestone schedule for submitting the Part B QAP and its Implementation Plan is proposed as follows:

- Develop and issue Part B QAP and its Implementation Plan for internal review: 120 days prior to Part B contract award
- Internal review and comments resolution: 90 days prior to Part B contract award
- Issue final revision and internal approval: 75 days prior to Part B contract award
- Issue Part B QAP to DOE: 60 days prior to Part B contract award

These milestones were selected to provide ample time for review and comments by the Regulatory Unit before the QAP is established and approved for Part B activities. Firm dates will be added as soon as they are available.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL proposed submitting the Part B QAP and its Implementation Plan to the RU 60 days prior to Part B contract award. This response is acceptable since the proposed schedule would allow sufficient time for the RU review of these documents and the resolution of any comments.

Question # 77

Description

Regulatory Unit Review of Substantive changes to the BNFL Inc. QAP

Section 1.7.4 of the BNFL Inc. QAP states in part: "The TWRS-P Project QA Manager is responsible for keeping the TWRS-P QAP current ...."

Section 1.9.2 of the BNFL Inc. QAP states in part: "Revisions to the QAP and Implementation Plan shall be submitted to the TWRS Regulatory Unit for review and approval to confirm that revisions do not after (sic; should be "alter") the effectiveness of the TWRS-P Project QAP."

As explained in Regulatory Unit Question QA-2, it appears that the reporting relationship shown for the QA group in Figures 11-1 and 11-2 of the BNFL Inc. ISMP was changed from that shown in Exhibit 1-2 of the BNFL Inc. QAP. I t was also apparent that, as stated in the BNFL Inc. QAP, it is "essential" for the TWRS-P Project QA Manager to report directly to the Corporate QA Manager (in order to "... independently and effectively verify program requirements and to ensure product quality").

Was the BNFL Inc. QAP revised to reflect the QA organizational structure that is reflected in the ISMP? If not, why wasn't this done in order to keep the QAP current as required by Section 1.7.4? Assuming the QAP was revised to reflect this change, and given the substantive nature of this revision (i.e., in terms of the "essential" aspects of the former approach), why wasn't this revision submitted to the Regulatory Unit for its review and approval as required by Section 1.9.2 of the BNFL Inc. QAP?

Please identify the measures that will be employed by BNFL Inc. in the future to ensure that substantive revisions to the BNFL Inc. QA program are submitted to the Regulatory Unit in a timely manner for review and approval to confirm that they do not reduce the effectiveness of the BNFL Inc. QA program.

Contractor Response

The ISMP was developed for Part B activities. Figures 11-1 provides the project organization for the design and construction phases. Figure 11-2 provides this same information for operational phase. Upon commencement of operation, the "essential" reporting line for the project QA Manager shifts to the General Manager (President) of the Limited Liability Corporation.

Exhibit 1-2 of the QAP shows the TWRS-P project integration and coordination team organization for Part A activities. No revision of the QAP for Part A is needed. This final final QAP for Part A (Revision 2) was approved by DOE RU (Letter 97-RU-0042, February 12, 1997).

Revisions to the QAP for design and construction will portray the project QA Manager reporting to the BNFL Inc. Corporate QA Manager. Revision to the QAP for operation will portray the Facility QA Manager reporting to the Facility General Manager.

Changes to the QAP that affect commitments specified in a previously approved QAP shall be submitted to the Regulatory Unit for review and approval 30 days prior to the implementation of subject changes.

Disposition

The BNFL response is responsive and acceptable.

BNFL has stated that Figure 11-1 reflects the reporting relationship for the design and construction phases. Figure 11-2 provides the same information for the operational phase. Upon commencement of operation, the reporting line for the project QA Manager shifts to the General Manager (President of Limited Liability Corporation). Revisions to the QAP will show the project QA Manager reporting to the BNFL Inc. Corporate Manager for design and construction and to the Facility General Manager for operation. The BNFL Inc. response states that changes to the QAP that affect commitments specified in a previously approved QAP will be submitted to the RU for review and approval 30 days prior to the implementation of the changes.

Supplemental Response

Supplemental Disposition

BNFL has stated that Figure 11-1 reflects the reporting relationship for the design and construction phases. Figure 11-2 provides the same information for the operational phase. Upon commencement of operation, the reporting line for the project QA Manager shifts to the General Manager (President of Limited Liability Corporation). Revisions to the QAP will show the project QA Manager reporting to the BNFL Inc. Corporate Manager for design and

Question # 78

Description

Substantive Content of the BNFL Inc. QA Program Implementation Plan

The term "Implementation Plan" is defined within Part 830 as follows: "Implementation Plan means a document prepared by a contractor that sets forth: (1) When and how the actions appropriate to comply with the requirements of a section of this Part, including the requirements of a plan or program required by the section, shall be taken ...." (emphasis added)

Section II of the Implementation Guide for use with 10 CFR Part 830.120 (G-830.120-Rev. 0, April 15, 1994) states in part: "10 CFR 830.120 requires the preparation of an implementation plan which describes the schedules, milestones, and activities necessary to implement the regulation." (emphasis added)

The BNFL Inc. QAP and ISMP both state that BNFL Inc. will comply with 10 CFR 830.120. Accordingly, the statements quoted above are applicable to the BNFL inc. QA program Implementation Plan. However, contrary to the above, it appears that the BNFL Inc. QA program Implementation Plan contains little or no information regarding: (a) "when and how" the activities described in the BNFL QAP will be accomplished or (b) the "schedules, milestones, and activities" necessary to implement 830.120. Please provide this specific information to an extent that sufficiently describes the role the BNFL QA program will play in providing adequate confidence in the safety of the TWRS-P Project.

Contractor Response

The Implementation Plan developed for Part A in accordance with the guidance provided by DOE standard DOE-STD-1082-94, October 1994, contains all information available and applicable for this stage of the project: developmental design to support a cost estimate for the facility to be built. The current Implementation Plan (paragraph 2.1.6) contains the BNFL's commitment to comply fully with the requirements of 10 CFR 830.120.

"Schedule, milestones, and activities" necessary to implement 830.120 are part of the Part B activities.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The BNFL Inc. response to Question #72 contained adequate insight as to how BNFL Inc. and its principal subcontractors will address the requirements of 10 CFR 830.120 and the QAP, at least for Part A.

The QAIP needs to be revised to include the Quality Assurance Program milestones and schedules for the remaining life stages of TWRS-P.

BNFL's response indicated that the QAIP contained all of the information available and applicable for this stage of the project. However, the QAIP does not contain the schedules and the actions for the Quality Assurance Program for the remaining life stages of the TWRS-P. Discussions with BNFL personnel indicated that there was a misunderstanding regarding the expectations of the schedules and milestones in the implementation plan. The QAIP should provide schedules and milestones for implementing the Quality Assurance Program. BNFL's response assumed that the milestones and schedules were to address construction milestones and schedules.

Supplemental Response

The milestone schedule for revisions and submittals to DOE of the QAP and its Implementation Plan before start of construction, production operations, and deactivation will follow the same scheme as presented in the Supplemental Response to the Question # 76: revisions will be submitted to DOE 60 days prior to starting each phase of the project.

Supplemental Disposition

BNFL's supplemental response was acceptable. The December 7, 1997 response submitted by BNFL indicated that 60 days prior to construction, production operations, and deactivation, BNFL will submit revised Quality Assurance Programs (QAPs) applicable to each phase to the DOE RU for review and approval. The RU finds the response acceptable conditioned on the acceptability of the QAP submitted for each of the phases.

construction and to the Facility General Manager for operation.

Question # 79

Description

BNFL Inc. Subcontractors' QAPs

The last paragraph of Section 2.2.3 of the BNFL Inc. QA program Implementation Plan (Appendix A within the BNFL Inc. ISMP) states: "Each principal subcontractor is responsible for the execution of its own work scope and the development and implementation of its own QAP, under the overall control and direction of BNFL Inc. QAPs established by the subcontractors are reviewed for acceptance by BNFL Inc."

Please describe the process by which BNFL Inc. will review and accept the QAPs of the subcontractors and the standards to which the subcontractors will be held in this regard. Include a description of how BNFL Inc. will ensure that each subcontractor meets the requirements of 830.120 and other applicable QA-related requirements. Please explain how BNFL Inc. will control and integrate the QA-related activities of the subcontractors, particularly since it appears that each subcontractor will implement its own, unique QA program. In the response to these questions, clearly indicate those commitments made in the BNFL Inc. QAP that are binding on all subcontractors versus those QA-related activities that may be performed to subcontractor-specific standards. Also, please explain why a project-specific QAP that is binding upon all members of the BNFL Inc. team was not developed, including a discussion of how the current BNFL Inc. approach fosters integrated safety management.

Contractor Response

For Part A activities, each principal subcontractor was responsible for establishing and implementing its own QAP for the TWRS-P project in compliance with 10 CFR 830.120. This concept was considered the most efficient and cost effective approach to the implementation of the QAP consistent with the scope of work for Part A.

BNFL has conducted planned and scheduled audits at all its principal subcontractors to verify compliance with all aspects of their QAP and to determine its effectiveness. The implementation of the QAP requirements were found to be satisfactory.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response states that, for Part A, each principal subcontractor established and implemented its own QAP in compliance with 10 CFR 830.120 since this was the most efficient and cost-effective approach. BNFL Inc. also stated that they audited their principal subcontractors and verified they satisfactorily implemented their QAP requirements. In a subsequent Meeting Note (IMS# 97-RU-0396), BNFL stated that the scope of the BNFL audits of subcontractors include confirming that their QAPs meet the requirements of 10 CFR 830.120, as applicable to their scopes of work.

Supplemental Response

Supplemental Disposition

Question # 80

Description

Applicability of DC II to Facility and Co-Located Workers

Table 1-3 at the top of page 1-17 within the BNFL Inc. ISMP, entitled "Design classification Summary," identifies "Worker protection (facility and co-located worker)" for DC-II under the column heading "Critical Function."

The last paragraph on page 1-17 of the BNFL Inc. ISMP (within Section 1.3.10, "Classification of Structures, Systems, and Components") states in part: "Design Class II (DC II) items are those SSCs necessary to ensure that the radiation and chemical exposure standards for facility workers are not exceeded as a result of accidents."

Verify that the definition for DC II at the bottom of page 1-17 within the BNFL Inc. ISMP should state "facility and co-located workers" instead of "facility workers."

Contractor Response

The word "facility" will be removed from the last paragraph on page 1-17. As explained on page 1-4, when used unmodified in the ISMP, "worker" refers to the facility and co-located worker both individually and collectively.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response indicated that the word "facility" will be removed. Page 1-4 of the ISMP states that the unmodified term "worker" refers to the facility and co-located worker both individually and collectively.

Supplemental Response

Supplemental Disposition

BNFL's supplemental response was acceptable. Page 1-4 of the ISMP stated that the unmodified term "worker" refers to the facility and co-located worker both individually and collectively. BNFL provided a redlined-strikeout version of the ISMP that corrected this error by removing the word "facility."

Question # 81

Description

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." DOE/RL-96-006, Paragraph 4.1.3.1 states that "Material that is part of the authorization basis should be established, documented, and submitted to the Director of the Regulatory Unit for evaluation and in support of authorization decisions and regulatory oversight."

Although Section 3.3.3 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) describes the manner in which changes to safety documentation will be controlled after construction is authorized, it does not address the control of the SRD and the ISMP during the period between Standards Approval and Construction Authorization. Please describe the manner in which safety documentation (e.g., the SRD and ISMP) will be controlled during the period between Standards Approval and Construction Authorization. Also, in Section 12, the BNFL ISMP defines the licensing basis as "The composite of information provided by BNFL in response to radiological, nuclear, and process safety requirements that is the basis on which the Director of the Regulatory Unit grants approval to operate the TWRS-P facility." Thus, the licensing basis includes, at a minimum, the items specified in Sections 4.3.2 and 4.4.2 of DOE/RL-96-0003. Several of these items are not addressed in Section 3.3.3 of the BNFL ISMP. Please describe the manner in which changes to these other documents will be controlled.

Contractor Response

After approval of the SAP and prior to issuance of the construction authorization, changes to safety documentation will be controlled by the TWRS-P Project configuration management program. The RU will be informed of proposed changes to the SRD and ISMP during this period. However, design activities will proceed during RU review of the proposed changes. These changes will be incorporated into the construction authorization request submitted to the RU for review and approval.

The items listed in DOE/RL-96-0003, Sections 4.3.2 will be incorporated into the PSAR, ISMP, HAR, and SRD and controlled by the process defined in ISMP Section 3.3.3 "Changes to Safety Documentation," for these documents with the exception of the following items of Section 4.3.2:

7) Detail design drawings. Detail drawings not included in the PSAR, ISMP, HAR, and SRD will be available onsite for review.

16) The contractor's technical and experience qualifications. These qualifications are maintained as project records.

17) The contractor's financial capability to construct the plant. This financial capability is maintained as project records.

19) The procedures to be used to implement the construction and pre-operation testing portions of the SRD and the ISMP. These will be available on-site for DOE review.

The items listed in DOE/RL-96-0003, Sections 4.4.2 will be incorporated into the FSAR, ISMP, HAR, and SRD and controlled by the process defined in ISMP Section 3.3.3 "Changes to Safety Documentation," for these documents with the exception of the following items of Section 4.4.2:

7) Final design data and design drawings. Design data and drawings not included in the PSAR, ISMP, HAR, and SRD will be available onsite for review and will be revised without DOE review and approval.

10) The contractors technical and experience qualifications. These qualifications are maintained as project records.

11) The contractors financial capability to construct the plant. This financial capability is maintained as project records.

13) The procedures to be used to implement the construction and pre-operation testing portions of the SRD and the ISMP. These will be available onsite for DOE review.

22) Final operating procedures, including those for recovery from off-normal events. These will be available onsite for DOE review.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," present a conditionally acceptable description of the change control process for the SRD and ISMP between SAP approval and construction authorization. The change control process preserves the elements of the DOE/RL-96-0004 process for changes to the SRD, provides a structured change process with appropriate levels of BNFL review for both the SRD and the ISMP and provides for RU review and approval of any changes that "could be interpreted as a decrease in commitment to worker or public safety" prior to their implementation. BNFL needs to update Section 3.3.3 of the ISMP and Section 3.6 of Volume I of the SRD to reflect these understandings.

Supplemental Response

The response to Question 81 was modified as noted in the Disposition to replace the first paragraph of the response with the following:

"After approval of the SAP and prior to issuance of the construction authorization, changes to safety documents will be controlled by the TWRS-P Project configuration management program. The RU will be informed of proposed changes to the SRD and ISMP during this period. If a proposed change to SRD Volume II or the ISMP could be interpreted as a decrease in commitment to worker or public safety, RU review and approval of the proposed change will be obtained prior to implementation of the change. For other changes to these two documents, marked-up pages indicating the changes will be submitted to the RU every six months. In addition, every two years a revision to the documents will be submitted to the RU that will incorporate the changes made during that two year period.

For changes to the SRD, the configuration management process requires that the proposed changed be evaluated for impacts on safety, compliance with regulations and the license basis (including hazard and accident analyses) and then reviewed and approved commensurate with the process applied to the original configuration, including obtaining regulatory authorization prior to implementing changes which could be considered as decreasing the prescribed level of safety. This configuration management of the SRD ensures the essential elements of DOE/RL-96-0004 as addressed in the original development of the SRD are incorporated. Changes are addressed via an established configuration management process (process initiation) will be evaluated by subject experts for impacts on safety and the license basis (based on hazards/work to be performed and compliance with selected standards), and reviewed and approved by the same or an equivalent level organization (confirmation and approval), and approved by the RU where required."

These revisions regarding RU review and approval of changes to the SRD and ISMP also apply to the BNFL responses for Question 169 (items 2 and 3) and 177.

The responses to Questions 81 and 82 was clarified as noted in the Dispositions by a commitment that changes to the documents called out in items 7, 16, and 19 of Section 4.3.2 of DOE/RL-96-0003 and in items 7, 10, 13, and 22 of Section 4.4.2 of DOE/RL-96-0003 would be controlled by the BNFL configuration management process described in the Safety Requirements Document (SRD), Integrated Safety Management Plan (ISMP), and Quality Assurance Program (QAP).

The BNFL responses to Questions 81 and 82 were further clarified as noted in the Dispositions by a commitment that changes to the documents called out in item 17) of Section 4.3.2 of DOE/RL-96-0003 and in item 11) of Section 4.4.2 of DOE/RL-96-0003 would be controlled as required by DOE Contract DE-AC06-RL13308 Standard No 6.

Supplemental Disposition

Question # 82

Description

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." DOE/RL-96-006, Paragraph 4.1.3.1 states that "Material that is part of the authorization basis should be established, documented, and submitted to the Director of the Regulatory Unit for evaluation and in support of authorization decisions and regulatory oversight."

Question -- In Section 12, the BNFL ISMP defines the licensing basis as "The composite of information provided by BNFL in response to radiological, nuclear, and process safety requirements that is the basis on which the Director of the Regulatory Unit grants approval to operate the TWRS-P facility." Thus, the licensing basis includes, at a minimum, the items specified in Sections 4.3.2 and 4.4.2 of DOE/RL-96-0003. Several of these items are not addressed in Section 3.3.3 of the BNFL ISMP. Please describe the manner in which changes to these other documents will be controlled.

Contractor Response

See response provided for Question 81.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," present a conditionally acceptable description of the change control process for the items listed in Sections 4.3.2 and 4.4.2 of DOE/RL-96-0003. BNFL needs to update Section 3.3.3 of the ISMP to reflect these understandings.

Supplemental Response

See revised response for Question 81.

Supplemental Disposition

Question # 85

Description

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." DOE/RL-96-006, Paragraph 4.1.3.1 states that "Material that is part of the authorization basis should be established, documented, and submitted to the Director of the Regulatory Unit for evaluation and in support of authorization decisions and regulatory oversight."

Question Section 4.1.3 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) discusses, and figure 4-3 in the BNFL ISMP illustrates, a change process for the SRD that does not appear to involve either obtaining DOE-Regulatory Unit approval of proposed changes or informing the DOE-Regulatory Unit that changes were made to the SRD. Please explain how this process provides the information related to the SRD that the Director of the Regulatory Unit requires for regulatory oversight.

Contractor Response

DOE will be involved in approval of changes to the SRD as discussed in ISMP Section 3.3.3 and in response to Questions 81, 82, and 177. This DOE review and approval is part of the "Initiate change to SRD" block of Figure 4-3.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," is conditionally acceptable. The meeting note contains the requisite BNFL commitment to revise Figure 4-3 to properly illustrate the SRD change control process, including the role of the RU in that process. BNFL needs to revise Figure 4-3 in the ISMP and to make conforming changes to Figure 3-2 in Volume I of the SRD.

Supplemental Response

The response to Question 85 was clarified as noted in the Disposition by a commitment to revise ISMP Figure 4-3 to reflect the changes to the SRD change control process that has provided in the response to Question 81. In addition, Figure 4-3 will be revised to explicitly show the RU review and approval of SRD changes.

Supplemental Disposition

Question # 86

Description

Radiation Protection During Construction

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles" DOE/RL-96-006, Paragraph 4.2.3.1 states that "An acceptable system of radiation protection practices should be followed in the design, construction, and pre-operational testing phases of the facility for the protection of workers and the public."

Question -- BNFL has stated that the SRD and ISMP focus upon the design phase of the project and that standards and management practices more appropriate for construction will be presented in revised SRD and ISMP submittals for the Construction Authorization regulatory action. However, item 1 of Paragraph 4.1.2 of DOE/RL-96-003 requires that the Contractor's Standards Approval Submittal package shall consist of A...standards for design, construction, operation, ..." Since Chapter 5 of Volume II of the SRD (BNFL-5193-SRD-01, Rev. 0) includes management standards for radiation protection, their applicability during construction is assumed . Therefore, it is appropriate for the ISMP to reflect the management programs and practices that will implement these standards during construction. However, the discussion of radiation protection practices in Section 3.9 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) does not address radiation protection during construction. Please describe the radiation protection measures to be employed during construction.

Contractor Response

There are very few activities involving radioactivity or radioactive materials during normal construction operations. Of these, radiography is the principal activity. Since radiography is performed by NRC-licensed subcontractors who are responsible for the safe operation of their equipment, only a minimal construction radiation protection program is required for TWRS-P. Consequently, during the construction phase, BNFL will implement a standard industrial safety radiation protection program to cover this type of work. This program will be typical of those used on any large construction project, and will include the procedures and training necessary to ensure construction workers follow Hanford requirements for sheltering or evacuation during releases from other Hanford Site areas.

The exception to the above is construction activities involving Tank 241-AP 106, which contains radioactive material. These activities include modifications to the tank ventilation system and the connection of TWRS-P transfer lines to the tank. For these activities, the program radiation protection established for operating the TWRS-P facility will be used to ensure the work is performed with an adequate level of safety. This program will be described in Section 5.0 of the ISAR.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," adequately addresses this subject. The response provided addresses those aspects of radiation protection associated with activities involving known sources of radiation and known radioactive materials, including construction radiography and construction activities involving Tank 241-AP 106. The additional commitments in the meeting understandings adequately addresses the possibility that BNFL will encounter "legacy" radioactive materials that have been buried or otherwise discharged to the soil and groundwater during construction.

Supplemental Response

The response to Question 86 was clarified as noted in the Disposition by adding the following BNFL commitment:

"There may be radioactively contaminated soil on the TWRS-P Facility site. Such areas are to be characterized under the DOE Site Characterization Study prior to the start of a construction. Furthermore, to ensure protection of workers, appropriate sampling programs will be performed through BNFL's environmental monitoring program in accordance with the BNFL TWRS-P Project contract. In the event a previously undetected area of contamination is found, work in the area would be suspended, samples taken, and necessary remediation activities performed."

Supplemental Disposition

Question # 87

Description

Environmental Qualification of SSCs

Requirement -- Paragraph 11 c) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Ensure that the Contractor is ... in conformance with the top-level safety standards and principles..." and Paragraph 4.2.2.3 of DOE/RL-96-0006, which states "Structures, systems, and components important to safety should be designed and qualified to function as intended in the environments in which they are intended to respond. The effects of aging on normal and abnormal functioning should be considered in design and qualification."[Emphasis added.]

Question -- Section 3.11 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) discusses the incorporation of expected environmental conditions into the design specifications for important to safety SSCs. However, the section is silent about the qualification of important to safety SSCs and about the incorporation of the effects of aging in the development of design specifications and environmental qualification requirements for important to safety SSCs. Please describe the environmental qualification requirements that will be applied to important to safety SSCs. Also, please describe the manner in which the design specifications and environmental qualification requirements for important to safety SSCs incorporate the anticipated effects of aging on the performance of SSCs under normal and abnormal conditions.

Contractor Response

The referenced paragraph of ISMP Section 3.11 will be changed to read as follows, "...or mitigate the consequences of accidents. Requirements regarding the environmental qualification of Design Class I systems and components, including considerations for aging, are provided in SRD Volume II, as Safety Criterion 4.4-2."

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," is conditionally adequate. The response provides the requisite information about Design Class I structures, systems, and components. The additional commitments in the meeting understandings adequately presents the BNFL approach to assuring that Design Class II structures, systems, and components will operate in the environments for which they were designed. This approach for Design Class II structures, systems, and components reflects the overall BNFL graded approach. BNFL needs to incorporate the additional commitments in the meeting understandings in the Section 3.11 of the ISMP and the applicable safety criteria in Section 4 of Volume II of the SRD.

Supplemental Response

The response to Question 87 was clarified as noted in the Disposition by adding the following BNFL commitment:

"In addition to making this change to ISMP Section 3.11, it should be noted that ISMP Section 3.11 states that the BNFL design will incorporate the expected environmental conditions into the specification of the SSCs that must function to prevent hazardous situations or mitigate the consequences of accidents. This will be applied to Design Class II, as well as Design Class I, systems and components. While suppliers of Design Class II systems and components are not specifically required to provide test results relative to aging, the procurement specifications for these systems and components will specify the environmental conditions (e.g., temperature, humidity, and radiation field) to be expected during normal operation and the accident duration for which the system or component must function. Specifying Design Class II systems and components in this manner provides reasonable assurance that they will perform their required safety function when called upon. The TWRS-P Project approach for the protection of public and worker safety through the specification of Design Class I and II SSCs and the tailored approach to establishing the design, construction, and maintenance requirements for these two classifications of SSCs is addressed in response to Question 170 (as amended on November 13, 1997)."

Supplemental Disposition

Question # 88

Description

Design for Human Factors

Requirements -- Paragraph 11 c) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Ensure that the Contractor is ... in conformance with the

top-level safety standards and principles..." and Paragraph 4.1.1.6 of DOE/RL-96-0006, which states "The human aspects of defense in depth should include a design for human factors..."

Question -- Section 3.12 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) describes the process by which human factors considerations are incorporated into the design, including the construction of physical or computer mockups of instrument panels, and the performance of task analyses to support ergonomic design. However, the process described appears to be purely mechanistic. Why is there no mention of the use of qualified human factors engineers or other human factors specialists to identify, evaluate, and resolve any human factors issues based upon the construction of mockup instrument / control panels or the performance of task analyses?

Contractor Response

Human factors specialists will conduct human factors reviews of training, operator capabilities, work spaces, and the design of the Design Class I and II SSCs and functions that are judged to be critical to facility performance and that have a high potential for human error. During the early design phase, the specialist will identify opportunities for design improvement and provide recommendations to address human factors principles and processes. Human factors specialist will be involved in the specification and use of mockups and models of instrument panels and controls rooms. These specialists will also be involved in the performance of task analysis that will evaluate the functions to be performed by operating and maintenance personnel against the facility design, procedures, and training.

Disposition

The BNFL response is considered to be responsive and acceptable.

This response provides a conditionally acceptable description of the role of human factors specialists in the design of the BNFL TWRS-P facility and in the development of specifications for the procurement of mockups and models of instrument panels and control rooms. These commitments need to be incorporated in Section 3.12 of the ISMP.

Supplemental Response

Supplemental Disposition

Question # 89

Description

Composition of the Safety Committee

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." Paragraph 4.4.1 of DOE/RL-96-0006, states "The Contractor should establish a framework for its safety review organizations that are responsible for assuring the safety of the facility..." Paragraph 4.1.4.1 of DOE/RL-96-0006, states "A safety/quality program should be established that governs the Contractor's actions and interactions of all personnel and organizations engaged in activities related to the facility and emphasizes excellence in all activities..." [Emphasis added.]

Question -- Section 3.16.1 of the ISMP (BNFL-5193-ISP-01, Rev 0) discusses the Safety Committee purpose and makeup. However during the construction, operations and deactivation phases, workers are not included as members of the committee. Please describe how excluding workers from the safety committee conforms to the Top Level Standard and Principle (DOE/RL-96-0006, paragraph 4.1.4.1) on Safety/Quality culture?

Contractor Response

Workers participation in safety committees is one of the most important elements of the Safety/Quality culture and the heart of the Safety Improvement Program. The TWRS-P Project Safety Committee (ISMP Section 3.16.1) is a senior management safety committee which evaluates safety performance at the project level. As part of safety communications throughout the Project, workers will be invited to participate in the TWRS-P Safety Committee meetings, (e.g., during regular updates on worker safety performance and review of proposed corrective actions for incidents involving worker activities). Facility operators are also expected to serve as active members on other TWRS-P safety committees which will operate at every level of the organization, e.g., facility area safety committees.

Disposition

The BNFL response is responsive and acceptable.

The answer is responsive and acceptable. It clarifies the roles that workers will have on the TWRS-P Safety committee meetings.

Supplemental Response

Supplemental Disposition

Question # 90

Description

Unreviewed Safety Question Process

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." Paragraph 4.4.4 of DOE/RL-96-0006, states "All facility modifications after operations begin that can affect safety should be assessed by the Contractor for an "unreviewed safety question" and positive determinations submitted to the Director of the Regulatory Unit for review."

Question -- Page 3-33, section 3.16.4 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states that proposed activities with identified USQs are to be sent to the regulator "prior to completion of the activity." The intent of the Top Level Safety Criteria is that proposed changes which involve a positive USQ determination be reviewed by the Director of the Regulatory Unit before they are implemented and can affect operations and to allow greater flexibility for proposed changes which do not involve a positive determination. The DOE USQ Order as well as 10 CFR 50.59 require submittal to DOE and NRC respectively before initiating a new activity involving a positive determination of a USQ. What is the justification for this proposal for deviating from the standard DOE and NRC USQ practice?

Contractor Response

The words "before completion of the activity" are included to allow design and fabrication activities related to an identified USQ to proceed at risk to BNFL. Installation can also precede so long as the installation itself does not create a USQ. 10CFR50.59 does not require submittal of the USQ request prior to initiating the activity that would result in a USQ.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," is conditionally adequate. It addresses appropriately the RU review and approval role for USQs. In particular, in the meeting understandings, BNFL commits to not undertake, without RU review and approval, any activity where the initiation of the activity would itself involve an unreviewed safety question. This commitment needs to be incorporated in Section 3.16.4 of the ISMP and Safety Criterion 7.4-2.

Supplemental Response

The responses to Questions 90 and 177 were clarified as noted in the Dispositions by a commitment that BNFL would not undertake, without RU review and approval, any activity where the initiation of the activity would itself involve an unreviewed safety question.

Supplemental Disposition

BNFL's supplemental response was acceptable. BNFL stated that it would not undertake, without RU approval, any activity where the initiation of the activity would itself involve an unreviewed safety question.

Question # 91

Description

Description of Safety Management Processes

Requirements -- Paragraph 3) of Section 3.3.1 of DOE/RL-96-0003, which states "The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operations, and its deactivation."

Question -- Although Section 4.1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) describes many attributes of the safety management processes, it does not describe the processes themselves. Please describe the safety management processes to be employed by BNFL for the design, construction, operation, and deactivation of the TWRS-P facility. Please include in this description a discussion of the manner in which administrative and technical standards for safety management for the TWRS-P facility will evolve as the project

continues. In this discussion, please address the relationship of this process by which the technical and administrative standards will be modified to the standards process in DOE/RL-96-0004 . Please indicate which portions of the SRD define the safety management processes.

Contractor Response

Safety management processes such as organization and management, safety committee, configuration management, recordkeeping, quality assurance, audits and assessments, maintenance, procedures and training, and radiation and chemical safety are summarized in the ISMP Section 1.3, "Description of the Integrated Safety Management Plan." Additional detail will be provided in the ISAR. Procedures to implement these activities will be developed in Part B. Chapter 7.0 of the SRD Volume II provides the Safety Criteria governing the development of these safety management processes.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," present an acceptable approach for resolution of this issue. The response provided addresses all aspects of the question except for the relationship of the process by which technical and administrative standards are modified to the DOE/RL-96-0004 process. In the meeting understandings related to question 81, BNFL discusses the relationship of the process by which administrative and technical standards will be modified to the standards process stipulated in DOE/RL-96-0004.

Supplemental Response

The response to Question 91 was clarified as noted in the Disposition by the BNFL discussion of the relationship of the process by which technical and administrative standards will be modified to the standards process in DOE/RL-96-0004 in the revision to the response to Question 81.

Supplemental Disposition

Question # 92

Description

Standards Basis for Procedure Development

Requirement -- Paragraph 3) of Section 3.3.1 of DOE/RL-96-0003, which states "The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operations, and its deactivation."

Question -- Section 4.1.3 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states that "Procedural development will be based on accepted industry practices for ensuring safety through adequate training, conduct of operations, and engineering and design programs." Please explain how using "accepted industry practices" as the basis for procedural development is more consistent with standards-based safety management than basing procedural development on the applicable standards in Section 7.2, Training and Procedures, of Volume 2 of the SRD.

Contractor Response

There is no conflict between SRD Volume II, Section 7.2 and ISMP Section 4.1.3. Procedural development will be implemented using accepted industry practices to ensure the completed procedures and procedure development program meet the standards as contained in the SRD Volume II Section 7.2.

Disposition

The BNFL response is responsive and acceptable.

The response clarifies the roles that the standards in SRD Section 7.2 and "accepted industry practices" will play in BNFL procedure development activities.

Supplemental Response

Supplemental Disposition

Question # 93

Description

Commitment to Standards

Requirements -- Paragraph 11 c) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Ensure that the Contractor is ... in compliance with the SRD..."

Question -- The first sentence in Section 4.2.3.1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states "The format and content of the Preliminary Safety Analysis Report (PSAR) and Final Safety Analysis Report (FSAR) are in accordance with guidance provided in the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 3.52, Standard Format and Content for the Health and Safety Sections of License Applications for Fuel Cycle Facilities, draft (NRC1995a). The second paragraph of Section 4.2.3.1 states "Table 4-1 lists the planned deviations from the format and content guidance of Regulatory Guide 3.52 in this regard." Table 4-1 lists four pages of areas in which the PSAR and the FSAR format and content will deviate from NRC Regulatory Guide 3.52. Given this apparent contradiction, please explain precisely what BNFL means when it commits to meeting a standard. For example, does BNFL's commitment to a standard mean: 1) compliance with all requirements and recommendations (i.e., treating "shoulds" as "shalls"); 2) compliance with all requirements and those recommendations judged appropriate or desirable; 3) compliance with those recommendations judged appropriate or desirable; 4) compliance with the perceived intent of the standard; 5) compliance with the perceived intent of the standard, except where deviations are desirable and can be justified; or 6) some different meaning? Also, please identify all of BNFL's planned deviations, analogous to those in Table 4-1, from the requirements of each of the standards identified in Volume II of the SRD (BNFL-5193-SRD-01, Rev. 0).

Contractor Response

Regulatory Guide 3.52 is not a standard but a guide relative to the format and content of a Safety Analysis Report. Compliance with a standard means that all applicable statements will be implemented as appropriate to the specific phase of the project in the most consistent, safe, and cost effective manner.

At this point there are no planned deviations from the standards identified in Volume II of the SRD. Any future deviations from a committed standard would, of course, be justified.

Disposition

The BNFL response is considered to be responsive and acceptable.

The revision to the response documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," presents a conditionally acceptable definition of what is meant by compliance with a standard. It includes compliance with all mandatory portions, unless deviations are approved by the RU, and a documented review of all recommendations. This commitment needs to be incorporated in Chapter 4 of the ISMP.

Supplemental Response

The response to Question 93 was clarified as noted in the Disposition by revising the meaning of a commitment to comply with a standard as follows:

"Compliance with a standard which is included in Volume II of the SRD means that all mandatory statements (shall/will/must) applicable to nuclear, radiological, or process safety will be implemented or deviations justified and approved by the RU. Compliance with non-mandatory statements (should/may) will not be required; but will be reviewed and considered for each standard and statement on an individual basis. This review will be documented. Compliance to statements not applicable to nuclear, radiological, or process safety will in many cases be required to ensure compliance to regulations outside the scope of the RU review (e.g., OSHA or environmental protection); however, if no other regulatory entity requires compliance via the standard, compliance will not be required but will be reviewed on an individual basis."

Supplemental Disposition

Question # 94

Description

Standards Basis for Selected Safety Management Processes

Requirement -- Paragraph 3) of Section 3.3.1 of DOE/RL-96-0003, which states "The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operations, and its deactivation."

Question -- Section 4.2 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0), which describes the tailoring of safety management processes, discusses the tailoring of the Integrated Safety Management Plan (Section 4.2.3.2), the Safety Requirements Document (Section 4.2.3.3), the Licensee Controlled Requirements (Section 4.2.3.4), and the Emergency Plan (Section 4.2.3.5). However, the SRD (Volume 2) contains no standards addressing these safety management processes. Please explain how these safety management processes are standards-based when they are not addressed by standards in the SRD.

Contractor Response

A Safety Criterion addressing Licensee Controlled Requirements will be added to Volume II of the SRD as shown on the attachment. Safety Criteria addressing Emergency Response are included in Volume II of the SRD Section 7.8. Implementing procedures and standards will be identified and included as appropriate to fully develop this program in Part B, prior to the need for the plan to be in place. The safety management programs addressed in the ISMP are derived from the Safety Criteria and referenced implementing standards (as appropriate to the phase of the project) contained in the SRD.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address the question in a conditionally acceptable manner. The standard for licensee control requirements provides a clear standards basis for this aspect of the BNFL integrated safety management program. The BNFL commitment to provide draft licensee control requirements with the request for construction authorization ensures that this information will be available to support RU review for the construction authorization regulatory action. This commitment needs to be incorporated in the appropriate safety criterion in Chapter 9 of Volume II of the SRD. The explanation of the standards basis for the remaining safety management processes addressed in the question is acceptable.

Supplemental Response

The responses to Questions 94 and 142 are clarified by a commitment that draft Licensee Controlled Requirements would be included in the documents submitted to the RU for review as part of the request for construction authorization pursuant to Paragraph 4.3.2 of DOE/RL-96-0003.

Supplemental Disposition

Question # 95

Description

Integration Through Design, Construction, Operation, and Deactivation

Requirement -- DOE/RL-96-0003, Paragraph 3.3.1, Approval of the ISMP (5) states that approval of the ISMP is to be based on a determination that the "program documented in the ISMP contains appropriate features of integrated safety management."

Question -- Paragraph 4.2.3.2 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) indicates the ISMP is focused on design and construction and will be revised to reflect life cycle changes. Justify how addressing the process by considering design and construction without considering operation and deactivation provides an integrated approach.

Contractor Response

The statement in ISMP 4.2.3.2 , "the ISMP is focused on design and construction," places emphasis on the design phase of the TWRS-P Project, and considers operations and deactivation. In fact, the ISMP covers the development and review of the TWRS-P Project work definition and its safety deliverables and will continue to provide an integrated safety approach to areas important to safe operations and deactivation.

Disposition

The BNFL response is responsive and acceptable.

The response is responsive and acceptable. BNFL's response indicates that operations and deactivation are considered in the design phase of the TWRS-P.

Supplemental Response

Supplemental Disposition

BNFL's supplemental response was acceptable. BNFL's response stated that operations and deactivation are considered in the design phase of the TWRS-P and the requested

information would be provided with the Construction Authorization Request.

Question # 96

Description

Document Control and Maintenance Process and Scope

Requirement -- DOE/RL-96-0003, Paragraph 3.3.1, Approval of the ISMP (7) states that approval of the ISMP is to be based on a determination that the "Safety documentation processes delineated in the ISMP provide for appropriate document control and maintenance."

Question -- A. Section 8.0, Document Control and Maintenance, references procedures PC06-Q-0004.1, QA-01-TWRS, and QA-08-TWRS as providing the specific processes and controls for document and record control. Please provide these procedures for review under this criterion.

B. Table 8.1 identifies a number of documents to be retained. Please explain why the following documents were omitted: 1) Hazard Analysis Report; 2) records of defective and counterfeit items; and 3) occurrence reports.

Contractor Response

A. Procedures PC06-Q-0004.1 and QA-01-TWRS are available for RU's review in the BNFL office in Richland. Procedure QA-08-TWRS has not been developed because very few QA records have been generated by BNFL during Part A activities. A Records Inventory Disposition Schedule (RIDS) system has been established for the retention of project documents.

B. The Hazard Analysis Report is included as an Integrated Safety Analysis record, as shown in Table 8-1 (Sheet 3). Records of defective and counterfeit items will be added to Table 8-1 as a quality assurance record. Occurrence Reports are included as an Operation Record identified as "Incident Reports" in Table 8-1 (Sheet 2).

Disposition

The BNFL response is considered to be responsive and acceptable.

The revised response to question A documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," is acceptable. The acceptability of the procedures will be determined as a part of the review. The development of one of the procedures subsequent to the RU question in this area appears to be indicative of possible weaknesses in the control and management of QA records.

The response to question B is responsive and acceptable. BNFL's response indicated that the records of defective and counterfeit items will be added to Table 8.1. BNFL further indicated that the Hazard Analysis Report is part of the Integrated Safety Analysis Records and the Occurrence Reports are included in the Incident Reports both already included in Table 8.1.

Supplemental Response

The response to specific Question A of Question 96 was revised as noted in the Disposition as follows:

"Procedures PC06-Q-0004.1, QA-01-TWRS, and QA-06-TWRS (renumbered from QA-08-TWRS) are available for RU's review in the BNFL office in Richland."

In addition, a copy of BNFL procedure QA-06-TWRS, issued with an effective date of November 19, 1997, was provided to the RU.

Supplemental Disposition

BNFL's supplemental response was acceptable.

The supplemental response to Question A (documented in the Meeting Note IMS # 97-RU-0396, dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP,") adequately responded to the concern. The development of one of the procedures subsequent to the RU raising a question in this areas appears to be indicative of potential weaknesses in the control and management of QA records. The RU will continue to watch this area for indications of a systemic problem.

In the supplemental response to Question B, BNFL stated that the records of defective and counterfeit items will be added to Table 8.1. BNFL further indicated that the Hazard Analysis Report (HAR) is part of the Integrated Safety Analysis Records and the Occurrence reports

are included in the Incident Reports, both already included in Table 8.1.

Question # 97

Description

Sequence of Safety-Related Activities - Time Scale

Requirement --Paragraph 11 e) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Specify the expected flow and schedule of the Contractor's safety-related work and deliverables, including interactions with the Regulatory Unit..."

Question -- The horizontal axis of Figure 9-1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) does not provide a time scale. Please provide the time scale for Figure 9-1.

