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7. Abstract

The risk and consequences of interim stabilization of surface contaminatio assocated with 216-T-3, 216-T-6, and 241-T-361 waste sites are compared to similar activiites analysed for the 216-A-24 crib. The risk is found to be acceptable, and the 216-A-24 Safety Evaluation is applicable.

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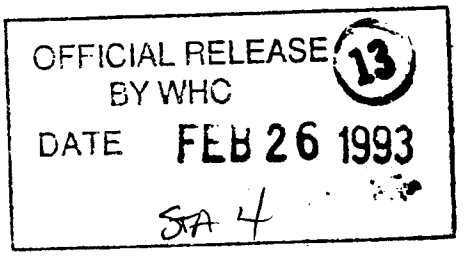

SAFETY EVALUATION FOR THE INTERIM STABILIZATION RADIOACTIVE SURFACE CONTAMINATION AT 216-T-3, 216-T-6, AND 241-T-361 WASTE SITES

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February 1993

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LIST OF TABLES

SAFETY EVALUATION FOR THE INTERIM STABILIZATION OF THE 216-T-3, 216-T-6, AND 241-T-361 WASTE SITES

1. INTRODUCTION

In the near future, Environmental Restoration Operations intends to interim stabilize the 216-T-3 (T-3) reverse well, 216-T-6 (T-6) cribs, and the 241-T-361 (T-361) waste storage tank. These waste sites are located in the 200 West Area, southwest of T Plant, and east of 241-T Tank Farm. The planned actions are described in WHC-SD-DD-TI-074, *Interim Stabilization Plan and Alternatives Evaluation for 241-WR Vault and 216-Z-12, 216-T-3, 216-T-6, and 241-T-361* (WHC 1993), and are necessary in order to prevent the spread of radioactive surface contamination until a record of decision is made for final remediation. The work consists of consolidation of contaminated soil from the vicinity of the 241-T-361 waste storage tank and 216-T-3 reverse well over the nearby 216-T-6 cribs. Consolidated soil will be interim stabilized with 18 to 24 inches of uncontaminated soil. Areas where soil was removed will be downposted to no posting. Wells located in the vicinity of the T-6 cribs will be extended to account for an expected grade change of 3.5 to 4 feet. All risers and vents have been previously isolated, and will require no further action. The equipment and methods used are the same as those successfully used for interim stabilization or decontamination of 1,100 acres at Hanford over the past 13 years.

In 1988, a safety evaluation (WHC 1989) was prepared for the stabilization of the 216-A-24 crib (A-24 for the rest of the document), which is located just outside the east fence of 200 East Area. After analyzing explosion, resuspension of contaminated soils, and resuspension of excavated soils scenarios, it was concluded that the consequences of these scenarios were well within the radiological and toxicological risk acceptance guidelines. Note that the explosion scenario is unlikely as there is no record of potentially explosive waste being disposed of at T-3, T-6, or T-361 waste sites. The work planned at the T-3 reverse well, T-6 cribs, and T-361 waste storage tank is similar to work conducted at the A-24 crib, with distances to onsite structures being similar. As a result, the two resuspension scenarios are appropriate for work at T-3, T-6, and T-361 waste sites, and provided there are no differences between the facilities which cause the results of the evaluation to exceed the risk guidelines, the safety evaluation is applicable to both. Excavated soil at the A-24 crib was contaminated with radioactive material at levels in excess to those found at the T-3, T-6, and T-361 waste sites. The hazards associated with this work were found to be within the risk acceptance guidelines. Therefore, the hazards associated with excavating and interim stabilizing soil at the T-3, T-6, and T-361 waste sites are also be within the risk acceptance guidelines.

2. COMPARISON OF RADIONUCLIDES INVENTORIES AND RISK

Table 1 presents the radionuclides inventories for the A-24 crib and T-3, T-6, and T-361 waste sites. The data for the A-24 crib was taken from the safety evaluation (WHC 1988), the data for the T-3 reverse well and T-6 cribs was taken from the Waste Inventory Data Sheets (WIDS) (WHC 1991c). Data for the T-361 waste storage tank was taken from WIDS and WHC-SD-DD-TI-057, *Summary of Radioactive Tanks Managed by Hanford Restoration Operations* (WHC 1991b). The inventories are decayed to 1986 for A-24 and 1989 for T-3, T-6, and T-361. To establish a reasonable basis for comparison, the quantities of the major dose contributing isotopes for each crib/trench were added together. This value was then divided by the value for the A-24 crib. The results are shown in the bottom row of Table 1. The T-361 waste site had the highest ratio at 19.04 times that of A-24. Using this number as a multiplier for the doses from the A-24 evaluation should provide a reasonable estimation of the consequences from similar events at the T-3, T-6, and T-361 waste site. Note that exposure to the contents of the T-361 tank is unlikely, as there have not been explosive materials added to the tank, and there is no indication that the tank is structurally unsound. As a precaution, no heavy equipment will be allowed on the surface of the tank. Table 2 presents the results of this calculation and a comparison of radiological risk. The radiological risk for these waste sites is below the risk acceptance guidelines.

3. CRITICALITY

Criticality concerns for the T-3, T-6, and T-361 waste sites were evaluated against the WHC-SD-SQA-CSA-20342, *CSAR 80-024, Addendum 5; Criticality Hazard Reviews of Restoration Work Plans for WHC Deactivated Cribs* (WHC 1991a), and the proposed scope of work. Based on the work scope, interim stabilization of these waste sites posses no criticality hazard.

