

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 16, 1996

MEMORANDUM

FOR:

G. W. Cunningham, Technical Director

COPIES:

Board Members

FROM:

Ralph Arcaro

SUBJECT:

Review of Hanford Tank Farms Draft Basis for Interim Operations

1. **Purpose:** This memorandum documents a Defense Nuclear Facility Safety Board's (Board) staff review of the Hanford tank farms draft Basis for Interim Operations (BIO). Board staff members Ralph Arcaro, Farid Bamdad, Rich Tontodonato, and Cliff Moore reviewed in-process documents and analysis that make up the BIO and participated in several videoconferences with Department of Energy Headquarters (DOE-HQ) and Richland Operations Office (DOE-RL) and Westinghouse Hanford Company (WHC) analysts, engineers, and managers.
2. **Issues:**
 - a. The WHC BIO has provided the first reasonably complete description of the risk associated with operation of the tank farms.
 - b. The draft BIO shows that the risk of operation of the tank farms is greater than previously estimated, even when crediting the operation of available safety systems.
3. **Background:** DOE-RL has determined that the authorization basis for the Hanford tank farms is deficient. DOE-RL and WHC are currently engaged in the development of a BIO and Final Safety Analysis Report (FSAR) that are compliant with DOE Order 5480.23. The BIO is scheduled to be submitted to DOE-RL for approval by September 30, 1996. The FSAR is to be completed by the Hanford contractor by November, 1996. The hazards and accident analyses performed for preparation of the BIO will also be used as the basis for the FSAR.
4. **Discussion/Observations:**
 - a. **BIO Accident Analysis:** Several credible accidents analyzed in the BIO have severe consequences, even with fully functional safety systems and administrative controls. The BIO does not require the implementation of additional controls for these accidents nor does it provide a convincing argument for why operation of the tank farms is acceptable under these conditions. The BIO explains that these conditions will exist until the FSAR is implemented. The FSAR is scheduled to be completed in late 1996. There are no indications that additional controls for these accidents will be developed in the FSAR. Implementation of the FSAR may take well into 1997. The following are examples of credible accidents with severe consequences:
 1. The consequences of an organic nitrate fire, which is expected to occur at a frequency between 10^{-4} - 10^{-2} /year, are 34,000 rem to a worker 100 meters away, and 2.9 rem to the maximally exposed public individual.
 2. The consequences of flammable gas deflagrations are not calculated in the

BIO. However, preliminary analysis of this accident by WHC shows that the consequences of a flammable gas deflagration in a single shell tank, which is expected to occur at a frequency between 10^{-4} - 10^{-2} /year, are approximately 5,000 rem to a worker 100 meters away, and 3 rem to the maximally exposed public individual.

3. The consequences of a spray leak from an overground waste transfer line, an anticipated event, are 4 rem to a worker 100 meters away.
 4. A seismic event with a frequency between 10^{-4} - 10^{-2} /year, could cause multiple accidents of the type described above.
- b. ***Development of Controls***: Accidents analyzed in the BIO are controlled by safety-class and safety-significant systems and Technical Safety Requirements (TSRs) if the unmitigated consequences of the accidents exceed the levels identified in the DOE-RL Risk Evaluation Guidelines. Controls labeled "defense-in-depth" are identified in the BIO as measures that provide a safety function in addition to safety systems and TSRs. Configuration control of these items is not as rigorous as that for safety systems or that for TSRs. For example, a USQ screening of a proposed change to a defense-in-depth control would result in a negative finding, allowing temporary or permanent removal of such a control.
 - c. ***Flammable Gas Justification for Continued Operation (JCO)***: An Unreviewed Safety Question (USQ) concerning the possibility of flammable gas deflagrations in waste containers states that existing controls are not adequate to prevent such an accident. The BIO incorporates the requirements of the Flammable Gas JCO for this USQ by reference. The JCO does not identify and implement any additional controls that support operations in the single-shell and double-shell tanks. DOE-RL has not yet approved the JCO and is considering requiring continuous portable monitors as an additional control during intrusive activities in the tanks.
 - d. ***Consideration of Public Highway 240***: The BIO accident analysis treats public highway 240 as within site boundaries. As such, the BIO does not calculate the dose to a member of the public on this highway. This position is based on the fact that emergency plans require that the highway be closed in the event of an accident. However, emergency plans do not further require that the highway be verified as cleared, and local authorities have confirmed that they will not clear the highway in the event of an accident. WHC is currently calculating the expected dose to a member of the public on highway 240.
 - e. ***Use of Risk Evaluation Guidelines***: WHC uses the approach of DOE Standard 3009 for identification of safety systems. This approach requires that systems be identified as safety class if they are required to reduce risk below values specified in risk evaluation guidelines. Due to the lack of a DOE-HQ approved set of values for these evaluation guidelines, different facilities at Hanford use different values. The BIO uses the values which are similar to those recommended in the canceled DOE Standard 3005. These values are significantly larger than those used in the Phase 2 Safety Analysis Report for the Hanford Canister Storage Building.
5. **Future Staff Actions**: The staff will continue its review of the authorization basis documentation at the tank farms. The staff will ensure that the tenets of Board Recommendation 95-2 are adhered to as DOE-RL reviews the BIO and improves the

authorization basis of the tank farms. The staff is reviewing alternatives for the prevention of tank farm accidents and mitigation of their consequences. Possible alternatives include installation of additional mixer pumps in flammable gas tanks, additional ventilation, and early retrieval of single-shell tank waste.