Contractor Response

The expected flow of information and schedule of work and deliverables, including interactions with the RU, is drawn to scale in Figure 9-1 of the ISMP. Start and finish dates will be submitted "at the end of the Contractor's period of performance for Part A," per the Contract No. DE-AC06-RL13308, Standard 1.e.

Disposition

The BNFL response is responsive and acceptable.

The knowledge that the Figure 9-1 is drawn to scale, even though the scale has not been provided in combination with the commitment to provide a detailed schedule at the end of Part A is sufficient for the requisite evaluation of the scheduling of safety-related activities.

Supplemental Response

Supplemental Disposition

Question # 98

Description

Safety-Related Deliverables - Regulatory Oversight

Requirement --Paragraph 11 e) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Specify the expected flow and schedule of the Contractor's safety-related work and deliverables, including interactions with the Regulatory Unit..."

Question -- Neither Section 9.3 nor Figure 9-1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) addresses the safety-related deliverables identified in items 1 through 4 of Paragraph 4.5.2 of DOE/RL-96-0003. Please provide the flow and schedule for these safety-related deliverables.

Contractor Response

The referenced four items of DOE/RL-96-0003 are addressed as follows:

Item 1- Proposed physical or administrative changes to the facility will be submitted in accordance with the USQ process. These USQ submittals that do not have a specific schedule. Physical and administrative changes that do not result in a USQ will be provided in the updates to the affected safety documentation (in most cases, the annual update to the FSAR). These updates are shown in Figure 9-1.

Item 2- Physical, procedural, and administrative changes to the facility will be provided in the annual update to the FSAR. A summary of the safety evaluations performed for these changes will be submitted with the annual update to the FSAR. This FSAR update is shown in Figure 9-1.

Item 3- Changes to implementing codes and standards will be included in the update to the SRD. These updates are shown in Figure 9-1. This SRD update is shown in Figure 9-1.

Item 4 - The submittal of the results of management assessments are submitted after completion of the assessment, and as such are not shown in Figure 9-1.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting

Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address the question in an acceptable manner. This material provides the requisite information about when the deliverables identified in items 1) through 4) of Paragraph 4.5.2 of DOE/RL-96-0003 will be provided.

Supplemental Response

The response to Question 98 was clarified as noted in the Disposition by a commitment to submit the documents identified in item 4 of Paragraph 4.5.2 of DOE/RL-96-0003 to the RU within 90 days of the completion of the assessment, drill, etc.

Supplemental Disposition

Question # 99

Description

Limited Work Authorization (LWA)
Requirement --Paragraph 11 e) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Specify the expected flow and schedule of the Contractor's safety-related work and deliverables, including interactions with the Regulatory Unit..."

Question -- Page 1 of 3 of Figure 9-1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) shows BNFL submittal of a "LWA Request" to the RU and the issuance of a "LWA." Please identify the portion of DOE/RL-96-0003 or the other part of the contract that provides for the issuance of a limited work authorization by the Regulatory unit or provides for any other approval for construction activities prior to the issuance of Construction Authorization described in DOE/RL-96-0003. Further, please describe the proposed documentation and approval basis that is anticipated to enable the RU to consider such a request for Limited Work Authorization.

Contractor Response

The Standard 6 of the Contract provides for the submittal of a LWA request as follows :
(a.1) Proposed incentive features that would provide DOE with a more favorable arrangement than is presently included in the Contract, and
(a.2) Changes in, or additions to, other Contract terms and conditions deemed necessary, in the opinion of the Contractor, to obtain more reasonable project financing terms.

BNFL believes the use of the LWA to fast track construction excavation and other limited onsite construction activities provides additional assurance to DOE that the Project can maintain its startup schedule.

The LWA Approval process will support the start of onsite activities once the RL gives written approval to BNFL Inc. The RU will be provided the following information for its approval bases: Site Suitability (i.e., address natural phenomena hazards); Excavation and Backfill (e.g., stability of subsurface soils); Design and Quality Assurance requirements to be applied; and the environmental impacts of implementing the requested work activity.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," provide a conditionally acceptable basis for the establishment of a framework for a limited work authorization process . The understandings define the activities to be permitted under a limited work authorization and the materials to be submitted to the RU to provide for a limited work authorization. These BNFL commitments need to be incorporated in the appropriate part of the ISMP.

Supplemental Response

The response to Question 99 was clarified as noted in the Disposition by a statement that the scope of the proposed Limited Work Authorization (LWA) includes excavation, backfill, recompaction, and installation of the mud mat and ground grid. This response is also clarified by a commitment to provide the RU with the following information for the LWA approval basis: Site Suitability (addressing hazards from natural phenomena and nearby facilities as they would impact the requested construction activity); Excavation, Backfill, and Recompaction Criteria; Stability of surface soils; Design Requirements and Quality Assurance Program to be applied to LWA activities; current SRD standards and ISMP program applicable to LWA activities; description of planned safety-related testing to be performed during LWA activities; references to the procedures to be employed for the requested work; and the environmental impacts of implementing the requested work activity.

Supplemental Disposition

Question # 100

Description

Consistency with Figure 2 of DOE/RL-96-0003
Requirements --Paragraph 11 e) of Section 4.1.2 of DOE/RL-96-0003, which states "The Contractor's ISMP, which shall ...Specify the expected flow and schedule of the Contractor's safety-related work and deliverables, including interactions with the Regulatory Unit..."

Question -- Section 9.1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states that "A schedule addressing compliance with Figures 2, 5, 6, and 7 of DOE/RL-96-0003, DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors, (DOE-RL 1996a) will be provided with the Initial Safety Assessment Package." For approval of the ISMP, item 8 of Paragraph 3.3.1 of DOE/RL-96-003 requires the Director of the Regulatory Unit to make a determination that "Scheduling of safety-related activities as described in the ISMP, including generation of regulatory submittals, is consistent with Figure 2 of this document [DOE/RL-96-003]." Please explain how delaying the submittal of evidence of compliance with Figure 2 of DOE/RL-96-0003 supports this determination. Also, pursuant to the last paragraph of Section 4.1.2 of DOE/RL-96-003, please provide all information that is available at this time that is material to demonstrating that BNFL has scheduled its safety-related activities, including regulatory submittals, in a manner consistent with Figure 2 of DOE/RL-96-0003.

Contractor Response

Figure 9-1, "Sequence of Safety Related Activities," represents a timeline, with RU involvement, for generating regulatory submittals. This figure demonstrates compliance with Figure 2 of DOE/RL-96-0003.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response provided, in combination with the information provided in response to question 97, acceptably resolves the issue of compliance with Figure 2 of DOE/RL-96-0003.

Supplemental Response

Supplemental Disposition

Question # 101

Description

Description

Section 2.3 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states that the section identifies "potential exemption requests from the 10 CFR 820 series regulations." Potential exemption requests to Part 835 are identified. Thus, the reference to Part 820 appears to be in error. The statement should either refer to the 830 series or specifically to Part 835.

Contractor Response

The wording was intended to refer to the series of regulations issued under 10 CFR 820. As there is no need to make mention of future regulations issued under 10 CFR 820, ISMP Section 2.3 will be revised to read "Implementation of 10 CFR 835, including a potential exemption request, and the radiation ...."

Disposition

The BNFL response is responsive and acceptable.

The response is responsive and acceptable. BNFL has committed to change the reference to 10 CFR Part 835.

Supplemental Response

Supplemental Disposition

BNFL's supplemental response was acceptable. BNFL provided a redlined-strikeout version of the ISMP that changed the reference to part 835.

Question # 102

Description

Paragraph 2.3.2 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) identifies potential exemption requests. In Section 2.3.2.1, BNFL proposes to request an exemption to DOE's authority to direct or make modifications to a Radiation Protection Program (RPP). BNFL may not request an exemption to an authority that does not apply to them. The second potential exemption , delineated in Section 2.3.2.2 would require a formal request in accordance with 10 CFR 820, Subpart E.

Contractor Response

The discussion regarding an exemption request of 10 CFR 835 will be removed. We agree the second potential exemption would require a formal request.

Disposition

The BNFL response is responsive and acceptable.

The response is responsive and acceptable. BNFL has agreed to remove the discussion of the first potential exemption request and agreed that the second potential exemption request would require a formal request for exemption in accordance with Part 820.

Supplemental Response

Supplemental Disposition

BNFL's supplemental response was acceptable. BNFL removed the discussion of the first potential exemption request and agreed that the second potential exemption request would require a request in accordance with Part 820.

Question # 103

Description

Figure 9-1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) contains several acronyms or abbreviations that are not defined in the acronyms and abbreviations list on page vii, such as CAP, DAR, EP, OAP, SA, and SER. Please define any acronyms or abbreviations used in Figure 9-1 that are not defined in the acronyms and abbreviations list.

Contractor Response

Acronyms and abbreviations have been updated as shown on the attachment.

Disposition

The BNFL response is responsive and acceptable.

The revised acronym list provides the acronyms employed in Chapter 9 that were not included in the previous acronym list.

Supplemental Response

Supplemental Disposition

Question # 104

Description

Section 11.1 of the BNFL ISMP (BNFL-5193-ISP-01, Rev. 0) states that the BNFL Project Manager is responsible for implementing the requirements of 10 CFR Part 820. Part 820 provides the procedural requirements for enforcement of nuclear safety requirements and is, for the most part, implemented by DOE. We suggest that the word "contractor" be added before the word "requirement" in that statement to indicate the correct responsibilities.

Contractor Response

The wording will be so changed for the design and construction and operating phases.

Disposition

The BNFL response is responsive and acceptable.

BNFL has agreed to add the recommended language.

Supplemental Response

Supplemental Disposition

BNFL's supplemental response was acceptable. BNFL revised the document to add the recommended language.

Question # 105

Description

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE

stipulated top-level safety standards and principles." Section 2 of DOE/RL-96-006, requires that BNFL derive and propose dose standards for the worker and co-located worker.

Question -- The BNFL ISMP (BNFL-5193-ISP-01, Rev 0) states in section 1.1 that when used unmodified in the ISMP, "worker" refers to the facility and co-located worker, both individually and collectively. However, in the several locations in the ISMP it appears that facility worker was used inadvertently in lieu of "worker" thereby eliminating the co-located worker from consideration. Table 1-3 on page 1-17 defines Design Class II SSCs as providing generic "worker" protection and parenthetically includes both facility and co-located worker. Yet the following ISMP sections contradict this definition:

-Section 1.3.10, page 1-17 Design Class II definition states that these SSCs are to ensure standards for facility workers are not exceeded. No mention is made of co-located workers in this section.

-Section 3.11, page 3-23 states that Design Class II SSCs are those necessary to ensure protection for facility workers. No mention is made of co-located workers.

Please clarify these discrepancies between Table 1-3 and the text regarding the purpose of Design Class II SSCs.

Contractor Response

The text on pages 1-17 and 3-23 will be revised to reference "workers" in lieu of "facility workers."

Disposition

The BNFL response is considered to be responsive and acceptable.

It commits to correcting the discrepancies in the definition of Design Class II SSCs to include both in facility and co-located workers.

Supplemental Response

Supplemental Disposition

Question # 106

Description

Project Stop Work Authority

Requirement -- The ISMP shall "[e]nsure that the contractor is ...in conformance with the DOE stipulated top-level safety standards and principles." Paragraph 4.1.2.2 of DOE/RL-96-0006, states "The assignment of and subdivision of responsibility for safety should be kept well defined throughout the life of the facility."

Question -- Section 11.0 of the ISMP (BNFL-5193-ISP-01, Rev 0) discusses and assigns safety roles to functional areas. Yet project or task stop work authority is not delineated as a responsibility for any functional group or manager. Who has internal BNFL project / task stop work authority during each phase of the project (construction, operations, deactivation)?

Contractor Response

The "Stop Work Authority" during Part A activities is defined in the QAP as follows:

"The TWRS-P Project QA Manager has the authority and responsibility to stop project work when the work, if allowed to continue, would result in activities or deliverables being noncompliant with stated requirements to an extent where it would be impossible to correct the conditions or determine their acceptance if work was allowed to continue. The TWRS-P Project QA Manager is responsible for determining when appropriate corrective/preventive action has been implemented and lifting the Stop Work Order to allow work to proceed." This type of "programmatic" stop work authority will continue through design, construction, and operation with the obvious addition of the Line Managers authority to stop work within their scope of supervision. When physical work begins, (i.e., construction, operation), the responsible supervisor, (i.e., construction crew supervisors, operation shift supervisor) will have stop work responsibility and authority within their scope of supervision.

It should be noted that Safety Culture at BNFL is one in which all employees are involved in and responsible for safe operation. Any employee who observes an imminent unsafe condition is empowered to take appropriate action to stop the work and inform the appropriate supervisor immediately such that the hazardous situation is prevented.

Disposition

The BNFL response is responsive and acceptable.

It clarifies the responsibilities for Stop Work Authority and provides empowerment for all employees to initiate stop work.

Supplemental Response

Supplemental Disposition

Question # 107

Description

THEME: Application of Standards Approval Package Documents to Subcontractors

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

h) Identify roles, responsibilities, and authorities for defining, implementing, and maintaining safety.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

10) Safety definition, implementation, and maintenance roles, responsibilities, and authorities defined in the ISMP are clear and appropriate.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.1, Page 1-1.

OBSERVATIONS: Page 1-1, the BNFL ISMP states, "The BNFL safety management practices outlined in the ISMP have been developed specifically for the TWRS-P Project. The development of these management practices was based upon the substantial experience of the BNFL team at other nuclear facilities in the areas of design, construction, and operation."

Although the development of the ISMP is based upon the experience of the BNFL team, the commitments made in the ISMP are not explicitly stated to apply to all members of the BNFL team, specifically subcontractors.

DETAILED QUESTIONS:
1. Do the ISMP commitments apply to all BNFL team members and other subcontractors working on the TWRS-P Project?
a) If so, describe the process that BNFL will employ to ensure that its subcontractors are made aware of, and comply with, the commitments made in the BNFL ISMP?
b) If not, please provide
1. the Integrated Safety Management requirements that BNFL subcontractors are required to follow and
2. a description of the process that BNFL employs to ensure that its subcontractors comply with their Integrated Safety Management requirements.

Contractor Response

The ISMP commitments apply to all BNFL team members and subcontractors. The flowdown of ISMP commitments to other team members and subcontractors is addressed in ISMP Section 5.2, "Control of Subcontractors."

Disposition

The BNFL response is considered to be responsive and acceptable.

The statement in the response that the BNFL ISMP commitments are binding upon all subcontractors and the commitments made regarding ES&H coordination with subcontractors and ES&H oversight of subcontractors in Section 5.2 of the ISMP provide an acceptable response to this question.

Supplemental Response

Supplemental Disposition

Question # 108

Description

THEME: Application of Standards Approval Package Documents to Subcontractors

SUBMITTAL CRITERIA:
7) The rationale for the selection of the standards and the adequacy of the set;

8) The standards identification process used and the credentials of the participants;

9) The standards confirmation process used and the credentials of the participants;

11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

5) Appropriate expertise was employed in the standards selection and confirmation processes; and

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

9) Self assessment elements documented in the ISMP are appropriate; and

REFERENCE CITED:
Safety Requirements Document (SRD); Volume I, Section 1.

Safety Requirements Document (SRD); Volume II, Section 7

Integrated Safety Management Plan (ISMP), Section 2 and 3.

OBSERVATIONS:
Chapters 2 and 3 of the BNFL ISMP address compliance with laws and regulations and conformance to top level standards and principles. However, the BNFL ISMP does not appear to address the means employed to ensure compliance with the SRD by BNFL or by its subcontractors. Furthermore, neither the ISMP nor the SRD appear to provide an explicit statement addressing whether the SRD standards and commitments are binding on BNFL subcontractors.

DETAILED QUESTIONS:
1. Describe how BNFL will ensure compliance with the SRD.
2. Are all BNFL subcontractors required to comply with the SRD?
a) If so, describe the process that BNFL will employ to ensure that its subcontractors are made aware of, and comply with, the standards and other commitments in the SRD.
b) If not, provide:
1) the set(s) of standards developed by or for each of the BNFL subcontractors;
2) the process employed to develop this set, or these sets, of standards;
3) the standards development process that BNFL subcontractors are required to follow in the modification of their set(s) of standards; and
4) a description of the process that BNFL employs to ensure that its subcontractors comply with a) the standards sets developed by or for them and b) the required standards modification process.

Contractor Response

1. For Part B activities, a review of the SRD Safety Criteria and implementing codes and standards against the design will be conducted as addressed in SRD Volume I Section 3.6. Verification of the implementation of the SRD will also occur as a part of the ORR prior to receiving Authorization to Commence Operations.

2. The ISMP commitments apply to all BNFL team members and subcontractors. The flowdown of ISMP commitments to other team members and subcontractors is addressed in

ISMP Section 5.2, "Control of Subcontractors."

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address these issues in an acceptable manner. The response presented for the first detailed question, in combination with the BNFL commitment to performing the assessment of compliance to the SRD that is required to be submitted with the request for construction authorization by Paragraph 4.3.2 of DOE/RL-96-0003, provides an acceptable commitment to a process for ensuring compliance with the SRD.

The BNFL commitment that all SRD standards will be applied equally regardless of whether an activity is done by BNFL or by one of its subcontractors is a conditionally acceptable means of addressing the second detailed question. This commitment needs to be incorporated in ISMP Section 5.2.

Supplemental Response

The response to Question 108 was clarified as noted in the Disposition by the BNFL commitment to include the self-assessment of SRD compliance mandated by item 3 of Paragraph 4.2.2 and by item 6 of Paragraph 4.3.2 of DOE/RL-96-0003 in the response to detailed question 1. This response is also clarified by the following BNFL commitment: The SRD commitments apply to all BNFL team members and subcontractors. The flowdown of SRD commitments to other team members and subcontractors is addressed in ISMP Section 5.2, "Control of Subcontractors."

Supplemental Disposition

Question # 109

Description

THEME: Application of Standards Approval Package Documents to Subcontractors

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

h) Identify roles, responsibilities, and authorities for defining, implementing, and maintaining safety.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

10) Safety definition, implementation, and maintenance roles, responsibilities, and authorities defined in the ISMP are clear and appropriate.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 11.

OBSERVATIONS:
Chapter 11 of the BNFL ISMP does not address the roles and responsibilities of BNFL team members and subcontractors related to safety.

DETAILED QUESTIONS:
1. Describe the roles and responsibilities of BNFL team members and other subcontractors related to safety.
2. Identify the BNFL organization(s) responsible for managing subcontractor performance and for ensuring that subcontractors discharge their safety responsibilities in an appropriate manner.

Contractor Response

The safety-related roles and responsibilities are described by function area in 11.1; safety expertise is integrated across the Project. BNFL has the sole responsibility for defining and implementing approved safety standards and communicating those safety standards as requirements for all team members and subcontractors who conduct work for the Project. TWRS-P team members manage subcontractors; BNFL retains responsibility for oversight of team members and subcontractors performance and for overall project safety.

Disposition

The BNFL response is responsive and acceptable.

The response, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address these issues that prompted this question in an acceptable manner. In particular, the commitment by BNFL that the SRD standards and ISMP commitments apply equally regardless of whether an activity is done by BNFL or by one of its subcontractors reduces the significance of organizational affiliation. The description of the flowdown process in Section 5.2 of the ISMP in combination with the question response provide a description of the organizational process for managing subcontractor safety performance that is adequate for this stage of the project.

Supplemental Response

Supplemental Disposition

Question # 110

Description

THEME: Application of Standards Approval Package Documents to Subcontractors

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

5) The program documented in the ISMP contains appropriate features of integrated safety management (i.e., integration among safety, design, and operations interests; integration over the life cycle of the activities; and integration into work planning and performance);

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 6.1, Page 6-1.

OBSERVATIONS:
Section 6.1 of the BNFL ISMP states that BNFL will "[m]anage and conduct a consistent and project-wide integrated approach to ES&H for all activities."

DETAILED QUESTIONS:
1. Identify the standards-based management processes that BNFL uses to manage and conduct a consistent, project-wide integrated-approach to Environmental protection, Safety, and Health protection (ES&H) for all activities.
2. Identify the standards in the SRD that govern the interactions of BNFL with its subcontractors and that ensure a consistent, project-wide integrated-approach to ES&H for all activities.

Contractor Response

1. In Part A the SRD requirements are translated to ISAR where they fit into format and content of the ISAR. Section 4.0 of the ISMP addresses the standards-based management processes that BNFL will use for TWRS-P.

2. There are no standards in the SRD that govern the interaction of BNFL with its subcontractors, nor are any required. That is because the SRD contains the standards for the performance of specific activities at TWRS-P, and these standards apply equally regardless of whether an activity is done by BNFL or by one of its subcontractors. The flowdown of these standards to subcontractors is addressed in the ISMP, Section 5.2, "Control of Subcontractors." This section states that "BNFL TWRS-P Project environment, safety, and health (ES&H) requirements are imposed on subcontractors in contracting documents."

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address these issues in an acceptable manner. The response to

the first detailed question provides an acceptable reference to the ISMP section describing the standards-based safety management processes employed to provide a consistent, project-wide integrated approach to ES&H. The response to the second detailed question was clarified in the meeting with BNFL. In the meeting Note BNFL indicates that there are standards in the SRD that govern the interaction of BNFL with its subcontractors and identified them as Safety Criteria 7.1-2, 7.3-6, and 7.3-11. BNFL also notes that the SRD standards apply equally regardless of whether an activity is done by BNFL or by one of its subcontractors.

Supplemental Response

The response to the second part of Question 110 was revised as discussed in the Disposition to note that there are standards in the SRD that governed the interaction of BNFL with its subcontractors and identified them as Safety Criteria 7.1-2, 7.3-6, and 7.3-11. Also, the SRD standards apply equally regardless of whether an activity is done by BNFL or by one of its subcontractors.

Supplemental Disposition

Question # 111

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

DOE/RL-96-0006

3.3.1 Public Protection – Measures in the design and operation of the facility to protect the public against accident conditions should be evaluated against acceptable guidelines to demonstrate that they perform their intended purpose with high confidence.

3.3.2 Worker Protection – Measures in the design and operation of the facility to protect workers against accident conditions should be evaluated using an acceptable approach to demonstrate that they perform their intended purpose with high confidence.

4.2.2.2 Common-Mode/Common-Cause Failure – Design provisions should be included to limit the loss of safety functions due to damage to several structures, systems, or components important to safety resulting from a common-cause or common-mode failure.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

DOE/RL-96-0006

3.3.1 Public Protection – Measures in the design and operation of the facility to protect the public against accident conditions should be evaluated against acceptable guidelines to demonstrate that they perform their intended purpose with high confidence.

3.3.2 Worker Protection – Measures in the design and operation of the facility to protect workers against accident conditions should be evaluated using an acceptable approach to demonstrate that they perform their intended purpose with high confidence.

4.2.2.2 Common-Mode/Common-Cause Failure – Design provisions should be included to limit the loss of safety functions due to damage to several structures, systems, or components important to safety resulting from a common-cause or common-mode failure.

REFERENCE CITED:

Integrated Safety Management Plan (ISMP), Section 1.3.10, Table 1-3, Page 1-16.

Integrated Safety Management Plan (ISMP), Section 12, Page 12-2.

OBSERVATIONS:
Section 1.3.10 of the BNFL ISMP states that "Design Class I (DC I) items are those SSCs necessary to ensure that radiation and chemical exposure standards for members of the public are not exceeded as a result of accidents." This section also states that "Design Class II (DC II) items are those SSCs necessary to ensure that radiation and chemical exposure standards for facility workers are not exceeded as a result of accidents." Table 1-3 of the ISMP further indicates that Design Class I items are designed to withstand the failure of any single active component. This table also summarizes the design standards applicable to DC I and DC II items. Chapter 12 of the ISMP contains definitions for DC I and DC II. However, the discussion, Table 1-3, or the definitions for DC I and DC II address the provisions made to ensure: 1) that failures of DC II or DC III items do not prevent DC I items from performing their intended safety functions and 2) that failures of DC III items do not prevent DC II items from performing their intended safety functions.

DETAILED QUESTIONS:
1. Describe the provisions that ensure:
a) failures of Design Class II or III items do not prevent Design Class I items from performing their intended safety functions and
b) failures of Design Class III items do not prevent Design Class II items from performing their intended safety functions.
2. Identify the SRD standards that provide the bases for these provisions.

Contractor Response

The following will be added to ISMP Section 1.3.10;

"DC I protection will be provided when failure of a SSC would result in the failure of a DC I SSC from achieving its specified safety function."

"DCI II protection will be provided when failure of a SSC would result in the failure of a DC II SSC from achieving its specified safety function."

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," is conditionally acceptable. The proposed changes to ISMP Section 1.3.10 are acceptable and BNFL has committed, in the meeting note, to making conforming changes to Safety Criteria 1.0-8 and 1.0-9 which establish the DC I and II designations.

Supplemental Response

The response to Question 111 was clarified as noted in the Disposition by a commitment to make the changes in Safety Criteria 1.0-8 and 1.0-9 to conform to those identified in the question response for ISMP Section 1.3.10.

Supplemental Disposition

Question # 112

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Safety Requirements Document (SRD); Volume II; Section 2, Page 2-1.

Integrated Safety Management Plan (ISMP), Section 1.3.10, Page 1-17.

Integrated Safety Management Plan (ISMP), Section 12, Page 12-2.

OBSERVATIONS:
Section 1.3.10 of the BNFL ISMP states that "Design Class I (DC I) items are those SSCs necessary to ensure that radiation and chemical exposure standards for members of the public are not exceeded as a result of accidents." This section of the BNFL ISMP also states that "Design Class II (DC II) items are those SSCs necessary to ensure that radiation and chemical exposure standards for facility workers are not exceeded as a result of accidents." Section 1.3.10 further states that "[o]ther SSCs designated as DC III ensure that the public and worker exposure to radiological and nuclear hazards is limited during normal operations and maintenance activities." These statements imply that the roles of Structures, Systems, and Components (SSCs) in protecting against hazards during normal operations and maintenance is not considered in determining whether a SSC should be designed DC I or II. (That is, the DC I and DC II designations are applied to SSCs based solely upon the analysis of postulated accidents.) They also imply that the Design Class I and II designations are limited to SSCs. However in Section 12.0 of the ISMP, Design Class I and II are defined as follows: "Design Class I. Structures, systems, components, or administrative controls that by performing their specified safety functions, prevent the maximally exposed member of the public from receiving a radiological exposure that exceeds the exposure standards specified in the SRD...." "Design Class II. Structures, systems, components, or administrative controls that by performing their specified safety functions, prevent workers from receiving a radiological exposure that exceeds the worker exposure standards defined in the SRD..." Because BNFL Safety Criteria 2.0-1, 2.0-3, and 2.0-4 in the SRD specify radiological dose limits for normal operations as well as for accident conditions, the definitions indicate that the role of SSCs in protecting against hazards during normal operations and maintenance is to be considered in determining whether a SSC should be designed Design Class I or II.

DETAILED QUESTIONS:
1. Clarify if the role of a SSC in protecting against hazards during normal operations and maintenance is considered in determining if it should be designed Design Class I or II. (For example, would a SSC be designed Design Class II solely because it is relied upon to maintain worker radiological exposure within the limits in the first row of Table 2-1 of BNFL Safety Criterion 2.0-1; that is, for normal operations?
2. Are the Design Class I and II applied to SSCs based solely upon the analysis of postulated accidents?)

Contractor Response

1. Design Class II will not be assigned to SSCs credited for worker protection during normal operation.

2. Design Class I and II are applied solely based on satisfying the accident radiological and chemical exposure standards (SRD 2.0-1 and 2.0-2).

Disposition

The BNFL response is responsive and acceptable.

The response is acceptable because it clarifies the bases for the assignment of DC I and II designations, as was requested in the question.

Supplemental Response

Supplemental Disposition

Question # 113

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall:

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Safety Requirements Document (SRD); Volume II; Section 2, Page 2-1.

Integrated Safety Management Plan (ISMP), Section 1.3.10, Page 1-17.

Integrated Safety Management Plan (ISMP), Section 12, Page 12-2.

OBSERVATIONS:
Section 12.0 of the ISMP, Design Class I and II are defined as follows: "Design Class I. Structures, systems, components, or administrative controls that by performing their specified safety functions, prevent the maximally exposed member of the public from receiving a radiological exposure that exceeds the exposure standards specified in the SRD...." "Design Class II. Structures, systems, components, or administrative controls that by performing their specified safety functions, prevent workers from receiving a radiological exposure that exceeds the worker exposure standards defined in the SRD..." These definitions indicate that the Design Class I and II designations are also applied to administrative controls.

DETAILED QUESTIONS:
Based on the stated observation, what are the administrative controls that are referred to, and what implementing standards apply to these controls?

Contractor Response

Reference to administrative controls will be removed from both definitions in the ISMP. Administrative controls refer to procedures and training. Administrative controls credited for public protection may serve as the basis for Technical Safety Requirements. Administrative controls for worker protection may serve as the basis for licensee controlled requirements.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response is acceptable because it clarifies whether administrative controls will be designed as DC I and II items, as was requested in the question.

Supplemental Response

Supplemental Disposition

Question # 114

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall:

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the

Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 12.0, Page 12-2.

OBSERVATIONS:
The ISMP, Section 12.0, page 12-2, definitions for Design Class I and II state in part: "Structures, systems, components, or administrative controls ...."

However, the discussions for these terms used elsewhere in the ISMP (e.g., Page 1-17 within Section 1.3.10) do not include the phrase "or administrative controls."

DETAILED QUESTIONS:
Please explain the reason for this inconsistency and the impact, if any, on the BNFL Inc's submittals (i.e., SRD, ISMP, and HAR).

Contractor Response

Reference to administrative controls will be removed from both definitions in the ISMP.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response proposed changes that clarifies the wording in an acceptable manner.

Supplemental Response

Supplemental Disposition

Question # 115

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall:

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Table 1-4, Page 1-21.

OBSERVATIONS: The ISMP, Section 1.3.11, "Quality Levels", second paragraph states in part: "All DC II SSCs are designated as QL-2."

Table 1-4 within that section contains a matrix showing the application of QAP requirements to QL-1, QL-2, and QL-3 SSCs.

SRD, Volume I, Table 3-1, Section 7.3/Quality Assurance Program states in part: "The receipt of the waste feed material requires the TWRS-P Facility be considered as a nuclear facility to which 10 CFR 830.120, "Quality assurance requirements", must be applied. "This requirement is imposed independent of the identification of any hazardous situation that may challenge protection of the worker, public, or the environment."

The ISMP, Table 1-4, criterion 6, "Design," fifth bullet states: "Computer software verification and validation." The "Remarks" column regarding QL-2 for this requirement states: "Computer software verification and validation is not required for QL-2."

QAP, Section 6.2.4, states in part: "Computer software used to originate or verify design solutions during the design process for SSCs important to safety shall be verified and validated. Software verification and validation activities shall ensure the following:

- Software adequately and correctly performs all intended functions; and
- Software does not perform any unintended function that either by itself or in combination with other functions can degrade the entire system."

DETAILED QUESTIONS:
As worded in Table 1-4, unverified and unvalidated computer software could be used to design DC II SSCs. Justify the acceptability of using unverified and unvalidated software for DC II SSCs.

Contractor Response

The note from "Remark" column regarding QL-2 will be removed.

Disposition

The BNFL response is considered to be responsive and acceptable.

The BNFL Inc. response proposed changes to the wording in ISMP Table 1-4 in a manner that addresses this concern (they will delete the note in the "Remarks" column regarding computer software verification and validation for QL-2 SSCs).

Supplemental Response

Supplemental Disposition

Question # 116

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:

Integrated Safety Management Plan (ISMP), Section 1.3.11, Table 1-4, Page 1-22.

OBSERVATIONS: The ISMP, Table 1-4, criterion 6, "Design," eighth bullet states: "The adequacy of design products will be verified or validated by individual or groups other than those who performed the work." The "Remarks" column regarding QL-2 for this requirement states: "Independent design verification is not required for QL-2."

10 CFR 830.120, Section (2)(ii) states in part: "The adequacy of design products shall be verified or validated by individuals or groups other than those who performed the work."

SRD, Volume II, Section 4.1, "General Design," Safety Criterion 4.1-2, page 4-3, states in part: "The adequacy of design products shall be verified or validated by individuals or groups other than those who performed the work."

QAP, Section 6.2.8, states in part: "The extent and number of design verifications should be based on the designed product's complexity and importance to safety."

DETAILED QUESTIONS:
As worded, Table 1-4 does not require the design of DC II SSCs be independently verified or validated. Justify why this is NOT required.

Contractor Response

The note will be changed to read: "Independent design verification for DCII SSCs will be on a case-by-case basis". This is justified because the design process includes the verification and checking of the design outputs, as prescribed in engineering procedures. The need and the extent of an independent design verification for DCII SSCs shall be determined by the engineering manager, on a case basis, based on the complexity of the design, the importance to safety, the degree of standardization, and the level of confidence in the design.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

As presently worded ("Independent design verification for DC II SSCs will be on a case-by-case basis" ... "The need and"), this response implies that independent design verification may not be conducted for DC II SSCs in some cases. Since DC II SSCs are considered important to safety, the requirements of 10 CFR 830.120 (including this provision) must be met. This does not preclude the application of independent design verification in a graded manner based on "the complexity of the design, the importance to safety, the degree of standardization, and the level of confidence in the design".

Supplemental Response

Regarding independent design verification for DC II SSCs, please revise the wording of the

Design classification is the process that establishes the design, quality assurance, and operational requirements for SSCs to ensure that the SSCs can perform their safety functions, i.e., the prevention or mitigation of accidents whose consequences can exceed public or worker exposure standards. This process is a tailored approach where the requirements applied to the SSCs are not fully prescribed but, instead, are directly related to the identified safety function.

Design Class I (DC I) Items

DC I items are those SSCs that are necessary to ensure that the radiation and chemical exposure standards for members of the public are not exceeded as a result of accidents. When an SSC is designated as DC I:

1. The highest level of quality assurance (Quality Level 1 in BNFL terminology) is applied to the SSC. Section 1.3.11 and Table 1-4 of the ISMP describe the requirements associated with Quality Level 1.
2. For active components, the design ensures that no single failure can credibly result in the loss of the safety function.
3. The SSC is designed to withstand the effects of natural phenomena such that it can perform any safety functions required as a result of a natural phenomena event. For example, if an earthquake can produce exposures to the public in excess of standards, the SSC that prevents or mitigates the exposures would be designed to be DBE-resistant. It should be noted, however, that DBE-resistance is not automatically applied to DC I SSCs. It is only applied when the earthquake is the initiating event, or when the earthquake could cause the initiating event. This design philosophy is also used for the loads imposed by other severe natural phenomena such as high winds or floods.
4. General design requirements are applied as invoked in Section 4 of the SRD. See SRD Safety Criterion 4.1-5 as an example.
5. Specific design requirements based on the type of component are applied as invoked in

Section 4 of the SRD. For example, SRD Safety Criterion 4.4-5 provides requirements associated with DC I air treatment systems.
6. Other design requirements may be applied based on the specific safety function to be performed by the DC I SSC. This specific safety function is determined from the accident analysis that identified the need for mitigation or prevention by DC I SSCs.
7. The highest level of operational requirements (e.g., periodic testing and preventative maintenance) are applied through the application of Technical Safety Requirements as discussed in Section 4.2.3.4 of the ISMP.

Design Class II (DC II) Items

DC II items are those SSCs that are necessary to ensure that the radiation and chemical exposure standards for facility and co-located workers are not exceeded as a result of accidents. When an SSC is designated as DC II:

1. A very high level of quality assurance (Quality Level 2) is applied to the SSC. Section 1.3.11 and Table 1-4 of the ISMP describe the requirements associated with Quality Level 2. In most instances, Quality Level 2 requirements are as stringent as those for Quality Level 1.
2. Identically to the approach taken for DC I SSCs, a DC II SSC is designed to withstand the effects of natural phenomena such that it can perform any safety functions required as a result of a natural phenomena event. Consequently, if an earthquake can produce exposures to workers in excess of standards, the DC II SSC that prevents or mitigates the exposures would be designed to be DBE-resistant.
3. General and specific design requirements are applied as invoked in Section 4 of the SRD.

4. Other design requirements may again be applied based on the specific safety function to be performed by the DC II SSC. This specific safety function is determined from the process hazards and accident analyses that identified the need for mitigation or prevention by DC II SSCs.

A very high level of operational requirements are applied through the application of Licensee Controlled Requirements as discussed in Section 4.2.3.4 of the ISMP.

The note in the "Remarks" column : "Independent design verification is not required for QL-2" will be removed.
proposed response in a manner that ensures the requirements of 10 CFR 830.120 are met.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL's removed the note in question ("Independent design verification is not required for QL-2") from the "Remarks" column. This response is acceptable since Table 1-4 is now consistent with the requirements of 10 CFR 830.120 in this area.

Question # 117

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Table 1-4, Page 1-22.

OBSERVATIONS: The ISMP, Table 1-4, Criterion 7, "Procurement," first bullet states: "Prospective suppliers shall be evaluated and selected on the basis of specified criteria." The "Remarks" column regarding QL-2 for this requirement states: "Procurement of QL-2 SSCs from suppliers not included in the Approved Suppliers List is acceptable."

10 CFR 830.120, Section (2)(iii) states in part: "Prospective suppliers shall be evaluated and selected on the basis of specified criteria."

QAP, Section 7.2.4, states in part: "The prospective suppliers shall be evaluated to verify their capability to meet quality requirements. The suppliers may be evaluated periodically to confirm their continuing capabilities. The suppliers shall be qualified on the basis of one or more of the following criteria:

Onsite assessment;
Past performance for identical or similar items/services;
Demonstrated capability or documented experience of users; and
Objective evidence of quality supplied by vendors." (emphasis added)

The ISMP, Table 1-4, criterion 7, "Procurement," third states: "Supplier Monitoring" The "Remarks" column regarding QL-2 for this requirement states: "Supplier monitoring is not mandatory during the procurement process for QL-2."

10 CFR 830.120, Section (2)(iii) states in part: "Processes to ensure that approved suppliers continue to provide acceptable items and services shall be established and implemented."

QAP, Section 7.2.5 states in part: "Supplier monitoring may include the following elements:

Audits or quality surveillances;
Review of plans and progress reports;
Processing of change information;
Review of supplier's supporting documents for the products supplies (sic) such as: calculations, drawings, analyses; and
Review and disposition of nonconformances."

DETAILED QUESTIONS:
As worded, Table 1-4 does not require DC II SSCs be procured from supplies whose quality requirements have not been verified. Justify NOT requiring DC II SSCs be procured from suppliers whose quality requirements (programs) have not been verified.

Contractor Response

The note from "Remarks" column which reads "Procurement of QL-2 SSCs from suppliers not included in the Approved Suppliers List is acceptable" will be removed.

However, the referenced statement in the "Remarks" column of Table 1-4 ("Suppliers monitoring is not mandatory during the procurement process for QL-2", which is the subject of this question) does not imply that "DC II SSCs be procured from suppliers whose quality requirements (program) have not been verified". The evaluation and selection of suppliers will be conducted early in the design and procurement process to verify their capability to meet performance and schedule requirements. Suppliers monitoring for QL-2 SSCs will be performed on a case-by-case basis, as determined by the engineering and quality assurance management.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

With respect to (a), the BNFL Inc. response proposed a revision to the wording in this table in a manner that addresses this concern (they will delete the note in the "Remarks" column regarding procurement of DC II/QL-2 SSCs from suppliers not included in the Approved Suppliers List). However, with respect to (b), the BNFL Inc. response regarding supplier monitoring is not acceptable. Since DC II/QL-2 SSCs are considered important to safety, the requirements of 10 CFR 830.120 (including this provision) must be met. This does not preclude the application of supplier monitoring in the graded manner described in Section 7.2.5 of the BNFL Inc. QAP.

Regarding supplier monitoring of DC II/QL-2 SSCs, please revise the wording of the proposed response in a manner that ensures the requirements of 10 CFR 830.120 are met.

Supplemental Response

Revised above answer to read.

The note from "Remarks" column which reads "Procurement of QL-2 SSCs from suppliers not included in the Approved Suppliers List is acceptable" will be removed.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL removed the note in question ("Supplier monitoring is not mandatory during the procurement process for QL-2") from the "Remarks" column. This response is acceptable since Table 1-4 is now consistent with the requirements of 10 CFR 830.120 in this area.

Question # 118

Description

THEME: Design Class I and II SSCs

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall:

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.10, Page 1-18.

OBSERVATIONS:
ISMP, Table 1-3, "Design classification Summary," 1-17 states "No" for DC-II under the column heading "Withstand Single Failure?"

ISMP, Section 1.3.10, "Classification of Structures, Systems, and Components," page 1-18, first paragraph states in part: "Although DC II SSCs are not required to withstand the effects of single active failures, defense-in-depth is applied where needed to ensure adequate protection of the facility workers."

ISMP, Section 3.1 "Defense In Depth," second paragraph states in part: "The degree of protection applied is commensurate with the consequence and frequency of the hazardous situation. Defense in depth means that no single failure of protection will allow the hazardous situation to occur."

DETAILED QUESTIONS:
Clarify what appears to be a conflict between ISMP, Sections 1.3.10 and 3.1 regarding the extent to which the single failure of a DC II SSC will allow a "hazardous situation to occur."

