Department of Energy
Richland Operations Office
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DEC 08 1995

95-CHD-102

Mr. John T. Conway, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington D.C. 20004

Dear Mr. Conway:

On October 24, 1995 you sent me a letter rejecting the Tank Waste Remediation System Risk Acceptance Criteria document sent to you on September 29, 1995 by members of my organization. This document was intended to address Commitment 1.20 of the Implementation Plan for Defense Nuclear Facility Safety Board Recommendation 93-5. As you are aware, this document should not have been sent by anyone other than myself and appropriate controls and instructions have been put into place to prevent a recurrence.

Upon receipt of your October 24 letter, a multi-contractor team was formed including outside experts in risk criteria to help develop an adequate risk acceptance document that the Department of Energy could approve and provide to the Board within 45 days, as you requested. The September 29 document was judged to contain approaches not yet accepted in the larger DOE and industrial community. These approaches appear to have some merit and in the future will be submitted to interagency committees for consideration. If they are generally accepted, they will be considered for implementation at Hanford.

When the new approaches were removed from the September 29 document, it became apparent that the applicable risk acceptance guidelines are basically those which the Hanford site already utilizes. These guidelines are contained in Section 7 of the Westinghouse Hanford Company Safety Analysis Manual (WHC-CM-4-46, Rev 4). This document was developed in steps and was fully implemented at Hanford subsequent to issuance of Commitment 1.20. The same basic guidelines are used widely at other DOE sites. These guidelines are considered to be sufficient to meet DOE Nuclear Safety Policy objectives (SEN-35-91). We therefore believe that section 7 of WHC-CM-4-46 (Rev 4) satisfies the risk acceptance criteria of Commitment 1.20 and is enclosed for your evaluation.

To fully close out Commitment 1.20, implementation documentation currently in development will be submitted to the Board within two months. This documentation will clearly explain how the risk acceptance guidelines will interface with the Data Quality Objectives process used for characterization needs identification.

This approach was discussed with your staff during their visit to Hanford on December 7, 1995. If you have any questions please contact me at (509) 376-7395.

Sincerely,

John D. Wagoner
Manager

CHD:JFT

Enclosure

cc w/encl:
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1.0 PURPOSE

Risk is a quantitative or qualitative expression of possible loss which considers both the probability that a hazard will cause harm and the consequences of that event. This chapter defines radiological and nonradiological acceptable risk guidelines for the evaluation of accident analyses.

2.0 SCOPE

This chapter applies to all DOE activities and nonreactor facilities managed by WHC for which a safety analysis is required.

3.0 REQUIREMENTS

The safety analysis shall demonstrate that there is a reasonable assurance that DOE operations and activities can be conducted in a manner that will limit risks to the health and safety of the public and employees, and adequately protect the environment.

Radiological and nonradiological consequences of all safety analyses must be evaluated with respect to the acceptable risk guidelines presented in this chapter, and documented in the appropriate section(s) of the safety analysis report (e.g., PSE, PSAR, FSAR, safety assessment, etc.).

3.1 Radiological Risk Comparison Guidelines

The radiological risk acceptance guidelines apply to only doses which would result from direct exposure to the passing plume (i.e., inhalation and submersion).

Potential effects resulting from secondary exposure (e.g., ingestion of contaminated food, exposure to contaminated soils, etc.) must also be evaluated and qualitatively discussed in terms of potential ingestion doses or estimates of the extent of ground contamination. Potential doses from the ingestion pathway are not included in the comparison to risk guidelines. Additional guidance concerning preventing the ingestion of contaminated food in the event of an accident can be found in the following references: DOE-RL 1994, WSDOH 1993, WS 1994, and EPA 1992.

Potential doses from the ground shine pathway (i.e., direct dose from ground contamination) are not included in the comparison to risk guidelines, but must be evaluated and qualitatively discussed in terms of estimates of ground contamination. Additional guidance concerning minimizing exposures from ground shine in the event of an accident can be found in the following references: DOE-RL 1994, WSDOH 1993, and EPA 1992.

In general, the risk of these secondary effects will be acceptable if potential ground contamination levels are not large enough to require interdiction of food or impoundment of land.

Table 1 and Figure 7-1 define offsite and onsite radiological risk comparison guidelines for all credible frequencies. If the event sequence is qualitatively categorized as 'anticipated,' 'unlikely,' or 'extremely unlikely,' the associated consequences must be shown by analysis to be bounded in the corresponding ranges. If a single point estimate is used to report potential consequences, the value must be equal to or less than the value in the corresponding probability range.

