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United States Government **Department of Energy**

memorandum

DATE: JAN 30 2003

REPLY TO
ATTN OF: EM-1

SUBJECT: Tank Farm Safety Basis Issues

TO: Roy J. Schepens, Manager, Office of River Protection

Reference: Tank Farm Nuclear Safety Risk Classification and Control Selection Guidelines (02-TED-003 & 02-TED-022)

The purpose of this memorandum is to notify you that concerns remain regarding your guidance to support Nuclear Safety Rule implementation and actions required to maintain compliance with safety basis requirements. The following describes my concerns and expectations;

- In light of my staff's review of the recent safety basis activities pertaining to Tank Farms and the Inactive Waste Sites (IWS), I want to assure that your direction and the contractor's course of actions are consistent with the Department of Energy's (DOE) intent and expectations as defined in the safe harbor Standard for the Documented Safety Analysis (DSA) and the Environmental Management guidance on IWS. It is imperative to remain consistent with the standard in order that the upgraded Tank Farm DSA and Technical Safety Requirements (TSRs) will not only be technically defensible, but also be produced and implemented in a cost-effective and timely manner. While it appears that some improvements have been made in your most recent guidance (02-TED-022), I still need to understand how our specific concerns and comments, that were raised on the referenced guidance (02-TED-003), have been addressed. Additionally, I need to know the potential impact on the schedule and costs of implementing the guidance, as well as the effect on meeting mission objectives. The attachments provide a summary of those concerns and comments, and suggested Risk Ranking and Control Selection Guidelines that were informally provided to your staff earlier for your consideration and use. These guidelines were also shared with Richland Operations Office staff for their use. Please come prepared to discuss the above issues during our February meeting.

- I am aware of your recent direction to the Tank Farm Contractor in terms of the change in the submittal date for the Safety Basis annual update. Although I agree with your interpretation that the new date of February 5, 2003, (the anniversary of the 2001 update submittal) would satisfy the intent of the Rule requirement, there may be more effective ways of addressing this requirement, considering the pressing rule implementation commitments. If the contractor update submittal is not scheduled to occur then I recommend that you request your contractor to prepare and submit for approval, no later than February 10, 2003, an exemption package that entails: 1) an adequate justification for continued operation without meeting the February 5 annual update requirement; 2) an interim safety basis update strategy that incorporates any outstanding commitments

sometime after the new safety basis is submitted; and 3) a longer term strategy and commitment to implement the new safety basis requirements, factoring in DOE approval time, consistent with my previous guidance memorandums.

- Your decision to assume your many IWS as nuclear hazard category 2 or 3 facilities rather that adopt my IWS hazard categorization guidance leaves many unanswered questions. I am requesting a clarification letter that describes what controls will be put in place while assuming these IWS as nuclear hazard category 2 or 3 facilities and how the contractor is planning to obtain necessary information to downgrade them in accordance with the criteria in my September 17, 2002, memorandum. It is urgent to perform the necessary analysis to recategorize IWS by April 10, 2003, in order to ensure that compliance is maintained with the Rule. Please come prepared to discuss the above during our February meeting.

If you have any questions please call Mr. Dae Chung, Senior Technical Advisor in the Office of Safety and Engineering, at (301) 903-3968.

Jessie Hill Roberson
Assistant Secretary for
Environmental Management

Attachments

cc: Sandra Johnson, EM-5
Paul Golan, EM-3
Mark Frei, EM-40
Beverly Cook, EH-1
Keith Klein, RL
Shirley Olinger, RL
John H. Swailes, RL

Attachment 1

Comments and Concerns on Tank Farm Nuclear Safety Risk Classification and Control Selection Guidelines

In general, the guidelines for risk classification and selection of worker safety controls from the hazard and accident analysis are overly prescriptive and extend beyond those required or intended by the governing Nuclear Safety Rule and safe harbor methods in DOE-STD-3009. The following items need to be addressed:

- A prevalent notion of "risk acceptance" in the receptor-dependent Risk Evaluation Guidelines and Risk Classification Bins and their application for control selection is problematic. The guidance must make it clear that there are no risk acceptance criteria or goals to be met in order to demonstrate Rule compliance and that the DOE-STD-3009 concept of risk ranking or binning is only intended to facilitate rational sorting or prioritizing of hazard analysis results. While an assessment of the level of consequences to a distant worker may be necessary to gain perspective, it is not appropriate to perform exposure calculations and apply any numerical exposure criterion for decision making, including worker control selection;