Contractor Response

Section 1.3.10 of the ISMP describes the attributes of a DCII SSC; Section 3.1 defines defense in depth. If the two concepts were mutually exclusive (i.e., use of DCI or DCII protection precludes the use of defense in depth) then there would be a conflict. No conflict occurs since the need to define SSCs as DCI or DCII is consequence related (challenge to public or worker exposure standards) and not based on whether or not to apply defense in

depth.

For example, the hazardous situation of the spurious opening or failure to close gamma gate coincident with a radiation source (e.g., product canister) and an operator present could reasonably be expected to challenge the worker dose standard. Protection from the hazardous situation will be administrative procedures (e.g., worker training, visual observation of area, check sheets etc.) and engineered safeguards (e.g., physical lock out, gamma monitoring, interlock systems, electrical isolations, etc.). This suite of protection constitutes defense in depth. Only one of the engineered safeguards (SSCs) needs to be designated as DCII and it is to that safeguard alone that the attributes of DCII protection apply. The use of defense in depth ensures that no single failure of protection will lead to the hazardous situation occurring.

Section 3.1 of the ISMP (as referenced) will be modified as follows to clarify the issue.

> "... DID means that multiple layers of protection are applied against the hazardous situation."

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response proposed changes that clarifies the wording in an acceptable manner.

Supplemental Response

Supplemental Disposition

Question # 119

Description

THEME: Set of Implementing Codes and Standards

SUBORDINATE THEME: 1a - Standard for Accident Analysis

SUBMITTAL CRITERIA:
7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled "Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors," DOE/RL-96-0006, Revision 0;

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

DOE/RL-96-0006

4.2.1.2 Risk Assessment, "Acceptable risk analysis should be applied during the design to delineate provisions for the prevention and mitigation..."

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 3.2, Safety Criterion 3.2-1, Page 3-5.

OBSERVATIONS:
There is no implementing standard selected for the performance of accident analysis. In SRD, Volume II, page 3-5, BNFL has established a Safety Criterion (3.2-1) for accident analysis. It further identified that the regulatory basis for the Safety Criterion is rooted in DOE/RL-96-0006 Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors (Section 4.2.1.2). However, there is no entry in "Implementing Codes and Standards" for this activity.

The evaluation and selection of accident scenarios will directly influence the identification and selection of hazard control strategies. The design and functional requirements of those

safety structures, systems and components needed for the prevention or mitigation of accidents must be supported by a rigorous analysis package. The result of the accident analysis must be fed back to the design team using a well established process. BNFL has recognized the importance of the accident analysis, however, no government or industry standards have been identified to insure the quality of this important activity.

DETAILED QUESTIONS:

What implementing standard has BNFL committed to in the performance of accident analysis?

Contractor Response

ESH-03-TWRS "TWRS Privatization Project: Accident Analysis Procedure" is the implementing procedure for the performance of accident analyses.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

BNFL's internal Accident Analysis Procedure is not a well known consensus standard. Consensus standards such as DOE Standard 3009-94 exist and it does not appear that the Contractor has evaluated such consensus standards for accident analysis. The RU understands that the contractor is not required to justify why specific standards were not selected. However it is expected that BNFL should discuss and justify the accident analysis standard that has been selected for the SRD and to evaluate its necessity and sufficiency for the job. Also, the Accident Analysis Procedure mentioned in the response has not been submitted as part of the response for review. Please provide the BNFL Accident Analysis Procedure and provide justification for its selection.

Supplemental Response

Revised Response

The accident analysis procedure has been subsequently provided to the RU as the accident analysis standard for the TWRS-P Project. As such, there should be no need to discuss the accident analysis standard in this revised response.

The stated purpose of the TWRS-P Project accident analysis procedure is to allow "...for the identification of engineered and administrative controls necessary for protection of workers and the public...." This is similar to the stated purpose of accident analysis in Section 3.4, "Accident Analysis," of DOE-STD-3009-94 "...to identify any safety-class SSCs and TSRs needed for the protection of the public."

The flowchart for performing an accident analysis included in DOE-STD-3009-94 as Figure 3-4 is similar to the process described in the TWRS-P Project accident analysis procedure with the following exceptions.

1) For TWRS-P Project there is no need or requirement to complete a hazard categorization for the facility as the scope of the accident analysis and safety analysis report are defined by the DOE-RL/BNFL contract.

2) For the TWRS-P Facility the comparison to exposure guidelines is also made for the identification of engineered and administrative features required for the protection of the workers.

The following two differences exist between the TWRS-P Project accident analysis procedure and Section 3.4, "Accident Analysis," DOE-STD-3009-94.

1) In the development of the TWRS-P Project safety approach, BNFL found in unnecessary to use the term "design basis accidents" as all identified potential accidents must be addressed that could challenge the worker and public radiological or chemical exposure standards. The potential accidents are addressed in either a quantitative or qualitative manner.

2) The TWRS-P Project accident analysis procedure does not require the evaluation of beyond design basis events. It should be noted, that DOE-STD-3009-94 states that evaluation of beyond design basis events is not required to provide assurance of public health and safety.

For the TWRS-P Facility, the development of procedures and training for facility operators and for emergency response will, in part, be symptoms-based, and as such, will not be limited to hazardous situations and accidents identified in the Hazard Analysis Report and the Final Safety Analysis Report.

Section 5.2.2, "Accident Selection," of the TWRS-P Project accident analysis procedure includes the accident selections process discussed in Section 3.3.2.3.5, "Accident Selection" of DOE-STD-3009-94. The BNFL and DOE accident selection processes are similar with the exception that for Part A , accident selection for the TWRS-P Facility will be independent of estimated frequency of occurrence. This is conservative relative to the accident selection process of DOE-STD-3009-94.

Supplemental Disposition

The Contractor's supplemental response was acceptable. BNFL referenced DOE-STD-3009-94 as an Equivalent Standard Reviewed to SRD Safety Criterion 3.2-1. Additionally, BNFL committed to adding a reference to DOE-STD-3009-94 to the Accident Analysis procedure when it is revised prior to Part B.

Question # 120

Description

THEME: Set of Implementing Codes and Standards

SUBORDINATE THEME: 1b - Electrical and Mechanical Systems

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
1) The set documented in the SRD includes all requirements of applicable laws and regulations;

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled "Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors," DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 4.3 and 4.4, Pg. 4-13.

OBSERVATIONS:
It is the review team's understanding that the initial set of Safety Criteria was developed (see SRD Vol. I, Section 3.3.2) using hazard identification and control of hazards information from SRD, Vol. III (the HAR). However, the general nature of the linkage between hazards, hazard controls and Safety Criteria does not ensure that a complete set of "Implementing Codes and Standards" has been defined such that hazards are suitably controlled. Also, SRD, Vol. I, Table 3-1, "Driver for the SRD Safety Criteria," does not adequately describe this linkage. The manner in which "Implementing Codes and Standards" were generated from consideration of related Safety Criteria and "Equivalent Standards Reviewed" Standards (as stated in Section 4.3 and 4.4 in SRD, Vol. II) is not clear.

BNFL Letter number 5193-97-0496, from Maurice J. Bullock to Dr. Clark Gibbs states: "The listing provided in the SRD, Volume I, Section 5.1, is a complete listing of the Implementing Codes and Standards to which BNFL is committing." However, the linkage between the implementing codes and standards of Section 5.1 of Volume I of the SRD and the Safety Criteria in Volume II of the SRD and the hazards identified in the HAR is not clear.

GENERAL QUESTIONS:

Question 1(b) - 1 Please explain how the "Equivalent Standards Reviewed" information was utilized in the selection of implementing codes and standards.

DETAILED QUESTIONS:

1. The "Equivalent Standards Reviewed" section related to Safety Criterion 4.3-4 indicates that 10 CFR 50 App A Criterion 4 was reviewed for the environmental and dynamic effects design bases. Criterion 4 states that structures, systems, and components important to

safety shall be designed to accommodate the effects of and to be compatible with environmental conditions associated with normal operation, maintenance, testing, and postulated accidents. However, appropriate codes and standards for implementation of such considerations were not addressed. While 10 CFR 50 is not a requirement of the Contract, please explain how and when standards for inclusion of environmental and dynamic effects in the design of SSCs important to safety will be provided.

2. The "Equivalent Standards Reviewed" section for Safety Criterion 4.4-1 indicates that Items (d) and (j) of the 10 CFR 50.49 were evaluated for considerations regarding environmental qualification. However, appropriate codes and standards for the implementation of such considerations were not addressed. Please provide appropriate codes and standards for the implementation of the environmental qualification portions of Safety Criterion 4.4-1.

3. The "Equivalent Standards Reviewed" section for Safety Criterion 4.4-2 indicates that Item a, b, d, e and j of 10 CFR 50.49 were evaluated in relation to environmental qualification. However, no codes and standards were identified for dynamic and seismic qualification of the Design Class I systems and equipment. Please identify the implementing standards for dynamic and seismic qualification.

Contractor Response

The equivalent standards reviewed listed for Safety Criteria indicate that the referenced requirements from 10 CFR 50 were reviewed and considered in the development of the Safety Criteria. It does not imply that all requirements or commitments made are appropriate or included in the Safety Criterion.

Detailed Questions.

1. Standards for the inclusion of environmental and dynamic effects are addressed via SC 4.1-3, SC 4.3-4, and SC 4.4-2 and include Standards as identified in the response to detailed question #3.

2. SC 4.4.1 has no environmental qualification aspects. SC 4.4-1 identifies the attributes of DC-I SSCs which must be included in the list of DC-I equipment, an Implementing Code or Standard is not necessary.

3. SC 4.4-2 includes IEEE 323-84 on an Implementing Standard which address environmental qualification of electrical equipment. Seismic qualification is addressed via SC 4.1-3 via the Implementing Std IEEE-344-87. SC 4.3-4 includes IEEE 603-91 as an Implementing Standard.

Disposition

The BNFL response is responsive and acceptable.

General Question: The contractor's response is acceptable because the requirements of 10CFR50 were reviewed and considered in the development of the Safety Criteria

Detailed Question : The contractor's response is acceptable because the cross reference has been cited via SC 4.1-3, SC 4.3-4, and SC 4.4-2.

Supplemental Response

Supplemental Disposition

Question # 121

Description

THEME: Set of Implementing Codes and Standards

SUBORDINATE THEME: 1b - Electrical and Mechanical Systems

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and

principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
1) The set documented in the SRD includes all requirements of applicable laws and regulations;

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled "Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors," DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 4.3 and 4.4.

OBSERVATIONS:
It is the review team's understanding that the initial set of Safety Criteria was developed (see SRD, Vol. I, Section 3.3.2) using hazard identification and control of hazards information from SRD Vol. III (the HAR). However, the general nature of the linkage between hazards, hazard controls and Safety Criteria does not ensure that a complete set of "Implementing Codes and Standards" has been defined such that hazards are suitably controlled. The review team also believes that SRD, Vol. I, Table 3-1 - Driver for the SRD Safety Criteria does not adequately describe this linkage. Moreover, the manner in which "Implementing Codes and Standards" were generated from consideration of related Safety Criteria and "Equivalent Standards Reviewed" Standards (as stated in Section 4.3 and 4.4 in SRD Vol. II) is not clear.

Finally, BNFL Letter number 5193-97-0496) from Maurice J. Bullock to Dr. Clark Gibbs states: "The listing provided in the SRD Volume I, Section 5.1 is a complete listing of the Implementing Codes and Standards to which BNFL is committing." However, the linkage between the implementing codes and standards of Section 5.1 of Volume I of the SRD and the Safety Criteria in Volume II of the SRD and the hazards identified in the HAR is not clear.

GENERAL QUESTION:

1(b) - 5 Applicable codes and standards are not yet integrated with specific systems, structures and components. Moreover, specific application and interpretation of standards depends upon design details. Please explain how the interpretation of codes and standards, and proposed exceptions to codes and standards will be reviewed, approved and documented. The detailed questions below provide several examples illustrating this general question.

DETAILED QUESTIONS:

1. Safety Criterion 4.3-2 includes protection against lightning. However, no appropriate codes and standards for implementation lightning protection were identified. Please explain how the requirements for the lightning protection in the Safety Criterion will be implemented.
2. No implementing codes and standards were provided for the control room design and performance objectives stated in Safety Criterion 4.3-7. Please provide appropriate standards and codes for the implementation of the control room design and performance objectives outlined in Safety Criterion 4.3-7.
3. Implementing codes and standards for the ventilation systems including dampers were not identified under the "Implementing Codes and Standards" section of Safety Criterion 4.4-7. Please provide appropriate implementing codes and standards that are applicable for ventilation systems and dampers.
4. Safety Criterion 4.4-8 describes design requirements for Design Class I power systems including batteries. However, no implementing codes and standards were identified for the batteries, battery chargers, or uninterruptible power supplies. Please provide appropriate implementing codes and standards for batteries, battery chargers and uninterruptible power supplies.
5. No implementing codes and standards have been identified for the objective for inspection and testing of the Design Class I and Design Class II electric power systems that are stated in Safety Criteria 4.4-10 and 4.4-11. Please provide appropriate codes and standards that are applicable for the implementation of inspection and testing portions of these Safety Criteria.
6. No implementing codes and standards have been identified for the isolation objective stated in Safety Criterion 4.4-13 for Design Class I and non-Design Class I systems. Please provide appropriate implementing codes and standards for isolation.
7. No implementing codes and standards have been identified for the instrument air systems

performance objectives stated in Safety Criterion 4.4-16. Please provide appropriate implementing codes and standards for instrument air systems.
8. No implementing codes and standards have been identified for the motor operated valves performance objectives stated in Safety Criterion 4.4-20. In addition, the reviewers were unable to identify implementing codes and standards for valves in general. Please provide appropriate implementing codes and standards for valves.

Contractor Response

As explained in SRD Vol. I, Section 2.1, the development of the SRD is an iterative process, starting with the identification of laws and regulations, top-level safety standards, and best industry practices that may be applicable to the final design of the facility. As the TWRS-P design detail is developed, the SRD will be updated to eliminate requirements that are found to be not applicable, and to add detailed requirements for Design Class I and II SSCs as the level of design completion is advanced. Because of the conceptual nature of the TWRS-P Part A design, the initial listing of implementing codes and standards for the safety criteria was generally limited to system level requirements.

The interpretation of codes and standards and proposed exceptions to codes and standards will be reviewed, approved, and documented in the normal course of the engineering design process and using established engineering documentation including System Design Basis documents, equipment specifications, the Preliminary Safety Analysis Report (PSAR), and the Final Safety Analysis Report (FSAR). In addition, the SRD will be kept up to date with the design of the facility.

The engineering design process is a controlled process that is monitored for compliance to established procedures through an approved Quality Assurance Plan. Engineering documents such as the system design basis and equipment specifications include listings of codes and standards to be followed and identification of specific exceptions to be taken, if applicable. These documents will be reviewed and approved by the Project Design Supervisor, the project regulatory supervision and by off-project design and regulatory specialists, if deemed appropriate by the Project Engineering Manager.

The PSAR / FSAR will be written in accordance with NRC RG 3.52 and will cover the information required by NUREG 1520. Section 4.0 of the PSAR / FSAR will be a summary of the results and a description of the Integrated Safety Analysis (ISA) for the facility and in accordance with NUREG 1520 will include the design codes and standards employed for process equipment.

Responses to the detailed questions included with this question are as follows:

1. Specifically, SC 4.3-2 reads in part: "DC I engineered safety systems shall be designed to assure that the effects of natural phenomena (including lightning) ...on redundant channels...do not result in the loss of protective function...". The effects of lightning (or any other phenomenon) on redundant channels is mitigated by the application of the standards listed in SC 4.3-2, specifically, IEEE-323, 344, 379, and 384.

Lightning protection requirements are governed by NFPA-780, Standard for Installation of Lightning Protection Systems, which is included as a daughter standard to NFPA 801; included as an Implementing Code and Standard for Safety Criteria related to Fire Protection. NFPA 801 will be added to SC 4.3-2 as an Implementing Code and Standard.

2. The essence of the requirements in SC 4.3-7 are to provide a control room environment that protects the operator from radiation or chemical exposure in the unlikely event that there is an accident, if credit is taken for operator action to limit offsite doses to the public.

Implementing standards for maintaining control room habitability include:
ASME N509 - 1989, and ASME N 510 - 1989
These standards are currently included in other Safety Criteria and will be included with SC 4.3-7.

3. In addition to the standards listed in Safety Criterion 4.4-7 for ventilation system fans and blowers, the following standards are applicable to the design of ventilation systems:
NFPA 801 - 1995, ASME N509 - 1989, and ASME N510 - 1989 and will be added to SC 4.4-7.

4. The focus of this safety criterion is the design of electric power systems to have "...sufficient independence, redundancy, and testability to perform their specified safety functions assuming a single failure." The cited standards are adequate for the specification of these system level safety requirements and apply to Design Class I power system components including the batteries, battery chargers, and uninterruptible power supplies.

Daughter standards implemented through the cited Implementing Codes and Standards for Safety Criterion 4.4-8 (IEEE 308) for the general design of DC power components include:
IEEE 450, Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications
IEEE 484, Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications
IEEE 485, Recommended Practice for Sizing Large Lead-Acid Batteries for Generating Stations and Substations
IEEE 946, Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations

5. The implementing standard for testing and inspection should have been included: IEEE 338, Standard Criteria for Periodic Surveillance Testing of Nuclear Power Generating Stations Safety Systems will be added to SC 4.4-10 and SC 4.4-11. This standard has been cited in other Safety Criteria in Section 4.4.

6. The implementing standard: ANSI/ANS 59.3 "Nuclear Safety Criteria for Control Air Systems," will be added as an Implementing Standard for SC 4.4-13.

Disposition

The BNFL response is responsive and acceptable.

General Question: The contractor's response is acceptable because it is stated that the SRD is an iterative process, and that the SRD will be updated (to eliminate requirements that are found to be not applicable) as the design details are developed. Moreover, the interpretation of codes and standards and proposed exceptions to codes and standards will be made following established engineering process as the design details are developed. The response is acceptable if these commitments are met by the Contractor.

Follow-up question - Questions addressing the RU involvement in changes to the SRD include questions 81, 85, and 177. Therefore the question will not be repeated here, but the acceptability of the response to the general question, above, is conditional upon the responses to those questions.

Supplemental Response

Supplemental Disposition

Detailed Question :

1. The response is acceptable because the contractor has committed to add NFPA standards to SC4.3-2

2. The response is acceptable because the contractor has committed to add ASME -N509 and N510 "standards for maintaining control room habitability" to SC 4.3-7

3. The response is acceptable because the contractor has committed to add NFPA-801, ASME N509 and ASME N510 to SC 4.4-7

4. The response is acceptable because the contractor has committed to add IEEE 450, 484, 485 and 946 to SC 4.4-8.

5. The response is acceptable because the contractor has clarified the question with proper reference to SC 4.4.

6. The response is acceptable because the contractor has committed to add ANSI/ANS 59.3, "Nuclear Safety Criteria for Control Air Systems" to SC 4.4-13

7. The response is acceptable because the contractor has committed to add ISA S7.0-01

8. The response is acceptable because the contractor clarified how the requirements of the NRC GL 89-10 will be implemented, and has committed to add the IEEE 338 to SC4.4-20

7. The implementing standard for the quality of instrument air is: ISA S7.0.01 - 1996, Quality Standard for Instrument Air will be added. This standard supersedes S7.3 - 1975, and will replace ISA S7.3-1975 where referenced in the SRD.

8. Safety Criterion 4.4-20 was taken from NRC Generic letter 89-10 and captures a concern of the NRC that Design Class I and II motor operated valves be properly specified for their safety function (i.e., that maximum torque at minimum voltage be identified). There is no standard that specifically addresses the load combinations to consider for a Design Class I or II valve; however, the criteria itself is sufficient to establish the design condition.

Testing of the actuator to verify it's qualification for the design conditions shall be to IEEE

382, Standard for Qualification of Actuators for Power Operated Valve Assemblies with Safety Related Functions for Nuclear Power Plants. This standard includes directions to identify load conditions and duty cycle for the actuator.

Periodic testing of Design Class I valves shall be to IEEE 338.

The above Standards will be added to SC 4.4-20.

Question # 122

Description

THEME: Set of Implementing Codes and Standards

SUBORDINATE THEME: 1b - Electrical and Mechanical Systems

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
1) The set documented in the SRD includes all requirements of applicable laws and regulations;

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled "Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors," DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 4.3 and 4.4.

OBSERVATIONS:
It is the review team's understanding that the initial set of Safety Criteria was developed (see SRD Vol. I, Section 3.3.2) using hazard identification and control of hazards information from SRD Vol. III (the HAR). However, the general nature of the linkage between hazards, hazard controls and Safety Criteria does not ensure that a complete set of "Implementing Codes and Standards" has been defined such that hazards are suitably controlled. SRD Vol. I, Table 3-1 - Driver for the SRD Safety Criteria does not adequately describe this linkage. Moreover, the manner in which "Implementing Codes and Standards" were generated from consideration of related Safety Criteria and "Equivalent Standards Reviewed" Standards (as stated in Section 4.3 and 4.4 in SRD Vol. II) is not clear.

BNFL Letter (number 5193-97-0496) from Maurice J. Bullock to Dr. Clark Gibbs states: "The listing provided in the SRD Volume I, Section 5.1 is a complete listing of the Implementing Codes and Standards to which BNFL is committing." However, the linkage between the implementing codes and standards of Section 5.1 of Volume I of the SRD and the Safety Criteria in Volume II of the SRD and the hazards identified in the HAR is not clear.

GENERAL QUESTIONS:

1. In many instances, the SRD Volume II, does not provide implementing codes and standards that are implied by the detailed objectives described in the proposed Safety Criteria.
a) Please either provide the implementing codes and standards, or describe the proposed specific plan(s) (including schedule) to select or develop the implementing codes and standards.
b) Please include a description of the manner in which the selection of implementing codes and standards will be reviewed, approved, and documented. The detailed question below is one example.

DETAILED QUESTIONS:

2. Safety Criterion 9.2-3 does not identify implementing codes and standards for determining (i.e., for defining the calculational methodology for) safety limits, limiting control settings and limiting conditions for operations. Please provide appropriate implementing codes and standards for determining safety limits, LCSs, and LCO's.

Contractor Response

1. Many SRD Criteria reflect programmatic activities that will be conducted during operations; implementing procedures for these criteria will be developed in Part B, but prior to the ORR for the TWRS-P Facility. Implementing procedures will be developed in

Disposition

The BNFL response is responsive and acceptable.

General Question: The response is acceptable since the contractor is committed to implement the details of these criteria in Part B

Detailed Question : The response is acceptable since the contractor is committed to implement the details of these criteria in Part B

Supplemental Response

Supplemental Disposition

Question # 123

Description

THEME: Unmitigated Consequences

SUBORDINATE THEME: 2a - Electrical and Control Systems

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Pages 5-83, 5-157, 5-259, 5-278

OBSERVATIONS:
N/A

GENERAL QUESTION:

1. How are standards selected and the determination of Design Classification I or II made for electrical and control systems without analyzing the domino effect of failures?

DETAILED QUESTIONS:

2. During loss of power the Cs recovery as a solid operation [Event Identifier 1614662/126, Page 5-83] would rely on battery backup. This implies that the battery backup power source would be required to perform safety functions. However, an unmitigated analysis is required to determine the severity of consequences and also to identify appropriate codes and standards for the battery backup power source. Please explain how the codes and standards in SRD, Vol. II, were selected for the power source for this event.

3. During loss of power event for the LAW/HLW Glass Melter [Event Identifier 3200/122, Page 5-157] the automatic valves would move to safe position. It is not clear what motive power would be required for valve operations. However, an unmitigated analysis is required to determine the severity of consequences and also to identify appropriate codes

and standards for the backup motive power safety function performance. Please explain how the codes and standards in Vol. II of the SRD were selected for the motive power source for this event.

4. During loss of normal power the operation (Process Reagents [Event Identifier 1614683/139, Page 5-259]) would rely on backup power. However, an unmitigated analysis is required to determine the severity of consequences and also to identify appropriate codes and standards for the backup power source. Please explain how the codes and standards in Vol. II of the SRD were selected for the power source for this event.

5. No safeguard has been identified for the loss of power event for LAW/HLW Melter Maintenance [Event Identifier 1614774/301, Page 5-278]. Please identify the safeguard that would be required to mitigate the event.

Contractor Response

The general question is identical to Question 3 (general question and detailed question 1(a)-1). The response to that is duplicated below.

The domino (cascade) effect was considered explicitly by the PHA study for each area of the process. A copy of the guide word list based on the procedure is attached for information. Considering the cascade effect from loss of services (e.g., power, water, air), process-effects such as loss of cooling and valve closures identified area. Where there was an impact on safety identified, the team examined these effects in more detail. For

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

General Question: The contractor's response is unacceptable. The response indicated that the domino effect from loss of services has been analyzed in the PHA. The response states that no credit was taken for the availability of ventilation system as well as the backup power. The response also states that the backup power will not perform safety function. However, it is not clear from the HA that such a conclusion can be drawn. It is conceivable that a design basis seismic event can cause a loss of offsite power. The onsite backup power is also assumed to be lost if it is not being built as a safety class example, there was the generic concern that valve closures could result in a reduction of system. Under this condition, the function of the offgas system could be impaired to the safety. An action was given to the Process Team Member to ensure that valve closures on extent such that exposure to the public could exceed the established limits.
loss of service (e.g., air or power) would result in the facility failing to a safe state. This requirement has been incorporated into the BOD (Appendix 5), which includes the following: The HA should address the consequence of Natural Phenomenon Hazards (NPH). This is usually the most demanding design consideration for a facility. The domino effect starts at NPH causing multiple coincident failures including the backup power supply source. The HA The detailed design phase of the project will consider the failure position for control valves. provided in this submittal does not appear to contain sufficient details to allow the reviewer Structures, systems, and components shall be designed to provide adequate safety on loss (or the designer at this time) to draw definitive conclusions on the design classification of the backup power supply.

Several IEEE standards for the Design Class I power supply systems have been identified in the SRD Vol. II. This implies that safety class power supply and/or control systems will be used in this facility. The HA did not explicitly conclude if safety class electrical systems are needed or not. These standards were selected without proper support from the HA. The linkage is weak.

Detailed Questions:

2. The contractor's response is acceptable because the consequence from the event is considered negligible and no backup power is needed for this event.

3. The contractor's response is acceptable because the consequence from the event is considered negligible and no backup power is needed for this event.

4. The contractor's response is acceptable because the consequence from the event is considered negligible and no backup power is needed for this event.

5. The response is conditionally acceptable because the contractor will address the issues later during the development of the maintenance procedures.

Supplemental Response

Please see Supplemental Response to Question 3.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The BNFL supplemental response to Question #3 and, in part, Question #12 adequately address the reviewers concerns associated emergency electrical power supplies. These responses also stated that further information with regard to the concerns in this question will be provided in the ISAR. Specifically, the ISAR will contain an accident analysis that is "unmitigated". of motive power to control valves.

These design requirements are independent of the consequences of any potential hazard arising from valve closures after loss of services. The BOD document was provided to the RU on September 26, 1997.

In all cases it should be noted that the HAR does not make the selection of standards against hazards identified. Selection is dependent on accident analysis results.

Response to detailed question 2.

The consequences identified for this event (Fault Schedule event identifier 1614662/126, HAR page 5-83) were considered by the Hazards Evaluation Team to be negligible - reflected in the worker/public consequence rating of 1. None of the consequences identified, taking no credit for mitigation (e.g., ventilation or filtration), are likely to lead to DCI or DCII protection requirements. Boiling liquor may challenge the ventilation system with increased activity and humidity but due to the large amount of ductwork and distance to the filters (as well as dilution from other air streams), no challenge to filter integrity is considered credible at this time. Therefore, there is no requirement for the back up power to perform a safety function or the need for standards from the SRD.

Response to detailed question 3.

The consequences identified for this event (Fault Schedule event identifier 3200/122, HAR page 5-157) were considered by the Hazards Evaluation Team to be negligible - reflected in the worker/public consequence rating of 1. None of the consequences identified motive, taking no credit for mitigation (e.g., ventilation or filtration), are likely to lead to DCI or DCII protection requirements. Therefore, there is no requirement for the back up motive power to perform a safety function or the need for standards from the SRD.

Response to detailed question 4.

The consequences identified for this event (Fault Schedule event identifier 1614683/139, HAR page 5-259) were considered by the Hazards Evaluation Team to be negligible - reflected in the worker/public consequence rating of 1. None of the consequences identified, taking no credit for mitigation (e.g., ventilation or filtration), are likely to lead to DCI or DCII protection requirements. Therefore, there is no requirement for the power source to perform a safety function or the need for standards from the SRD.

Response to detailed question 5.

Fault Schedule event identifier 1614774/301 (HAR page 5-278) is a maintenance issue which should be in Appendix A1 (Maintenance Concerns). Although the event is considered to present negligible consequences (an in-cell operation), safeguards would be sheathing or guarding vulnerable electrical connections and maintenance procedures.

As the design develops, information on maintenance activities will become available; these issues will be addressed in developing the maintenance procedures and safeguards. The issue raised in the specific event identifier above is the result of an ongoing action: "Short-circuit implications during maintenance of replaceable items on the melter." This addresses the need to avoid process problems with the melter during routine maintenance activities.

Question # 124

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3a - Process Chemistry

SUBMITTAL CRITERIA:

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 5.2.3, Page 5-36.

OBSERVATIONS:
Precipitation of Strontium/TRU is used for separating the strontium and TRU from the waste stream for Envelope C waste. The effectiveness and past performance of this process are not described in the Standards Approval Package submittal. Other chemical species present in solution (e.g. organic complexants and inorganic complexants) may impair performance this pretreatment process, resulting in unacceptably high Sr/TRU concentration in the LAW waste stream.

DETAILED QUESTIONS:

1. Given the lack of performance data for the Sr/TRU precipitation process, how were the hazards associated with this process characterized?

2. Without a basis for characterizing the Sr/TRU precipitation process hazards, how were hazard control strategies determined?

Contractor Response

Detailed question 1.

Although specific performance data are not yet forthcoming for the TWRS-P process, co-precipitation of (acidic) salts from alkaline solution using ferric ions is well known and the basis for a number of Sellafield plants (e.g., Enhanced Actinide Removal Plant). The Hazard Evaluation Team are well acquainted with the process, hence able to identify concerns during the hazard characterization process using the guide words.

The description (work description) of the Sr/TRU precipitation process is described in the HAR page 5-36. Its hazard evaluation was covered by the Hazard Evaluation Team considering entrained solids removal (HAR page 5-38). The Hazard Evaluation Team considered entrained solids removal which, in the case of Envelope C waste, considered precipitation and removal (by ultrafiltration) of the Sr/TRU precipitate (solid). The results of the study can be found in the HAR pages 5-39 to 5-49.

Detailed question 2.

Initial concerns with the precipitation process included cross contamination of process materials (insufficient or inefficient precipitation, incomplete washing, wrong reagent, incorrect concentration of reagent) allowing Sr/TRU to enter areas of the process where they would not be expected under normal operations. The consequences were considered to be trivial (rating of 1). See Event Identifiers 1/9 (HAR page 5-49), 1/28 (HAR page 5-48) and 1/52 (HAR 5-40) for examples. The need for hazard controls, although identified in the safeguards, are considered to be minimal at this stage.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The responses are unacceptable. Although the responses provide reasonable explanations and the assumptions for intrinsic hazards based on experience of the BNFL's Hazard

Supplemental Response

The reviewer's concern is that he is unable to "evaluate the characterization of the hazards associated with the Sr/TRU precipitation process..."

The hazardous situations identified represent a set of bounding cases which would apply on failure of the process. As development data and detailed design information become available, the hazardous situation potential can be more accurately determined. The cases currently stated in the PHA are considered to be a pessimistic interpretation of the failure of the process. That the consequences are considered to be negligible is a function of the

in-cell process and that its failure does not challenge shielding integrity.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL stated that the hazardous situations identified represent a set of bounding cases which would apply on failure of the process. BNFL also stated that the cases currently described in the PHA are considered to be a very conservative interpretation of the failure of the process.

Evaluation Team on Enhanced Actinide Removal Process in Sellafield Plants, DOE/RL-96-0003, section 4.1.2, items 3 and 5, state: "The Standards Approval submittal package shall consist of the following documentation...The hazards assessment used to facilitate the selection of the standards [and] description of the process and facility and its proposed operation." Without performance data for the Sr/TRU precipitation process, it is very difficult for the RU reviewers to evaluate the characterization of the hazards associated with the Sr/TRU precipitation process, which the contractor has asserted.

Question # 125

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3a - Process Chemistry

SUBMITTAL CRITERIA:
4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles:

Section 4.1.1.2 Prevention: Principle emphasis should be placed on the primary means of achieving safety, which is the prevention of accidents, particularly any that could cause an unacceptable release.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.1.2, Table 4-2 and 4-3; Page 4-3 - 4-10.

OBSERVATIONS:
Table 4-2 of the HAR lists hazardous chemicals (e.g. Sodium Hydroxide, ammonia and nitric acid) used in a large quantity throughout the process . Also, a number of hazardous potential by-products (e.g. NOx, metal oxide, and sodium oxide) have been identified in Table 4-3.

DETAILED QUESTIONS:

1. Please clarify why the recycle of potential by-product chemicals (e.g. NOx and sodium oxide) is not considered to minimize the use of process chemicals and reduce the process risk.

Contractor Response

Technical experts in defining the work optimized the process as described in the BOD. Principle emphasis has been placed on safety during design.

Disposition

The BNFL response is considered to be responsive and acceptable.

The response is acceptable. The response addresses the roles of the BNFL's technical experts in defining the work optimized the process as described in the BOD.

Supplemental Response

Supplemental Disposition

Question # 126

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3a - Process Chemistry

SUBMITTAL CRITERIA:
4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.1.2, Page 4-4.

OBSERVATIONS:

The process includes numerous organic compounds (e.g., ion exchange resin Superligand-SL644 and Reillex-HPQ) that are not described or specified. Many of these organic compounds could consist of halogenated polymeric materials. In high radiation fields, these polymeric materials degrade, generating hazardous by-products, e.g. formaldehyde and chloride.

DETAILED QUESTIONS:

1. Did the hazards assessment consider radiation-induced degradation of these organic materials?

2. How were hazards associated with radiation-induced degradation of organic compounds dispositioned?

Contractor Response

Detailed question 1.

Yes. Numerous events, including radiation effects, are identified in the Fault Schedule which could lead to the potential degradation of the ion exchange resins in the pertinent study areas of Cs (and Tc) removal using ion exchange. See (for example) Event Identifiers 2200/24, 2200/25, 2200/13, 2200/12, 1614664/118 within those study areas (HAR pages 5-65 - 5-77 and 5-87 - 5-92)

Detailed question 2.

As indicated above, these events (leading to the hazard) can be found in the Fault Schedule in the cited areas.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The responses are unacceptable. Organic material, e.g. resin, will undergo degradation in high radiation environment. Furthermore, the process description should consider if the resin may generate hazardous by-products if it deteriorates, e.g. formaldehyde. The responses refers to pages 5-65, 5-77, 5-87, and 5-92 of Hazard Analysis Report, but these pages silent on this issue, only postulates potential accident for Hydrogen gas and addresses the handling and impacts of these effects.

Supplemental Response

Although only hydrogen was mentioned as a degradation by-product, it was recognized by the Hazards Evaluation Team that other, potentially hazardous, by-products (e.g. formaldehyde and other toxins) may be generated and that resin degradation should be

avoided. The strategy is to prevent the resin from undergoing degradation by suitable monitoring and administrative regimes (e.g. determination of resin life and operational procedures to ensure an appropriate frequency of resin change). A number of safeguards mentioned in the references to the HAR in the original response reflect this strategy

Supplemental Disposition

The Contractor's supplemental response is acceptable. The supplemental response clarifies how the strategy is used to prevent the resin from under going degradation by suitable monitoring and administrative regimes (e.g. determination of

Question # 127

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3a - Process Chemistry

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 2.3.3.

OBSERVATIONS:
DOE/RL-96-005, page 2. states that "the contractor will have significant responsibility and flexibility for identifying its standards and requirements within the context of 1) the contractor's specific technology and processes. 2) the work to be performed, 3) the character and magnitude of the radiological, nuclear, and chemical hazards involved...."

In the Hazards Analysis Report Section. 2.3.3, page 2-26, the entrained solids are discussed. The entrained solids may contain significant amounts of organic material. Total Organic Carbon (TOC) has also been specified in Table TS-7.1 (LAW chemical composition) of Contract specification 7.

DETAILED QUESTIONS:

1. Were hazards identified or analyzed for the potentially uncontrollable chemical reaction between nitrate (or nitrite) and organic complexant Total Organic Carbon (TOC) during preparation of melter feed? If so, please identify the fault schedules that include these hazards. If not, please either explain why no such hazard exists or provide additional fault schedules addressing them.

2. Were hazards identified or analyzed for the potential exothermic reaction of organic material with nitrates or nitrites during preparation of melter feed? If so, please identify the fault schedules that include these hazards. If not, please either explain why no such hazard exists or provide additional fault schedules addressing them.

Contractor Response

Detailed question 1.

In considering melter feed preparation, the Hazard Evaluation Team considered the organic content of the material and the potential for violent chemical reactions (under the guide word "fire/explosion"). The information given by the process team was that the organic content of the feed was less than 3%. The amount of organics and nitrate/nitrites is far below stoichiometric quantities. Due to the low inventory of organics and the high water content of the feed solution, the Hazard Evaluation Team did not identify the potential for a violent chemical reaction between any organics present and nitrate/nitrite content. Hence no hazards were identified and no reference appears in the Fault Schedule.

Detailed question 2.

In considering melter feed preparation, the Hazard Evaluation Team considered the organic content of the material and the potential for violent chemical reactions (under the guideword "fire/explosion"). The information given by the process team members was that the organic content of the feed was around 3%. The amount of organics and nitrate/nitrite is far below stoichometric quantities. Due to the low inventory of organics and the high water content of the feed solution, the Hazard Evaluation Team did not identify any potential for a violent chemical reaction between any organics present and nitrate/nitrite content. Hence no hazards were identified and no reference appears in the Fault Schedule.

Disposition

The BNFL response is responsive and acceptable.

The responses are acceptable. The responses clarify that violent chemical reactions (under the guideword "fire/explosion") become incredible due to 3% organic content of the feed which is far below stoichiometric quantities.

Supplemental Response

Supplemental Disposition

Question # 128

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3b - Inconsistent information presented

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.2.2, Proven Engineering Practices/Margins.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 2.3.4, Page 2-29; Section 4.4.1, Pages 4-15 and 4-19; and Section 5.2.9, Page 5-95.

OBSERVATIONS:
The last paragraph of Section 2.3.4 on page 2-29 of the Hazards Analysis Report states that the spent resins are to be disposed of as mixed radioactive waste for the LAW-only option and are to be incorporated into the IHLW product for the HLW/LAW option. However, Section 5.2.9, page 5-95, states that spent resin is pumped to the LAW melter.

The statements in Section 4.4.1, page 4-15, "The TWRS-P waste streams do not contain significant concentrations of volatile organic compounds..." and in the first row of Table 4-6, page 4-19 "No volatile hydrocarbons or explosive gases other than hydrogen are expected in the melters" suggest that the hazards analysis may not have considered the hazards associated with addition of the spent ion exchange resins to the melters.

DETAILED QUESTIONS:

1. What is the planned disposition of the spent ion exchange resins for the LAW only and the HLW/LAW options?

2. Did the appropriate hazards evaluation teams consider the hazards associated with the planned disposition options? If so, please identify where these hazards are documented in the HAR. If not, please provide a description/fault schedule addressing these hazards.

3. What was the basis (e.g. experience with similar operations at another facility, experience of the hazard evaluation team members, or quantitative analysis) used for evaluating the hazards associated with vitrification of the spent ion exchange resins in the LAW or HLW melters?

Contractor Response

Detailed question 1.

The proposal is to feed the spent ion exchange resins to the LAW melter for both options (LAW only and HLW/LAW). See process description in HAR page 5-95.

Detailed question 2.

The Hazards Evaluation Team considered only the addition/removal process of resins to the ion exchange columns themselves. Although concerns regarding increased (above normal) content of resin in melter feed and the need for a test plan were identified in the Fault Schedule (Event Identifiers 1614669/197, 205 refer), the main thrust of the study was the ion exchange process.

The mass of resin required to be fed to the LAW melter is expected to be of the order of 1te/year. Since process (melter) feed to the LAW melter is of the order of 30te/day, then the mass of resin per melter batch is negligible by comparison. Although not yet considered explicitly, no major process perturbations are expected as a result of the small contribution that spent resins will make to the overall LAW melter feed. Nevertheless, potential

Disposition

The BNFL response is considered to be responsive and acceptable.

The Contractor's response is acceptable. This is a three part question. The response to the first part clarifies the disposition of the spent ion exchange resins. The response to the second part shows that the hazards associated with addition of resins to the LAW melter were considered but were believed to be small because of the low mass fraction of resin in the melter feed. The response to the third part of the question acknowledges the need for test work on methods to control resin addition to the melter feed and on evaluation of the effects of the added resin on the melter off-gas composition. All three parts of the response are acceptable.

Supplemental Response

Supplemental Disposition

Question # 129

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3b - Inconsistent information presented

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.2.2, Proven Engineering Practices/Margins.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.4, Pages 4-14, 4-22; Section 5.1, Page 5-2.