3.2 Nonradiological Risk Guidelines

Table 2 and Figure 7-2 present the guidelines, which apply to the airborne pathway only, to be used in the determination of risk for toxic chemical releases. These guidelines should be applied as illustrated in Figure 7-3 for chlorine. If a single point estimate is used to report potential consequences, the value must be equal to or less than the value in the corresponding probability range.

4.0 PROCEDURE

4.1 Radiological Evaluation of Risk

1. Identify the frequency of the event sequence and radiological consequences for the maximum onsite and the maximum offsite individuals for each accident scenario.

2. Compare the values to Table 1 or Figure 7-1 to determine if the risk is acceptable. If the risk is below the corresponding acceptable risk guideline, the risk will generally be considered acceptable. However, the risk associated with the operation of any facility will be formally accepted on an individual, case-by-case basis.

3. If the event sequence is qualitatively categorized as "anticipated," "unlikely," or "extremely unlikely," show by analysis that the associated consequences are equal to or less than the dose value in the corresponding probability range.

4. Compare the consequences and frequency determined in the accident analysis to the risk acceptance guidelines to determine if the risk is acceptable. Risk is generally considered to be acceptable if the consequences or frequency of the accident do not exceed the risk acceptance guidelines.

5. If the risk is determined to be unacceptable, reevaluate the accident scenario(s) to eliminate excess conservatisms. Use the tools and techniques discussed in Chapter 2.0 of this manual.

6. If the risk is verified as unacceptable after excessive conservatisms are removed, notify management to reevaluate plant designs, to consider additional preventive or mitigative features, and/or to implement new procedures and administrative controls to reduce the risk.

4.2 Nonradiological Evaluation of Risk

1. Determine the annual frequency and frequency category of the event and calculate the hypothetical chemical concentrations at the receptor locations of concern. (See Appendix D for a discussion of screening of chemicals to determine which chemicals should be evaluated.)

2. Calculate the concentrations for comparison with the guidelines as the peak 15-minute average concentrations (Reference A) for all chemicals where the toxic effect is immediate, (i.e., concentration-dependent). If it is known that the toxic effects of a chemical are not concentration-dependent, but depend on the total quantity of chemical taken up by the body (i.e., dose-dependent), then the peak 1-hour concentration may be used.

   NOTE: Concentration-dependent chemicals are defined as fast-acting chemicals whose toxic effects are immediate and correlate more closely to concentration than dose. Sensory irritants and chemicals which are corrosive or cause blistering of tissue are included in this catagory. Any chemical which has been assigned an OSHA PEL-STEL or PEL-C, or an ACGIH TLV-STEL or TLV-C value must be considered concentration-dependent.

3. Use atmospheric models appropriate for the site and the accident scenario being evaluated (e.g., dense gas model, buoyant plume model, straight-line Gaussian plume model, etc.) so that a conservative risk assessment is performed. Building wake effects may be used with caution, but plume meander should not be considered. The presence of a structure may actually increase an individual's exposure level, depending on the characteristics of the release and the person's location relative to the structure.

   NOTE: The plume meander correction is not applicable to chemical releases.

4. Obtain the most current ERPG values from HEHF. See Appendix D for definitions of the three ERPG values and values to be used if ERPGs are not available.

5. Compare the consequences determined in the accident analysis to the chemical-specific concentration guidelines to determine if the risk is acceptable. Concentration guidelines are obtained from curves developed for each chemical using the ERPG values in Table 2. Risk is generally considered to acceptable if the consequences of the accident do not exceed the concentration guidelines associated with the frequency of the event sequence.

6. If the event sequence is qualitatively categorized as "anticipated," "unlikely," or "extremely unlikely," show by analysis that the associated consequences are equal to or less than the exposure concentration value in the corresponding probability range.

7. If the risk is determined to be unacceptable, reevaluate the accident scenario(s) to eliminate excess conservatisms, use the tools and techniques discussed in Chapter 2.0 of the this manual.

8. If the risk is verified as unacceptable after excessive conservatisms are removed, notify management to reevaluate plant designs, to consider additional preventive or mitigative features, and/or to implement new procedures and administrative controls to reduce the risk.