- The implied emphasis on using more quantitative information would generate unnecessary calculations or, even very costly, computer modeling, particularly as the receptor position becomes closer to the source of hazards. The fidelity of both radiological and chemical exposure calculations for close distance is highly questionable and the results can be widely interpreted or misinterpreted. The worker risk guidelines, particularly for the extremely unlikely frequency bin and beyond (1E-4/yr or less) should not be construed as any realistic safety goal or limit since there could be (in a probabilistic sense) significant events in those low frequencies (e.g., severe natural phenomena and external man-made events) that would result in extremely severe consequences to the workers onsite. The hazard evaluation for worker protection should be based on the qualitative analyses with the appropriate input from various disciplines and functional groups to make rational, informed decisions;

- When a risk ranking process is used as a tool per DOE-STD-3009, the hazard scenarios that were evaluated to not require any further actions should remain sufficient without imposing additional justifications or controls, provided that the ranking was made based on the unmitigated frequency and consequence estimates. Those scenarios that show high consequences to Maximally-Exposed Offsite Individual, independent of frequencies (with the exception of man-made external events), must be forwarded into accident analysis to determine the need for safety class structures, systems, or components; (SSC)

- An holistic approach embedded in safety management programs that largely protect workers during normal operation and abnormal events may be jeopardized by assigning a "discrete" administrative control that should be part of a broader program requirement. The discipline imposed by the Safety Management Programs (SMPs) extends beyond simply supporting the assumptions made in the hazard analysis and is an essential part of defense in depth safety posture;

- Accounting for each hazard, as conveyed by the use of "all hazards," and the obligation to establish clear links to SMPs as specific controls produces an administrative requirement that subjects unnecessary detail to compliance assessment;

- The protection of the public and workers during normal operations is governed by 10 CFR 835, Occupational Radiation Protection; unintended (incidental) releases of sufficiently high frequency, as considered a part of normal operations, would also be governed by this regulation. Programmatic commitment to implement 10 CFR 835 is made in the Documented Safety Analysis (DSA);

- Expectations on the safety classification of structures, systems, and components and the Technical Safety Requirement (TSR) coverage for defense-in-depth (DID) items and passive design features are not fully consistent with DOE-STD-3009. Only the significant contributors to DID should warrant a safety significant SSC designation and those design features that provide significant safety benefit covered by a TSR Design Feature; and

- There should be clear expectations given in terms of the control hierarchy (i.e., engineered safety controls, passive vs. active controls, preventive vs. mitigative, administrative controls, and activity-specific controls). The activity-specific controls derived from such as the Job Hazard Analysis should be developed as part of a work control process, not as a specific control of the Safety Basis. The adequacy of the implementation of the committed work control process should be reviewed as part of the annual Integrated Safety Management System verification.

ATTACHMENT 2

EM RECOMMENDED TANK FARM NUCLEAR SAFETY RISK RANKING AND CONTROL SELECTION GUIDELINES

January 2003

The following Nuclear Safety Risk Ranking Process and associated Control Selection guidelines should be used as a qualitative tool to supplement the safe harbor methods in DOE-STD-3009. It is advised that the numerical guidelines are not to be construed as either risk acceptance criteria nor compliance criteria. Table 1 identifies Consequence Levels and Evaluation Guidelines for the maximally exposed offsite individual, maximally exposed hypothetical onsite worker, and involved facility worker. Table 2 identifies the Risk Ranking Bins. Specific guidelines for Tank Farms application are summarized below.

The following hierarchy of control decision preference is:
Preventive controls over mitigative
Passive controls over active control
Engineering controls over administrative controls
Controls with the highest reliability
Controls closest to the hazard

The cost of implementation and maintenance of available controls should be considered as a part of control selection.

Unmitigated hazard events in the Tank Farms stemming from the hazard analysis database will be evaluated in accordance with the Tables 1 and 2 and guidelines provided herein.

Risk Class I events must be protected with safety structures, systems, and components (SSC) and Technical Safety Requirements (TSR). For offsite public protection, Safety Class SSCs and TSRs are required for radiological events >25 rem TEDE in accordance with Appendix A of DOE-STD-3009, Change Notice 2. Events which challenge but do not exceed 25 rem TEDE offsite should be considered in selection of Safety SSCs and/or TSRs. Events resulting in high offsite radiological consequence must be moved forward into accident analysis for determination of safety classification, without consideration of frequency.