OBSERVATIONS:
The analysis of the hazards associated with the proposed TWRS-P facility, as presented in the Hazards Analysis Report (BNFL-5193-HAR-01, Rev. 0), is based on the experience of

the hazards evaluation teams and prior design and operating experience with similar facilities. However, the SAP does not provide some of the documentation needed to evaluate and assess this experience. For example, the SAP does not include any documentation of the prior experience that is relevant to assessing the hazards associated with: 1) the selective catalytic reduction unit to be used in the off gas treatment system, 2) use of crystalline silicotitanate ion exchange media for storage of separated cesium, and 3) disposition of ion exchange media by incineration in the melters. Also, we note that information (e.g. the simplified mass balance information that was available to the hazards evaluation teams - see page 5-2) pertinent to the quantitative basis for the hazards consequences tabulated in Section 5.2 of the Hazards Analysis Report is not provided in the SAP.

DETAILED QUESTIONS:

1. Please provide the relevant prior experience of the hazards evaluation team members with all of the types of hazards identified in the HAR.

2. Please provide additional information about the extent to which the processes, designs, and operations at the similar facilities cited in Section 4.4, "Comparison to Similar Facilities" are indeed similar to those planned for the proposed TWRS-P facility.

3. What quantitative basis (e.g. radionuclide inventories at risk, mass balances) was used for evaluating the worker and public consequence results provided in the Fault Schedule Tables? Please provide this basis information so that reviewers can verify the reasonableness of the estimates of worker and public conditions.

Contractor Response

Detailed question 1.

Each team member has many years of experience in designing and/or operating nuclear chemical facilities.

Members of the Hazards Evaluation Team have experience with similar operating plants (e.g., Sellafield vitrification plants, Enhanced Actinide Removal Plant, Site Ion Exchange Plant) handling equipment and processes (vitrification, ion exchange processes, ultrafiltration) that present similar hazards comparable with TWRS-P. In addition, team members are experienced with hazards associated with the specific process and equipment, and hazards associated with the in-cell operation of a nuclear chemical facility (e.g., in-cell radioactive liquor spillages).

Detailed question 2.

This information has been provided in Tables 4.6 and 4.7 of the HAR (pages 4-19 to 4.-21) and Table 1-1 of the ISMP (page 1-2).

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor's response is unacceptable. This question includes three detailed questions that request information concerning documentation of the basis for hazards identification and consequence evaluation for the proposed TWRS-P facility. The responses are not acceptable because they do not identify and describe the basis for identification and evaluation of the hazards associated with each of the process steps in the proposed TWRS-P facility. We recognize that some of the needed documentation is provided in the Hazards Analysis Report. In particular, we agree that the information in Tables 4-1, 4-6 4-7 and 4-8 provides a sufficient basis to allow people with relevant experience to identify the hazards associated with the feed receipt, feed evaporation and HLW and LLW vitrification steps in the proposed TWRS-P facility. However, the HAR does not include information concerning the inventories at risk or a description of relevant experience for cesium and technetium ion exchange and the LAW and HLW offgas treatment systems. This omission leaves the basis for identification and assessment of some of the more hazardous processing steps (specifically, those for which public and worker consequences greater than 2 have been identified) undefined. An acceptable response would provide a description of the basis used for assessing the hazards associated with each of the process steps for which the hazards may have worker or public consequences higher than 2. This might include quantitative information (e.g. of the type shown in Table 4-1) which would describe the radionuclide inventories at risk in each of the process steps. Where the basis relies on prior experience of the hazards evaluation team members or experience with operation of similar facilities, the specific experience that is relevant to consideration of the proposed TWRS-P process steps might be described.

Please provide a description of the basis (radionuclide inventories at risk, experience with process steps similar to those proposed for the TWRS-P facility and information to show that the hazards evaluation team did indeed have relevant experience) used for identifying and assessing the hazards associated with process steps for which public or worker consequences higher than 2 have been identified.

Supplemental Response

The potential for a filter fire was identified during the PHA. Further consideration during the accident analysis work has concluded that minimal potential exists for a filter fire. Two mechanisms, organic vapors and ammonium nitrate accumulation, were identified but considered not be a concern under TWRS-P Facility process conditions. There is insufficient organic material within the process material to give rise to significant vapors and the TWRS-P Facility process conditions are not conducive to ammonium nitrate accumulation. Hence no assessment has been made of a filter fire.

In common with all potential hazardous situations associated with the TWRS-P Facility process, filter fire potential will be reviewed and reassessed as the design matures. In light Similarities are drawn between similar facilities to TWRS-P such as the Sellafield Vitrification of current duty of the cesium concentrate storage vessel, V2710, an omission on page Plant which has in-cell melters producing high-level waste glass product. Hazards already 5-102 of the HAR will be rectified by adding under the following entry under the "Hazards identified for this plant for melter operations were passed on to the TWRS-P Hazards Consequence" column for Event Identifier 1614667/153: " #4. Radiolytic heat Evaluation Team for consideration during the appropriate study area. The Savannah River generation-loss of cooling to vessel V2710 with the potential for Cs and Tc to become DWPF has similarities to the proposed TWRS-P process. Consideration of the DWPF volatile and enter vessel vent system."
process indicated several concerns that should be addressed by the TWRS-P Hazard evaluation team: hydrogen generation, potential for ammonium nitrate formation, and The inventory for a cesium ion exchange accident has been estimated as about 17,000 TBq. chemical interactions (see Table 4.6, HAR page 4-20) to name but a few.

Detailed question 3. All areas of evaluation were constituted with members of the technical community with
pertinent background in the process area. The process experts and comments on their The evaluation of worker and public consequences was carried out by the Hazards experience for the six major process areas is presented herein.
Evaluation Team in follow on meetings to those which identified the hazards. Team members, engineers familiar with the facility and process, used their knowledge of Process Area Process Expert
inventories and radionuclide content (as detailed in Tables 4-1 to 4-1, HAR pages 4-1 to 4-14) and experience of processes, as well as the potential hazard development LAW Feed Receipt - David Hughes
mechanism (e.g., leak, fire, etc.) to make a qualitative judgment of consequences. Twenty years of experience in process design, commissioning, and operation of process plant converting coal to high grade liquid fuels.

HLW Feed Receipt - Lee Marquis
Five years of nuclear experience with assignments in process design and operability of Waste Vitrification and Plutonium Packaging plant.

Evaporation - Robert Collins
Five years of industrial experience with previous evaporator assignments and hazard analysis.

Ultrafiltration - David Hughes
Twenty years of experience in process design, commissioning, and operation of process plant converting coal to high grade liquid fuels.

Cesium and Technetium Ion Exchange Michael Johnson
Resume submitted as member of ISRT in the SRD. Mike has provided the BNFL lead in the use of IBC resins.

LAW and HLW Vitrification - Rich Peters
Seventeen years of experience in the design and analysis of joule heated melters. Developed flowsheets and analyzed failure modes for the HWVP.

Off-gas Treatment - Martin Coleman
Honors graduate in Chemical Engineering with a graduate degree. Has five years of

nuclear/industrial experience. Martin has focused on process development and had responsibility with respect to developing health and safety bases.

Supplemental Disposition

The supplemental response is acceptable. BNFL described the basis for consideration of the hazards associated with 1) the offgas treatment systems - specifically the potential for a filter fire 2) the storage of the separated cesium and technetium in tank V2710 and 3) the cesium inventory on a loaded ion exchange column. Also, the process experts and their pertinent experience were identified for each of the six major processing steps considered in the PHA.

Question # 130

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3c - Melter Flooding

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.4.1, Page 4-19; and Section 5.2.12, Pages 5-130 and 5-139.

OBSERVATIONS:
In 1993, DWPF experienced an incident in which water entered the melter (melter flooding) during startup testing. In the DWPF SAR accident analysis, melter flooding was recognized as an important accident of low consequence, but high risk (due to its high probability of occurrence). The overall facility risk analysis for DWPF identified this type of accident as risk dominant. The comparison of the TWRS-P Facility Hazard Evaluation with the DWPF Hazard Analysis in Table 4-6 of the HAR indicates that TWRS-P events that correspond to the DWPF water interaction events are Events 3200/167 for the LAW Melter and 3200/249 for the HLW Melter. However, neither of these events has water interaction as a listed initiating event. The DWPF SAR accident analysis concluded that the worst possible steam explosion in the melter will not challenge the structural integrity of the vessel and the consequences of a steam explosion are no worse than those of a melter spill. Furthermore, generation of a coherent, large-scale steam explosion was judged to be very unlikely due to the non-optimal geometry for the interaction (coolant stream poured onto fuel). The interaction would most likely be a surface interaction between the stream of water entering the melter and a very thin layer on top of the molten salt pool (molten glass is ruled out as a fuel due to its high viscosity).

GENERAL QUESTION:

Question 3(c) - 1 Why was the possibility of melter flooding not addressed in the HAR? If so, please identify or provide the fault schedule that addresses this hazard. If not, please describe the safeguards or design features that have eliminated the hazard.

DETAILED QUESTIONS:

1. Can an overpressurization event in the melter lead to a glass spill?

2. How can process water enter the melter?

3. Why was a steam explosion in the melter identified as an open item?

Contractor Response

General question 3(c)-1

Fault schedule events 3200/165 (HAR page 5-168) and 3200/247 (HAR page 5-147) address water ingress into the melter. The response to question 41 indicated the need for a revision to these sheets. A mark up of the revision is attached to the response to question 41.

The events referenced in Table 4-6 were matched against the potential for an explosion/overpressurization hazard. For completeness, these events (Fault Schedule event identifiers 3200/167 and 3200/249) should have referenced water ingress as an initiating event. To aid the reviewers, this reference will be added. A mark up of the revision is attached for information.

Detailed question 1.

Overpressurization can lead to small glass spillages. Pressure transients could force glass melt along the discharge lines. To protect against this, empty canisters are positioned below the discharge lines during melter operations to catch small spillages. The fault schedule

Disposition

The BNFL response is considered to be responsive and acceptable.

The contractor's response is Conditionally Acceptable. The additional information in the response is acceptable provided it is incorporated into the HAR. The event consequences for water in the melter should indicate that a glass spill can result. The safeguards should indicate that an empty canister will be placed below the discharge line at all times to prevent small glass spills.

Supplemental Response

Supplemental Disposition

Question # 131

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3d - HAR Table 4.1

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.4.1, Page 4-2; and Section 5.2.4, Page 5-38.

OBSERVATIONS:
Some information in Table 4-1 of the HAR is missing or contradicts information found elsewhere.

DETAILED QUESTIONS:

1. HAR, Table 4-1, Row 2, last column, states that the HLW feed material is stored in the LAW feed tank. However, on pg. 5-38, it is stated that, "Envelope D feeds are received into the TWRS-P Facility in one of three Envelope D Receipt Vessels…." Please clarify this part of the process description.

2. The only fissile materials listed in table 4-1 are Pu-239 and Pu-241. Are other fissile materials are contained in the process streams? If so, describe the affect of these fissile materials.

Contractor Response

Detailed question 1.

The reference cited is a typographical error, it should have read "HLW receipt vessel (3 off)." This is now consistent with the correct description on page 5-38. Table 4.1 is being revised to correct a number of errors, a mark up of the revision is attached to our response package.

Detailed question 2.

Table 4-1 should have listed U-235. This will be included. Our response to question 25 details the effects of the fissile content of the feed material (including U-235). Table 4-1 is being revised to correct a number of errors, a mark up of the revision is attached to our response package.

Disposition

The BNFL response is responsive and acceptable.

The contractor's response is acceptable because typographical errors were corrected, U-235 will be included in Table 4-1, and other numerical errors in the Table will be corrected.

Supplemental Response

Supplemental Disposition

Question # 132

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3e - Confinement Design

SUBMITTAL CRITERIA:
7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

4) The set documented in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE in the document titled Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 4.2.

OBSERVATIONS:
The SRD, Section 4.2, "Confinement Design," identifies a number of codes and standards for design of Class I and II mechanical equipment and piping such as ASME B31.1, ASME B31.3, and ASME Section VIII of the Boiler and Pressure Vessel Code. However, the SRD does not specifically identify where and when these codes will be applied (i.e. for various classes and types of equipment and piping and for various functions such as design, fabrication, testing , inspection etc.), and also does not provide justification for their selection considering the nature and severity of the hazards to be mitigated. The acceptability of the standards selected could not therefore be assessed.

DETAILED QUESTIONS:

1. Provide via a table(s) or other format, a list of equipment and piping types and identify the codes that will be applied to various classes of piping and equipment and for various design/ construction functions.

2. Provide justification of the adequacy of the selected standards in the intended applications.

Contractor Response

1. Upon further review, ASME B31.1 is specific to power generation piping systems and will be removed from the SRD as a selected standard. ASME B31.3 is specific to process piping systems and will be used for other DCI/DCII piping including all DCI/CDII pressure vessels (>15 psig) and for "in-cell" vessels. API 650 will be used for all other DCI/DCII vessels with pressures <15 psig.

A listing of the DCI/DCII piping and vessels will be provided in the PSAR.

2. Justification of the adequacy of the selected standards is presented in Table 3-2 and Table 3-3 of Volume 1 of the SRD.

Disposition

The BNFL response is considered to be responsive but unacceptable for reasons indicated below:

The contractor's response is not acceptable as, (a) it didn't provide the requested listing in question (1); and (b) the justification provided by merely referring to an unapproved DOE Standard is neither comprehensive, nor adequate. The Contractor should provide the RU with a plan for addressing the issues raised in this question.

Supplemental Response

See Attachment-Question 132 to BNFL's Response to RU Disposition, Letter # 5193-97-0554, December 8, 1997.

Supplemental Disposition

The Contractor's supplemental response was acceptable. However, the adequacy of the supplemental information cannot be determined at this time as the accident analysis and the system design requirements needed to mitigate accidents will not be completed until the ISA. It may be that standards other than those listed in the response may be needed for designing the subject mechanical components so that these components have a degree of reliability commensurate with the accident severity and mitigation needs. This issue will be evaluated during the ISA review.

Question # 133

Description

THEME: Quality Levels

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Page 1-18.

OBSERVATIONS:
ISMP, Section 1.3.10, "Classification of Structures, Systems, and Components," describes the design classification process used on the TWRS-P project in terms of three design classes: Design Class I, Design Class II, and Design Class III. ISMP, Section 1.3.11 "Quality Levels," describes the assignment of Quality Levels (QL) to SSCs based on their respective Design Class.

The ISMP, Section 1.3.11, first paragraph, states in part: "Designation of correct quality levels ensures that the appropriate quality assurance requirements are applied to specific TWRS-P Facility SSCs."

Table 1-4 on pages 1-19 to 1-23 shows what QAP requirements applied to QL-1, QL-2, and QL-3 SSCs.

DETAILED QUESTIONS:
1. Given the very limited extent to which QA requirements are applied to QL-III SSCs, please explain how BNFL ensures that the correct quality level is designated to specific SSCs. In particular, please explain how BNFL Inc. ensures that a DC I/QL-1 or DC II/QL-2 SSC is not mistakenly designated as a DC III/QL-III SSC.

Contractor Response

A DC I/QL-1 or DC II/QL-2 SSC cannot be missclassified because of three tiered process for categorization:

1. The Master Equipment List developed during the development phases of the design shall designate both the Design Class and Quality Level of the SSCs.

2. A project procedure prescribing the criteria for the appropriate allocation of quality levels for each procured item, process, or service is in process of being developed. Criteria for the evaluation of quality assurance requirements and allocation of quality levels include: radiological risk to personnel, seismic qualification, restricted access for repair/replacement, active decommissioning, etc.

3. The QA organization shall conduct audits and surveillances to verify compliance with project document and procedures requirements.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response described three provisions to prevent SSCs from being misclassified.

Supplemental Response

Supplemental Disposition

Question # 134

Description

THEME: Quality Levels

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Page 1-18.

OBSERVATIONS:

The ISMP, Section 1.3.11, Page 1-18 states in part, "The remainder of the DC III SSCs are designated QL-3, representing the application of a standard level of quality assurance requirements."

DETAILED QUESTIONS:
1. Please explain the phrase "standard level of quality assurance requirements," specified in this section.

Contractor Response

"Standard level of quality assurance requirements" refers to quality requirements traditionally classified as "best industry practices under quality control system."

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response provided a meaningful explanation of the phrase "standard level of quality assurance requirements

Supplemental Response

Supplemental Disposition

Question # 135

Description

THEME: Quality Levels

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Table 1-4, Page 1-19.

OBSERVATIONS: ISMP, Section 1.3.11, Table 1-4 contains a matrix showing the application of QAP requirements to QL-1, QL-2, and QL-3 SSCs.

DETAILED QUESTIONS:
1. Please describe the specific BNFL Inc. process by which the QAP requirements are applied selectively to each TWRS-P SSC in accordance with Table 1-4.

Contractor Response

As noted in the response to the question #133, project procedure is in process of being developed to describe the specific BNFL process by which the QAP requirements are applied selectively to each TWRS-P SSC.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response stated that a project procedure is being developed to describe the process by which the QAP requirements are selectively applied to each SSC in accordance with ISMP Table 1-4.

Supplemental Response

Supplemental Disposition

Question # 136

Description

THEME: Quality Levels

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Appendix A, Section 2.7, Page .

OBSERVATIONS:
ISMP, Appendix A, Section 2.7, "TWRS Privatization Project Implementation Plan for Part 1A Quality Assurance Program" defines Quality Level-1 and -2 as follows:

Quality Level (QL-1): The SSCs that prevent or mitigate releases to the public that would otherwise exceed the offsite radiological risk guidelines or prevent accidental nuclear criticality. These are SSCs traditionally classified as safety related. QL-1 requires application of all provisions of the TWRS-P QAP."

Quality Level (QL-2): The SSCs that prevent or mitigate releases of radiological materials to onsite workers and toxic chemicals to the offsite public and onsite workers."

The definitions for these terms used elsewhere in the BNFL Inc. ISMP (e.g., Page 1-18 within Section 1.3.18) are substantially different in that they classify public protection from either radiological or chemical exposure as Design Class I/QL-1 (whereas the definitions within Section 2.7 of Appendix A of the BNFL Inc. ISMP place public protection from chemical exposure/toxic chemicals in DC II/QL-2).

DETAILED QUESTIONS:
1. Please explain the following: (a) the reason for this inconsistency; (b) which is the correct set of definitions; and (c) the impact on the BNFL Inc.'s submittals (i.e., SRD, ISMP, and HAR).

Contractor Response

(a) We agree that the definitions are inconsistent and they will be fixed. The QAP was issued prior to the development of the BNFL Standards Approval Package (SRD, ISMP, and HAR).

(b) The correct description of Quality Levels is the one used in the ISMP. The definitions of the Quality Levels in the QAP and the Implementation Plan will be changed to be consistent with the terms used in the ISMP.

(c) The Appendix A of the ISMP will be changed as stated in paragraph (b) above; no impact on the other deliverables: SRD and HAR.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response acknowledged the inconsistency, clarified which set of definitions is correct, and indicated that the quality level definitions in the implementation plan would be changed to be consistent with the terms in the ISMP.

Supplemental Response

Supplemental Disposition

Question # 137

Description

THEME: Lessons Learned Program

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 3.2, Page 3-3.

Hazard Analysis Report (HAR), Section 4.4.2, Page 4-21.

OBSERVATIONS: The ISMP, Section 3.2, page3-3, third paragraph states in part: "Part of the preparatory work for hazard identification studies is to review safety and incident reports from similar operating facilities to ensure that credible events are considered at an early stage in the design. For the TWRS-P Facility, the operating histories of Sellafield's Vitrification Plants ... are reviewed to take account of their operating experience. In this way, lessons learned are incorporated into the TWRS-P Facility design and plans for operation."

The HAR, Section 4.4.2, page 4-21 discusses the insights gained from a compiled list of off-normal events from several facilities including; Sellafield, DWPF, and West Valley. Table 4-8, contains that list of off normal events and how they are addressed for TWRS-P.

It is not clear from the above-quoted statements whether BNFL Inc. intends to continue to obtain, evaluate, and incorporate lessons learned from other facilities into the TWRS-P

Facility during Part B activities.

DETAILED QUESTIONS:
1. To the extent that factoring lessons learned information into the TWRS-P Facility operation is an on-going process, please briefly explain the process that BNFL inc. plans to use to ensure that this is accomplished in a consistent, systematic manner.

Contractor Response

BNFL will obtain, evaluate, and incorporate lessons learned from other facilities during Part B. The TWRS-P Project will implement a lessons learned program in Part B that will require review of internal and external events from similar facilities for the purpose of enhancing the safety of the facility. The program will be initiated early in Part B for the review of external events as they are of particular importance to design and construction. This program is briefly described in ISMP Section 3.16.7, "Lessons Learned."

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response provided a meaningful explanation of the on-going process that BNFL Inc. plans to use to obtain, evaluate, and incorporate lessons learned from similar facilities into the TWRS-P Facility during Part B activities.

Supplemental Response

Supplemental Disposition

Question # 138

Description

THEME: Quality Assurance Program

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 3.16.4, Page 3-32.

OBSERVATIONS: The ISMP, Section 3.16.5, first paragraph, states in part: "performance monitoring is used at the TWRS-P Facility to verify that ES&H and other TWRS-Facility programs, plans, and procedures exist; are in place; are adequate; are functioning as designed; and are in compliance with applicable regulatory or permit requirements. Performance monitoring is conducted by a TWRS-P multidisciplinary team consisting of environmental protection, industrial safety, process safety, health physics, nuclear safety, and regulatory staff."

The ISMP, Section 3.16.5, second paragraph, listed the areas in which performance monitoring is conducted. The last entry in this list states: "Employee compliance to established safety and quality criteria (See ISMP Section 3.4, <Safety/Quality Culture)."

DETAILED QUESTIONS:
1. Please explain the rationale for not including a member of the TWRS-P Quality Assurance organization on the team that will conduct performance monitoring and why Quality Assurance Program is not one of the areas to be monitored.

Contractor Response

The ISMP will be changed to reflect the inclusion of a member of the TWRS-P Quality Assurance organization on the team that will conduct performance monitoring and the Quality Assurance Program as one of the areas to be monitored.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response indicated that the ISMP will be changed to add a member of the QA organization to the performance monitoring team and include the QA program as one of the areas to be monitored.

Supplemental Response

Supplemental Disposition

Question # 139

Description

THEME: Quality Assurance Program

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 11.2, Page 11-11.

OBSERVATIONS:
ISMP, Section 11.2, page 11-11, lists the roles of various members of the TWRS-P staff during the operations phase. The section provides a list of five roles of the Quality Assurance Group, the fourth of which states: "Implementing stop work for unsafe conditions and to control future operations until conditions are corrected."

ISMP , Section 11.2, page 11-5, provides a list of three roles of the Quality Assurance Group during the design and construction phase. Stop work authority is not included in this list.

DETAILED QUESTIONS:
1. Please indicate if the Quality Assurance Group has the authority to "stop work for unsafe conditions and to control future operations until conditions are corrected" during the design, construction, and start-up of the TWRS-P Facility.

Contractor Response

The TWRS-P Quality Assurance Manager has the authority to stop project work when items or activities are not in compliance with applicable quality requirements, or when unsatisfactory conditions occur including stop work for unsafe conditions during the construction and start-up of the TWRS-P facility.

Please see also the response to the question #106.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response indicated that the TWRS-P QA Manager has the authority to stop work during the construction and start-up of the TWRS-P Facility.

Supplemental Response

Supplemental Disposition

Question # 140

Description

THEME: Text Verification

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Appendix A, Section 2.7, Page .

OBSERVATIONS:
The ISMP, Section 4.2, first paragraph, the following sentence appears to be garbled and should be clarified: "Major hazards and hazardous situations are identified as the level of design detail increases and additional PHAs in Part B."

The ISMP Table 1-4 (pages 1-19 through 1-23) identifies each page heading with a number beginning with "Sheet 10" (page 1-19) and ending with "Sheet 14" (page 1-23). "Sheets" 1 through 9 could not be located within the ISMP.

DETAILED QUESTIONS:
1. Please provide clarification of the sentence and either provide the missing pages or confirm that the Sheet numbers used in Table 1-4 were incorrectly stated.

Contractor Response

All sheets were provided. The sheets were incorrectly numbered and will be corrected.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. committed to correct these errors.

Supplemental Response

Supplemental Disposition

Question # 141

Description

THEME: Technical Basis Unclear

SUBORDINATE THEME: 3b - Inconsistent information presented

SUBMITTAL CRITERIA:

3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

DOE/RL-96-0006 Top-level Standards and Principles

Section 4.2.2, Proven Engineering Practices/Margins.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 5.2, Pages 5-5, 5-7, 5-13.

OBSERVATIONS:
The types of information presented as "Study Area/Keyword" and "Hazard Consequences", in the Fault Schedules in Section 5.2 of the Hazards Analysis Report, are not consistent. For example, we note that the Study Area Keyword, "Filling DST - Dropped Load/Impact Hazard" for Event 0/27 (page 5-7) is included as an "Initiating Event" for Event 0/7 "Filling DST - Loss of Containment Hazard" (page 5-13). Likewise, the "Hazard Consequence" for Event 0/70 is "Need to determine integrity/maintainability." The lack of clear, consistent study area keywords, hazard consequences, and descriptions of the accidents associated with each "Event Identifier" leads to many questions requesting clarification of the information presented in the Fault Schedules.

DETAILED QUESTIONS:

1. How does the "DST Vessel - Corrosion/Erosion Hazard" on page 5-5 differ from the "Filling DST - Corrosion/Erosion Hazard on page 5-6?

2. What type of information is intended to be included under the "Hazard Consequence" column of the Fault Schedules? The difficulties in interpreting the information under this heading are illustrated by the entries "Downstream effects e.g. DST inlet line closed during transfer from DOE tank." for Event 0/24 on page 5-7, by the entry "Not considered credible" for Event 0/6 on page 5-6, and by the entry "Need to determine integrity/maintainability" for Event 0/70 on page 5-13. Please explain how these statements relate to hazard consequences.

3. Please provide the Keyword Checklist and the associated definitions of terms that were used by the hazard evaluation teams.

Contractor Response

Detailed question 1.

There are two different concerns. The first (HAR page 5-5) concerns the vessel itself and the need to demonstrate integrity over our operational period against the materials which will be transferred in and (interim) stored there. The second concern (HAR page 5-6) stems from the pumping of a slurry along the transfer pipework and into the tank. Effects such as scouring, contaminants, and current effects are functions of transferring material into the tank and not the tank itself.

Detailed question 2.

The hazard consequence column in the Fault Schedule contains a qualitative description of hazard potential arising from the initiating event(s). Where that hazard potential may exist elsewhere (as in event 0/27, HAR page 5-7) then it is appropriate that it should be noted in the hazard consequence column. If there is considered to be no hazard consequence (i.e., no hazard) from the initiating event(s) then a qualitative statement to that effect is made. It is agreed that the statement "not considered credible" is not a statement of consequence, it would have been clearer to say "no consequence." Occasionally this column is used for notes which indicate the uncertainty of the result. These uncertainties are a function of the

Disposition

The BNFL response is responsive and acceptable.

The question includes three detailed questions. Each requested clarification of information presented in the Fault Schedules. The responses provide the requested clarification and are acceptable.

Supplemental Response

Supplemental Disposition

level of design detail available, they are captured in the fault schedule to indicate the ongoing nature of the hazards identification work. All uncertainties which depend on further design detail for resolution are tracked to ensure completeness and are subject to review by the Hazards Evaluation Team.

Detailed question 3.

The keyword checklist has already been provided in response to earlier questions (questions 3 and 23) and is attached to the response of question 3. The definitions are equivalent to those in the AIChE "Guidelines for Hazard Evaluation Procedures" (Table 6.11, page 129) although specific to nuclear chemical plant (Table 6.11 has no equivalent to criticality).

Question # 142

Description

THEME: Set of Implementing Codes and Standards

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Safety Requirements Document (SRD); Volume II, Section 9.

Integrated Safety Management Plan (ISMP), Section 12, Page 12-4.

OBSERVATIONS:
Chapter 12 of the BNFL ISMP defines licensee controlled requirements as "Those requirements that define conditions necessary to ensure the worker radiological and chemical exposure standards of the SRD are not exceeded for credible events." However the SRD contains no standards for licensee controlled requirements.

DETAILED QUESTIONS:
The requirements relied upon for work safety during normal operations and accidents (i.e., the licensee controlled requirements) are not standards-based, therefore, the BNFL management process appears not to be standards-based. Please describe how BNFL management processes are standards-based.

Contractor Response

A Safety Criterion addressing Licensee Controlled Requirements will be added to Volume II

of the SRD as shown on the attachment.

The safety management programs addressed in the ISMP are derived from the Safety Criteria and will reference implementing standards (as appropriate to the phase of the project) contained in the SRD, and are therefore standards-based.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address the question in an acceptable manner. The standard for licensee control requirements provides a clear standards basis for this aspect of the BNFL integrated safety management program. The BNFL commitment to provide draft licensee control requirements with the request for construction authorization ensures that this information will be available to support RU review for the construction authorization regulatory action.

Supplemental Response

See revised response to Question 94.

Supplemental Disposition

Question # 143

Description

THEME: Compliance to Laws (QA/RP)

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

a) Define the key safety-related activities to be performed by the Contractor;

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.11, Table 1-4, Page 1-21.
OBSERVATIONS:
Many of the bulleted items in Table 1-4 of the ISMP use the verb should instead of shall. Shall is used in the BNFL QAP, Revision 2. This inconsistency in the usage of the terms reduces the importance of the requirements stated in the QAP. Additionally, some shalls used or implied in 10 CFR 830.120 or your approved QAP have been changed to shoulds. Below are two specific examples of the concern:

ISMP, Section 1.3.11, Table 1-4, Element 6, "Design," bullet 1, states the following:
"Design inputs should be technically correct and complete."

BNFL QAP, Section 6.2.7, "Design Output," states the following: "
"Design inputs shall be technically correct and complete."

ISMP, Section 1.3.11, Table 1-4, Element 6, "Design," bullet 6, states the following:
"The completed design should be recorded in design output documents such as…"

BNFL QAP, Section 6.2.7, "Design Output," states the following: "
"The completed design shall be recorded in design output documents such as…"

DETAILED QUESTIONS:
Please resolve the inconsistency between the requirements of 10 CFR 830.120, the QAP and the ISMP.

Contractor Response

ISMP Table 1-4 will be changed as necessary in its use of "should" to "shall" to achieve compliance with the BNFL QAP and 10 CFR 830.120.

Disposition

The BNFL response is responsive and acceptable.

In their response to this question, BNFL Inc. stated that ISMP Table 1-4 would be changed as necessary from "should" to "shall" to achieve compliance with 10 CFR 830.120 and the BNFL QAP.

Supplemental Response

Supplemental Disposition

Question # 144

Description

THEME: Compliance to Laws (QA/RP)

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

a) Define the key safety-related activities to be performed by the Contractor;

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;
7) Safety documentation processes delineated in the ISMP provide for appropriate document control and maintenance;

8) Scheduling of the safety-related activities as described in the ISMP, including generation of regulatory submittals, is consistent with Figure 2 of this document;
REFERENCE CITED:
Integrated Safety Management Plan (ISMP); Sections 1.3.9, 1.3.12, and 1.3.16; Pages 1-16, 24, and 27.

OBSERVATIONS:
The last sentence in Section 1.3.9 of the ISMP states that the scope and the details of the QAP are further discussed in Chapter 3.3, "Quality Assurance." of the ISAR. The last sentence in Section 1.3.12 of the ISMP states that the training plan will be further discussed in Chapter 3.0 of the ISAR. It appears that the underlined words should be identical. Also, The last sentence in the second paragraph of Section 1.3.16 of the ISMP refers to Section 3.3, "Licensing Basis."

DETAILED QUESTIONS:
Please correct the inconsistency in working of the above paragraphs.

Contractor Response

The inconsistencies relative to reference to the ISAR in the present and future tense will be corrected. Most references in the ISMP to information to be contained in the ISAR were in the future tense due to the different schedules for the submittal of these two deliverables. Section 1.3.9, and other sections of the ISMP will be changed to reference the ISAR in the future tense. Also, Section 1.3.9 will be changed to more correctly state "The

implementation of the QAP will be discussed in ISAR Section 3.3, 'Quality Assurance'," and ISMP Section 1.3.12, will be changed to state, "The training plan will be described in ISAR Section 3.4, 'Training and Qualification'."

The reference in ISMP Section 1.3.16 to "ISMP Section 3.3, 'Licensing Basis,'" is correct; note this reference is to the ISMP, not to ISAR Section 3,3, "Quality Assurance."

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response stated these inconsistencies would be corrected.

Supplemental Response

Supplemental Disposition

Question # 145

Description

THEME: Design Classification/Quality Level Classification

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

h) Identify roles, responsibilities, and authorities for defining, implementing, and maintaining safety.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

5) The program documented in the ISMP contains appropriate features of integrated safety management (i.e., integration among safety, design, and operations interests; integration over the life cycle of the activities; and integration into work planning and performance);

10) Safety definition, implementation, and maintenance roles, responsibilities, and authorities defined in the ISMP are clear and appropriate.

REFERENCE CITED:
Safety Requirements Document (SRD), Volume I, Attachment C, Page C-4 &5.

OBSERVATIONS:
SRD Volume I, Attachment C, Pages C-4 and C-5, "Independent Safety Review Team Staffing and Qualifications," tabulates the qualifications of BNFL's Independent Safety Review Team.

DETAILED QUESTIONS:
Please justify how independent safety oversight can be achieved without having ISRT members having qualifications associated with system topics (Civil/Structural Systems, Mechanical Systems, Electrical Systems, and Control Systems) are not needed for Part A activities.

Contractor Response

The Independent Safety Review's Team Charter did not include a one-over-one review for the areas of "Civil/Structural Systems," "Mechanical Systems," "Electrical Systems," and "Control Systems." Independent review for these areas consisted of ensuring that the selected standards were reviewed and/or generated by highly qualified personnel, nominally licensed engineers, (i.e., RIT members) in the subject areas. Qualification for RIT members participating in the development and review of standards associated with these areas is presented in SRD Volume I Attachment B.

Disposition

The BNFL response is considered to be responsive and acceptable.

The BNFL response adequately addresses the specific concern.

Supplemental Response

Supplemental Disposition

Question # 146

Description

THEME: Design Classification/Quality Level Classification

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

a) Define the key safety-related activities to be performed by the Contractor;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The ISMP shall include the planning elements of the implementation plans required by DOE regulations, particularly 10 CFR 830.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

9) Self assessment elements documented in the ISMP are appropriate; and

REFERENCE CITED:
Integrated Safety Management Plan (ISMP); Section 8, Table 8-1, Page 8-4.

OBSERVATIONS:
Section 4.3.1.5 of DOE/RL-96-0006 discusses surveillances as part of the internal safety review process.

Section 10.2 of the BNFL Inc. QAP identifies surveillances as one of the methods they will use to conduct independent assessments.

The records shown in Table 8-1 of the BNFL ISMP for the subject "Quality Assurance" (last row on Sheet 4) identifies nine record types to be developed as part of the safety management process including "Audit and assessment procedures and reports." Surveillance procedures and reports are not included in this list.

DETAILED QUESTIONS:
Please state BNFL's plan with respect to retention of surveillance procedures and reports.

Contractor Response

The lack of reference to surveillance reports will be corrected. Reference to "Surveillance Reports" will be added to the list of QA records. "Surveillance Procedure," is covered by reference to "Administrative Procedures with Safety Implications," in the list of Management Organization and Administrative Records.

Note, the ISMP reference to Table 8-1 states "Safety documents developed as a part of the safety management process controlled by the QAP include but are not limited to those identified in Table 8-1." BNFL will reach agreement with the RU in Part B as to the specific records to be retained,

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response stated the list will be corrected to address this question.

Supplemental Response

Supplemental Disposition

Question # 147

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBORDINATE THEME: Electrical and Mechanical Systems

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

APPROVAL CRITERIA:
1) The set documented in the SRD includes all requirements of applicable laws and regulations;

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 4.3 and 4.4, Pg. 4-13.

OBSERVATIONS:
SRD, Volume II, Section 4.3, Safety Criterion 4.3-1 and 4.3-4 identify IEEE 603-91 "Criteria for Safety Systems for Nuclear Power Generating Stations"

SRD, Volume I, Section 5.1 lists IEEE 603 "Safety Criteria for Safety Systems for Nuclear Power Generating Stations," IEEE 603-1980, Institute of Electrical and Electronic Engineers, Inc., New York, New York as one of the Selected Consensus Codes and Standards.

DETAILED QUESTION:
Please clarify to which version of IEEE 603 BNFL, Inc. will commit.

Contractor Response

IEEE-603 was inadvertently referenced as a 1980 version in Section 5.1 of SRD Volume I and will be revised to reflect the use of the 1991 version as specified in Volume II.

Disposition

The BNFL response is responsive and acceptable.

The response clarified the selected version of IEEE 603.

Supplemental Response

Supplemental Disposition

Question # 148

Description

THEME: Compliance to Laws (QA/RP)

Approval Criteria:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
RESW, Section 3.5.2, page 6, last sentence in the section.

OBSERVATIONS:
The submittal states that for a ground level release, the location of the collocated worker is considered no closer that 100m from the release point.

DETAILED QUESTIONS:

Is there a basis for the 100 meter distance?

Contractor Response

A distance of 100 meters has been previously accepted as the location for the co-located worker on the Hanford Site for new facilities. Relative to proposed nuclear fuel project facilities, DOE-RL has stated that "Therefore, the recommendation is made that the co-located worker is defined to be 100 meters from the facility," (E.D. Sellers, DOE to H.J. Hatch, Fluor Daniel Hanford, Inc., "Contract No. DE-AC06-96RL13200: Proposed Spent Nuclear Fuel Project Division (SFD) Risk Acceptance Guidelines [RAG], dated December 11, 1996). For the TWRS-P Facility site, a 100 meters radius from any release point of the radioactive waste and processing building will not include any non-TWRS-P Project related buildings.

Disposition

The BNFL response is responsive and acceptable.

The contractor provided an acceptable basis for selecting 100 meters as the closest location for a collocated worker.

Supplemental Response

Supplemental Disposition

Question # 149

Description

THEME: Compliance to Laws (QA/RP)

Approval Criteria
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
RESW, Section 3.5.3, page 7.

OBSERVATIONS:
The submittal provides a lengthy discussion and justification for locating the off-site receptor (i.e. the public). In the final paragraph, the submittal states, "As can be seen from the above excerpts, the assumed location for the offsite receptor for TWRS-P satisfies the requirements of 10 CFR 72 and 10 CFR 100."

The question of whether the contractor's location of the public satisfies NRC regulations is a question that can only be determined by the NRC in a licensing type of action. The footnotes in Table 1, of DOE/RL-96-0006, that reference 10 CFR 72.106 and 10 CFR 100.10 only reference where the values came from, they are not intended to make the NRC regulations a requirement. However, the contractor may chose any standard or regulation they deem appropriate to assure adequate safety, and they are free to chose the cited NRC regulations.

Furthermore, it is inappropriate to introduce for comparison, in a strict sense (i.e. to determine compliance), a DOE-based definition of "public" within an NRC-based regulation.

DETAILED QUESTIONS:
Is it BNFL's intention to commit to 10 CFR 72 and 10 CFR 100 in their RESW. Please clarify the term used, "satisfies," and state any assumptions and limitations as used in this section of the submittal.

Contractor Response

BNFL does not intend to comply with 10 CFR 72 and 10 CFR 100; these rules were used to support the selection of the location of the off-site receptor. The term "satisfies" means that within the boundary established for the offsite receptor, it is reasonable to expect that DOE would retain the right and ability to control activities during emergency conditions during the operating life of the TWRS-P Facility. This is the only assumption or limitation used in this section of the RESW submittal.

Disposition

The BNFL response is responsive and acceptable.

The response clarified that BNFL does not intend to comply with 10 CFR 72 and 10 CFR 100, and clarified that term "satisfies" does not imply that compliance with the NRC regulations was established.

Supplemental Response

Supplemental Disposition

Question # 150

Description

THEME: Compliance to Laws (QA/RP)

SUBMITTAL CRITERIA:
The Standards Approval submittal package shall consist of the following documentation:

1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 2.0, Table 2-1, "Radiological Dose Standards Above Normal Background," Page 2-1.

OBSERVATIONS:
DOE/RL-96-0006, Table 1, "Dose standards Above Normal Background," Revision 0, classifies events by their type and estimated range of conditional (annual) probability of occurrence. The groups include, normal events, anticipated events, unlikely events, and extremely unlikely events. This set of groups include probabilities that cover the range from 1 to 10-6.

SRD, Volume II, Section 2.0, Table 2-1, "Radiological Dose Standards Above Normal Background," classifies events by their type and estimated frequency of occurrence. The set of groups include event frequencies that cover the range from 10-1 to 10-6 occurrences/year.

DETAILED QUESTIONS:
Please clarify the estimated frequency for normal events (i.e. provide a number range).

Contractor Response

The frequency for normal events is defined as: Events that occur regularly in the course of facility normal operations.

A number range for this classification is not appropriate as discussed in the Radiological Exposure Standard for Workers Under Accident Conditions previous provided to the RU.