4. COMPARISON OF CHEMICAL INVENTORIES AND RISK

Table 3 presents the reported chemical inventories for the A-24 crib and the 216-T-3, 216-T-6, and the 241-T-361 waste sites. The waste sites received different inventories of chemicals, with the A-24 crib receiving the most hazardous material. The explosion scenario generated the worst case release of hazardous chemicals at A-24, and this was shown to be within the acceptance guidelines. Because the 216-T-3, 216-T-6, and 241-T-361 received highly soluble material, with the exception of metals, it is not likely that dangerous concentrations of these chemicals have accumulated. These waste sites also did not receive any volatile organic material, further reducing the risk associated with the chemical inventory.

Table 1. Radionuclides for the A-24 Crib, 216-T-3, 216-T-6, and 241-T-361 Waste Sites

CURIES DECAYED TO 1986 (A-24) AND 1989 (216-T-3, 216-T-6, and 241-T-361)

RADIONUCLIDES	A-24	T-3	T-6	T-361
H-3[1]	3680	-	-	-
Co-60	.0575	-	-	-
Sr-90	52.8	1.86E+1	1.24E+2	
Ru-106	.00005	5.22E-12	6.07E-11	-
Cs-137	767	2.13+1	1.10E+2	7.75E+3
Pu-239[2]	.76	2.06E+2	2.39E+1	122.56
Pu-240	.204	-	-	-
U-238[3]	.441	-	7.57E-3	-
TOTAL	820.56	245.9	503.80	15622.56
RATIO TX/A24	1.00	0.30	0.61	19.04

1. Major dose contributing radionuclides only, tritium not included to avoid understatement.
2. Reported only as plutonium in WIDS, November 20, 1991.
3. Reported as "U-gross" in WIDS, November 20, 1991.

Table 2. 216-A-24 Crib and 216-T-X Radiological Risk Comparison.

RECEPTOR	RESUSPENSION OF SURFACE SOIL EDE (rem)	RESUSPENSION OF EXCAVATED SOIL EDE (rem)
Onsite Individual A-24 Crib	4.50 E-6	4.30 E-4
Onsite Individual T-X	8.57 E-5	8.19 E-3
Risk Acceptance Guidelines	5.00 E-1	5.00 E-1
Offsite Individual A-24	4.30 E-6	1.80 E-5
Offsite Individual T-X	8.19 E-5	3.43 E-4
Risk Acceptance Guidelines	1.00 E-1	1.00 E-1

Table 3. Comparison of Chemical Inventories (in metric tons).

CHEMICALS	A-24	T-3	T-6	T-361
Paraffin Hydrocarbon	79	-	-	-
Butyl Phosphates	236	-	-	-
Ammonium Carbonate	525	-	-	-
Fluoride	-	40	24	-
Sodium	-	250	160	10.5
Nitrate	-	290	180	59.2
Ammonium Nitrate		4	2.6	-
Phosphate		21	13	3.4
Potassium		60	-	-
Sodium Oxalate		9	6	-
Sulfate		2.4	1.5	3.4
Calcium		-	-	2.0
Iron		-	-	2.0
Aluminum		-	-	3.4
Nitrite		-	-	4.8
Nickel		-	-	19.7
Silicon		-	-	6.1
Magnesium		-	-	0.68
Manganese		-	-	11.7
Carbonate		-	-	0.90

A sample was taken from the sludge in 241-T-361 in 1976. This sample is the basis for the chemical inventory displayed in Table 3. It is assumed that the sample is representative of the tank contents. Data for the 216-T-3 and 216-T-6 does not report any of the metals found in the 241-T-361, but since the metals are not highly reactive, or otherwise immediately hazardous, no additional risk is associated with them.

Since the results of the explosion scenario was shown to be within the risk acceptance guidelines for A-24, and since the risk associated with the waste disposed of at these facilities is less than at A-24, the risk for similar work at these waste sites is also within the risk acceptance guidelines.

5. INDUSTRIAL SAFETY HAZARDS

Industrial safety hazards will be addressed in a Job Safety Analysis (JSA). A JSA will be prepared specifically for this interim stabilization and decontamination job and will be reviewed with the workers at the prejob safety meeting. Radiological hazards will be documented in the Radiation Work Permit (RWP).

6. CONCLUSION

Based on the above comparison, the Safety Evaluation for 216-A-24 Crib is applicable to the work planned at the 216-T-3, 216-T-6, and 241-T-361 waste sites, and no further evaluation of the risk is required.

As with previous projects, the work will be performed in accordance with an approved procedure and other operating level documents. All field personnel will have been trained in (as a minimum) to the 24-Hour Hazardous Waste Site Basic training and radiation worker training. In addition, a prejob safety meeting will be conducted and documented. Health Physics Technician will be instructed to survey for alpha contamination. All equipment used on this job will be inspected to assure it is in safe operating condition.

7. REFERENCES

WHC, 1988, *Safety Evaluation of Stabilization of 216-A-24 Crib*, WHC-SD-DD-TI-032 Rev. 0, September 13, 1988, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, *CSAR 80-024, Addendum 5; Criticality Hazard Reviews of Restoration Work Plans for WHC Deactivated Cribs*, WHC-SD-SQA-CSA-20342, August 30, 1991, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *Summary of Radioactive Tanks Managed by Hanford Restoration Operations*, WHC-SD-DD-TI-057 Rev 0., October 24, 1991, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991c, Waste Inventory Data Sheet, November 20, 1991, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Interim Stabilization Plan and Alternatives Evaluation for UN-216-W-24, -26, and -30, and 207-S*, WHC-SD-DD-TI-067 Rev. 0, June 24, 992, Westinghouse Hanford Company, Richland, Washington.

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