Risk Class II events must be considered for protection with TSRs and safety SSCs. The consideration of control(s) will be based on the effectiveness and feasibility of the considered controls along with the identified features and layers of defense in depth (DID). Events resulting in high offsite radiological consequence must be moved forward into accident analysis for determination of safety classification, without consideration of frequency.

Risk Class III events are generally protected by the safety management programs (SMPs). These events may be considered for defense in depth SSCs in unique cases.

Risk Class IV events do not require additional measures.

For facility worker protection, significant hazardous events are evaluated for appropriate controls in accordance with DOE-STD-3009, Change Notice 2. The activity-specific controls (e.g., PPE and hot work permit) should be developed as part of a work control process, not as specific part of the Safety Basis per 10 CFR 830. The actual implementation of work control process should be reviewed as part of the annual ISMS verification. For those events identified in the hazard analysis that require a control that is not contained in an SMP, a discrete administrative control should be established.

DID is a philosophy that ensures the facility is operated in a safe manner through multiple means. DID features include the entire suite of safety controls, encompassing Safety Class and Safety Significant SSCs, TSRs, safety management programs, and other administrative and engineered controls. Only the significant contributors to DID should warrant a safety significant SSC designation and those design features that provide significant safety benefit covered by the TSR Design Feature section. Compensatory measures should be provided for those existing TSR Design Features that do not meet functional requirements. DOE G 423.1-1 provides additional guidance for consideration.

Many important aspects of the defense in depth strategy are implemented through the safety management programs. The holistic approach embedded in the SMPs and their effective implementation as part of the ISMS must continue to optimize the intended safety benefits. The discipline imposed by the SMPs extends beyond simply supporting the assumptions made in the hazard analysis and is an essential part of defense in depth safety posture.

The protection of the public and workers during normal operations is governed by 10 CFR 835, Occupational Radiation Protection; unintended (incidental) releases of sufficiently high frequency, considered a part of normal operations, would also be governed by this regulation. Programmatic commitment to implement 10 CFR 835 is made in the DSA.

Table 1: Consequence Levels and Risk Evaluation Guidelines

Consequence Level	Offsite Public MOI location shortest distance to the Hanford Site Boundary	Hypothetical Onsite Worker MEI location not less than 100 meters or facility boundary from the point of release For elevated doses use point of highest doses	Site Facility Worker Involved worker within facility boundary Use highest dose within facility boundary
High **25 rem[1]** **100 rem**	**Considerable off-site impacts on people or the environs.** **>25 rem TEDE or >ERPG-2/TEEL-2**	**Considerable on-site impacts on people or the environs.** **>100 rem TEDE or >ERPG-3/TEEL-3**	[2]Facility worker hazards are typically protected with SMPs. For Safety Significant designation, consequence levels such as prompt death, serious injury, or significant radiological and chemical exposure, should be considered.
Moderate **25 rem >1** **100 rem>25**	**Only minor off-site impact on people or the environs.** **≥1 rem TEDE or >ERPG-1/TEEL-1**	**Considerable on-site impact on people or the environs.** **≥25 rem TEDE or >ERPG-2/TEEL-2**	
Low **< 1 rem** **< 25 rem**	**Negligible off-site impact on people or the environs.** **< 1 rem or <ERPG-1/TEEL-1**	**Minor on-site impact on people or the environs.** **< 25 rem or <ERPG-2/TEEL-2**	

Notes:
DSA: Documented Safety Analysis

SSC: structures, systems, or components
TSR: Technical Safety Requirement

SMP: Safety Management Programs, Chapters 6-17 of the DSA
MOI: Maximally-Exposed Offsite Individual
MEI: Maximally-Exposed Collocated Worker

[1]Offsite consequences >25 rem must be protected with Safety Class SSCs independent of frequency
[2] Occupational Radiation Protection; unintended (incidental) releases of sufficiently high frequency is considered a part of normal operations governed by 10 CFR 835.

Table 2: Qualitative Risk Ranking Bins[3]

Consequence Level	Beyond[1] Extremely Unlikely Below 10^{-6}/yr	Extremely Unlikely 10^{-4} to 10^{-6}/yr	Unlikely 10^{-2} to 10^{-4}/yr	Anticipated 10^{-1} to 10^{-2}/yr
High Consequence	III	II	I	I
Moderate Consequence	IV	III	II	I
Low Consequence	IV	IV	III	III

[3] Industrial events that are not initiators or contributors to an uncontrolled release of tank waste material are not risk classified. Standard Industrial hazards are not covered in the DSA