Disposition

The BNFL response is considered to be unresponsive for reasons indicated below:

More clarification is required regarding the frequency of events encompassed by normal events and the related general guidelines for facility capability.

Specifically, are all events with frequency greater than 10-1/year (e.g. 1 in 5 years) classified as normal events? Furthermore, which "General Guideline" would be applicable; would the facility design provide adequate protection of health and safety within the normal modes of operating systems, or would these events not require extensive corrective action or repairs? Please clarify.

Supplemental Response

Frequency Range for Normal Events is greater than or equal to 0.1. SC 2.0-1 will be modified to include this range.

Normal mode of operations will provide adequate protection of the public and worker.

Note. To further clarify this criterion (2.0-1), the "Events" description box was modified to read as follows. [NORMAL EVENTS]
"Events that occur regularly in the course of facility operation (e.g. normal facility operations); including routine and preventative maintenance activities."

Supplemental Disposition

The Contractor's supplemental response was acceptable. BNFL provided a redline-strikeout version that incorporated the corrections of the modified SRD.

Question #

151

Description

THEME: Compliance to Laws (QA/RP)

Approval Criteria
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
RESW, Section 3.5.1, page 6.

OBSERVATIONS:
The submittal states that the controlled area may include land beyond the TWRS-P Facility security fence if that fence is located within the leased area, because BNFL would have control of that area between the fence and the boundary of the leased land.

It is not clear what this statement means. One interpretation is that there may be satellite controlled areas, but there isn't sufficient detail to clearly make an evaluation.

DETAILED QUESTIONS:
Please clarify RESW, Section 3.5.1, Page 6.

Contractor Response

The statement simply means that BNFL has the right to control all activities on land leased to BNFL by DOE. The only satellite area would be that land associated with 241-AP-106.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The contractors response did not resolve the potential conflict with DOE/RL-96-006 requirements because the submittal's use of the term "security fence" does not conform to the definition of "controlled area" found in DOE/RL-96-006. Further discussions were held with the contractor to clarify this point and they agreed to resubmit their response.

Supplemental Response

The above response is clarified by explaining that the boundary of the leased land will be posted to clearly define the BNFL controlled area.

Supplemental Disposition

The contractor's supplemental response was acceptable. BNFL responded that the boundary of the BNFL leased land would be posted to clearly define the controlled area.

This response is accepted with the condition that the controlled area is enclosed by a common perimeter fence as defined in DOE/RL-96-0006, Section 6.0.

Question # 152

Description

THEME: Compliance to Laws (QA/RP)

Approval Criteria
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 2.3.4, page 2-5, last paragraph

OBSERVATIONS:
The submittal states that "The formalization and implementation of the design-related components of the ALARA program are critical to all stages of definitive design per 10 CFR 835.1002, 'Facility Design and Modifications.' Therefore, the design-related components of the TWRS-P Facility ALARA program are prepared for application to the definitive design in Part B."

The issue that this paragraph appears to be addressing is the 10 CFR 835.101(a) requirement that "A DOE activity shall be conducted in compliance with a documented radiation protection program (RPP) as approved by the DOE." One such activity covered by this regulation is the design of facilities (10 CFR 835.1002). This paragraph attempts to identify the point in time when the approved Radiation Protection Program must be in place to perform facility design.

A problem in the submittal statement is that the regulation (10 CFR 835.1002) does not use or define the term "definitive design." In fact, the regulation only uses the term "design," but does not define it. The submittal attempts to introduce the "definitive" modifier into the regulation's requirements without providing the definitions, assumptions, or bases.

DETAILED QUESTIONS:
Please clarify the term "definitive design" and state the basis for asserting that 10 CFR 835.1002 requirements become enforceable in Part B (i.e. What is the basis for asserting that the design work currently underway is not a covered DOE activity as defined in 10 CFR 835.101(a)).

Contractor Response

#1 The ISMP will be modified to indicate ALARA will be considered in all stages of facility design. The word "definitive" will be removed from the first sentence of the reference paragraph, and the last sentence will be deleted.

#2 Implementation of the principles of ALARA in the design of BNFL facilities is committed to in the SRD and implemented through design procedures. Per BNFL's contract with the DOE, which requires a RPP be submitted in support of the Authorization for Operation, the TWRS-P Project becomes an activity carried out for DOE requiring an approved RPP during the Operating Phase of the facility lifecycle.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The contractor did not answer the question regarding the requirement derived from 10 CFR 835.101 that design work for DOE activities be conducted under a DOE-approved RPP. Discussions were held with BNFL representatives to clarify this question, and BNFL plans to resubmit their response addressing the question.

Supplemental Response

Upon DOE Approval of the SRD all activities will be governed under the Standards contained therein. The current Section 5.2 of Volume II of the SRD identifies the design related requirements and ALARA commitments of 10 CFR 835.1002. See Attachment-Question 1 to BNFL's Response to RU Disposition, Letter # 5193-97-0554, December 8, 1997.

Supplemental Disposition

The contractor's collective supplemental response was acceptable. BNFL provided additional information (that was placed in the BNFL Docket) to the supplemental response on

December 15, 1997. This response satisfactorily answered the remaining parts of the initial question - namely: (1) when will design activities commence that are covered DOE-activities as defined in 10 CFR 835.101(a) and would therefore require a DOE approved RPP and (2) how will compliance to 10 CFR 835.101(a) and (e) be achieved?

The response stated that prior to performing "substantive design," an RPP covering this phase of design would be submitted to the Regulatory Official for approval. The response

Question # 153

Description

THEME: Compliance to Laws (QA/RP)

Approval Criteria:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
RESW, Section 3.5.3, page 6.

OBSERVATIONS:
The submittal states that workers at the WNP-2 nuclear power plant, a Nuclear Regulatory Commission licensee, should be considered members of the public. However, the submittal does not mention whether workers at the other NRC licensee at Hanford (U.S. Ecology) will also be treated as members of the public.

DETAILED QUESTIONS:
Please clarify if U.S. Ecology workers will be treated as the public, and provide the basis for your answer.

Contractor Response

Workers, inside the boundary defining the "Location of the Offsite Receptor" for the TWRS-P Facility but outside the TWRS-P Controlled Area, are treated as co-located workers. This includes workers at the U.S. Ecology complex, workers in the 200E and 200 West Areas, workers in the 100 Areas, and workers in portions of the 600 Area of the Hanford Site. (The 600 Area defines those Areas of the Site which are not contained within the 100, 200, 300, or 400 Areas.) Personnel within this area are required to be Hanford Site trained and able to respond to emergencies. Additionally, DOE has physical control of access to this area.

The WNP-2 nuclear power plant, on the other hand, is outside the boundary defining the "Location of the Offsite Receptor" for the TWRS-P Facility. Receptors outside of this boundary are treated as members of the Public. This also includes workers in the 300 and 400 Areas of the Hanford Site.

Disposition

The BNFL response is responsive and acceptable.

The contractor provided an acceptable bases for treating U.S. Ecology workers as collocated workers.

Supplemental Response

Supplemental Disposition

Question # 154

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Location of Receptor

SUBMITTAL CRITERIA: P. 1 #2, #6 and #7; P. 3 (SRD) #2.
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8.

Safety Requirements Document, (SRD), Volume II, Section 2, Safety Criterion 2.0-1, Page 2-1.

Integrated Safety Management Plan (ISMP), Table 1-2, Page 1-11.

OBSERVATION:
DOE/RL-96-0006 requires that the exposure standards for workers and co-located workers at the unlikely and extremely unlikely event probability ranges be derived.

The radiation exposure standards are presented in Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8. This table is repeated in appropriate sections of the SRD and the ISMP submittals. The table includes information on the Location of Receptor for the Worker, Co-located Worker, and Public. For the Co-located Worker and Public, the Location of Receptor descriptions include the expression "the most limiting location ...".

DETAILED QUESTIONS:
Do the Location of Receptor descriptions define the maximally exposed individual from the worker, co-located worker and public population groups for comparison with the applicable standards or limits?

Contractor Response

Yes. The most limiting locations for the maximally exposed individual of the public will be at the locations along the near-river bank, Highway 240, and the southern boundary (see Figure 1 of the RESW submittal) that is associated with the greatest X/Q. Two locations are determined for the public, one for a ground level release and one for a stack release.

For the co-located worker ground level release, the location is 100 m from the facility and in that direction associated with the greatest X/Q. For the co-located worker stack release, the most limiting location will be that distance and direction that is associated with the greatest X/Q.

Disposition

The BNFL response is responsive and acceptable.

The BNFL response addressed and resolved the question. It has been explicitly stated that the location of the receptor will be representative of the maximally exposed individual.

Supplemental Response

Supplemental Disposition

Question # 155

Description

THEME: Compliance to Laws (QA/RP)

SUBORDINATE THEME: Completeness of Selected Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document, (SRD), Volume I, Attachment E, Page E-1.

Safety Requirements Document, (SRD), Volume II, Sections 4 and 7.

OBSERVATION:
Per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to include all requirements of applicable laws and regulations. Per DOE/RL-96-0004, applicable laws and regulations specifically include the DOE nuclear safety regulation 10 CFR 830.120, Quality Assurance Requirements.

A comprehensive review of the set of radiological, nuclear and process safety standards documented in the SRD, Vol. II, was performed against the requirements specified in 10 CFR 830.120. The SRD, Vol. I, Attachment E, Compliance with Applicable Laws and Contract Requirements, was used to assist in the review. The following discrepancies were identified.

10 CFR 830.120 requirements not included in the documented standards set: Section 830.120(b)(4).

10 CFR 830.120 requirements not adequately addressed in the documented standards set: Sections 830.120(a)(1)(i), .120(a)(1)(ii) and .120(b)(1).

10 CFR 835 requirements for which the recommended standards set deletes phases that could change the intent of the requirement: Sections 830.120(c)(1)(iii).

DETAILED QUESTIONS:
Based on the discrepancies identified above, it appears that 10 CFR 830.120 is not adequately included and that compliance to the requirements is not adequately assured. Please explain your basis for determining compliance with 10 CFR 830.120 using the recommended set of radiological, nuclear and process safety standards documented in the SRD.

Contractor Response

BNFL is committed to full compliance with 10 CFR 830.120, absent the granting of an exemption to a specific section. To this extent, a Safety Criterion (1.0-10) will be added to Volume II of the SRD stating this.

Proposed Safety Criterion:

"Safety Criterion: 1.0-10
In addition to the Safety Criteria contained herein, compliance with all requirements of 10 CFR 830.120 and 10 CFR 835 shall be achieved absent the granting of an exemption request to any specific requirement therein."

See Attachment 1 for Question 155 for responses to individual points addressed in the Observation.

Disposition

The BNFL response is considered to be responsive and acceptable.

The BNFL response addressed and resolved the question. With the addition of a new Safety Criterion 1.0-10, the BNFL set of selected standards now requires compliance with 10 CFR 830.120.

Supplemental Response

Supplemental Disposition

Question # 156

Description

THEME: Compliance to Laws (QA/RP)

SUBORDINATE THEME: Completeness of Selected Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 2.

Safety Requirements Document, (SRD), Volume II, Attachment E, Page E-3.

Safety Requirements Document, (SRD), Volume II, Sections 1 and 9.

OBSERVATION:
Per DOE/RL-96-0003, the Contractor's ISMP shall ensure that the contractor is in compliance with DOE Nuclear Safety Requirements and complies with applicable laws and regulations. Also per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to include all requirements of applicable laws and regulations. Per DOE/RL-96-0004, applicable laws and regulations specifically include the DOE nuclear safety regulation 10 CFR 820, Procedural Rules for DOE Nuclear Activities, which sets forth the procedures to govern the conduct of persons involved in nuclear activities and, in particular, to achieve compliance with the DOE Nuclear Safety Requirements, such as 10 CFR 830.120 and 10 CFR 835, by all persons subject to those requirements.

The Integrated Safety Management Plan (BNFL-5193-ISP-01, Rev. 0), Section 2.0, Compliance With Applicable Laws and Regulations, does not address compliance with the requirements of 10 CFR 820. In general terms, the section needs to address the BNFL TWRS-P Project compliance with Compliance Orders issued under 10 CFR 820. Actions specifically required of a respondent (such as BNFL Inc.) or compliance measures required by the procedural rules are indicated in Sections 820.11; .24(b) and (c); .25(b)(2), (c), (d) and (e); .26; .27; .28; .29; .30; .31(a); .32(c); .33; .37; .39; .43; .62; .66; and .71.

The Safety Requirements Document (BNFL-5193-ISP-01, Vol. I, Rev. 0), Attachment E, Compliance With Applicable Laws and Contract Requirements, does not address incorporation of the requirements of 10 CFR 820 into the SRD. While all of 10 CFR 820 deals with compliance with the DOE Nuclear Safety Requirements, the submittal should include presentation of Safety Criterion (consistent with the SRD, Vol. II, of the SAP) that are associated with the scope or conduct of safety program activities. For example, a Safety Criterion incorporating Section 820.11 would be expected.

DETAILED QUESTIONS:
Based on the information presented above, it appears that 10 CFR 820 is not adequately included in the ISMP or incorporated in the SRD such that compliance to the requirements would be adequately assured. Please explain your basis for omission of compliance with 10 CFR 820 in the SAP submittal.

Contractor Response

The need to comply with 10 CFR 820 is addressed in ISMP Section 11.1, "Design and Construction Phase," and Section 11.2, "Operations Phase." Implementation of 10 CFR 820 is also addressed in ISMP Sections 3.16, "Internal Safety Oversight, " 3.16.3, "Incident

Disposition

The BNFL response is considered to be responsive and acceptable.

The BNFL response addressed and resolved the question. The BNFL SAP will contain additional discussion in the ISMP of compliance with 10 CFR 820.

Supplemental Response

Supplemental Disposition

Investigation," and 10.3. "Corrective Action Implementation and Tracking." To address 10 CFR 820 more explicitly, a new Section 2.4, "Compliance with 10 CFR 820, 'Procedural Rules for DOE Nuclear Facilities'" will be added to the ISMP to fully address compliance with 10 CFR 820. It will state the following:

"The Price-Anderson Amendments Act (PAAA) provides indemnification to DOE contractors, subcontractors, and suppliers who manage and/or conduct nuclear activities in the DOE complex. DOE issued 10 CFR Part 820, "Procedural Rules for DOE Activities," to implement the PAAA, and an enforcement policy (Appendix A to Part 820) which sets forth the DOE strategy for ensuring contractor compliance. These documents subject DOE contractors, subcontractors, and suppliers to potential civil and criminal penalties for violations of DOE rules, regulations, and compliance orders which contain nuclear safety requirements. Proactive compliance by the contractor with the enforcement policy could result in the reduction, or possible elimination of, civil penalties for a noncompliance with a nuclear safety requirement. Rules that have been issued by DOE to implement the provisions of 10 CFR 820 include 10 CFR 830.120, "Quality Assurance Requirements," and 10 CFR 835, "Occupation Radiation Protection." A number of rules have been drafted but are not yet issued for implementation. Following issuance of a specific rule under 10 CFR 820, BNFL will develop implementation plans as required by that rule. To provide for implementation of 10 CFR 820, training and procedures will be developed in Part B for the following activities:

1) Identifying, reporting, correcting, and tracking non-compliances,
2) Preparation, review, and approval of implementation plans for nuclear safety requirements,
3) Requesting and receiving exemptions to nuclear safety rules,
4) Roles and responsibilities of the TWRS-P and DOE staff implementing 10 CFR 820,
5) Procedural rules for nuclear activities.

Several ancillary procedures and systems will also be developed to implement 10 CFR 820 such as: a procedure for performing audits and assessments, "a procedure for performing root cause analysis", a system for trending non-compliances, "and a commitment database for tracking corrective actions for identified deficiencies."

With this addition, the SAP submittal adequately addresses 10 CFR 820.

Question # 157

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Top-level Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document, (SRD), Volume I, Attachment E, Page E-18-25.

Safety Requirements Document, (SRD), Volume II, Sections 1 and 9.

OBSERVATION:
Per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to conform to the top-level standards and principles contained in DOE/RL-96-0006. Per DOE/RL-96-0005, Section 2, the DOE regulatory approach requires the Contractor take an active and significant role in identifying and recommending the standards and requirements it will use to achieve adequate safety for its specific activities. These standards and requirements shall include applicable legal requirements and shall be based on a set of DOE-stipulated top-level standards and principles for effective radiological, nuclear, and process safety. Per DOE/RL-96-0004, the Contractor is required to follow a DOE-specified, structured process to identify the set of subordinate standards and requirements that, when properly implemented, provide adequate safety, comply with legal requirements, and conform to the top-level safety standards and principles.

The Safety Requirements Document (BNFL-5193-ISP-01, Vol. II, Rev. 0) presents a recommended set of standards as Safety Criterion and Implementing Codes and Standards. BNFL has stated that conformance with numerous top-level standards related to safety goals, objectives or principles is achieved through a Safety Criterion (BNFL-5193-ISP-01, Vol. I, Attachment E, Rev. 0) that essentially repeats the words from DOE/RL-96-0006. Merely repeating the end objective is not identification of subordinate standards. Subordinate standards in the SRD are essential to establish a binding agreement between BNFL and the RU on the technical approach to safety as a prerequisite for future regulatory predictability (consistent with a fixed-price proposal). It is important to note that the requirement for subordinate standards is not a request for program development, but rather a requirement for identification of the criteria governing the technical approach thereby reducing the potential ambiguity in the interpretation of conformance with the top-level standard. However, top-level standards or principles that only state a requirement for a specific deliverable program or numerical limit may not necessitate a corresponding subordinate standard (e.g., DOE/RL-96-0006, 4.2.3.4, Deactivation Plan; There should be an approved plan for deactivation of the facility before it is constructed).

DETAILED QUESTIONS:
Based on the information presented above, it appears that conformance with numerous top-level standards related to safety goals, objectives or principles is not adequately achieved. Please explain your basis for omission of subordinate standards for these top-level standards.

Contractor Response

DOE-RL-96-0004 does not make reference to the term subordinate standards.

Many SRD Criteria reflect programmatic activities which will be conducted during operations; implementing procedures for these criteria will be developed in Part B, but prior to the ORR for the TWRS-P Facility. Implementing procedures will be developed in accordance with the safety management program for procedures and training as identified in Volume II of the SRD Section 7.2. Descriptions of the programs will be provided in the ISAR. As provided for in DOE/RL-96-0003, Sections 4.3.2 and 4.4.2, these procedures will be provided prior to implementation of construction and operating phases of the facility lifecycle.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The term subordinate standards is specifically referenced in DOE/RL-96-0005 (which may not have been stated clearly in the original question based on the response provided). The document states that "the Contractor is required to follow a DOE-specified, structured process to identify the set of subordinate standards and requirements that, when properly implemented, provide adequate safety, comply with legal requirements, and conform to the top-level safety standards and principles" (p. 2 of 2, paragraph 2). The requirement is an essential part of the regulatory program and is required by the contract as presented in Standard 4, paragraph C.2, which states that "the contractor's integrated standards-based safety management program shall be developed to comply with . . . the regulatory program . . . established in . . . (3) DOE/RL-96-0005, Revision 0." As explained in DOE/RL-96-0005, the requirement is essential and as stated "the DOE regulatory approach requires that the Contractor take an active and significant role in identifying the standards and requirements . . . These standards and requirements . . . shall be based on a set of DOE-stipulated top-level standards and principles."

The subordinate standards are essential to establish an approved technical approach to safety thereby reducing the potential ambiguity in the interpretation of conformance with the

top-level standard. Acceptable approaches to providing subordinate standards include identifying an existing technical standard, establishing an ad hoc standard or committing to develop a program satisfying the intent of the standard (such as currently presented in the ISMP, Chapter 3, which "discusses the methods used by the Tank Waste Remediation System-Privatization (TWRS-P) Project to conform to top-level safety standards and principles".) However, the last approach is not a request for program development. Although the set of selected standards developed or chosen by BNFL are rather extensive, the linkage presented in SRD, Vol. I, Attachment E, between these standards (selected as safety criterion and/or implementing codes and standards) and the top-level standards and principles is, in cases, incomplete. Where the linkage is limited to a single safety criterion that only restates the top-level standard or principle, additional subordinate standards that are already contained in the SRD need to be identified or new subordinate standards need to be developed to demonstrate conformance, as appropriate.

Supplemental Response

Please see Attachment-Question 157 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997, which identifies implementing codes and standards for each Safety Criteria in the SRD.

Supplemental Disposition

The Contractors supplemental response is responsive and acceptable. The Attachment Question 157 (pages 157-1 to 157-25) provides ISMP references and codes and standards to be added to the SRD as well as additional text to be added to the ISMP. This method incorporates the referenced ISMP sections as ad hoc standards in the SRD. Acceptable conformance to the top-level standards and principles has been achieved and will be reevaluated during the future Phase I, TWRS Privatization reviews and authorizations.

Question # 158

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Top-level Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8.

Safety Requirements Document, (SRD), Volume II, Section 2, Safety Criteria 2.0-1, Page 2-1.

Integrated Safety Management Plan, (ISMP), Table 1-2, Page 1-11.

OBSERVATION:
DOE/RL-96-0006 provides top-level exposure standards for the ALARA design limit for workers and co-located workers at the normal and anticipated event probabilities; in each case the top-level standard is listed as <= 1.0 rem ALARA design limit.

The ALARA design limits for the normal event probability range is presented in Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8. This table is repeated in appropriate sections of the SRD and the ISMP submittals. The table lists <= 1.0 rem/y per 10 CFR 835 design objective for the worker standard at the normal event probability range and <=1.0 rem/y ALARA design goal for the co-located worker at the normal event probability range. It is assumed that the 10 CFR 835 reference is to

§835.1002(b) which states that "The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of 0.5 mrem (5 microsieverts) per hour...". It is noted that an annual 2000 hour occupational exposure to 0.5 mrem/h results in 1.0 rem/y. Although §835.1002(c) regulates program requirements governing the design objective for the control of airborne radioactive material such that the inhalation of radioactive material by workers is to be controlled to levels that are ALARA, it does not provide numerical value for the ALARA design limit; that is, 10 CFR 835 does not provide an ALARA design limit for airborne radioactive material comparable to that for external sources. For this reason, the worker exposure standard for the ALARA design limit is more comprehensive than that regulated by 10 CFR 835 and the exposure standard for the ALARA design limit should be explicitly stated (e.g., <= 1.0 rem/y ALARA design limit) and not referenced to 10 CFR 835.

For the co-located worker, the comparable exposure standard must be stated as an ALARA design limit rather than an ALARA design goal consistent with DOE/RL-96-0006. The selection of the standard as a limit means that for an event within the stated probability range with consequences resulting in an exposure above the ALARA design limit, the ALARA design engineering program must be applied. Stating the ALARA design limit exposure standard as a goal has no apparent meaning.

DETAILED QUESTIONS:
Based on the information presented above, it appears that the submittal does not conform to the ALARA design limits for the normal event probability range required per DOE/RL-96-0006. Please explain your basis for apparent nonconformance with these top-level standards.

Contractor Response

The approach to ALARA for normal events contained in the BNFL submittal (BNFL-5193-RES-01, Rev. 0) is considered to be in conformance with DOE/RL-96-0006. The RU question makes two observations which are offered as evidence to the contrary. BNFL disagrees with these observations, and our responses to them are given below.

Response to the first observation:

This observation states, as a conclusion, that "... the worker exposure standard for the ALARA design limit is more comprehensive than that regulated by 10 CFR 835 and the exposure standard for the ALARA design limit should ... not [be] referenced to 10 CFR 835." This observation is not supported by DOE/RL-96-0006. Paragraph 2.1 of DOE/RL-96-0006 introduces Table 1 (Dose Standards) and explicitly states "Footnotes to the table refer to the origin of a specific standard." The worker ALARA standards for normal events in Table 1 are marked with footnote 3, which is 10 CFR 835.1002(b). Consequently, contrary to the observation, it is entirely proper to reference the worker ALARA standards to 10 CFR 835.

Response to the second observation:

The observation is based on the premise that the worker ALARA standard should be a limit and not a goal. Since, as shown above, the ALARA standard in DOE/RL-96-0006 originates in 10 CFR 835 (where it is clearly a goal), the premise of the observation is not supported.

In addition, this second observation employs an argument based on applying the ALARA standard to "an event within the stated probability range." This argument cannot be used since, in the normal events probability range, the ALARA standard is not applied to individual events. Instead, the ALARA process is applied to all individual events regardless of consequences, and, if cost-beneficial, dose reduction features are implemented. The ALARA standard is then applied to the aggregate of all individual events on an annual basis as required by Table 1 of DOE/RL-96-0006.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

It is the position of the RU that an ALARA design limit is required for the worker and the co-located worker for each of the annual event probability ranges. (This question focuses on the normal event probability range.) To clarify, the ALARA design limit standard specifies the event consequence (as a radiation exposure value) above which the documented ALARA design engineering program must be applied to evaluate potential safeguards affecting the event sequence.

[During a meeting on November 14, 1997, among BNFL and RU representatives, potential resolutions to this issue were discussed. On November 19, a new write-up indicated that the BNFL position was unchanged on this issue. This position was reviewed, stated to be

unacceptable and potential resolutions discussed again.]

Supplemental Response

The BNFL position stated in the Contractor Response section, above, remains unchanged. In summary, the BNFL position is that the Worker/CLW ALARA standard for normal events in Table 1 of DOE/RL-96-0006 is clearly and explicitly tied to the ALARA design objectives of 10 CFR 835.1002(b). Consequently, BNFL's wording, as shown in the mark-up of Table A of the RESW contained in Attachment Question 158 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997, is fully in conformance with the DOE/RL-96-0006 top-level standards.

Furthermore, no additional ALARA standard is required even though it is recognized that 10 CFR 835.1002(b) only deals with external exposures. This is because BNFL has committed to full compliance with 10 CFR 835 in the SRD, and the other sections of 10 CFR 835.1002 provide adequate requirements to ensure routine worker exposures will be ALARA. However, to provide additional assurance, note 1 will be added as shown on the attached RESW Table A , that states:

"In addition to meeting the listed design objective of 10 CFR 835.1002(b), the inhalation of radioactive material by workers and co-located workers under normal conditions is kept ALARA through the control of airborne radioactivity as described in 10 CFR 835.1002(c)."

Supplemental Disposition

The Contractor's supplemental response is responsive and acceptable. Although the Contractor's current submittal does not list the ALARA standards specified in DOE/RL-96-0006, Table 1, for the worker and co-located worker under normal events, the standards submitted are sufficiently equivalent. Table 1 lists a standard of a <=1.0 rem/yr ALARA design limit for the worker and co-located worker standard under normal events with an associated footnote. In DOE/RL-96-0006, Section 2.1, it states that the "Footnotes to the table refer to the origin of a specific standard." The footnote listed with the specified <=1.0 rem/yr ALARA design limit standard is "10 CFR 835.1002(b) Facility design and modification". The reference to 10 CFR 835.1002(b) denotes the origin of the 1.0 rem/yr value listed in the standard. The Contractor's documented position is that this footnote provides justification to reference the worker and co-located worker standards to 10 CFR 835.1002(b) rather than <=1.0 rem/yr. This position was stated to be unacceptable previously in the original RU disposition which addressed the limited scope of 835.1002(b) to external radiation only. The supplemental response states that "... no additional ALARA standard is required even though it is recognized that 10 CFR 835.1002(b) only deals with external exposures...". The RU does not agree with this position. In the supplemental response, the Contractor has added a footnote to the table for these entries which states that "In addition to meeting the listed design objective of 10 CFR 835.1002(b), the inhalation of radioactive material by workers and co-located workers under normal conditions is kept ALARA through the control of airborne radioactivity as described in CFR 835.1002(c). With this footnote, the Contractor's ALARA standards is determined to be equivalent to that specified in DOE/RL-96-0006, Table 1. The submittal incorporates an ALARA standard equivalent to <=1.0 rem/y for external exposure and more conservative than <=1.0 rem/y for internal exposures resulting from inhalation.

Question # 159

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Top-level Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED: Reference Cited:
Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8.

Safety Requirements Document, (SRD), Volume II, Section 2, Safety Criteria 2.0-1, Page 2-1.

Integrated Safety Management Plan, (ISMP), Table 1-2, Page 1-11.

OBSERVATION:
DOE/RL-96-0006 provides exposure standards for the ALARA design limit for workers and co-located workers at the normal and anticipated event probability ranges and requires that the exposure standards for the ALARA design limit for workers and co-located workers at the unlikely and extremely unlikely event probability ranges be derived.

The submittal redefines the normal and anticipated event probability ranges. The ALARA design limits for the normal probability range is presented in Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8. This table is repeated in appropriate sections of the SRD and the ISMP submittals. The table does not present exposure standards for the ALARA design limit for workers and co-located workers at the anticipated, unlikely and extremely unlikely event probability ranges. It is expected that the "to be derived" ALARA design limit would be less than the "to be derived" radiation exposure standard, however, if the numerical values are the same, it should be stated in the Table A.

DETAILED QUESTIONS:
Based on the information presented above, it appears that the submittal does not present a derivation of ALARA design limits for the workers and co-located workers at the anticipated, unlikely and extremely unlikely event probability ranges required per DOE/RL-96-0006. Please explain your basis for apparent nonconformance with these top-level standards.

Contractor Response

The worker dose standards for accidents contained in the BNFL submittal (BNFL-5193-RES-01, Rev. 0) currently do not specify corresponding accident ALARA limits. This approach is considered to be in conformance with DOE/RL-96-0006, but is contrary to the observation contained in the DOE question. BNFL disagrees with this observation, and our response to it is given below.

The observation states that "DOE/RL-96-0006 ... requires that the exposure standards for the ALARA design limit for workers and co-located workers at the unlikely and extremely unlikely event probability ranges be derived." There is no explicit requirement in Table 1 of DOE/RL-96-0006 to derive ALARA standards for workers under accident conditions. Furthermore, Table 1 clearly implies that none are required since there are no ALARA standards specified in the Table for the public under accident conditions.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

It is the position of the RU that an ALARA design limit is required for the worker and the

Supplemental Response

The BNFL position stated in the Contractor Response section, above, remains unchanged. In summary, the BNFL position is as follows:

ANTICIPATED EVENTS - As noted in RESW, all normal events - regardless of frequency - are included in the normal events category where they fall under the much more conservative "per/yr" standard rather than a "per/event" standard. This means that the anticipated events category includes only events that are to be treated as accidents. The ALARA standard in Table 1 of DOE/RL-96-0006 is clearly tied to 10 CFR 835.1002(b), and therefore to normal operation. Consequently, no worker accident ALARA standards are required for RESW to be in conformance with the DOE/RL-96-0006 top-level standards for anticipated events.

UNLIKELY AND EXTREMELY UNLIKELY EVENTS--There is no explicit requirement in Table 1 of DOE/RL-96-0006 to derive ALARA standards for workers under accident conditions. Furthermore, Table 1 clearly implies that none are required since there are no ALARA standards specified in the Table for the public under accident conditions. Consequently, no

worker accident ALARA standards are required for RESW to be in conformance with the DOE/RL-96-0006 top-level standards for unlikely and extremely unlikely events.

Although, as noted above, no accident ALARA standards for workers are required, note 3 will be added as shown on RESW Table A, provided as Attachment-Question 159 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997, that states:

"In addition to meeting the listed dose standards for accidents, BNFL's approach to accident mitigation is to evaluate accident consequences to ensure that the calculated exposures are far enough below standards to account for uncertainties in the analysis, and to provide for sufficient design margin and operational flexibility."

This note will be added to the accident standards for both workers and the public.

Supplemental Disposition

The Contractor's additional supplemental response was acceptable. For anticipated events, the Contractor tailored the top-level standards addressing ALARA design limits. The Contractor presented a standard that specifies a 1.0 rem/event design action threshold with an accompanying footnote stating that "When a calculated accident exposure exceeds this threshold, then appropriate actions are taken. These include carrying out a less bounding (i.e., more realistic) evaluation to show that the accident consequences will be below the threshold or evaluating additional safeguards for cost-effectiveness and/or feasibility. This threshold is not a limit; it does not require the implementation of additional preventive or mitigative features if they are not both cost-effective and feasible." This standard achieves the intent of the top-level standard to provide an adequate level of safety and ensures that cost-effective safeguards affecting anticipated events are evaluated (and incorporated as appropriate) whenever the final calculated event consequence to a worker or co-located worker is 1 rem or more. For the unlikely and extremely unlikely events probability range, the Contractor provided additional justification assuring that their listed standards are equivalent to the intent or expectations of the "To be derived" entries. A footnote for the entries is to state that "In addition to meeting the listed dose standards for accidents, BNFL's approach to accident mitigation is to evaluate accident consequences to ensure that the calculated exposures are far enough below standards to account for uncertainties in the analysis, and to provide for sufficient design margin and operational flexibility." The proposed 25 rem/event consequence limit is sufficiently low to ensure that the risk to workers and co-located workers from the consequence of accidents would be acceptable. Therefore, the Contractor's overall approach to accident mitigation and selection of safeguards will provide an adequate level of safety and their proposed consequence limit is sufficiently low to ensure that radiation exposures to workers and co-located workers as a result of accidents would be ALARA.
co-located worker for each of the annual event probability ranges. (This question focuses on the anticipated, unlikely and extremely unlikely annual event probability ranges.) As also stated for Question 158, the ALARA design limit standard specifies the event consequence (as a radiation exposure value) above which the documented ALARA design engineering program must be applied to evaluate potential safeguards affecting the event sequence.

[During a meeting on November 14, 1997, among BNFL and RU representatives, potential resolutions to this issue were discussed. On November 19, a new write-up indicated that the BNFL position was unchanged on this issue. This position was reviewed, stated to be unacceptable and potential resolutions discussed again.

Question # 160

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Selection of Radiation Exposure Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and

process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8.

Safety Requirements Document, (SRD), Volume II, Section 2, Safety Criteria 2.0-1, Page 2-1.

Integrated Safety Management Plan, (ISMP), Table 1-2, Page 1-11.

OBSERVATION:
DOE/RL-96-0006 requires that the exposure standards for workers and co-located workers at the unlikely and extremely unlikely event probability ranges be derived. The Worker Accident Risk Goal specified in DOE/RL-96-0006, Section 3.1.3, states that the risk of fatality from radiological exposure should not be a significant contributor to the overall occupational risk of fatality to workers.

The radiation exposure standards are presented in Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8. This table is repeated in appropriate sections of the SRD and the ISMP submittals. The table lists an exposure standard of 25 rem per event for the worker and co-located worker at the unlikely event probability range of 10-2 to 10-4 per year. Part of the basis for this standard is a 1963 reference to the National Bureau of Standards (NBS) Handbook 69, Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure. (Note that the submittal incorrectly cites Handbook 69 as an NCRP document.) The concept of maximum permissible body burdens and maximum permissible concentrations is outdated for radiation protection practices. It has been replaced in both 10 CFR Part 20 and 10 CFR 835 by annual limits on intake (ALIs) and derived air concentrations (DACs). Similarly, the reference statement that a 25 rem exposure may be disregarded in the determination of radiation exposure status should be updated using a current reference (e.g., BEIR V). The submittal equates the 25 rem/event standard for unlikely event range (10-2 to 10-4 per year) to a maximum annual increase in worker lifetime risk of premature death of only 2 x 10-4. According to EH-12-94-01, Vol. 1, the risk of a fatality to workers in U.S. industries ranges from about 0.3 X 10-4 in the "safest" industry to 4 X 10-4 in the "least safe" industry and a value of 1 X 10-4 can be considered "average". Using 10% as the threshold for a single significant contributor such as radiological exposure, an overall risk of fatalities associated with facility accidents of approximately 1 X 10-5 per year would result in an accident not being a significant contributor to the overall occupational risk of fatality to workers. Such a value would satisfy the Worker Accident Risk Goal specified in DOE/RL-96-0006 (RL/REG-97-09). Therefore, it appears that the Worker Accident Goal is not met at 10-2 per year event probability with the proposed 25 rem radiation exposure standard. (Note: one approach to meet this criterion would be to establish an average exposure standard (single value) across the probability range of 10-2 to 10-4 that results in an average fatality risk of approximately 1 X 10-5 per year. The corresponding value for the 10-2 to 10-4 event probability range is a constant worker dose standard of slightly less than 10 rem if the probability of event is evenly distributed across the probability range.)

DETAILED QUESTIONS:
Can the exposure standard of 25 rem/event be shown to meet the Worker Accident Risk Goal for the probability of event distribution applicable to the BNFL facility for the unlikely event probability range?

Contractor Response

The worker dose standards for accidents contained in the BNFL submittal (BNFL-5193-RES-01, Rev. 0) currently specify a 25 rem limit for unlikely events (probability range 10-2 to 10-4 per year). The DOE question is whether the BNFL approach can meet the Worker Accident Risk Goal specified in DOE/RL-96-0006.

The approach described in BNFL-5193-RES-01 will, by definition, meet the Worker Accident Risk Goal since BNFL has explicitly committed to "calculating the risk of facility operation to workers" and to adding "accident prevention and mitigation features ... as necessary to satisfy the worker accident risk goal."

This approach is a more precise alternative to that described in DOE RL/REG-97-09 (and which was essentially repeated in the observation to the DOE question). The RL/REG-97-09 approach relies on the assumption that the probability of events is evenly distributed across

the probability range. Given that assumption, a standard of less than 10 rem/event is indeed necessary to meet the risk goal; however, the BNFL approach obviates the need for the even distribution assumption and, therefore, the need to establish the worker dose standard below 10 rem.

Finally, the observation states that BNFL-5193-RES-01 incorrectly refers to NBS Handbook 69 as an NCRP document. In actuality, Handbook 69 is a report of the NCRP, as is explicitly stated in the introduction of the Handbook. Also, the observation makes a point about the outdated terminology in the title of this document. BNFL concurs that this terminology is outdated; however, it was only used in the reference section to allow the correct citation of the document. Neither the terminology nor the concepts are used anywhere in the BNFL approach.

As a consequence, no changes to the BNFL submittal are considered necessary as a result of this question.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

During a meeting on November 14, 1997, among BNFL and RU representatives, BNFL representatives indicated that RESW Table A would likely also be modified to include a statement of commitment to achieving the Worker Accident Risk Goal in addition to specifying a 25 rem limit. Such a modification of the table is a more accurate description of the approach described in BNFL-5193-RES-01, which is restated in the response.

[In a meeting on November 19, 1997, BNFL representatives indicated that conformance with the Worker Accident Risk Goal would be indicated in Table A through the addition of a footnote.

Supplemental Response

This material is supplemental to the information provided in the Contractor Response section, above.

Based on experience with similar plants, BNFL considers it unlikely that the actual situation for the TWRS-P Facility will show that events are evenly distributed across the unlikely event probability range. Furthermore, experience indicates that there will be relatively few accidents falling into this range, and that they will be distributed toward the low probability end of the range. Consequently, a value higher than 10 rem can safely be used for the worker accident standard for unlikely events, provided that, as noted above, BNFL ultimately demonstrates that the Worker Accident Risk Goal has been met.

Text that reflects the above will be added to Section 2.0 of RESW. Furthermore, to provide additional assurance, note 2 will be added to RESW Table A, provided as Attachment-Question 160 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997, that states:

"In addition to meeting the listed worker and co-located worker exposure standards for accidents, the Worker Accident Risk Goal is satisfied through the calculation of the risk from accidents with accident prevention and mitigation features added as necessary to meet the Goal. See Section 2.0."

Mark-ups of Section 2.0 and Table A of RESW are included in Attachment-Question 160 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997.

Supplemental Disposition

The Contractor supplemental response is responsive and acceptable. The Contractor has indicated that the frequency distribution of accidents within the unlikely events probability range will support the worker and co-located worker dose standards selected and will ensure that "the Worker Accident Risk Goal is satisfied through the calculation of the risk from accidents with prevention and mitigation features added as necessary to meet the Goal."

Question # 161

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Completeness of Selected Standards

SUBMITTAL CRITERIA:
2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable

laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document, (SRD), Volume I, Section 4.

Integrated Safety Management Plan, (ISMP), Section 3.3.1.6.

OBSERVATION:
Per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to conform to the top-level standards and principles contained in DOE/RL-96-0006. Top-level standard 4.3.2.1, Radiation Practices, requires that an acceptable system of radiation protection practices should be followed in the operational phase for the protection of workers and the public.

The Safety Requirements Document (BNFL-5193-ISP-01, Vol. II, Rev. 0) presents a recommended set of standards as Safety Criterion and Implementing Codes and Standards. A review of the set of radiological, nuclear and process safety standards documented in the SRD, Vol. II, was performed. It was noted in numerous Safety Criterion that a requirement from 10 CFR Part 20 was paraphrased. In some cases, the paraphrased Safety Criterion changes the intent of the 10 CFR Part 20 requirement cited in the corresponding Regulatory Basis listing. In the ISMP, Section 3.3.1.6, Radiation Protection Program (RPP), it is stated that the outline for the RPP "has been developed to facilitate transition to U.S. Nuclear Regulatory Commission (NRC) as the regulator and the need to comply with 10 CFR [Part] 20, Standards for Protection Against Radiation."

DETAILED QUESTIONS:
If the paraphrasing of numerous 10 CFR Part 20 requirements as Safety Criterion is intended to limit or change the scope of the requirement, please explain the apparent inconsistency with your stated (radiation protection) regulatory expectations.

Contractor Response

The BNFL RPP will be in compliance with 10 CFR 835.