5.0 DESIGNATED REVIEWING ORGANIZATIONS

Organizations listed below are responsible for this process. If you have any questions about this procedure, please contact the process owner.

Designated Reviewing Organizations	CMPOC
Safety (process owner)	ESQ/SFT
Safety Analysis	PSS/SAE

6.0 REFERENCES

DOE-RL 1994, "Emergency Implementation Procedures," DOE-0223, Department of Energy, Richland Field Office.

EPA 1992, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," U.S. Environmental Protection Agency, Washington, D.C.

WS 1994, "Fixed Nuclear Facility Emergency Response Procedure," Section 10.6 - Department of Agriculture, Washington State.

WSDOH 1993, "Response Procedures for Radiation Emergencies," Appendix A - Protective Action Guides, Washington State Department of Health.

Reference A: Douglas K. Craig, et al., "Toxic Chemical Hazard Classification and Risk Acceptance Guidelines for Use in DOE Facilities - Recommendations of the Westinghouse M&O Nuclear Facility Safety Committee Subcommittee on Nonradiological Risk Acceptance Guidelines Development" WSRC-MS-92-206, Rev. 1, April 20, 1993.

Table 1 Radiological Risk Guidelines [1]

		EFFECTIVE DOSE EQUIVALENT (mSv)	
EVENT FREQUENCY CATEGORY[2]	EVENT FREQUENCY (yr^{-1})	ONSITE	OFFSITE
Anticipated	$> 10^{-2}$ to $\leq 10^{0}$	50	5
Unlikely	$> 10^{-4}$ to $\leq 10^{-2}$	250	50
Extremely Unlikely	$> 10^{-6}$ to $\leq 10^{-4}$	1000	250

Table 2 Toxic Chemical Risk Guidelines

		PRIMARY CONCENTRATION GUIDELINES	
EVENT FREQUENCY CATEGORY	EVENT FREQUENCY (yr^{-1})	ONSITE	OFFSITE
Anticipated	$> 10^{-2}$ to $\leq 10^{0}$	$\leq$ERPG-1	$\leq$PEL-TWA
Unlikely	$> 10^{-4}$ to $\leq 10^{-2}$	$\leq$ERPG-2	$\leq$ERPG-1
Extremely Unlikely	$> 10^{-6}$ to $\leq 10^{-4}$	$\leq$ERPG-3	$\leq$ERPG-2

[1]These guidelines are to be applied as step-functions as shown in Figure 7-1.

[2]See Appendix B for additional definitions of the probability categories.