Paraphrasing of 10 CFR 20 requirements does not in itself, limit or change the scope of the requirements, nor does it change the intent of a Radiation Protection. Inclusion of a requirement from 10 CFR Part 20 as a basis for the development of a BNFL TWRS-P Safety Criteria does not mean nor imply that the developed Safety Criteria is in full compliance to 10 CFR Part 20. These Safety Criteria were developed specifically to address the transition from DOE to NRC regulation should that occur.

Disposition

The BNFL response is responsive and acceptable.

The response to this question provides a clear statement of the intent of the submittal pertaining to safety criteria based on 10 CFR Part 20 requirements.

Supplemental Response

Supplemental Disposition

Question # 162

Description

THEME: Conformance to Top Level Standards and Principles

SUBORDINATE THEME: Compliance Statement

SUBMITTAL CRITERIA:

2) The Contractor's certification that the set of radiological, nuclear, and process standards in the SRD will, when implemented, will provide adequate safety, comply with all applicable laws and regulations, and conform to the DOE-stipulated top-level safety standards and principles;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8.

Safety Requirements Document (SRD), Volume I, Attachment E, Page E-20 & 21.

Safety Requirements Document (SRD), Volume II, Section 2, Safety Criteria 2.0-1, Page 2-1.

Safety Requirements Document (SRD), Volume II, Section 3; Safety Criteria 3.1-4, 3.2-1; Page 3-2, 3-3, & 3-5.

Safety Requirements Document (SRD), Volume II, Section 4, Safety Criteria 4.1-1, Page 4-3.

Integrated Safety Management Plan, (ISMP), Table 1-2, Page 1-11.

OBSERVATION:
Per DOE/RL-96-0003, the Contractor's recommended set of radiological, nuclear and process safety standards documented in the SRD is to conform to the top-level standards and principles contained in DOE/RL-96-0006. The need for acceptable risk and safety analyses affecting design provisions for preventing and mitigating postulated accidents are specified in top-level standards 4.2.1.1, Safety Design; 4.2.1.2, Risk Assessment; and 4.2.1.3, Safety Analysis.

Radiation exposure standards are presented in Radiological and Nuclear Exposure Standards for Facility and Co-located Workers (BNFL-5193-RES-01, Rev. 0), Table A, Exposure Standards Above Normal Background, p. 8. This table is repeated in appropriate sections of the SRD and the ISMP submittals. The table includes a statement of compliance with the exposure standards for the worker and co-located worker at the anticipated, unlikely, and extremely unlikely event probability ranges. The statement is "(Compliance established using qualitative methods supported where necessary by numerical analysis.)" It appears that this statement pertains directly to conformance with top-level standards 4.2.1.1, 4.2.1.2 and 4.2.1.3. SRD, Vol. I, Attachment E, Compliance with Applicable Laws and Contract Requirements, lists Safety Criterion (SC) 4.1-1, SC 3.1-4, and SC 3.2-1 as standards demonstrating conformance with top-level standards 4.2.1.1, 4.2.1.2 and 4.2.1.3, respectively.

DETAILED QUESTIONS:
Is the statement of compliance listed in the table intended to support demonstration of compliance with top-level standards 4.2.1.1, 4.2.1.2 and 4.2.1.3 and is it consistent with the scope of SC 3.1-4?

Contractor Response

In Table A of the BNFL submittal (BNFL-5193-RES-01, Rev. 0), the qualifier in question is reflective of the discussion in Section 2.0 of the document, which includes BNFL's approach to compliance with the worker accident exposure standards. The purpose of the qualifier is solely to indicate that dose consequences to workers as a result of accidents need not be calculated in all cases. For example, numerical analyses will not be necessary for

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The BNFL response states that the text in question (qualifier) that appears in Table A of the RESW provides a statement of BNFL's approach to compliance with the worker accident exposure standards and is not intended to support demonstration of conformance with any potentially relevant top-level standard. Because the qualifier specifically addresses

compliance to the worker accident exposure standards, which is to be reviewed for acceptability by the RU at a later date, the qualifier statement has not and will not be considered as part of the review and approval process for the RESW.

[In a meeting on November 19, 1997, BNFL representatives indicated that the qualifier statement would be deleted from Table A.

Supplemental Response

This material is supplemental to the information provided in the Contractor Response section, above.

To avoid confusion, the qualifier in question has been deleted as shown on RESW Table A, Attachment-Question 162 to BNFL's Response to RU Dispositions, Letter # 5193-97-0554, December 8 1997.

Supplemental Disposition

The Contractor supplemental response is responsive and acceptable. The qualifier text has been deleted from the reference material.
events that are bounded by other events or for accidents where the consequences to workers are clearly of no concern.

Therefore, given the above, the qualifier is not intended to support demonstration of compliance with DOE/RL-96-0006 top-level standards 4.2.1.1, 4.2.1.2, and 4.2.1.3. See Appendix E of Volume I of the SRD for compliance with these standards.

Finally, there is no inconsistency between the qualifier (which is related exclusively to the accident analyses) and SRD Safety Criterion 3.1-4 (which is related to the hazard analysis).

Question # 163

Description

THEME: Compliance to Laws (QA/RP)

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall:

h) Identify roles, responsibilities, and authorities for defining, implementing, and maintaining safety.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

10) Safety definition, implementation, and maintenance roles, responsibilities, and authorities defined in the ISMP are clear and appropriate.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 11.0

OBSERVATIONS:
Exhibit 1-2 of the BNFL Inc. Quality Assurance Program ("QAP;" BNFL-5193-QAP-01, Revision 2, February 7, 1997) shows the TWRS-P Project QA Manager reporting directly to the BNFL Inc. Corporate QA Manager with a dotted line reporting relationship to the BNFL Inc. Project Manager.

Section 1.7.4 of the BNFL Inc. QAP (page 9 of 14 with Section 1) states: "The TWRS-P Project QA Manager reports directly to the Corporate (BNFL Inc.) QA Manager. This is essential to independently and effectively verify program requirements and to ensure product quality."

Figure 11-1 of the BNFL Inc. ISMP (entitled "Design and Construction Organization") shows the Quality Assurance Group reporting directly to the Project Manager with a dotted line reporting relationship to the VP ES&H and QA.

Figure 11-2 of the BNFL Inc. ISMP (entitled "Operational Organization") shows the Quality Assurance Group reporting directly to the General Manager (there is no dotted line reporting relationship shown on the organization chart for this group).

DETAILED QUESTIONS:
Given the statement in the BNFL Inc. QAP that it is "essential" for the TWRS-P Project QA Manager to report directly to the Corporate QA Manager (i.e., in order to "... independently

and effectively verify program requirements and to ensure product quality"), please explain why the elimination of this direct reporting relationship will not adversely impact safety.

Contractor Response

As noted in the response to the question # 77, Exhibit 1-2 of the BNFL QAP shows the TWRS-P project integration and coordination team organization for Part A project activities.

The ISMP, on the other hand, was developed for Part B project activities. Figures 11-1 and 11-2 provide the project organization for the design and construction phase and operational phase, respectively. The dotted line in Figure 11-1 will be changed into a solid line to reflect the Project QA Manager direct reporting to the BNFL Corporate QA Manager. Figure 11-2 however, shows the organization during the facility operation which is a Limited Liability Company (LLC), a separate entity from BNFL. This company will have its own Quality Assurance organization reporting directly to the Facility General Manager (the President of the LLC). During the operation, BNFL will provide directions with regard to the Corporate policies, standards, and procedures.

Disposition

The BNFL response is responsive and acceptable.

The BNFL Inc. response : (a) stated that the reporting relationship shown in Figure 11-1 would be changed to parallel that in the QAP and (b) provided an adequate explanation regarding the adequacy of the reporting relationship shown in Figure 11-2. See also the Justification statement for Question 77.

Supplemental Response

Supplemental Disposition

Question # 164

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

4) The selected safety management processes documented in the ISMP properly and adequately address management of process hazards;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 5.0, Page 5-1.

Integrated Safety Management Plan (ISMP), Section 5.2, Page 5-2 & 5-3.

OBSERVATIONS:
BNFL-5193-ISP-01 Rev. 0, Sect. 5.2 Control of Subcontractors, states (pages 5-2 and 5-3);

"BNFL's responsibilities include the following:.....item 3) Developing and implementing safe work practices to control the entrance, presence, and exit of subcontractor employees, including their presence in areas of the process covered by the PSM Standard."

The Contractor has determined that TWRS-P will contain highly hazardous chemicals in amounts that exceed the thresholds listed by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" (the Process Safety Management (PSM) Standard). Anhydrous ammonia is defined as a "highly hazardous chemical" by Appendix A to 1910.119 - List of Highly Hazardous Chemicals, Toxics and Reactives (Mandatory). The planned inventory of anhydrous ammonia exceeds the PSM Standard's listed threshold of 10,000 pounds; therefore TWRS-P is a "covered process" and the employer must comply with the OSHA PSM Standard.

"Process" is defined in 29 CFR 1910.119 (b) as "any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process".

On page 5-1, the ISMP states "because the top-level standards and principles mirror most of the elements of the PSM standard (with the exception of employee involvement and trade secrets), a program that satisfies the OSHA PSM standard also satisfies the top-level principles." Thus BNFL appears to be relying upon compliance with 29 CFR 1910.119 to ensure conformance with General Process Safety Principles (Sect 5.0 of DOE/RL-96-0006).

DETAILED QUESTIONS:
a.) In light of the statement in the ISMP Sect. 5.2, "Control of Subcontractors," concerning presence of subcontractor employees "in areas of the process covered by the PSM Standard," and the definition of "process" provided by 29 CFR 1910.119, what portions of the TWRS-P process and the TWRS-P facility does BNFL consider not to be included in the category of "covered process"?

b) How will BNFL ensure conformance with General Process Safety Principles (Sect 5.0 of DOE/RL-96-0006) in any parts of the TWRS-P process and the TWRS-P facility that are not included in the category of "covered process" under 29 CFR 1910.199?

Contractor Response

a. At this point, it is expected that the melter assembly building, empty container storage building, services building, and administration building would not be covered under the PSM requirements. Buildings that would potentially be covered under PSM include the radioactive waste treatment building, immobilized waste container shipping building, wet chemical storage building, and glass formers storage building.

b. Conformance to the General Process Safety Principles Section 5.0 the DOE/RL-96-0006 will be achieved through implementation of the SRD Safety Criteria, which are not solely dependent on 29 CFR 19190.119, and are applied through BNFL's controlled area as appropriate.

Disposition

The BNFL response is responsive and acceptable.

The first detailed question asks the Contractor to identify what portions of the TWRS-P process are not included in the category of OSHA PSM "covered process". The response identifies the melter assembly building, empty container storage building, and administration building as portions of the TWRS-P process that would not be covered under the PSM requirements. However, "PSM" generally means Process Safety Management, a broad, general concept, while the OSHA PSM Standard is a specific regulation embodying the principles of Process Safety Management. The response is acceptable based on the Contractor commitment to document that "PSM requirements" in the Contractor's response means "OSHA PSM Standard" requirements.

The second detailed question asks how BNFL will ensure compliance with the General safety Principles in Sect. 5.0 of DOE/RL-96-0006 in any parts of the process not included in the category of "covered process" under 29 CFR 1910.119. The Contractor's response to the second detailed question is acceptable, and states that conformance with the General Process Safety Principles will be achieved through implementation of the SRD Safety Criteria, which are applied "through BNFL's controlled area as appropriate."

Supplemental Response

Supplemental Disposition

Question # 165

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 5.0, Pages 5-1 – 5-10.

OBSERVATIONS:
The TWRS-P process is a covered process as defined by 29 CFR 1910.119 because of the projected inventory of anhydrous ammonia. The ISMP states in Sect 5.0 that "because the top-level principles mirror most of the elements of the PSM standard (with the exception of employee involvement and trade secrets), a program that satisfies the OSHA PSM standard also satisfies the top-level principles."

DETAILED QUESTIONS:
a) How does BNFL Inc. intend to tailor the General Process Safety Principles (Sect 5.0 of DOE/RL-96-0006) to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation?

b) How does BNFL Inc. intend to implement the requirements of 29 CFR 1910.119(c), "Employee Participation," and of 29 CFR 1910.119 (p), "Trade Secrets for TWRS-P?"

c) It is possible that, due to process changes as the design work progresses, or as a result of a decision during the operational phase to reduce the inventories of "highly hazardous" chemicals in TWRS-P below the thresholds listed in Appendix A of 29 CFR 1910.119, the TWRS-P process will change so that it is no longer a "covered process" as defined by 29 CFR 1910.119. If this should happen, how will BNFL ensure conformance with the General Process Safety Principles (Sect 5.0 of DOE/RL-96-0006) and tailor their application to the hazards associated with the proposed TWRS-P facility, its operation, and its deactivation?

Contractor Response

a. The General Process Safety Principles of Section 5.0 of DOE/RL-96-0006 will be tailored to the hazards associated with TWRS-P through the application of the SRD Development Process as defined in "TWRS-P Privatization Project: TWRS-P Safety Requirements Document Development Procedure."

b. BNFL is implementing the requirements of 29 CFR 1910.119(c) employee participation and 29 CFR 1910.119(p) as reflected in Safety Criteria 3.1-1, 3.1-2, and 3.1-5 and implemented through the PHA Plus Procedure K0104_REP_007_SAF provided to the RU.

c. . Conformance to the General Process Safety Principles Section 5.0 the DOE/RL-96-0006 will be achieved through implementation of the SRD Safety Criteria, which are not solely dependent on 29 CFR 19190.119.

Disposition

The BNFL response is responsive but unacceptable for reasons indicated below:

The Contractor responses to the first and third detailed questions are acceptable. The Contractor response to the second of the detailed questions is unacceptable.

The first detailed question asks how BNFL intends to tailor the General Safety Principles (Sect. 5.0 of DOE/RL-96-0006) to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation. The response is acceptable and indicates that the General Process safety Principles will be tailored to the hazards through the application of the SRD Development Process as defined in TWRS-P Privatization Project: TWRS-P Safety

Supplemental Response

Section 2.2.2 "Information Requirements For PHA-Plus" of K0104_REP_002_SAF, Process Hazard Analysis Procedure for TWRS-P requires the following information be provided to the PHA Study Team and be of sufficient content to identify Feeds to the plant, intermediates and products, process stages and unit operation, plant locations, inventory, approximate sizes, and plant throughput, outline process control information, and process chemical behavior. Information shall also be provided for the compilation of a Chemical Interaction Matrix and the Hazardous Characteristics of Process Materials. See Section 4.1 of the HAR.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL provided the RU with a redline-strikeout version of the SRD that implements the requirements of 29 CFR 1910.119 (p) by requiring those persons provided with Trade Secret information necessary for 1) compiling process safety information, 2) developing the process hazard analysis, 3) operating procedures, 4) incident investigations, 5) emergency planning and response, and 6) compliance audits, to enter into confidentiality agreements not to disclose the information, as set forth in 29 CFR 1910.1200. The change resulted from a telecon between Mr. Roy Hardwick (RU) and Ms. Leanne Smith (BNFL), on December 11, 1997.
Requirements Document Development Procedure.

The second detailed question asks how BNFL intends to implement the requirements of 29 CFR 1910.119 (c) "Employee Participation" and of 29 CFR 1910.119(p) "Trade Secrets". The response is unacceptable and indicates that the OSHA PSM Standard's requirement concerning trade secrets are reflected in Safety Criteria 3.1-1, 3.1-2, and 3.1-5 and implemented through the PHA Plus Procedure K0104_REP-007-SAF provided to the RU. The OSHA PSM Standard, 29 CFR 1910.119(p) Trade secrets states: " (1) Employers shall make all information necessary to comply with the section available to those persons responsible for compiling the process safety information (required by paragraph (d) of this section), those assisting in the development of the process hazard analysis (required by paragraph (e) of this section), those responsible for developing the operating procedures (required by paragraph (f) of this section), and those involved in incident investigations (required by paragraph (m) of this section), emergency planning and response (paragraph (n) of this section) and compliance audits (paragraph (o) of this section), without regard to possible trade secret status of such information." An acceptable response to the detailed question will demonstrate how Safety Criteria 3.1-1, 3.1-2, and 3.1-5 reflect the requirements of 29 CFR 1910.119(p) or provide other substantive arguments to support the Contractor's position.

The third detailed question asks how BNFL will ensure conformance with the General Process Safety Principles in the event the TWRS-P facility ceases to be an OSHA PSM Standard "covered process". The response is acceptable and states: "Conformance to the General Process safety Principles will be achieved through implementation of the SRD Safety Criteria, which are not solely dependent on 29 CFR 1910.119."

Question # 166

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

a) Define the key safety-related activities to be performed by the Contractor;

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to the nature and level of hazards, including process hazards), implemented, and maintained;

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:

The approval of the Contractor's proposed ISMP will be issued upon determination by the

Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 5.6.7, Page 5-10.

OBSERVATIONS:
Sect. 5.6.7 Investigation of Incidents states that " For incidents that have the potential to result in a major accident or a release of hazardous or radioactive material from the controlled area of the TWRS-P Facility, an investigation is conducted in accordance with the Safety Criteria of SRD Volume II, Section 7.7 "Reporting and Incident Investigation." The undefined term "major accident" is also used in SRD Volume II 7.7 Reporting and Incident Investigation, Safety Criterion 7.7-1.
TWRS-P is a "covered process" for the application of OSHA's PSM Standard 29 CFR 1910.119, including incident investigation covered by paragraph (m) "Incident Investigation". The incidents for which OSHA expects employers to become aware and to investigate are the types of events which result in or could reasonably have resulted in a "catastrophic release of a highly hazardous chemical". The PSM Standard defines "catastrophic release" as a major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace." "Highly hazardous chemical" means a substance possessing toxic, reactive, flammable, or explosive properties and listed in Appendix A of 29 CFR 1910.119.

GENERAL QUESTION:
Please provide additional information regarding the tailoring of DOE/RL-96-0006 Top-Level Principle Sect. 5.2.10 Incident Investigation to the TWRS-P Project.

DETAILED QUESTIONS:

a) How is "major accident" defined for the purpose of ISMP Sect. 5.6.7 Investigation of Incidents?

b) How does a potential "major accident" differ from a potential "release of hazardous or radioactive material from the controlled area of the TWRS-P facility"?

c) How will the determination be made that an accidental "near miss" or an actual release of a hazardous material merits reporting and an incident investigation?

d) Will the investigation of incidents and "near misses" be tailored, and, if so, what criteria and process will be employed to tailor them ?

Contractor Response

General Question:

Disposition

The BNFL response is unresponsive for reasons indicated below:

The Contractor response to the general question is unresponsive, to the detailed questions (a) and (b) the responses are acceptable, and to questions (c) and (d) unresponsive.

The general question asks for additional information regarding the tailoring of DOE/RL-96-0006 Top-level Principle Sect. 5.2.10 Incident Investigation to the TWRS-P Project. The Contractor's response to the general question lists five potential areas for investigation that a team could examine but does not address tailoring of the investigation effort to the consequences of an actual accident or to the potential consequences of a "near-miss" event. For example, in the event of a cold chemical spill, the magnitude of the spill and the nature of the chemical could be relevant criteria to determine whether or not to conduct an investigation, and the size and composition of the investigation team if an investigation is warranted. However, the Contractor response is silent in these respects.
Detailed question (a) asks for the definition of "major accident" for the purpose of ISMP Sect. 5.6.7 Investigation of Incidents. The Contractor's response is acceptable and defines "major accident" for incident investigation and reporting requirements of 29 CFR 1910.119(m) involving "highly hazardous" chemicals. Releases of anhydrous ammonia at TWRS-P fall in this category of "major accident" provided the Contractor stores more than 10,000 lbs of anhydrous ammonia (the threshold quantity of this "highly hazardous chemical" for designating the process as an OSHA PSM Standard "covered process"), and the release amount is sufficient to present a serious danger to employees in the workplace
Detailed question (b) asks how a potential "major accident" differs from a potential "release

of hazardous or radioactive material from the controlled area of the TWRS-P facility. The Contractor's response to detailed question (b) is acceptable and indicates that the term "major accident" applies to chemical and radiological releases to the facility worker, and "release of hazardous or radioactive material from the controlled area of the facility" refers to the co-located worker and the public. Therefore the term "major accident" for TWRS-P has a special significance when releases of "highly hazardous" chemicals are involved, and also a general meaning when facility workers are exposed to chemicals and radiological materials.

Detailed question (c) is a "tailoring" question that asks how the Contractor will determine that an accidental "near miss" or an actual release of a hazardous material merits reporting and an incident investigation. The Contractor's response commits that in Part B, the PSAR and FSAR will include tables that will define reporting requirements; however, the response is silent on the issue of decision for when a release merits an investigation, and what determines the extent of an investigation. Therefore, the Contractor's response to detailed question (c) is unresponsive.

Detailed question (d) asks whether the investigation of "near misses" will be tailored, and, if so, what criteria and process will be employed to tailor the investigation. The Contractor's response is : "See the response provided for the general question", and, like the response to the general question, is unresponsive because the response is silent about tailoring in terms of criteria and process.

As the TWRS-P Facility will contain both radiological and chemical materials, the incident investigation process will treat both of these hazards equally. The incident investigation

Supplemental Response

Revised Responses

General Question and detail Questions c and d.

The basis for the finding on the response to the general question and the specific questions c and d is related to the same point of BNFL having not described how the incident investigation process will be tailored to the nature of the event. The following is provided to address the concerns stated for the general question and the specific questions c and d.

Incidents are categorized after occurrence as either an emergency, unusual incident, or offnormal incident. This categorization is one factor used in determine the extent of the incident investigation in terms of the size of the investigation team, its independence, and the depth of the root cause analysis. By this process, the extent of the incident investigation is tailored to the consequences of the event or the potential consequences of a "near miss." For example, by tying the incident investigation to the event categorization, an increasing level of investigation is applied to the following events; 1) a hazardous substance release that exceeds 50 percent of a CERCLA reportable quantity, 2) a chemical release that violates environmental requirements in state or federal permits, and 3) a chemical release that had reported affects on co-located workers.

The categorization process is not the only factor that determines the extent of incident investigation. For example, incidents that are repeat occurrences will receive more in depth investigation, in part, to determine the reason for ineffectiveness of the corrective actions. Where repeat incidents or recurring causes are indicated, prompt follow-up action is initiated to identify additional corrective actions needed to preclude recurrence. These additional corrective actions are tracked to completion and their adequacy verified to ensure correction of the problem. An evaluation is also conducted for repeat occurrences to determine if the trend represents a programmatic failure reportable under 10 CFR 820.

The investigative process is used to gain an understanding of the incident, its causes, and corrective actions necessary to prevent recurrence. The process is summarized below.

1) The scope and depth of analysis of a particular incident is tailored to the significance of the incident. The tailoring of the analysis (i.e., incident investigation) is, in part, dependent investigation process will be tailored to the nature of the event, as requested in the general incident), if the incident is a repeat occurrence, and if the incident is considered as a investigation process will be tailored to the nature of the event, as requested in the general upon the categorization of the incident (i.e., an emergency, unusual incident, or offnormal The Contractor’s supplemental response is acceptable. BNFL described how the incident significant condition adverse to quality. question and in the detailed questions (c) and (d).

2) If the investigative process warrants a team investigation as determined from the evaluation above, at least one member of the investigative team is assigned from the organization most closely involved with the activities that were ongoing at the time of the event or incident. This member provides detailed firsthand knowledge of the performance of

the activities. Other members are independent, and all members are knowledgeable of facility design and operations, or are experts in safety (industrial or process).

3) At least one member is formally trained in at least one of the various industry-accepted methods of incident investigation and cause determination.

4) The team investigates the event, identifies underlying causes, formulates corrective action recommendations, and documents the results of the investigation.

5) The incident investigation process, its implementation, and its effectiveness are reviewed periodically by the TWRS-P Project Safety or by audits or assessments.

The ISMP will be revised to incorporate the above response.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL described how the incident investigation process will be tailored to the nature of the event, as requested in the general question and in the detailed questions (c) and (d).

Question # 167

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBMITTAL CRITERIA
6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

DOE-RL/96-0006

3.3.2 Worker Protection – Measures in the design and operation of the facility to protect workers against accident conditions should be evaluated using an acceptable approach to demonstrate that they perform their intended purpose with high confidence.

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE-RL/96-0006

3.3.2 Worker Protection – Measures in the design and operation of the facility to protect workers against accident conditions should be evaluated using an acceptable approach to demonstrate that they perform their intended purpose with high confidence.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.10, Pages 1-16 – 1-18.

Integrated Safety Management Plan (ISMP), Section 1.3.11, Pages 1-18 – 1-23.

Hazard Analysis Report (HAR), Section 1, Page 1-2 & 1-4.

OBSERVATIONS:
The ISMP provides a description of how worker protection will be achieved through designation of Design Class II systems, a process similar to that which is provided in DOE-STD-3009-94. The HAR also references DOE-STD-3009-94 in several locations. However, DOE-STD-3009-94 is not among the selected set of standards in the SRD.

DETAILED QUESTIONS:
Is DOE-STD-3009 a selected standard? If not, are the process and diagrams outlined in the ISMP in figure 1-1 and described in Sections 1.3.10 & 1.3.11 an ad hoc standard? If it is, why is it not listed as such in the SRD? If not, what is the implementing standard selected for SC 1.0-6 or SC 1.0-9 that guides the process to ensure protection of workers as required to conform to DOE/RL-96-0006, item 3.3.2?

Contractor Response

DOE-STD-3009 is not a selected standard. No, the figure is not an ad hoc standard; however, the elements of Figure 1-1 are implemented through K0104_REP_007_SAF, "PHA Plus Procedure," and ESH-03-TWRS, "Accident Analysis Procedure" and will be included as implementing procedures for Safety Criterion 1.0-9. The design process as addressed in Section 3.1, 3.6, 3.7, and 3.11 of the ISMP implements Safety Criterion 1.0-6 and demonstrates conformance to DOE/RL-96-0006.

Disposition

The BNFL response is responsive and acceptable.

The answer is responsive and acceptable. It clarifies the implementing standards to be used for accident analysis (SC 1.0-9) and commits to including them with SC 1.0-9.

Supplemental Response

Supplemental Disposition

Question # 168

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBMITTAL CRITERIA:
6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

DOE/RL-96-0006
4.3.1.8 Operational Events – Facility management should institute measures to ensure that events relevant to safety are detected and evaluated and that necessary corrective measures are taken promptly and information on them is disseminated. Operational event reports should be prepared and submitted to, the Director of the Regulatory Unit. The facility management should have access to operational safety experience from other related facilities.

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

DOE/RL-96-0006
4.3.1.8 Operational Events – Facility management should institute measures to ensure that events relevant to safety are detected and evaluated and that necessary corrective measures are taken promptly and information on them is disseminated. Operational event reports should be prepared and submitted to, the Director of the Regulatory Unit. The facility management should have access to operational safety experience from other related facilities.

REFERENCE CITED:
Safety Requirements Document (SRD); Volume II, Section 7.7-6, Page 7-21 & 7-22.

Integrated Safety Management Plan (ISMP), Section 12.

OBSERVATIONS:
Safety Criterion 7.7-6 refers to "reportable occurrences." However the safety criterion provides neither a definition for "reportable occurrences" nor standards for determining whether occurrences are reportable. Likewise, the glossary in Chapter 12 of the ISMP contains no definition for "reportable occurrences.

DETAILED QUESTIONS:
Please define "reportable occurrences" and identify the standard(s) that will be employed for determining whether an event is a reportable occurrence.

Contractor Response

ISMP Section 12.0, "Definitions" will be revised to include the following definitions:

Reportable Occurrence - An incident that shall be reported to the DOE Incident Reporting and Process System and other Federal or State agencies. The threshold for reporting will be provided in the TWRS-P Facility Incident Reporting Procedure, to be developed in Part B.

In Part B, the PSAR will provide specific criteria for incident reporting during the construction phase and proposed criteria for the operations phase. The FSAR will provide specific criteria for the operating phase. The FSAR will be revised near the end of waste processing operations to address specific incident reporting criteria for the deactivation phase.

ISAR Section 3.7 "Incident Investigations" will provide proposed guidelines for incident reporting.

Disposition

The BNFL response is considered to be responsive and acceptable.

The definition of reportable occurrence, including the commitment to define the threshold for reporting in the TWRS-P incident reporting procedure to be developed in Part B, that is provided in the response, in combination with the commitment to provide specific incident reporting criteria in the PSAR for in is an acceptable approach to addressing the issue at this point in the project.

Supplemental Response

Supplemental Disposition

Question # 169

Description

THEME: Change process to Standards or other safety documents.

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

e) Specify the expected flow and schedule of the Contractor's safety-related work and deliverables, including interactions with the Regulatory Unit;

DOE/RL-96-0006
Section 4.1.3.1 Authorization Basis – Material that is part of the authorization basis should be established, documented, and submitted to the Director of the Regulatory Unit for evaluation and in support of authorization decisions and regulatory oversight.

Section 4.4.4 Unresolved Safety Questions – All facility modifications after operations begin that can affect safety should be assessed by the Contractor for an "unreviewed safety question" and positive determinations submitted to the Director of the Regulatory Unit for review.

Section 5.2.9 Management of Change – The contractor should evaluate all planned changes involving the technology of the process and the facility design and operation in order to ensure that the impact on safety is analyzed and acceptable and to determine the need for modifications to operating procedures. The contractor should establish and implement written procedures to manage changes to process chemicals, technology, equipment, and procedures; and changes to facilities. These procedures should address the technical basis for the proposed changes, impact of the changes on process safety, modification of the operating procedures, the schedule for proposed changes, impact of the changes on process safety, modification of the operating procedures, the schedule for proposed changes, and authorization for proposed changes.

10 CFR 830.120(c)(2)(ii) "Design. Items and processes shall be designed using sound engineering/scientific principles and appropriate standards. Design work, including changes, shall incorporate applicable requirements and design bases. Design interfaces shall be identified and controlled. The adequacy of design products shall be verified or validated by individuals or groups other than those who performed the work. Verification

and validation work shall be completed before approval and implementation of the design."

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

7) Safety documentation processes delineated in the ISMP provide for appropriate document control and maintenance;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume I, Section 3.6, Page 3-24 & 3-25.

Integrated Safety Management Plan (ISMP), Section 1.3.16, Page 1-26 & 1-27.

Integrated Safety Management Plan (ISMP), Section 3.3.3, Page 3-7 & 3-8.

Integrated Safety Management Plan (ISMP), Section 5.3, Page 5-5.

OBSERVATIONS:
The commitments regarding the process for document control and maintenance as documented in the SRD and the ISMP vary for the different phases of operation.

Section 3.3.3.2 of the ISMP indicates that changes made to the ISMP, SRD, FSAR, HAR, QAP, Emergency Plan, Licensee Controlled Requirements, Licensee Control Requirements (LCR) and TSRs Bases, made after issuance of the Operating Authorization will be made as allowed by the USQ process.

Section 3.3.3.1 of the ISMP commits to inform the regulator of proposed changes to the design and construction commitments of the PSAR, the SRD, and the ISMP after issuance of the construction authorization and prior to issuance of the operating authorization. Section 3.3.3.1 also commits during this period to inform the regulator of the identification of new or changed hazards and hazardous situations that have a significant impact on the results of the HAR. The changes are incorporated into the applicable document "if requested." Section 3.6 of the SRD states that after issuance of the construction approval, but prior to issuance of the SRD operating Authorization Request package, the Regulatory Unit will be will be notified when the hazards analysis "identifies a new situation affecting public safety or a significant revision occurs in law of regulation that affects the design."

Section 3.6 of the SRD states that prior to issuance of the SRD as part of the Construction Authorization Request package, the SRD Safety Criteria will be modified "as necessary."

DETAILED QUESTIONS:
1. Will BNFL select standards different from those identified in the SRD during Part A. If so, how will the RU be involved in this change process?

2. What is the expected level of interaction between BNFL and the RU with respect to changes made to the SRD, the ISMP, and the HAR prior to submittal of the Construction Authorization Request Package and how will this level of interaction ensure that these documents continue to be acceptable following review and initial approval?

3. Sections 3.3.3.1 of the ISMP and 3.6 of the SRD appear to have different thresholds for informing the RU of proposed changes between construction authorization and operating authorization. What is the threshold for informing the RU of changes for each of the major documents submitted prior to operating authorization and how will these thresholds ensure that these documents continue to be acceptable following initial approval?

4. Section 3.3.3.1 of the ISMP indicates that proposed changes will be incorporated into documents "if requested." Please clarify (1) if this means that changes will not be made unless and until the RU agrees, or (2) if not, what provisions will be made to get RU agreement and ensure that appropriate changes are incorporated?

Contractor Response

1. Yes. It is expected that the standards selected will change as the information related to the design, operation, and associated hazards of the TWRS-P Facility matures. This is consistent with DOE/RL-96-0003 Sections 4.3.2 and 4.4.2 which provide for RU review and approval of the SRD at key stages of the facility lifecycle. Standards that govern administrative controls, (i.e., procedures) will be further identified and included in Part B revisions to the SRD.

2. In Part B, prior to the submittal of the construction authorization request, DOE will be

informed of proposed changes to the SRD, ISMP, and HAR. However, continuation of design activities will proceed during DOE review of the proposed changes. These changes will be incorporated into the Construction Authorization Request, submitted to the RU for review and approval.

3. Section 3.6 of the SRD intended to state the SRD would be updated "biannually" during the period between the Construction Authorization Request and submittal for Operating Authorization Request. ISMP Section 3.3.3.1 is correct. The SRD Section 3.6 will be modified to state updates to the SRD will be submitted to the Regulator every 2 years, which is consistent with ISMP Section 3.3.3.1.

4. DOE will be informed of proposed changes to the facility design and construction after issuance of the construction authorization and prior to issuance of the operating authorization. A DOE response will be requested. However, design and construction activities will proceed during DOE's review of the proposed changes. These changes will be included in the Operating Authorization Request. If DOE approves a change, the safety documentation will be amended to reflect the change if DOE so requests.

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address the question in a conditionally acceptable manner. The BNFL commitments in the meeting note provide for appropriate RU review and approval as the selected standards evolve. Any changes to the SRD that could be interpreted as a decrease in commitment to worker or public safety require RU review and approval prior to implementation. In addition, any deviations from the requirements of a standard committed to in SRD Volume III require RU review and approval prior to implementation. In addition, the RU will be informed of all changes made within six months of the change. These commitments need to be incorporated into the SRD and ISMP as discussed in the dispositions of the responses to questions 81 and 93.

Supplemental Response

For items 2 and 3, see Supplemental Response to Question 81.

Supplemental Disposition

Question # 170

Description

THEME: Process used to develop SRD

SUBMITTAL CRITERIA:
6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

7) The rationale for the selection of the standards and the adequacy of the set;

11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

DOE/RL-96-0006

3.3.2 Worker Protection – Measures in the design and operation of the facility to protect the workers against accident conditions should be evaluated using an acceptable approach to demonstrate that they perform their intended purpose with high confidence.

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 1.0-8, Page 1-2.

Safety Requirements Document (SRD), Volume II, Section 1.0-9, Page 1-3.

Integrated Safety Management Plan (ISMP), Section 1.3.10, Page 1-16 – 1-18.

Integrated Safety Management Plan (ISMP), Section 1.3.11, Page 1-18 – 1-23.

OBSERVATIONS:
In several sections of the SRD and ISMP, BNFL proposes a graded safety approach that imposes less rigor on safety measures relied upon to ensure the worker safety than those relied upon for public safety. Examples include: 1) The designation of Design Class I and II structures, systems, and components (SSC) in Safety Criteria 1.0-8 and 1.0-9 and in ISMP Section 1.3.10, with less stringent standards for SSC relied upon for worker protection; 2) The application of less stringent quality standards to measures for worker protection in ISMP Section 1.3.11; and 3) The relegation, in ISMP Section 1.1, of requirements that define conditions necessary to ensure the worker radiological and chemical exposure standards of the SRD are not exceeded for credible events to the category of licensee controlled requirements that are not controlled with the rigor of Technical Safety Requirements.

DETAILED QUESTIONS:
Please provide justification why the worker is to be given an apparently lower level of protection than the public.

Contractor Response

BNFL's approach provides an adequate level of accident protection for both workers and the public. If this protection were achieved solely through the application of Design Class I and II SSCs, then there would indeed be an apparently lower level of protection for workers. However, this is not the case.

BNFL's approach recognizes that workers need to and are able to be protected in a different manner than the public. There are two principal reasons why this is necessary:

1. Workers are trained and experienced in recognizing hazards, dealing with accidents, and responding to emergencies. In addition, they are aware of the inherent hazards of the work, and have voluntarily accepted the risks associated with working in a nuclear facility. The public, on the other hand, must be assumed to have none of this training or experience, nor have they voluntarily accepted the associated accident risks.

2. The public is relatively far from the radioactive material sources while workers can be very close to both the sources and the equipment containing those sources. Therefore, workers must be protected from the consequences of a much wider spectrum of potential accidents, many of which would have only negligible impact on a member of the public at the TWRS-P location of the offsite receptor. Direct exposure to a highly radioactive component because of inadvertently opening a shield door is an example of such an event.

PROTECTION OF THE PUBLIC

The approach taken to protect the public consists principally of the use of Design Class I (DC I) SSCs. The highest levels of design and quality assurance requirements are applied to DC I SSCs to ensure that they can perform their safety function so that no member of the public is exposed to radioactivity above dose standards. As noted above, the public cannot be relied on to respond to emergencies. Therefore, there must be a "guaranteed" assurance of protection such as provided by DC I SSCs. This approach is consistent with proven practices within both the DOE complex and the commercial nuclear industry and accurately

reflects DOE-RL/REG-97-07, Section 6.5, which states "Protecting the public is a priority whenever activities are planned and performed."

It should be noted that, should an accident actually occur, additional public protection (beyond that provided by DC I SSCs) will be provided because:
· The actual source terms and release fractions will almost certainly be significantly less than the ones assumed;
· Systems not designated as DC I will probably function to mitigate the event;
· Actual meteorology should be less severe than the worst-case meteorology assumed;
· The individual will almost certainly be location further away than the nearest boundary; and,
· The duration the individual remains in the plume may be shorter than the duration of event.

Disposition

The BNFL response is responsive and acceptable.

The response provides an acceptable rationale for the overall graded safety approach proposed by BNFL in establishing standards related to protection of workers and the public. The rationale presented is logical and is consistent with past DOE and NRC practices. However, acceptance of the rationale for the overall graded approach does not necessarily imply that all individual aspects of the approach, such as those addressed in RU questions 112, 116, 135, and 143, are acceptable.

Supplemental Response

NOTE: The following paragraphs (submitted to the RU in hard copy) were omitted from the original response.

PROTECTION OF WORKERS

The approach taken to protect workers from the consequences of accidents takes advantage of several layers of protection to ensure worker safety. These consists of:
· The designation of Design Class II (DC II) items. Very high levels of design and quality assurance requirements are applied to DC II items. In most instances, these requirements as stringent as those applied to DC I items;
· An accident evaluation methodology that uses a high degree of conservatism in source terms, release fractions, personnel locations, and other assumptions;
· A formal, documented defense-in-depth program to ensure that accidents with potentially severe consequences to workers are prevented or mitigated by multiple levels of protection;

· Worker training programs that are tailored to the specific hazards and potentially hazardous situations presented by the TWRS-P facility; and,
· An aggressive health and safety program that employs personnel protective equipment for workers, and continuously seeks to reduce the potential for accidents.

This approach to worker safety is comprehensive and is generally more rigorous than has been employed within either the DOE complex or commercial nuclear industry. Since neither has ever shown indication of a systematic detriment to workers from the radiological consequences of accidents, it is logical to conclude that the BNFL approach provides a clearly acceptable level of protection to workers.

Supplemental Disposition

Question # 171

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

7) The rationale for the selection of the standards and the adequacy of the set;

11) The Contractor's ISMP, which shall

b) Specify the standards-based management processes to be used by the Contractor to ensure that radiological, nuclear, and process safety is adequately defined (i.e., tailored to

the nature and level of hazards, including process hazards), implemented, and maintained;

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

6) The set documented in the SRD will provide adequate safety if properly implemented.

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

3) The selected safety management processes documented in the ISMP are standards based and are appropriately tailored to the hazards associated with the Contractor's proposed facility, its operation, and its deactivation;

4) The selected safety management processes documented in the ISMP properly and adequately address management of process hazards;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume I , Section 5.1, Page 5-5 – 5-8.

Safety Requirements Document (SRD), Volume II, Section 4.3 & 4.4, Page 4-13 – 4-26.

Integrated Safety Management Plan (ISMP), Section 4.2.1, Page 4-8 & 4-9.

OBSERVATIONS:
The SRD makes reference to nuclear power plant standards (e.g., IEEE 603-91, Criteria for Safety Systems for Nuclear Power Generating Stations; IEEE 1023-68, Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations; and IEEE 628-87, Standard Criteria for the Design, Installation, and Qualification of Raceway Systems for Class 1E Circuits for Nuclear Power Generating Stations), sections of which appear either excessive or irrelevant to the design, construction, operation, and deactivation of the TWRS-P facility. The discussion of tailoring of engineered features is general and only addresses tailoring through application of the Design Class I, II, and III categorization. It does not address the process employed for tailoring nuclear generating station standards for use for the TWRS-P facility.

DETAILED QUESTIONS:
Please either 1) identify the subset of the cited nuclear power plant standards that will be used for the TWRS-P facility or 2) describe the process and when the process will be employed to tailor nuclear power plant standards for use for the TWRS-P facility.

Contractor Response

The application of some nuclear power generating station standards in the area of safety systems (Design Class I) has been utilized for TWRS-P because national standards have not been developed that are specific to nuclear waste treatment facilities.

Standards like IEEE 603, IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations, establish minimum functional design criteria for nuclear power generating station safety systems. The criteria are to be applied to those systems required to protect the public health and safety by functioning to mitigate the consequences of a design basis event. The intent is to promote safe practices for design and evaluation of safety system performance and reliability. Although the standard was prepared for, and is directly applicable to, nuclear power generating station safety systems many of the principles have applicability to systems, structures, or components (SSCs) related to safety in other facilities.

To apply the requirements of a nuclear generating station standard to TWRS-P, the following process is followed:
1. The conceptual design of the facility is completed and a hazards analysis is done. This identifies the hazards and hazardous situations inherent in the facility.

2. A determination is made of what mitigating or preventative features, systems, and components are required to protect the public health and safety. These are the SSCs to which the criteria from nuclear power generating station standards may apply.

3. A selection is made of the codes and standards from the SRD that apply, (i.e. structural codes and standards for structural requirements, system standards for system requirements, electrical standards for electrical requirements, equipment standards for equipment requirements, etc.)

4. The requirements of the standards are tailored to the TWRS-P application. This is done by: a) first understanding the standard - what is the purpose of the standard and how is it used in nuclear power plants; b) eliminate clearly non-applicable requirements, (i.e., requirements for reactor specific systems like reactor protection system or control rod drive system); c) look for similarity in system or component safety functions, eliminate criteria for items that have no similar application in TWRS-P; and d) apply the remaining criteria from the standard to the TWRS-P design. It is anticipated that criteria such as redundancy, testability, channel separation, single failure proof, reliability, maintainability, quality, qualification, etc. will all be applied to TWRS-P Design Class I SSCs as applicable from the standards.

The above process for tailoring requirements will be employed as depicted in Figure 4-3 of the ISMP as the design proceeds from the conceptual stage to the detailed stage. Any deviation in the application of a selected standard will be documented via this change process to ensure that adequate safety is provided. In addition, these changes will require DOE review and approval. The results of the process will be Design Class I structures, systems, and components which meet the intent of nuclear power generating station standards employed to ensure they are capable of performing their intended safety function. The PSAR and FSAR will document which SSC's are Design Class I and how they meet the requirements of the standards.

Disposition

The BNFL response is responsive and acceptable.

The Contractor's response adequately addresses the stated concern.

Supplemental Response

Supplemental Disposition

Question # 172

Description

THEME: Weaknesses in the HAR

SUBMITTAL CRITERIA:
7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 2.0, Safety Criterion 2.0-1, Page 2-1.

Safety Requirements Document (SRD), Volume II, Section 4.1, Safety Criterion 4.1-3, Page 4-4 & 4-5.

Safety Requirements Document (SRD), Volume II, Section 4.1, Safety Criterion 4.1-4, Page 4-7 & 4-8.

Hazard Analysis Report (HAR), Section 2.1.2.3, Page 2-6.

OBSERVATIONS:
Safety Criterion 4.1-3 establishes the design basis earthquake response spectra for Design Class I SSCs as an equal hazard response spectra of 0.24 g horizontal acceleration at 33 hertz and 0.16 g vertical acceleration at 50 hertz. Section 2.1.2.3 of the HAR indicates that this is the equal hazard spectra for 2,000 year-return period earthquake. Safety Criterion

4.1-4 establishes the earthquake response spectra for Design Class II SSCs as Uniform Building Code Zone 2B, which is less demanding than the response spectra established for Design Class I SSCs.

Safety Criterion 2.0-1 established radiological exposure standards for events with return periods as long as 1,000,000 years.

DETAILED QUESTIONS:
1) Please explain how structures, systems, and components designed to standards based upon the 2,000 year return period earthquake (for Design Class I) or less stringent requirements (for Design Class II) can be relied upon to perform their safety functions to prevent the maximally exposed member of the public (Design Class I) or workers (Design Class II) from receiving a radiological exposure in excess of the limits established in Safety Criterion 2.0-1 for extremely unlikely seismic events (i.e., those with return periods between 10,000 and 1,000,000 years).

Contractor Response

The justification for the selection of the NPH criteria and loads is that they are based upon DOE-STD-1020-94, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities. The adequacy of DOE-STD-1020-94 as the basis for the TWRS-P Facility design was demonstrated by BNFL for earthquakes in a presentation to the DOE RU on June 25, 1997. The DOE-STD-1020-94 standard does not require that seismic events with return periods of 10,000 and 1,000,000 years be established for the design of SSCs, even for facilities such as operating reactors.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The Contractor's response is unacceptable for reasons stated in the disposition to the response to question 12.

Supplemental Response

See revised response provided for Question 12.

Supplemental Disposition

The Contractor’s supplemental response was acceptable. The supplemental response for Question #12 provided sufficient additional information on seismic events to adequately answer the reviewers concerns.

Question # 173

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

DOE/RL-96-0006

4.2.7.2 Availability, Maintainability, and Inspectability – Structures, systems, and components important to safety should be designated, designed, and constructed for appropriate inspection, testing, and maintenance throughout their operating lives to verify their continued acceptability for service with an adequate safety margin.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

DOE/RL-96-0006

4.2.7.2 Availability, Maintainability, and Inspectability – Structures, systems, and components important to safety should be designated, designed, and constructed for

appropriate inspection, testing, and maintenance throughout their operating lives to verify their continued acceptability for service with an adequate safety margin.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 3.6.1, Page 3-11.

OBSERVATIONS:
Section 3.6.1 of the ISMP states, "Fluidic devices (pumps and valves) that contain no moving parts are used to transport and divert highly radioactive liquids. These items require no maintenance."

DETAILED QUESTIONS:
Please describe how BNFL will ensure, without appropriate inspection, testing, and maintenance activities, that corrosion or erosion will not render those fludic devices that do not have moving parts unacceptable for service.

Contractor Response

Design of devices with no moving parts takes into account the operating environment, duty, and required life. This includes the potential for erosion by the process fluids. Erosion capability of process fluids has already been addressed by the Hazards Evaluation Team in the PHA. If the life of a fluidic device is determined to be shorter than the operating life of the facility, the design will ensure that it can be monitored for performance and, when necessary, remotely replaced. The operator is able to use process parameters (e.g., flows, levels) to monitor the performance of fluidic devices.

If a fluidic device is designated as DCI or DCII protection, then the requirements of the maintenance schedules applicable to such protection apply. Their design will ensure that those requirements are met. For fluidic devices not designated as safety protection, their failure would lead to operability problems. This alone will drive the design to ensure that such devices are fit for duty.

Disposition

The BNFL response is responsive and acceptable.

The Contractor response to the question is acceptable. The question asks BNFL to describe how BNFL will ensure, without appropriate inspection, testing, and maintenance activities, that corrosion or erosion will not render fluidic devices unacceptable for service. The Contractor response recognizes the potential for erosion by process fluids, and states that the Hazards Evaluation team is aware of the phenomenon of erosion. If the life of fluidic devices is determined by BNFL to be shorter than the planned life of the TWRS-P facility, the

Supplemental Response

Supplemental Disposition

design of fluidic devices will provide for performance monitoring, and when necessary, replacement. If Design Class I and Design Class II fluidic devices are required for TWRS-P, maintenance will be scheduled appropriately to maintain their safety performance.

Question # 174

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBMITTAL CRITERIA:
6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

DOE/RL-96-0006

4.1.1.6 Human Aspects – The human aspects of defense in depth should include a design for human factors, a quality assurance program, administrative controls, internal safety reviews, operating limits (Technical Safety Requirements), worker qualification and training,

and the establishment of a safety/quality program.

4.1.2.4 Operating Experience and Safety Research – Operating experience and the results of research relevant to safety should be obtained, reviewed, and analyzed, and lessons that are learned should be implemented in the design, construction, or modification, and operation of the facility.

4.2.6.1 The possibility of human error in facility operations should be taken into account in the design by facilitating correct decisions by operators and inhibiting wrong decisions and by providing means for detecting and correcting or compensating for error.

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

DOE/RL-96-0006

4.1.1.6 Human Aspects – The human aspects of defense in depth should include a design for human factors, a quality assurance program, administrative controls, internal safety reviews, operating limits (Technical Safety Requirements), worker qualification and training, and the establishment of a safety/quality program.

4.1.2.4 Operating Experience and Safety Research – Operating experience and the results of research relevant to safety should be obtained, reviewed, and analyzed, and lessons that are learned should be implemented in the design, construction, or modification, and operation of the facility.

4.2.6.1 The possibility of human error in facility operations should be taken into account in the design by facilitating correct decisions by operators and inhibiting wrong decisions and by providing means for detecting and correcting or compensating for error.

REFERENCE CITED:
Safety Requirements Document (SRD),Volume I, Attachment E, Page E-19 & E-22.

Safety Requirements Document (SRD),Volume II, Section 4.3, Safety Criterion 4.3-4, 4.3-6, and 4.3-7, Page 4-14 – 4-16.

Integrated Safety Management Plan (ISMP), Section 3.12, Page 3-23 & 3-24.

OBSERVATIONS:
Section 3.12 of the ISMP states, "In the design of the TWRS-P Project, careful attention is paid at every interface between the operating personnel and the facility to ensure that good human factors and ergonomics practices are followed. ... The design effort commences with the general layout of the plant and continues through the design stages for each aspect of human involvement during the life of the facility." Despite the general scope of the human factors / ergonomics program described in the ISMP, the only Safety Criteria that explicitly address human factors are SC 4.3-4, SC 4.3-6, and SC 4.3-7 , which are limited in scope to Design Class I and II instrumentation and controls. Likewise, the safety criterion that SRD Attachment E indicates addresses the incorporation of operating experience into design (SC 4.1-2) is silent on the incorporation of operating experience into the human factors aspects of design.

GENERAL QUESTION:
Please clarify the scope of the human factors program and the standards upon which it is based.

DETAILED QUESTIONS:
1) Does the scope of the human factors program address every interface between the

operating personnel and the facility (e.g., habitability, lighting, noise, general work environment, clear identification of equipment items and trains to ensure maintenance of correct equipment) as implied by the ISMP? If so, how can it be standards-based, when the only human factors standards in the SRD are limited in scope to Design Class I and II instrumentation and controls. If not, please justify how a human factors program applicable only to Design Class I and II instrumentation and controls conforms to General Radiological and Nuclear Safety Principles 4.1.1.6, Human Aspects, and 4.2.6.1, Human Error.

2) Please describe the manner in which operating experience at similar BNFL facilities or other similar facilities is being incorporated into the human factors design for the TWRS-P Project. Please identify the safety criterion or other standard that governs the incorporation of human factors-related operating experience into the design for the TWRS-P Project.

Contractor Response

Detailed question 1.

Yes, the human factors program addresses the interfaces between the operating personnel and the facility. Human factors in design and operation of the facility is required to fulfill two objectives:
1. Management of the interfaces between the facility and the operators (examples noted in the question material).
2. Minimize the potential for human error in facility operations - good management (1) will minimize potential for human error since factors such as layout, alarm siting (and priorities), and good design (operability aspects, task analysis) are all important.
Any program developed which fulfills these objectives is sufficient in its application of human factors to facility design and operation.
An Implementing Standard IEEE 1023 will be added to Safety Criterion 1.0-7 which goes beyond DCI/DCII features.

Detailed question 2.

A number of approaches will be used to incorporate human factors and previous operating experiences in the TWRS-P design. These include:
1. Using human factor specialists with many years experience on a wide variety of nuclear chemical plants, including facilities similar to TWRS-P.
2. Interviews of operations personnel from similar facilities to identify lessons learned relative to human-machine interfaces.

The standard that governs incorporation of human factors related operating experience into the TWRS-P Facility design and operation is IEEE-1023. Section 5.1," Non-Observational Methods," of this standard identifies "historical review," as an acceptable method of incorporating non-observational information into the human factors program.

3. Use of information from incident databases to identify where human-machine interfaces were contributory factors in recorded incidents.

Disposition

The BNFL response is responsive and acceptable.

The response is acceptable because the additional commitments made in the response expand the human factors program from merely addressing instrumentation and control to the broader perspective required to address all aspects of human factors. Furthermore the approaches taken to incorporate human factors-related operating experience appears to be appropriate.

Supplemental Response

Supplemental Disposition

Question # 175

Description

THEME: Compliance to Laws (QA/RP)

SUBORDINATE THEME: Radiation Zoning and Access Control Features (NRC RP-15)

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in

conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

12) ISMP compliance with applicable laws and regulations, particularly the implementation plans required in the 10 CFR 830 rules;

10 CFR 835.1002(b) "The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of 0.5 mrem (5 microsieverts) per hour and as far below this average as is reasonably achievable. The design objectives for exposure rates for potential exposure to a radiological worker where occupancy differs from the above shall be ALARA and shall not exceed 20 percent of the applicable standards in § 835.202."

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

1) The program documented in the ISMP complies with all applicable laws and regulations;

10 CFR 835.1002(b) "The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of 0.5 mrem (5 microsieverts) per hour and as far below this average as is reasonably achievable. The design objectives for exposure rates for potential exposure to a radiological worker where occupancy differs from the above shall be ALARA and shall not exceed 20 percent of the applicable standards in § 835.202."

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 3.9.1.2, Page 3-15.

OBSERVATIONS:
ISMP Section 3.9.1.2 states that "Maximum allowable exposure rates in accessible areas are defined to ensure that personnel standards are not exceeded." However, this discussion does not address the establishment of design goals for these areas of ALARA and not exceeding 20 percent of the applicable standards in 10 CFR 835.102.

DETAILED QUESTIONS:
1. Please provide the radiation protection design objectives established for maximum allowable exposure rates in accessible areas.

2. Please describe the process for considering major dose accumulating functions (e.g., maintenance, material handling, in-service inspection, calibration, decommissioning, and recovery from anticipated operational occurrences) are considered in plant design for radiation protection to ensure that potential radiation exposure from these activities will be maintained ALARA during normal operations and anticipated operational occurrences.

Contractor Response

1. The radiation protection design goals are found in Safety Criterion 2.0-4 and implemented in the BNFL TWRS-P ALARA program that will be applied during Part B design activities. The design target is to limit exposure in continuously occupied areas to no greater than 0.5 mrem per hour. In areas of less than full occupancy, the dose rate will be limited to ensure as a minimum the annual dose accumulation does not exceed 20% of the statutory standard. After the design target is established the ALARA program will drive a cost-benefit analysis to evaluate alternatives that result in less occupational dose with equivalent results. If it is determined that a modification to equipment, facility configuration, procedures, etc. is justified, then the modification(s) may be incorporated into the facility design.

2. As part of the hazard identification and control activities during Part B design, collective radiation doses for facility worker groups will be projected for all routine tasks that could involve radiation exposure. Candidate groups include, but are not limited to, operations,

Disposition

BNFL's response is responsive and acceptable.

Contractor's selected set of standards adequately addresses ALARA and cumulative exposure issues.

Supplemental Response

Supplemental Disposition

maintenance, inspection and calibration, material handling, waste management, safety, and engineering. This data will be evaluated for dose reduction opportunities and to ensure exposures of personnel from multiple source situations do not exceed design goals and are ALARA.

Question # 176

Description

THEME: Change process to Standards or other safety documents.

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

c) Ensure that the Contractor is in compliance with DOE Nuclear Safety Regulations, in conformance with the DOE-stipulated top-level safety standards and principles, and in compliance with the SRD;

h) Identify roles, responsibilities, and authorities for defining, implementing, and maintaining safety.

13) ISMP conformance to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006.

DOE/RL-96-0006

4.1.5.1 Formal Configuration Management – Formal configuration management should be applied to all facility activities during the program's lifetime to ensure that programmatic objectives, including safety, are fully achieved. Work should be performed and controlled according to pre-approved plans and procedures that clearly delineate responsibilities. Documented records should be retained.

4.3.4.1 Personnel Training – Personnel engaged in activities bearing on facility safety should be trained and qualified to perform their duties.

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

2) The program documented in the ISMP conforms to the top-level radiological, nuclear, and process standards and principles contained in DOE/RL-96-0006;

10) Safety definition, implementation, and maintenance roles, responsibilities, and authorities defined in the ISMP are clear and appropriate.

DOE/RL-96-0006

4.1.5.1 Formal Configuration Management – Formal configuration management should be applied to all facility activities during the program's lifetime to ensure that programmatic objectives, including safety, are fully achieved. Work should be performed and controlled according to pre-approved plans and procedures that clearly delineate responsibilities. Documented records should be retained.

4.3.4.1 Personnel Training – Personnel engaged in activities bearing on facility safety should be trained and qualified to perform their duties.

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 1.3.16, Page 1-26 & 1-27.

Integrated Safety Management Plan (ISMP), Section 6.1.3, Page 6-2 & 6-3.

Integrated Safety Management Plan (ISMP), Section 11.1, Page 11-16.

OBSERVATIONS:
Section 1.3.16 of the ISMP identifies the elements of the BNFL Configuration Management Program. The discussion in Step 2, Evaluation, indicates that "compliance of the change with regulations, license basis, applicable codes and standards, and risk significance" are "factors to be considered" in the evaluation of changes. However, this discussion does not indicate that proposed changes that create noncompliances with regulations, license basis, or applicable codes and standards will be rejected. Section 11.1 of the ISMP indicates that, during the design and construction phase, there is a configuration management group that is

responsible for "developing and implementing the configuration management (CM)program." However, Section 11.1 of the ISMP does not discuss the roles and responsibilities of other organizations, such as the TWRS-P Project Safety Committee, the ES&H Group, the Quality Assurance Group, and the Technical Group in configuration management. The discussion of personnel qualification in Section 6.1.3 of the ISMP is also silent regarding the qualifications required for individuals responsible for performing the four basic configuration management steps defined in Section 1.3.16 of the ISMP.

DETAILED QUESTIONS:
1) Please identify the organizations or positions responsible for performing each of the four basic configuration management steps defined in Section 1.3.16 of the ISMP.

2) Please identify the qualifications required for personnel responsible for performing each of the four basic configuration management steps defined in Section 1.3.16 of the ISMP.
3) Please identify the safety-related requirements that would cause proposed changes to be rejected during the evaluation configuration management evaluation step (e.g., noncompliance with regulations, noncompliance with a safety criterion or implementing standard, or unreviewed safety question).

Contractor Response

1) Responsible Position

A) Identification - Any facility organization may identify the need for a change. For example, the ES&H group would most likely identify a change necessary to implement a new safety or environmental protection regulation.

B) Evaluation - Most proposed changes will be evaluated by the Engineering Group (Architect Engineering Group during construction). This evaluation by the engineering organization ensures that the design and licensing bases and design requirements are consistent and not compromised; that safety and mission impacting requirements are identified; that acceptance testing, operational, and maintenance specifications are developed; and that affected or interfacing SSCs and CM documentation, including the FSAR and TSRs, are modified or reconciled.

C) Approval - Final approval affecting DC I and DC II features of the facility is by the Project Manager during design and construction and the Facility Manager during operation. This approval will be predicated on a recommendation for approval by the Project Safety Committee.

D) Implementation - The facility change would be implemented by the responsible organization. For example, the ES&H group would be responsible for implementing a new safety or environmental regulation. The CM organization would be responsible for assuring the change was implemented properly.

2) Qualification Requirements

Personnel responsible for performing each of the above-listed aspects of configuration management will meet minimum qualification requirements for the particular position being filled. For example, ES&H personnel will meet minimum requirements for environmental or safety duties. These qualification requirements will be established in Part B. In addition, personnel involved in the change management process will receive training specific to that program.

3) A proposed change would be disapproved if found to compromise safety, result in non-compliance with the contract. or result in non-compliance with a regulation or law. A change that would result in an USQ would not be approved until regulatory approval was granted; this would then remove the USQ. Specific criteria will be provided in Section 3.1 "Configuration Management" of the PSAR and FSAR.

Disposition

The BNFL response is unresponsive for reasons indicated below:

Evaluation of Response:
1) The BNFL response indicated that any facility organization can identify a need for a change. However, the response does not address how BNFL ensures that the need for a change is identified in all cases.
2) The BNFL response indicates that Most proposed changes will be evaluated by the Engineering Group (Architect Engineering Group) during construction. The response does not address how operating considerations are addressed by an architect engineering group, nor does it address who will perform this evaluation after construction. In addition,

the response indicates how most changes will be evaluated, but does not address the exceptions.
3) The BNFL response indicates that the final approval affecting DC I and DC II features of the facility will be approved by the Project Manager for design and construction and by the Facility Manager during operation. This is acceptable.
4) The BNFL response indicates that implementation will be done by the responsible organization and provides two examples, but the response does not state what process or procedure will be used to determine and assign the effort to the responsible organization.

Follow-up Question:
1) What organization is responsible for ensuring that all needed changes are identified?
2) Please indicate how operational interests are appropriately considered during the evaluation of changes.
3) Please indicate how the exceptions to the process described in the response are evaluated.
4) Please state what process or procedure is used to determine and assign the effort of implementation to the appropriate organization.
5) Please revise the ISMP to state who is responsible for identification, evaluation, approval, and implementation of changes.

Supplemental Response

Please see Attachment Question 176 to BNFL's Response to RU Disposition, Letter #5193-97-0554, December 8, 1997.

Supplemental Disposition

BNFL's supplemental response was acceptable as described in the following paragraphs.

1) In the November 11, 1997 response, BNFL indicated that "any facility organization" can identify a need for a change. In the December 7, 1997 supplemental response BNFL supplemented that response by stating that the need for changes can be determined by a multitude of activities and listed the various activities. Furthermore the Configuration Management process identified in the ISMP Section 1.3.16 describe the actions by which BNFL will ensure the need for changes are identified for the specific activities addressed. The RU considers this response acceptable.

2) The November 11, 1997 response, BNFL indicated that "Most" proposed changes will be evaluated by the Engineering Group (Architect Engineering Group) during construction. In the December 7, 1997 supplemental response, BNFL stated that during design and construction, the lead responsibility for evaluating changes to engineered features related to civil/structural design and to support systems is with the Architect Engineering group and the lead responsibility for evaluating changes to the waste processes is with the Technical Group. During operation, the lead responsibility for evaluating changes to the engineered features is with the Engineering group. The lead responsibility for evaluating changes that involve administrative controls related to facility operations is with the Operations Support group during design, construction, and operation. However, for changes to the startup test program made during design and construction, the lead responsibility is with the Startup group. During operation, the lead responsibility for evaluating changes to the non-radioactive startup program is with the Startup group and for changes to the radioactive startup program, with the Operations Support group. During design, construction, and operation, the lead responsibility for evaluating changes that involve implementation of nuclear, radiological, and process safety and environmental impact is with the ES&H group. The RU considers this level of detail regarding the assignment of responsibilities with respect to evaluating changes to the design and facility to be adequate at this time.

3) The BNFL supplemental response indicated that the final approval affecting DC I and DC II features of the facility will be approved by the Project Manager for design and construction and by the Facility Manager during operation. This is acceptable.

4) The November 11, 1997 response from BNFL indicated that implementation will be done by the "responsible organization" and provided two examples, but the response did not state what process or procedure would be used to determine and assign the effort to the responsible organization. In the December 7, 1997 supplemental response, BNFL stated that changes to engineered features, the configuration management program requires a Design Change Application (DCA) to be developed to identify, communicate, record, and control a proposed design change that requires a physical modification to the facility. During design and construction, the responsibility for implementing a DCA affecting the facility design and supports system is assigned to the Architect Engineering group and for implementing changes to the waste processing systems is assigned to the Technical Group. During operation, DCAs affecting engineered features are evaluated by the Engineering group. Furthermore, BNFL stated that the responsibility for implementing changes is assigned to the same group assigned responsibility for the evaluation of the change. The

RU considers this acceptable.

Question # 177

Description

THEME: Change process to Standards or other safety documents.

SUBMITTAL CRITERIA:
11) The Contractor's ISMP, which shall

g) Describe the Contractor's approach for tailoring its radiological, nuclear, and process safety deliverables and actions commensurate with the nature and level of hazards associated with its waste processing activities; and

APPROVAL CRITERIA:
The approval of the Contractor's proposed ISMP will be issued upon determination by the Director of the Regulatory Unit that:

7) Safety documentation processes delineated in the ISMP provide for appropriate document control and maintenance;

REFERENCE CITED:
Integrated Safety Management Plan (ISMP), Section 3.3.3, Page 3-7 & 3-8.

Integrated Safety Management Plan (ISMP), Section 3.16.4, Page 3-32.

Integrated Safety Management Plan (ISMP), Section 4.1.3, Page 4-5.

Integrated Safety Management Plan (ISMP), Section 4.2.3.4, Page 4-26.

OBSERVATIONS:
Section 3.3.3.1 of the ISMP states that "The regulator is informed of proposed changes to the design and construction commitments made in the PSAR or changes in or additions to SSCs credited for the protection of worker and public health and safety. The regulator is also informed of the identification of new or changed hazards and hazardous situations that have a significant impact on the results of the HAR. ... The regulator is informed of proposed changes to the design and construction commitments made in the SRD or ISMP." Section 3.3.3.2 of the ISMP states that "After issuance of the operating authorization, changes made to the ISMP, SRD, FSAR, HAR, QAP, Emergency Plan, Licensee Controlled Requirements (LCR), and TSR Bases, as allowed by the USQ process, are provided to the regulator as updates to the licensing basis documents at 12-month intervals." Section 3.16.4 of the ISMP states that "If a USQ is not identified, the TWRS-P facility management can authorize physical and administrative changes and conduct tests and experiments on the TWRS-P Facility without prior approval of the regulator. Section 4.1.3 of the ISMP states that "In either case, all activities are documented, and no change to the SRD is initiated without a formal review for compliance with the standards and requirements on which the SRD is based." Section 4.2.3.4 of the ISMP states that "The LCR is formatted in a manner similar to the TSRs but may be changed by BNFL provided no unreviewed safety question is identified."

DETAILED QUESTIONS:
1. Please identify all regulatory submittals, specified in Table S4-1 and DOE/RL-96-0003, that BNFL can change without the approval of the DOE RU. If there are special circumstances for such changes (e.g., changes without DOE RU approval can be made only if there is not a USQ involved, changes without DOE RU can be made only if the effectiveness of a program or the stringency of a standard is not decreased, or changes without DOE RU approval can be made only prior to operations authorization), please identify these circumstances.

2. Of those regulatory submittals that BNFL can change without the approval of the DOE RU, please identify those for which BNFL must inform the regulator when changes are made. Please indicate the period of time within which this information must be provided to the regulator.

Contractor Response

In Part B, prior to the submittal of the construction authorization request, the RU will be informed of proposed changes to the those regulatory submittals listed in Table S4-1 that are noted as Part A deliverables. However, design activities will continue during the RU review of the proposed changes. These changes will be incorporated into the construction authorization request submitted to the RU for review and approval.

For the period after the issuance of the construction authorization, attached Table 177-1 indicates which Table S4-1 regulatory submittals can be changed without DOE RU approval

Disposition

The BNFL response is responsive and acceptable.

The response provided, in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP," address the question in a conditionally acceptable manner. Any changes to the SRD or ISMP that could be interpreted as a decrease in commitment to worker or public safety require RU review and approval prior to implementation. In addition, any deviations from the requirements of a standard committed to in SRD Volume III require RU review and approval prior to implementation. In addition, the RU will be informed of all changes made to the SRD and ISMP within six months of the change. These commitments need to be incorporated in the SRD and ISMP in the manner discussed in the dispositions of the responses to questions 81, 90, and 93.

Supplemental Response

See Supplemental Response to Questions 81 and 90.

Supplemental Disposition

BNFL's supplemental response was acceptable. The response provided in combination with the understandings documented in the Meeting Note (IMS # 97-RU-0396), dated November 20, 1997, on the subject "Resolution of ISM Questions on BNFL SAP, " address the question is adequate. Any changes to the SRD or ISMP that could be interpreted as a decrease in commitment to worker or public safety require RU review and approval prior to implementation. In addition, any deviations from the requirements of a standard committed to in SRD Volume III require RU review and approval prior to implementation. Also, the RU will be informed of all changes made to the SRD and ISMP within six months of the change. BNFL incorporate these changes in the SRD and ISMP in the redline-strikeout version formally provided to the RU.

and the circumstances for which such changes can be made.

The response to Question 81 addresses regulatory submittals specifically in DOE/RL-96-0003.

Changes made prior to the issuance of the construction authorization request will be documented in the construction authorization request. The time periods for informing the regulatory of changes made after the issuance of the construction authorization request are provided in ISMP Section 3.3.3, "Changes to Safety Documentation."

Question # 178

Description

THEME: Completeness/Comprehensiveness of the Standards Set

SUBORDINATE THEME: Fire Protection

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
SRD Volume II, Section 4.5, SC 4-12 through 4-19.

OBSERVATIONS:
SC 4-12 through 4-19 refer to administrative items but do not have implementing codes or standards. NFPA 801 and other NFPA codes contain sections and subsections which could be referenced to implement these administrative items.

DETAILED QUESTIONS:
Please explain why implementing standards for fire protection administrative items have not been identified

Contractor Response

Failure to include NFPA 801 as an Implementing Code for SC-12 -19 was an error. This is will be corrected in a revision to the SRD. Adoption of NFPA 801 and the daughter NFPA codes referenced therein provide an adequate set of administrative controls for fire protection.

Disposition

The BNFL response is responsive and acceptable.

The Contractor's response is acceptable. The Observations provided along with the question suggested that NFPA 801 could be used as an appropriate standard to govern administrative aspects of the fire protection program. BNFL, in their response, committed to adopt NFPA 801 as suggested. No further questions are necessary to address this issue.

Supplemental Response

Supplemental Disposition

Question # 179

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Missing Safeguards Could lead to Incomplete Identification of Standards

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 5.2.2, Page 5-26.

Hazard Analysis Report (HAR), Section 5.2.4, Page 5-59.

Hazard Analysis Report (HAR), Section 5.2.6, Page 5-72.

OBSERVATIONS:
Safeguards are methods to mitigate the consequences of an event. They should also point to where potential standards and requirements could be used to preclude or lessen the effects of the event. The lack of safeguards may lead to less than a full set of codes and standards. This would also be the case where a full set of safeguards was not developed. An example of the later could be the addition of a nitrogen blanket or air purge safeguards option for the control of hydrogen for the page 5-72 event 2200/12.

Every attempt should be made to list the set of safeguards needed such that appropriate standards and requirements are identified.

DETAILED QUESTIONS:
1. In Section 5.2.2 of the HAR , page 5-26, liquid carry-over into the vent system is identified as one of the initiating events for an "External Dose Hazard" associated with Event Identifier # 2100/0. Why then does the list of safeguards for this event not include safeguards to mitigate the consequences of liquid carry-over into the vent system?

2. Why is "lines sloped to enable gravity drain of DOE transfer line" the only safeguard identified to prevent or mitigate the consequences of the transfer line break event postulated for Event Identifier # 1614666/118 (see Section 5.2.4, page 5-59 of the HAR)? Also, please explain how the safeguards and consequences that are identified for this event will lead to use of design codes and standards that will ensure high structural integrity for the transfer line.

Contractor Response

Detailed question 1.

HAR section 5.2.2 (page 5-4) describes the process covered by the Fault Schedule entitled "LAW Feed Receipt Evaporator" (HAR pages 5-22 to 5-34). The major process vessels considered during the study were the feed receipt vessels (V2101, V2102), feed to the evaporator, the evaporator vessel, separator, and heat exchanger. The liquor carry-over to the ventilation system is due to overfilling vessels. The safeguard suggested is high-level trips (event 2100/0 HAR page 5-26, safeguard 7).

Detailed question 2.

Other safeguards could have been mentioned such as the use of co-axial pipework with leak monitoring and detection. An exhaustive list of safeguards was never intended to be given, only a sufficient number to give confidence that the concept design embodies hazards control. If the unmitigated consequence of the event is determined to challenge public or worker exposure standards, then DCI or DCII protection will be specified. This selection will lead to standards providing assurance of structural integrity for the transfer line such that it will perform its intended purpose with high confidence. It should be noted that because the transfer line is soil-covered (bermed or underground) the potential to exceed worker or public exposure standards is remote.

Disposition

The BNFL response is responsive and acceptable.

The response to the first detailed question clarifies the point that the liquor carry-over pathway is through the vessel vent system and points out that safeguard 7, which provides for overfill protection on the process vessels involved, applies. The response to the second detailed question points out that the structural integrity of the transfer line will be assured by specifying DC 1 or DC 2 protection if the unmitigated accident consequence analysis challenges the public or worker exposure standards. These responses are acceptable for both of the detailed questions.

Supplemental Response

Supplemental Disposition

Question # 180

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Fire Protection

SUBMITTAL CRITERIA:
1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of a SRD;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.4.1, page 4-19

Hazard Analysis Report (HAR), Section 5.2.2, page 5-9.

Hazard Analysis Report (HAR), Section 5.2.17.2, page 240,

Hazard Analysis Report (HAR), Section 5.2.21, page 5-300.

OBSERVATIONS:
In Table 4-6 BNFL has made a determination that no volatile hydrocarbons are present in the melter.

The potential for an explosion/overpressure hazard due to radiolytic hydrogen has been

dismissed based on a report by D. Vickers. These calculations are not listed in the Section 5.2.2 of the HAR. In that these calculations are used to justify a passive venting system in the event of failure of the active system, maximum hydrogen generation rates as well as normal rates should be considered in the hazard analysis. In addition, the effect of generation of other flammable gases on the overall lower flammability/explosive limits of the mixture should be considered.

In the HVAC fire scenario, the filter fire (event #1614700/511) was determined to have a smaller consequence than the fire within the ventilated area (event #1614700/531). This appears counter intuitive.

DETAILED QUESTIONS:
1 Since the long chain organics present in the waste could decay into volatile species during feed preparation or evaporation, please explain why it is concluded that no volatile hydrocarbons are present in the melter.

2 Please either provide the report by D. Vickers, or present the key technical arguments in support of the dismissal of the explosion/overpressure hazard due to radiolytic hydrogen.

3 While H2 is not listed in the Fault Schedule on page 240 for HAR Section 5.2.17.2, other parts of the document acknowledge several means of hydrogen generation. Please explain why the hydrogen gas was not considered in this scenario.

4 Please provide enough detail for the HVAC fire scenario (HAR page 5-300 events #1614700/511 and #1614700/531) that the counterintuitive result can be understood.

Contractor Response

Detailed question 1.

Our response to Question127 notes that there is less than 3% of organic material in our feed material. Page 4-15 of the HAR states:

"The TWRS-P Facility waste streams do not contain significant concentrations of volatile organics...."

With this information, the Hazards Evaluation Team concluded that there was no significant hazard potential from organics in the feed. As the design develops and further hazard evaluation work is carried out, this hazard potential will be reviewed further as required, (e.g., if the feed specification was to change).

Detailed question 2.

The lower flammable limit for hydrogen in dry air is taken as 4.1% (CRC Handbook of Chemistry & Physics). At this concentration, hydrogen burns slowly and incompletely with no significant increase in pressure due to the reaction. The lower explosive limit (i.e., combustion accompanied by a pressure transient) occurs at a concentration of hydrogen in dry air above 8%.

The potential for significant pressure effects from a hydrogen explosion in a TWRS-P process vessel depends upon the amount available for combustion (reaction) and this is dependent on the headspace (ullage) above the radioactive liquid where radiolytic gases can collect. It follows therefore that the hazard potential from a potential hydrogen explosion is dependent on the ullage volume; the larger the volume, the larger the effects of any potential explosion. Large inventory vessels (with correspondingly larger ullage volumes) will have higher consequences from a potential radiolytic hydrogen explosion (both in terms of pressure generated and inventory at risk).

Early in Part A, all major process vessels containing solutions with significant radioactive inventory were examined to determine hydrogen concentrations in the ullage. The calculations assumed quiescent conditions within the vessels; (i.e., no credit was taken for forced extract or air purges) and that the ullage constituted 20 % of the vessel volume. The time taken for hydrogen concentrations to reach 1% (i.e., one quarter of the lower flammable limit) in the ullage was determined for each vessel. The time taken to reach this value was larger for large inventory (and ullage space) vessels than for the smaller ones. Times ranged from several days for large vessels such as the HLW receipt vessels (225 cu. meters inventory in each) to several hours for small ones (1.5 cu. meters inventory).

In conclusion, only a small number of TWRS-P process vessels are considered to be at risk from the potential for an explosion from radiolytic hydrogen reactions. Detailed design of the vessel ventilation will address this potential so that credit can be taken for buoyancy effects (I.e., escape of hydrogen through the ductwork even when the extract system has failed) such

that no significant hydrogen concentrations can build up in the ullage space of these vessels. The design intent is to design out from the TWRS-P process the potential explosion hazard from the presence of radiolytic hydrogen in process vessels.

Detailed question 3.

HAR Section 5.2.17.2 considers miscellaneous waste streams such as used quench water, condensates, wash water from decontamination activities, etc. Compared to process vessels, these waste streams do not contain significant amounts of activity. The potential for radiolytic hydrogen gas generation from these very low-activity streams was considered to be negligible and was not evaluated further.

Detailed question 4.

We concur the initiating event descriptions in the Fault Schedule event identifiers 1614700/511 and 1614700/538 (not 1614700/531 as in the question) are confusing. 1614700/511 initiating event should read "In-cell fire;" 1614700/538 should read "Fire within Ventilation Ductwork." This is in accordance with its description in the HAR page 6-10. The consequence rating (2, 2) for the first event assumes an unfiltered activity release from the cell as a result of the fire (but the filters themselves are not burning). The increased consequence rating for the second event reflects the judgement that a fully loaded filter undergoing combustion, could release a significant amount of activity.

The HAR will be revised to clarify these events. A mark up of the revision is included for information.

Disposition

The BNFL response is unresponsive for reasons indicated below:

The Contractor's response is acceptable because the response to question 127 is acceptable (same issue)

The Contractor's response to detailed question 2 is unacceptable. The response states that "Early in Part A, all major process vessels containing solutions with significant radioactive inventory were examined to determine hydrogen concentration in the ullage.....Times (to reach 1% H2 concentration) ranged from several days for large vessels such as the HLW receipt vessels (225 cubic meters inventory in each) to several hours for small ones (1.5 cubic meters inventory)." However, since the study was conducted, the Cesium Product Storage Tank has been redesigned. The tank was reduced in capacity from 225 cubic meters to 56 cubic meters to reduce the cost of the cooling jacket (necessary for removal of decay heat). Apparently prompted by RU question 21, the cesium inventory in the Cesium Product Storage Tank has been revised from 140,000 TBq to 200,000 TBq. Therefore, the assumptions on which the Vickers study were based may be invalid in the case of the Cesium Product Storage Tank, which is designed to hold the largest radionuclide hazard in TWRS-P.

The reduction in volumetric capacity simultaneous with an increase in the potential cesium nitrate inventory in the tank must mean that the projected aqueous cesium nitrate concentration has increased. Further analysis of radiolysis in the solution may modify assumptions about the radiolytic species produced. Not only hydrogen, but nitrogen oxides and, possibly, ammonia and ammonium nitrate may result from radiolysis of the solution. The RU understands that Tank 241-SY-101 in Tank Farms generates a mixture of gases, including hydrogen, nitrogen oxides and ammonia (all of them either flammable gases or oxidizers), the effect of which is to reduce the LFL below that of hydrogen/air mixture.

Assumptions about the (steady) rate of release of hydrogen gas from the surface of the solution need to be carefully examined. Again, Tank 241-SY-101 is notorious for the irregular manner in which hydrogen was released before the mixer pump was installed. Can similar concerns regarding possible rollover of cesium nitrate solution with an attendant "burp" of flammable gases be summarily discounted?

The intention expressed by BNFL in the response to this question "to design out the potential explosion hazard from the presence of radiolytic hydrogen in process vessels" (taking advantage of hydrogen's buoyancy relative to air) is a commendable implementation of DOE/RU-RL-0006 Top-level Standard and Principle 4.1.1.2 Prevention (same as BNFL Safety Criterion 1.0-2). However, as expressed in the RU's disposition of the Contractor's response to question 28, the cesium inventory projection for the Cesium Product Storage Tank appears to be driven solely by programmatic considerations, with the safety implications involved in storing such a large quantity of aqueous cesium nitrate solution in TWRS-P either examined insufficiently or not well explained in the Standards Approval Package. The need for interim storage of cesium in some form while the HLW melter(s) undergo shakedown on less radioactive feedstock is understood, but the rationale for quantities and form (aqueous solution)

needs to be explained and justified. Reducing the (projected) cesium inventory in the Cesium Product Storage Tank would have a safety benefit in reducing the rate of generation of flammable gases, perhaps putting BNFL's Safety Criterion 1.0-2 into practice even more effectively than merely planning for hydrogen escape by passive means (natural convection).

An acceptable response would provide detailed quantitative evidence to support BNFL's position with respect to generation of flammable gases, possibly including making the Vickers report available for examination by the RU. The technical issues surrounding this safety question are sufficiently complex that the RU anticipates continued review of the more detailed safety analysis results that become available as the design and level of quantitative assessment progresses during Part B.