Figure 7-1. Radiological Risk Guidelines

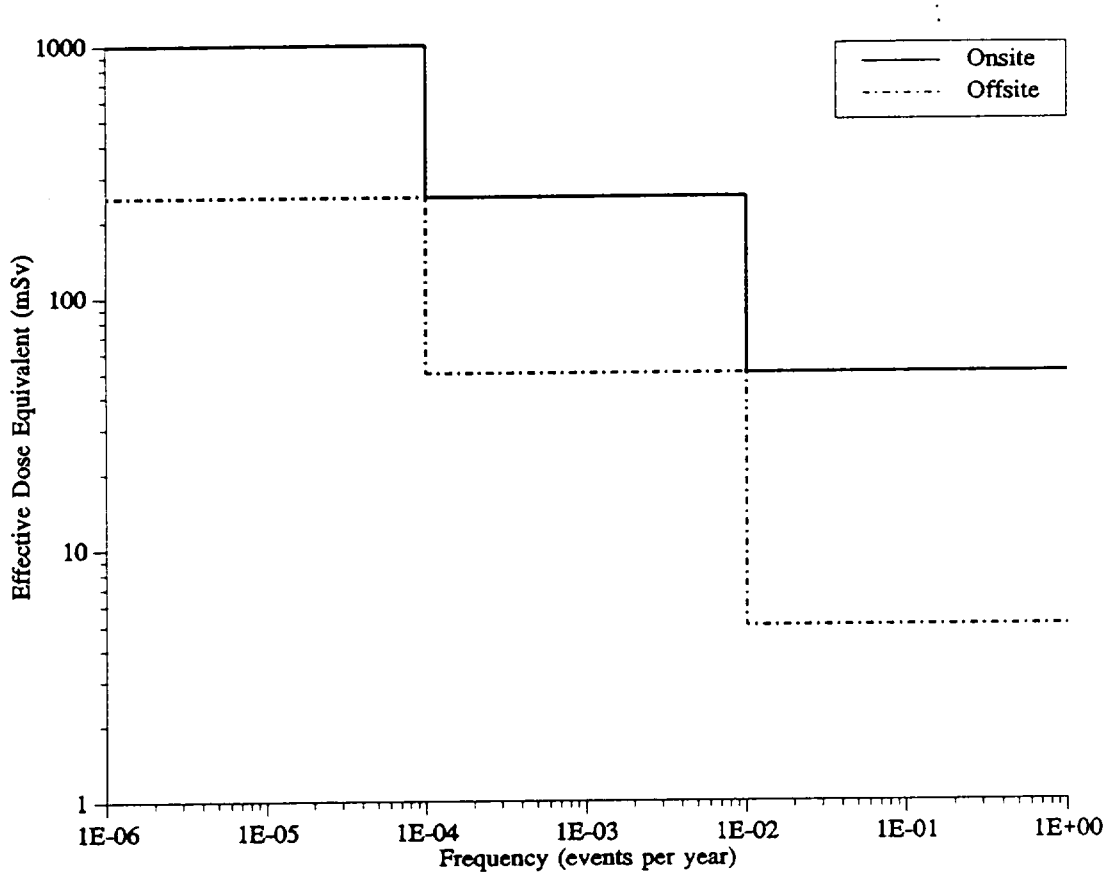

Figure 7-2. Toxic Chemical Risk Guidelines

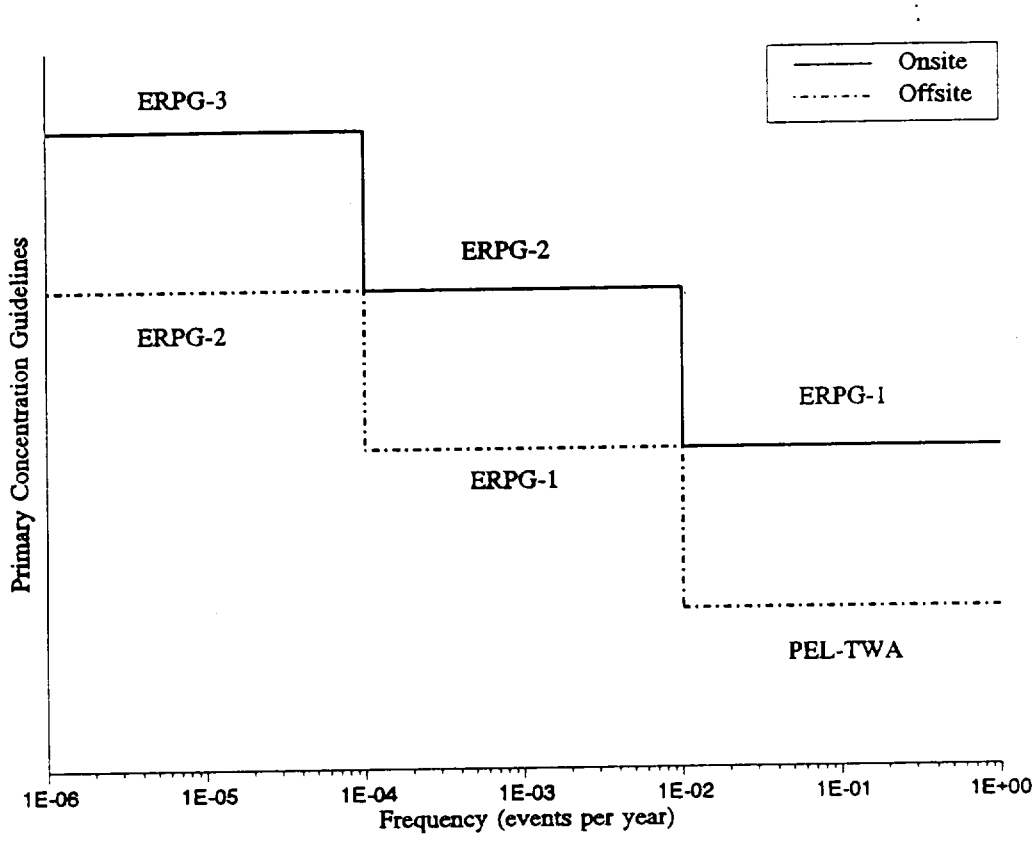

Figure 7-3. Chlorine Risk Comparison Guidelines