The Contractor's response is acceptable because the risk from this particular hazard is believed to be negligible based on low activity in the miscellaneous waste streams mentioned in HAR Section 5.2.17.2.

The contractor's response is acceptable because it resolves the ambiguity in the HAR and explains in more detail the assumptions made in estimating consequences.

Supplemental Response

The reviewer's concern is that the perceived high activity inventory of the 56 cu. meter Cs concentrate storage vessel may produce enhanced flammable gas mixtures with an LFL somewhere below the 4% (in dry air).

This 56 cu meter Cs concentrate storage vessel was examined as part of the facility wide determination of build up of hydrogen gas in the ullage spaces of process vessels. The study concluded that for this vessel (V2710) the time taken for the concentration of hydrogen to reach 1% was 23 hours. This assumed that the vessel is at its operating level, i.e. towards the end of the two year storage period with no credit taken for forced extract. BNFL would agree that the LFL could be depressed in terms of concentration by the presence of other gases such as ammonia and NOx but that still would give several days before the potential for an explosion (i.e. pressure generation) becomes significant. This represents the minimum time. At lower volumes of material (larger ullage space), the time taken for the hydrogen concentration to reach 1% will be increased. This assumes that there is a constant hydrogen evolution rate. Because the Cs concentrate is a mobile homogenous solution, any off-gassing will be at a constant rate, episodic releases are not considered to occur.

See response to Question 28 for rationale behind the choice of interim storage.

Although V2701 has a significant Cs-137 inventory, the potential for a radiolytic gas explosion is considered at this time to be low. Nevertheless, it is BNFL's intent to remove any potential for an explosion from radiolytic gas generation. As indicated in the initial response and the reviewer's disposition, continued safety review will take place as the design matures.

Supplemental Disposition

The Contractor's supplemental response is acceptable. BNFL's study of radiolytically-generated hydrogen in TWRS-P specifically examined 56 cubic meter capacity cesium storage tank V2710. The supplemental response recognizes that other gases present could depress the LFL of the headspace gases, but that several days without forced extract could pass before the hydrogen concentration reached 1% (25% of the LFL). The Contractor committed to continued safety review of flammable gas generation in the process as the design matures.

Question # 181

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Process Chemistry

SUBMITTAL CRITERIA:
RL-96-0003, Section 4.1.2:

3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the

Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 5.2.2, page 5-28.

OBSERVATIONS:
The HAR discusses in Section 5.2.2 (page 5-28) the corrosion hazard in the LAW feed receipt evaporator due to chloride negative ions in feed

DETAILED QUESTION:

Why were there no hazards identified or analyzed chemical reactions between evaporator components and fluorides/sulfates ions in feed?

Contractor Response

The compatibility of equipment and process with the process materials is considered at all stages of the design process. To this end, a test program to ensure equipment and process are compatible is planned for Part B. No concerns regarding fluoride and sulfate ions in evaporator feed material were raised at this stage. This does not preclude further study in this area. However, it is recognized that sulfates and fluorides (as with chlorides) in the melter off-gas system give a very corrosive material. A number of actions, (which have been incorporated into the test program) were raised. For example:

"Examine solubility of [melter - word added] Off-Gas halogens, sulfates.
Examine credibility of vertical current flow causing enhanced erosion."

"Examine scope for minimizing corrosion from chlorides, etc. and selection of appropriate materials to withstand effects."

Potential corrosion leading to a loss of confinement hazards was identified for the melter off-gas area.

Further HAZOP studies use the guideword "contaminants" for the study of the process. This ensures that corrosion and incompatibility issues are treated throughout the design process.

Disposition

The BNFL response is considered to be responsive and acceptable.

The responses are acceptable. In reaching this conclusion, the RU assumed that qualified chemical engineers will participate in the development of a test program to ensure equipment and process are compatible during Part B.

Supplemental Response

Supplemental Disposition

Question # 182

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Process Chemistry

SUBMITTAL CRITERIA:
RL-96-0003, Section 4.1.2:

3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

DOE-RL-96-0006 - Design provisions should be included to limit the loss of safety functions due to damage to several structures, systems, or components important to safety resulting from a common-mode failure.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 2 and 5, "LAW Melters," page 5-117.

Hazard Analysis Report (HAR), Section 2 and 5," HLW Melters," page 5-194.

OBSERVATIONS:
None

DETAILED QUESTIONS:
1 Were hazards identified or analyzed for the following process phenomena:

• Formation of insoluble dross on top of melt and potential subsequent overflow?

• Reactions between melter components and corrosive material, e.g., chlorides, fluorides, and sulfur oxides?

• Reactions between off-gas treatment components and corrosive material, e.g., chlorides, fluorides, and sulfur oxides?

If hazards were identified, please elaborate on their nature and consequences.

2 Were potential accidents resulting from two or more simultaneous failures identified during the PHA work? If so please elaborate .

Contractor Response

Detailed question 1.

The potential for insoluble or less soluble materials within the melt was identified, (e.g., sulfur content of Envelope B material). Design provisions are to reduce the waste loading of the glass for this material so that the reduced solubility can be taken into account. No insolubles have been identified to date; the potential for their occurrence will be reviewed if the feed specification or melter process conditions change. There are a number of events which can give rise to the potential for glass spillage, (e.g., fault Schedule event identifiers 3200/253, page 5-137, 3200/248, page 5-141)

Reactions between melter and melter off-gas components and corrosive materials were recognized. See response to Question 181. See, for example Fault Schedule event identifiers 3200/153 (HAR page 5-132), 3200/179 (HAR page 5-128).

Detailed question 2.

In general, simultaneous failure modes were not considered. The domino (cascade effect) guideword came up with simultaneous failure modes. A greater level of design detail than

Disposition

The BNFL response is unresponsive for reasons indicated below:

The Contractor's response for part 1 is acceptable.

The response of part 2 is unacceptable. This part asks for common cause and multiple failure scenarios for the above-mentioned process phenomena. The response states that the current PHA did not explicitly address common cause and multiple failure scenarios. However, DOE-RL-96-0006 requires that "design provisions should be included to limit the loss of safety functions due to damage to several structures, systems, or components important to safety resulting from a common-mode failure." Without good justification, the SSCs may be inadequately constructed to protect against common cause release events. This could result in the need for future design upgrades that could be much more costly than

adopting a conservative initial design.

Supplemental Response

The reviewer is concerned that there is no statement on how BNFL will be covering common cause failure. i.e., where is the subordinate standard (how BNFL addresses common cause failure) to support the top level standard 4.2.2.2?

The need to address common-mode (cause) failures, although stated explicitly in the top level standards (4.2.2.2), is driven by the need to satisfy the general principle of defense in depth, the requirement for "multiple, independent safety provisions...." (4.1.1.1). The subordinate standard which will apply to both is captured in the SRD in sections 3.1, Defense in depth and sections 3.7.1, 3.7.2, Proven Engineering practices (discussion of active and passive engineered features). These discuss multiple barriers and the need for redundancy. Although the term "common-mode failures" is not used, the need to achieve defense in depth ensures that the potential for such failures are addressed. Nevertheless an explicit reference will be made in the SRD (Safety Criterion 3.1.3) which indicates that common cause failures are addressed as part of the hazards identification process. The addition to Safety Criterion 3.1.3 (7) will read:
"Common-mode failure events."

In practical terms, initiating events (causes) will be further addressed and evaluated during the HAZOPs which support the Part B work. Potential common-mode failures will be identified. Additionally, fault and event tree analysis will be used where appropriate to determine the mechanisms which give rise to the potential such that appropriate protection is specified.

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response states that the subordinate standard which will apply to both is captured in the SRD in sections 3.1, Defense in depth and sections 3.7.1, and 3.7.2, Proven Engineering practices (discussion of active and passive engineered features). It also states that initiating events (causes) will be further addressed and evaluated during the HAZOPs which support the Part B work.

that required by a PHA study is necessary such that simultaneous failures could be identified. The PHA studies, with the conceptual design level of detail, focused its attention on identifying the major hazardous situations without necessarily considering all the failure modes which could lead to them. This is consistent with the AIChE guidelines on Hazard Evaluation Procedures where it says of the What If/Checklist and preliminary Hazards Analysis methods (basis of the BNFL PHA studies):

"The technique is generally used to analyze the most common hazards that exist in a process." (Page 62)

Question # 183

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Off-gas system

SUBMITTAL CRITERIA:
RL-96-0003, Section 4.1.2:

3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:

Hazard Analysis Report (HAR), Section 5.2.12.

Hazard Analysis Report (HAR), Section # 5.2.14.

OBSERVATIONS:
Blockage or failure of HEPA filters in the LAW or HLW off-gas systems is not identified in the HAR. The fault schedules for the off-gas systems do not contain an entry for blocked or failed HEPAs. The consequence columns for off-gas system fault schedules identify no initiators which may lead to blockage or failure of the HEPAs.

DETAILED QUESTION:
1 What events in the LAW and HLW off-gas systems could lead to blockage or failure of HEPAs?

2 Was HEPA failure or blockage considered in the assignment of consequence categories for off-gas system accidents?

Contractor Response

Detailed question 1.

Fault Schedule event identifiers (as examples) 3200/167, 3200/160, 3200/249, 3200/247 3200/165, HAR pages 5-128 to 5-168, deal with melter overpressurization and water ingress (steam generation). These events (and others) are considered to "challenge" the ventilation system. HEPA filter failure (due to excessive dust loading or moisture) may or may not occur; this was not determined. In some instances (event identifier 3200/247) failure was assumed.

Detailed question 2.

Qualitative assessment of consequences assumed no active mitigation features, therefore, PHA evaluations assumed that there was no filtration available.

Disposition

The BNFL response is acceptable based on the Contractor's commitment to revise the HAR reflecting their response to this question. Initiators that could lead to failure of HEPA filtration should be identified as such in the consequence columns of the fault schedules.

Supplemental Response

Supplemental Disposition

Question # 184

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Vitrification System

SUBMITTAL CRITERIA:
RL-96-0003, Section 4.1.2:

3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.
RL-96-0006, Section 4.1.2.4, Operating Experience and Safety Research. "Operating experience and the results of research relevant to the safety should be obtained, reviewed and analyzed and lessons that are learned should be implemented in the design, construction or modification and operation of the facility."

REFERENCE CITED:
Hazard Analysis Report (HAR), Section # 4.4.2; pages 4-21, 4-22

OBSERVATIONS:
In Section 4.0 of the HAR, page 4-1, paragraph 3 and Section 4.22, Table 4-8, it is stated that "hazard analyses and operating histories of other vitrification facilities provide an additional check on the completeness of the hazard identification." Also, the contractor states in Section 3.3.1 on page 3-8 of the HAR that a What If/Check List consists of "drawing upon previous operations experience in preparing for the review."

DETAILED QUESTION:
Why weren't experiences from other relevant vitrification plants also included in the review? Specifically, the contractor's experiences at the Fernald vitrification plant and the Savannah River M-Area vitrification plant should be pertinent?

Contractor Response

The Occurrence Report and Process System (ORPS) was queried for events that have occurred in vitrification facilities that are similar to the TWRS Privatization Facility. The historical experience is reported in Section 4.4, "Comparison To Similar Facilities." Similar facilities are those with pretreatment processes that prepare reprocessing waste for vitrification, like WVNS and DWPF. As the design become more definitive in Part B, the commonality of features of the TWRS Privatization melters and other melting systems can be more closely correlated and the ORPS reviewed with more specificity in key words. At the pre-conceptual stage of design, similarity is at a higher level.

Disposition

The BNFL response responsive and acceptable.

The Contractors response is conditionally acceptable. The BNFL response is acceptable based on additional input from Leanne Smith on 11/18/97 stating that Duratek experience from Fernald and M-Area and Vitreous State Laboratory was included in the development of the HAR. This experience will be explicitly identified in the HAZOPS.

An electronic copy of the details of the telephone conversation follows for the record:

Date: November 18, 1997
Time: 4:40-5:00 p.m.
RU Participants: Mike Elliott and Joe Perez
Contractor Participant: Leanne Smith of BNFL

Incoming/Outgoing Call: Outgoing
cc: Jay Boudreau

Supplemental Response

Supplemental Disposition

Rob Barr, Mike Elliott and Joe Perez called Leanne Smith to discuss the BNFL response to RU Question #184 that asked why the contractor's experience at Fernald and Savannah River M-Area were not identified as being used to develop the HAR. The conversation was opened with Mike stating that the BNFL response to the question was not sufficient and that the intent of the call was to get clarification of the response and try to resolve the RU discomfort with the response. Leanne stated that relevant Duratek experience was included in the development of the HAR and that this was not included in the BNFL response because it was felt to be intuitive. Mike Elliott responded that nowhere in the HAR did it state that Duratek was involved in the HAR development because the participants' affiliations were not included in the HAR. Leanne mentioned that one of the Duratek melters was presented as an example of the BNFL team experience in Table 1-1 of the ISMP. Both parties agreed that the experience gained at Fernald and Savannah River M-Area was covered by the fault schedules but that this was not explicitly stated in the HAR. It was agreed to add the following text to the RU responses for Question #184, "The BNFL response is acceptable based on additional input from Leanne Smith on 11/18/97 stating that Duratek experience from Fernald and M-Area and Vitreous State Laboratory was included in the development of the HAR. This experience will be explicitly identified in the HAZOPS."

Question # 185

Description

THEME: Weaknesses in the HAR

SUBORDINATE THEME: Vitrification System

SUBMITTAL CRITERIA:
RL-96-0003, Section 4.1.2:

3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

5) Description of the process and facility design and its proposed operation

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

DOE/RL-96-0006 Section 4.2.2, Proven Engineering Practices/Margins.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 4.4; Pages 4-14, 4-22,
Hazard Analysis Report (HAR), Section 5.1, Page 5-2.

OBSERVATIONS:
The scope of the Hazard Analysis Report is incomplete. Some systems were not described in the text or evaluated in the fault schedules.

DETAILED QUESTION:
1 Why weren't the LAW feed preparation steps described in Section 5.2.11?

2 Why weren't the HLW feed preparation steps included in the fault schedules? (It is assumed that the fault schedules for the HLW are the same as those for the LAW)

Contractor Response

Detailed question 1.

Section 5.2.11 should have referenced Section 5.2.13 (HAR Page 5-173) for details on glass former receipt and weighing and glass former blending operations. The inactive blending operations and the blending operations are similar for both LAW and HLW melter systems. Section 5.2.11 will be revised accordingly; a copy of the mark up is included for information.

Detailed question 2.

The assumption is correct. The hazard study of the HLW melter system was carried out "by exception." Similarities with the LAW system (previously studied) were not recorded, only the differences were recorded. The HLW fault schedule reflects the "exception" approach.

Disposition

The BNFL response is responsive and acceptable.

Section 5.2.11 should have referenced Section 5.2.13 on page 5-173 of the HAR. The recommended revision to the HAR is acceptable.

The Contractor's response is acceptable. The Contractor states that the Reviewer's assumption is correct, clarifying the ambiguity noted.

Supplemental Response

Supplemental Disposition

Question # 186

Description

THEME: Design Classification/Quality Level Classification

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

4) The hazards control strategy implemented in the design and proposed operations;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

3) The hazards associated with the proposed facility and its operation are appropriately assessed;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Safety Requirements Document (SRD), Volume I, Table 3-1, pages 3-7,

Hazard Analysis Report (HAR), Sections 2, 5 and 6.

OBSERVATIONS:
The Safety Requirements Document (SRD) provides three design classes (DC's) for structures, systems, and components (SSC's), based upon potential events identified in the HAR and Fault Schedules. These should be explained better, particularly as they impact the choice of standards, the design (the DC's are rarely mentioned in Section 2 of the HAR), and the HAR Fault Schedules (HAR Section 5).

Only one event (failure of the low activity waste [LAW]/high level waste [HLW] feed receipt tanks) in the SRD (Volume I, Table 3-1, pages 3-6) is identified as requiring SSC's meeting DC-I. The tank failure is not listed in the HAR fault schedules and it is not clear how a liquid pathway can affect the public in an accident scenario (i.e., usually airborne pathways ["clouds and plumes"] with dispersive energy are required for significant public effects from accidents).

There should be better agreement and correlation between the events listed for DC II in the SRD (Volume I, pages 3-7) and fault schedules identified in Section 6 of the HAR.

Several fault schedule events listed as requiring DC II appear capable of generating significant airborne contamination and clouds that could affect the public (e.g., SRD Volume I, page 3-7, Event 2200/12 "Cesium Ion Exchange Column Fire").

The primary process flow paths for DC I and II items in Table 3-1 are not identified.

DETAILED QUESTIONS:
1 Please provide more information on the failure of LAW/HLW feed receipt tanks event and how the event drives the standard.

2 Please explain which AIChE risk events (i.e., I, II, III, and/or IV fall into DC I and DC II - presumably, all Category IV events would be DC I but none are listed as such.

3 Please discuss further the Cesium Ion Exchange Column Fire and explain why it is DC II and why it should not require DC I SSC'S.

4 Please describe the design classification of the major components and systems (such as evaporators) making up the major flow/process paths for DC I and II items.

Contractor Response

Detailed question 1.

The LAW/HLW tank failure scenario, which assumed no mitigative or protective features whatsoever, was examined for the purpose of determining the hazard potential of the facility. Although catastrophic vessel failure and loss of all protection features, (e.g., cell, shielding, confinement passive features) is not considered credible (and therefore did not appear per se in the HAR), it serves as a bounding case for loss of confinement events (numerous references in the HAR).

Disposition

The BNFL response responsive and acceptable.

Each of the four detailed questions is addressed. As requested in the first detailed question

the response provides additional information that explains why the feed receipt tanks should be afforded DC-1 protection. We note however that it remains unclear why the feed receipt tanks alone should be afforded DC-1 protection; similar assumptions and bounding analysis would indicate that the off-site receptor would receive a greater dose from catastrophic failure of the tank used to store separated cesium in the LAW/HLW option. The response to the second and fourth detailed question clarifies the point that the definitive link between the AIChE risk categories and the design classification is to occur after the unmitigated accident analysis step. The response to the third detailed question states that the need for DC II as opposed to DC I protection for the ion exchange column fire event is based on early bounding consequence calculations which show that the off-site receptor doses for this event are lower than the evaluation guidelines.

Supplemental Response

Supplemental Disposition

Key assumptions around the scenario were as follows:

· The three HLW receipt vessels fail due to a seismic event (DBE).
· Entire liquor inventory is lost - no passive (protective) features remain.
· Activity becomes airborne due to shaking and splashing effects.
· Ground level release and X/Q based on Hanford meteorology.

Based on these assumptions, the off-site receptor could receive a dose of around 10 rem and the worker/co-located worker considerably more. Public and worker exposure standards are challenged, therefore it was felt appropriate, from a conservative standpoint, to select standards which could support DCI or DCII protection.

Detailed question 2.

The use of the AIChE risk events (I - IV) result from the qualitative frequency and consequence binning exercise in the HAR. DCI or DCII protection is driven by unmitigated consequence (accident) analysis and not by the qualitative results of the PHA. For category IV events that are high consequence, it is likely that they will require DCI or DCII protection, but the definitive link is only made after the quantified (unmitigated) consequence analysis.

Detailed question 3.

Early bounding consequence calculations (not those supporting the forthcoming accident analysis work) indicated that the unmitigated consequences of a Cs ion exchange fire was 0.41 rem to the off-site receptor. This is well below the off-site receptor dose limit of 5 rem, only the worker exposure limit was considered to be challenged, hence at the time, only the need for DCII protection was identified.

Detailed question 4.

Our preliminary bounding consequence analysis carried out earlier (for project purposes) has indicated that DCI features will be limited to structures and possibly the HEPA filters in HVAC systems. The potential for exceeding the worker exposure standard identified in the response to detailed question 3 above may require a DC II ventilation system and associated discharge stack. The need for additional DCII SSCs will be identified on completion of the accident analysis. The process path which defines the need for whether or not a SSC is designated as DCI or DCII is whether that SSC protects against a hazardous situation which could challenge public or worker exposure standards.

Question # 187

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
The Standards Approval submittal package shall consist of the following documentation:

1) The Contractor’s recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of an SRD;

6) The Contractor’s treatment of the top-level radiological, nuclear, and process safety standards and principles;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the

Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 7.0, Safety Criteria 7.1-4, 7.7-8, and 7.8-2, Page 7-4, 7-23, and 7-25.

OBSERVATIONS:
Section 4.1.2.3, Site and Technical Support, DOE/RL-96-0006, Revision 0, states "The Contractor should assure commitments from relevant parties to provide data and services needed to fulfill its safety commitments."

Attachment E, BNFL SRD Volume I, references Safety Criteria 7.1-4 and 7.8-2 as the complying criterion of the BNFL SRD.

Safety Criterion 7.1-4 incorporates the safety principle noted above. Safety Criterion 7.8-2 notes that the emergency response plan will address provisions for interfaces and coordination with Hanford Site and offsite agencies. This is an example of how the principle is addressed.

Safety Criterion 7.7-8 commits to use the services of Environment Safety and Health (ES&H) reporting system, maintained by the Office of Environment, Safety, and Health. This is an example of services BNFL is dependent upon.

DETAILED QUESTIONS:
1 What interface agreement with the Office of Environment, Safety, and Health assures the provision of services that Safety Criterion 7.7-8 commits to use?

2 What other interface agreements have been established or are planned for data and services upon which BNFL depends to meet any other commitments in the SRD and ISMP?

Contractor Response

1. DOE and BNFL have identified the need for more interaction in the area of emergency management. As part of this method of interaction, BNFL and DOE will develop a new Interface Control Document for emergency management between January and May of 1998.

2. The contract currently identifies 22 Interface Control Documents; BNFL believes these adequately address the need for other data and services in other areas.

Disposition

The BNFL response is responsive and acceptable.

The Contractor confirmed that measures are in place to assure DOE will provide the services of the Environment, Safety, and Health reporting system maintained by the Office of Environment, Safety, and Health as required to fulfill the commitments of BNFL Safety Criteria 7.7-8.

Supplemental Response

Supplemental Disposition

Question # 188

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
The Standards Approval submittal package shall consist of the following documentation:

1) The Contractor’s recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of an SRD;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II, Section 3.0, Safety Criterion 3.1-4, Page 3-2.

OBSERVATIONS:
Section 3.3.3, "Accident Vulnerabilities Mitigation," DOE/RL-96-0006, Revision 0, states "Particular care should be taken to identify, evaluate, and prevent and/or mitigate any vulnerabilities to accidents that might, by themselves, result in a release of radioactive material that exceeds acceptable levels."

SRD, Volume I, Attachment E, references Safety Criterion 3.1-4 as the complying criterion of the SRD. This criterion provides the requirements for performing hazards analysis. Item 3 of the criterion states that "The hazards analysis shall identify energy sources or processes that might contribute to the generation of or uncontrolled release of radioactive or highly hazardous non-radioactive material." Item 4 requires evaluation of identified energy sources and processes.

DETAILED QUESTIONS:
What standard(s) requires measures that prevent and/or mitigate any identified vulnerabilities to accidents that might, by themselves, result in a release of radioactive material that exceeds acceptable levels?

Contractor Response

BNFL procedure ESH-03-TWRS "TWRS Privatization Project: Accident Analysis Procedure" is the implementing procedure for the performance of accident analyses which identifies the need to provide mitigative and preventive features to control events leading to the unacceptable exposures to workers and the public in excess of prescribed exposure limits and will be added as an implementing procedure to SC 3.2-1.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The response is acceptable based on the Contractor's commitment to modify the SRD to incorporate the implementing procedure for BNFL Safety Criteria SC 3.2-1 as committed to in the response and that the implementing procedure requires particular care be taken to identify, evaluate, and prevent and/or mitigate any vulnerabilities to accidents that might, by themselves, result in a release of radioactive material that exceeds acceptable levels. This satisfies a requirement to conform to the Top-Level Safety Standards and Principles.

Supplemental Response

Supplemental Disposition

Question # 189

Description

THEME: Conformance to Top Level Standards and Principles

SUBMITTAL CRITERIA:
The Standards Approval submittal package shall consist of the following documentation:

1) The Contractor's recommended set of radiological, nuclear, and process standards for design, construction, operation, deactivation, and regulatory submittals in the form of an SRD;

6) The Contractor's treatment of the top-level radiological, nuclear, and process safety standards and principles;

APPROVAL CRITERIA:
The approval of the Contractor's recommended set of radiological, nuclear, and process

safety standards and requirements will be issued upon determination by the Director of the Regulatory Unit that:

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

REFERENCE CITED:
Safety Requirements Document (SRD), Volume II.

OBSERVATIONS:
Section 4.2.7.1, Reliability, DOE/RL-96-0006, Revision 0, states "Reliability targets should be assigned to structures, systems, and components or functions important to safety. The targets should be consistent with the roles of the structures, systems, and components or functions in different accident conditions. Provision should be made for appropriate testing and inspection of structures, systems, and components for which reliability targets have been set."

SRD, Volume I, Attachment E, provides no reference to Safety Criteria as the complying criterion of the SRD.

DETAILED QUESTIONS:
What are the set of Safety Criteria that incorporate or address the referenced reliability principle or explain what other measures are taken to incorporate the reliability principle into the recommended standards and requirements (i.e. The measures to be taken to assure reliability targets are assigned consistent with roles of the SSC's. The measure to be taken to assure inspection and testing of the SSC's.)?

Contractor Response

Section 4.2.7.1 was omitted from the Regulatory Basis list of SC 7.6-3 and will be added.

Disposition

The BNFL response is responsive and acceptable for reasons indicated below:

The Contractor response is acceptable based on the Contractor's commitment to revise the SRD to incorporate the omitted top-level safety principle, Section 4.2.7.1, into the SRD, as reflected in the question response. This satisfies a requirement to conform to the Top-Level Safety Standards and Principles.

Supplemental Response

Supplemental Disposition

Question # 190

Description

THEME: Process used to develop SRD
Process used to develop SRD

SUBORDINATE THEME: Hazard Assessment Links to Standards

SUBMITTAL CRITERIA:
3) The hazards assessment used to facilitate the selection of the standards;

7) The rationale for the selection of the standards and the adequacy of the set;

APPROVAL CRITERIA:
4) The set documented in the SRD was generated through the appropriate implementation of the standards process stipulated by DOE in the document titled Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED
BNFL Inc. Letter 5193-97-0513, October 23, 1997

Safety Requirements Document (SRD); Volume II

Hazard Analysis Report (HAR), Section 6.0, Table 6-1 through 6-6

OBSERVATIONS:
It is the RU's understanding that the purpose of Table 1,"Safety Criteria Linked to TWRS-P Specific Hazards/Controls," in Attachment 4 to the referenced letter, was to respond to the issue "that certain standards were selected which were not based on hazards, laws, or conformance to top-level safety standards and principles." As explained to the RU, the SRD Safety Criteria cited in Table 1 were supposed to be those Safety Criteria which did not have a "Regulatory Basis." However, SRD Safety Criteria 3.3-2 and 5.1-2, which do not have "Regulatory Bases," were apparently inadvertently omitted. Furthermore, the RU understands that the "Fault Schedule Events" listed for a specific "SRD Safety Criteria" were not necessarily all of the HAR events which could form the basis for the criteria, but were those considered to be sufficient to support the applicable criteria based on hazards. Notwithstanding the identified links in Table 1 between the HAR and the SRD, the table also indicates "other bases" for Safety Criteria which are "not based on hazards, laws, or conformance to top-level safety standards and principles." Therefore, these Safety Criteria appear to be unnecessary standards for the performance of the identified work.

It is the RU's understanding that the purpose of Table 2, "Controls (Safeguards) Linked to SRD," in Attachment 4 to the subject letter, was to respond to the issue of "the use of the HAR to facilitate the selection of standards." As explained to the RU, the "Event Identifiers" cited in Table 2 were those with consequences of 3 or higher. The RU compared the listed events in Table 2 against the events listed in Tables 6-1 through 6-6 of the proposed revision to Section 6.0 of the hazard analysis report. Based on this comparison, it appears that all events with consequences of 3 or higher were included in Table 2. However, two events in Table 6-5, "Events of Potentially Serious or Major Consequences to the Co-Located Worker," designated by "Event Identifiers" 1614775/399 and 2100/9, have consequences lower than 3, and apparently should not be in Table 6-5. Also, one event, designated by "Event Identifier" 1614776/283, is included in Table 2, has a consequence of 3 or higher, but is not included in any of the HAR Tables 6-1 through 6-6.

Furthermore, the RU understands that standards (i.e., "SRD Link/Control Type") were not selected for all "safeguards" listed in Table 2. The basis for choosing "safeguards" requiring standards was not specified. Without this basis, the RU may not be able to determine, in accordance with DOE/RL-96-0003, that "The set documented in the SRD will provide adequate safety if properly implemented."

GENERAL QUESTION:
a) Please explain why standards based on other than hazards, laws, or conformance to top-level safety standards and principles are necessary for the performance of the identified work.

b) Please provide the basis for choosing those "safeguards" requiring standards.

DETAILED QUESTIONS:
a) Please provide the "Fault Schedule Event/Other Basis" for SRD Safety Criteria 3.3-2 and 5.1-2.

b) Please confirm that the correct "Event Identifiers" are in Tables 6-1 through 6-6 of the proposed revision to Section 6.0 of the hazard analysis report. Please identify any corrections made to these tables.

Contractor Response

Response to General Question A.

No standards other than those based upon hazards or compliance with regulation or contractual commitments have been identified in the SRD. See response to detailed question A.

Response to General Question B.

Safeguards listed in the HAR include features and activities which are normally not considered part of a design control strategy. For Table 2 safeguards that clearly provide a preventive or mitigative function, specific Safety Criteria were identified. It was considered that these safeguards as identified would be sufficient to prevent or mitigate the hazard/hazardous situation. Although the other safeguards listed may be included in the TWRS-P design, these safeguards reflect the intent of BNFL to preclude the hazard (designed out), or reflect administrative activities which will be identified at a later time, only

if the hazard/hazardous situation cannot be designed out or prevented/mitigated by a selected control.

Note: At this stage of design, not all controls have been identified. This is consistent with AIChE Guidelines and K0104_REP_007_SAF on the performance of process hazards analyses.

Response to Detailed Question A.

As noted in the observation, the omission of the basis for the selection of 3.3-2 and 5.1-2 was an oversight. The basis for inclusion of SC 3.3-2 is that as provided for the other criticality standards 3.3-3, 3.3-4, 3.3-6, 3.3-7, 3.3-8; Event Identifiers 0/6; 1614661/118; 1614664/116; 1614666/117; 1614669/180; 3200/189.

SC 5.1-2 is based upon controlling personnel exposures to radiation from sealed sources, as identified in SRD Volume I Table 3-1. In addition, this criterion reflects DOE's proposed modification to 10 CFR 835 (December 23, 1996) which includes codification of requirements related to control of sealed sources.

Response to Detailed Question B.

The Table 2 of Attachment 4 to the letter provided to the RU on October 23 is correct. Events 1614775/399 and 2100/9 should not have been included in Table 6-5 and will be deleted. Event 1614776/283 should have been included in Table 6-2 and will be added.

Disposition

The BNFL response is considered to be unresponsive for reasons indicated below:

The BNFL response is inadequate for General Question A and Detailed Question A because the response appears to contradict the details provided in Table 1. The response for General Question B and Detailed Question B is adequate.

With respect to General Question A, as stated in the question, Table 1 cites "other bases" for Safety Criteria (SC). It is not clear how the BNFL response can be reconciled with Table 1. Please consider the following as examples of this apparent disparity:

1) For SC 2.0-3, the basis provided in Table 1 is "10 CFR 20 used to augment 10 CFR 835." Does this mean that 10 CFR 20 and 10 CFR 835 are the applicable laws upon which SC 2.0-3 is based? If so, then shouldn't the SRD reflect 10 CFR 20 and 10 CFR 835 as the "Regulatory Basis?" If not, then what hazard or top-level principle is the basis for this SC?

2) For SC 4.3-2 and SC 4.3-5, the basis identified in Table 1 is "All events involving engineered safety features or monitoring." Does this mean a particular list of "Fault Schedule Events," or does this basis refer to something more global, such as the top-level principle on defense in depth.

3) For SC 7.2-2, the basis identified in Table 1 is "NRC Regulations and Guidance." If this basis is meant to refer to applicable laws, shouldn't those laws and their applicability be specified as the "Regulatory Basis" in the SRD? If this is not what is meant, what hazard or top-level principle is the basis for this SC?

With respect to Detailed Question A, is the first sentence in the BNFL response referring to a top-level principle? If so, which one? If not, does the second sentence mean that 10 CFR 835 is the applicable law which should be the "Regulatory Basis" for SC 5.1-2?

Additional detail is needed describing the bases for SCs which do not have "Regulatory Bases" nor identified links to the HAR. Applicable regulations and contractual commitments should be specified.

Supplemental Response

1. As noted in Column one of Table 1 the hazard is radiological (exposure to radiation due to TWRS-P Facility activities). Control of this hazard is accomplished through adequate shielding design. Citing 10 CFR 20 provides the RU with assurance that BNFL's basis for determining the limit as specified in 2.0-3 is adequate to protect the public. (Note: Criterion 2.0-3 as been revised to reflect incorporation of other RU comments; however, the above response still hold true for the revised criterion.)

2. For SC 4.3-2 and 4.3-5 the basis of all events involving engineered feature is reflective of the broad nature of the Safety Criterion. Events 1614664/117, 1614672/139, 1614772/145, and 16146772/239 are examples of events in which DC I engineered features governed by these criteria are included as potential safeguard(s).

Events 1614664/117, 1614772/145, and 16146772/239 are examples in which the DC I electrical requirements of SC 4.4-8, 4.4-9, and 4.4-10 would apply to potential safeguard(s).

SC 4.4-11 for DC II electrical systems would apply to all events with DC II systems requiring electrical power, see Event 1614669/156. Safety Criteria 4.4-12, 4.4-13, and 4.4-14 would apply to DC I systems/ components (i.e., air actuators, pressure sensors) requiring instrument air to perform their intended safety function, Events 1614667/153 and 1614700/538. Safety Criteria 4.4-15 through 4.4-16 would apply to instrument air systems such as the one identified in Event 3200/114.
Safety Criterion 4.4-20 would potentially apply to Event 1614667/153.

3. As noted in column one the Table 1 the hazardous situation identified is Programmatic in nature, meaning the criteria is required to ensure that basic assumptions underlying the hazards analysis and safety basis are addressed. Included in these assumptions are that the workforce will be adequately trained. The underlying hazard would be that of not

Supplemental Disposition

The Contractor's supplemental response was acceptable. The supplemental response having a workforce trained and capable of dealing with radiological and chemical hazards indicated that for SCs which do not have "Regulatory Bases" nor identified links to the HAR, directly associated with TWRS-P operations. See Clarification of Detailed Question A. the basis was "the engineering judgment of the RIT Subject Matter Experts." It is the RU's Clarification of Response to Detailed Question A. The first sentence refers to Safety Criteria understanding that this is equivalent to stating that the basis for these SCs was SC 3.3-2 and SC 5.1-2. The Safety Criterion are based upon either TWRS-P specific conformance to top-level principle 4.2.2.1, "Proven Engineering Practices," from hazards as identified in the Hazard Analysis Report, hazards intrinsic to the TWRS-P DOE/RL-96-0006. The BNFL supplemental response is acceptable provided BNFL confirms operations (e.g., radiological), or the result of a regulatory or contractual commitment the RU's understanding.
(assumed to ensure protection against intrinsic hazards associated with operations involving radioactive material and process chemicals). For SC 5.1-2 the hazard is intrinsic based upon the need to perform radiography during construction (use of a sealed source) of the TWRS-P Facility to ensure adequate shielding is provided. For other Programmatic criteria which are not explicitly included in the HAR or regulatory requirement, the basis for the Safety Criteria is the engineering judgement of the RIT Subject Matter Experts that the standards contained in regulations and DOE/RL-96-0006 require augmentation to ensure the safety of the public and workers. This is consistent with the intent of DOE/RL-96-0004 in which BNFL is required to identify the necessary set of radiological, nuclear and process safety standard to ensure adequate protection of the public and workers.

Question # 191

Description

THEME: Compliance to Laws (QA/RP)

2) The set documented in the SRD conforms to the top-level radiological, nuclear, and process standards and principles contained in the DOE-provided document titled Top-level Radiological, Nuclear, and Process Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0;

6) The set documented in the SRD will provide adequate safety if properly implemented.

REFERENCE CITED:
Hazard Analysis Report (HAR), Section 6.1.6, page 6-4
Hazard Analysis Report (HAR), Section 6.1.7, page 6-5
Hazard Analysis Report (HAR), Event Identifier 1614700/512, page 5-299
Hazard Analysis Report (HAR), Event Identifier 1614700/510, page 5-303
Hazard Analysis Report (HAR), Event Identifier 1614700/536, page 5-303
Hazard Analysis Report (HAR), Event Identifier 1614700/580, page 5-301
Hazard Analysis Report (HAR), Event Identifier 1614775/389, page 5-292
Hazard Analysis Report (HAR), Event Identifier 1614775/431, page 5-291

OBSERVATIONS:
Section 6 of the HAR documents results of the Hazard Evaluation. Section 6.1.6, "Co-located Worker Related Events," addresses events related to abnormal discharge from the facility stack that may affect the co-located worker in a nearby facility. However, no mention is made of events that do not involve stack releases (i.e. ground level releases).

Additionally, Section 6.1.7, "Public Safety Related Events," documents postulated events that could result in consequences to the public. One event discussed in this section, a Cs line hose misconnection, is a loss of containment event occurring outside a process cell,

and is assumed to result in a ground level type of release. The submittal states that this ground level release event results in major consequences to the public, yet no mention is made of consequences to the co-located workers that would be closer to the release point.

(Note, however, that in the Fault Schedule, the public consequence from this hose misconnection event is listed as 1; perhaps a typographical error.)

Several other postulated events that result in ground level release (e.g. Events No. 1614700/512, 1614700/510, 1614700/536, 1614700/580, 1614775/389, etc.) show public consequences, yet again, the co-located worker consequences are not addressed. In fact, the definitions of consequences (HAR Table 3-4, page 3-14) in the HAR are based only on consequences to workers and the public. The Fault Schedules also reflect this definition of consequences in that there is no column for co-located worker consequences.

The apparent omission of the co-located worker consequences in the HAR is significant because ground level radioactive releases would tend to very quickly challenge the co-located accident dose limits specified in the Radiological Exposure Standard for Workers Under Accident Conditions.

DETAILED QUESTIONS:
What is the basis for not including postulated ground level release events in Section 6.1.6?

Please clarify the circumstances regarding the Cs line event (Identifier 1614775/431) that apparently results in exposure to the public, but no exposure to the co-located workers. Also please explain if the Consequence Category 1 assigned to this event is an error.

Is there a basis for not addressing consequences to co-located workers in the hazards analysis?

Contractor Response

Detailed question 1.

Consideration for ground level release was addressed in HAR Table 6-1. The following clarifying sentences will be inserted into the beginning of HAR Section 6.1.6, "Co-Located Worker Safety Related Events."

"In the previous sections of this chapter, events involving release of hazardous materials are discussed for their affect on the facility worker. The potential consequence to the facility worker was assigned because the release is assumed to occur outside cells, or otherwise may leave cell confinement and migrate to occupied areas of the facility. The

Disposition

BNFL's response is responsive and acceptable.

1)The HAR addressed ground level releases and the BNFL proposed changes are adequate to resolve the question.

2)The clarification provided regarding event identifier 1614775/431 resolved the question.

3)Revision to the HAR to clarify the distinction between worker and co-located worker resolves the question.

Supplemental Response

Supplemental Disposition

Question # 192

Description

THEME: Incomplete basis for technical conclusion in the HAR

REFERENCE CITED:

Hazard Analysis Report (HAR), Event Identifier 1614667/117

OBSERVATIONS:

Section 5.2.8.2, page 5-101, of the HAR, Fault Schedule event identifier 1614667/117 does not list overfill as an initiating event in the nitric acid recovery section. It is not evident that overfill is not a credible event based on equipment limitations.

DETAILED QUESTIONS:

Please explain why the hazard analysis does not address nitric acid overfill hazards, their mitigation and prevention

Contractor Response

"Overfill" could have been cited as an event leading to the loss of confinement (and potential dose uptake). However, as indicated in the response to several questions the hazards identification exercise at this level of (concept) design detail does not seek to identify all causes of the hazard. This is in accordance with the AIChE Guidelines for Hazard Evaluation Procedures which states:

"Usually the team does not attempt to develop an exhaustive list of causes; rather they list a sufficient number of them to judge the credibility of the accident." (Section 6.4, page 114.)

The isolation and level indications (safeguards 1, 5) would provide protection against an overfill event.

Disposition

The BNFL response is considered to be responsive and acceptable.

The question asks for an explanation of why the hazard analysis does not address nitric acid spills caused by overfills, and how overfills can be prevented and their consequences mitigated. The response indicates that at the conceptual level of design, the hazard evaluation team does not attempt to identify all of the initiating (primary) events causing a release of a hazardous material (such as nitric acid). The response also states that the safeguards identified in Fault Schedule event identifier 161466/117, i.e., the isolation device to cut off feed, and the CVF liquor level indication would provide protection against an acid overflow event. This response is appropriate for the present level of hazard analysis of the process design.

Supplemental Response

Supplemental Disposition