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Waste Site Reclassification Form

Date Submitted: 5/08/06 **Originator:** R. A. Carlson **Phone:** 373-1440	**Operable Unit(s):** 100-DR-1 **Waste Site ID:** 132-D-2 **Type of Reclassification Action:** Rejected ☐ Closed Out ☐ Interim Closed Out ☒ No Action ☐	**Control Number:** 2005-024 **Lead Agency:** Ecology

This form documents agreement among the parties listed below authorizing classification of the subject unit as rejected, closed out, interim closed out, or no action and authorizing backfill of the site, if appropriate. Final removal from the National Priorities List (NPL) of no action, interim closed-out or closed-out sites will occur at a future date.

Description of current waste site condition:

The 132-D-2 site (117-D Filter Building) and associated below-grade ductwork were decommissioned and demolished in two phases in 1985 and 1986, with a portion of the rubble left in situ beneath clean fill at least 1 m (3.3 ft) thick. Decommissioning included removal of contaminated equipment, including filters. Radiological characterization was performed prior to final decommissioning, including the collection of paint and concrete samples to support dose assessment calculations prepared in accordance with *Allowable Residual Contamination Levels (ARCL) for Decommissioning Facilities in the 100 Areas of the Hanford Site* (Kennedy and Napier 1983). The ARCL calculations indicated that "worst case" potential dose to the maximally exposed individual in 1986 would contribute less than 1 mrem/yr. A RESidual RADioactivity (RESRAD) evaluation was performed in 2005 using the 1985 sampling results (after accounting for radioactive decay) to support the no action decision. The evaluation accounts for radioactive decay from 1985 to 2005 and predicts the maximum dose rate is 1.01 mrem/yr above background over 1,000 years. RESRAD also showed that of the contaminants detected only tritium is predicted to reach groundwater within 1,000 years. The maximum tritium concentration in groundwater is predicted to be less than the remedial action goal (20,000 pCi/L). Therefore, the dose limits for the rural residential (15 mrem/yr) and groundwater (4 mrem/yr) pathways will not be exceeded.

Basis for reclassification:

The site achieves the remedial action objectives (RAOs) and the corresponding remedial action goals (RAGs) established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Residual concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario and pose no threat to groundwater or the Columbia River based on RESRAD modeling. However, the acceptability of unrestricted direct exposure to below-grade structure surfaces in the deep zone has not been demonstrated; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are required. The basis for reclassification to interim closed out is described in detail in the *Remaining Site Verification Package for 132-D-2; 117-D Filter Building* (attached). The data used for this evaluation was not obtained from environmental media and is not intended to be incorporated into the River Corridor Baseline Risk Assessment. Waste site-specific evaluations will be performed to determine which data are appropriate for ecological risk assessment and/or to assess the risk these sites present to ecological receptors.

K. Bazzell DOE-RL Project Manager	Signature	5/9/2006 Date
J. Price Ecology Project Manager	Signature	5/9/2006 Date
NA EPA Project Manager	Signature	Date

REMAINING SITES VERIFICATION PACKAGE FOR 132-D-2; 117-D FILTER BUILDING

Attachment to Waste Site Reclassification Form 2005-024

May 2006

REMAINING SITES VERIFICATION PACKAGE FOR 132-D-2; 117-D FILTER BUILDING

EXECUTIVE SUMMARY

The 117-D Filter Building was built in 1960, approximately 16 years after the startup of the 105-D Reactor, to filter the exhaust air from the reactor building before it was routed to the 132-D-4 (116-D) stack. The exhaust air was routed to the 117-D Filter Building via an underground concrete inlet duct, filtered through particulate (high-efficiency particulate air) and halogen (activated charcoal) filters, and then routed to the stack via an underground concrete exhaust duct. In 1967 the reactor and associated facilities including the 117-D Filter Building were shut down. The 117-D Filter Building and associated below-grade ductwork were decommissioned and demolished in 1986. Dust was vacuumed from the walls and floors to prevent spread of loose contamination. Filter equipment was removed and bagged. Decontamination activities consisted of using Masslin cloth, wire brushes, wet mopping, and other techniques on the equipment and on the vinyl paint layer that coated the inner surfaces of the building. Contaminated equipment was packaged and shipped to the Hanford Site 200 West Area burial grounds for disposal.

As part of decommissioning activities, extensive radiological surveying and sampling activities were performed to characterize residual radiological contamination on the accessible internal surface areas of the 117-D Filter Building. Characterization results indicated that residual contamination was confined to the 1 mm (0.04 in.) vinyl paint layer and underlying surface concrete.

The 117-D Filter Building was released for unrestricted use based on the post-decontamination characterization results and the *ARCL Calculations for Decommissioning the 117-D Filter Building* (UNI 1986a). Consequently, demolition and site grading were performed in 1986 using conventional heavy equipment. The rubble was buried under at least 1 m (3.3 ft) of clean fill, and the site was graded to blend with the natural terrain. The demolished 117-D Filter Building is identified as the 132-D-2 site in the Waste Information Data System (Appendix A).

Using the maximum radiological activities from the pre-demolition characterization data to represent residual contamination levels over 100% of the paint and concrete of the former building, RESidual RADioactivity (RESRAD) modeling was performed in 2005 to support the previous decision to demolish and bury the building in place. The RESRAD modeling accounts for radioactive decay from 1985 (year of sampling) to 2005, and predicts that the site achieves the dose limits and risk objectives for rural residential land use with institutional controls, groundwater protection, and river protection. Results of the RESRAD evaluation are summarized in Table ES-1.

Table ES-1. Summary of Remedial Action Goals for the 132-D-2 Site.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	1.01 mrem/yr is the highest dose rate above background predicted over 1,000 years.	Yes
Groundwater/River Protection – Radionuclides	Attain single-COC groundwater and river protection RAGs.	Tritium is the only radionuclide that is predicted to reach groundwater but its maximum concentration will not exceed the remedial action goal based on RESRAD modeling.	Yes
	Attain national primary drinking water standards:[a] 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5.[b]		

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and the Environment* (DOE Order 5400.5).
COC = contaminant of concern
MCL = maximum contaminant level
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose model)

In accordance with this evaluation, the 1985 sampling results support a reclassification of the 132-D-2 site to interim closed out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2005) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (ROD) (EPA 1999). These results show that the site and contaminant levels remaining in the soil will be protective of direct exposure, groundwater, and the Columbia River. However, the acceptability of unrestricted direct exposure to below-grade structure surfaces in the deep zone has not been demonstrated; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are required.

Soil cleanup levels were established in the interim action ROD based on a limited ecological risk assessment. A baseline risk assessment for the river corridor portion of Hanford began in 2004, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used as part of the final ROD for this site.

REMAINING SITES VERIFICATION PACKAGE FOR 132-D-2; 117-D FILTER BUILDING

STATEMENT OF PROTECTIVENESS

This report demonstrates that the 132-D-2 site meets the objectives for interim closed out as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (EPA 1999). These results show that the site and contaminant levels remaining in the soil will be protective of direct exposure, groundwater, and the Columbia River.

GENERAL SITE INFORMATION

The 117-D Filter Building was built in 1960, approximately 16 years after the startup of the 105-D Reactor, to filter the exhaust air from the reactor building before it was routed to the 132-D-4 (116-D) stack. The exhaust air was routed to the 117-D Filter Building via an underground concrete inlet duct, filtered through particulate (high-efficiency particulate air [HEPA]) and halogen (activated charcoal) filters, and then routed to the stack via an underground concrete exhaust duct. In 1967 the reactor and associated facilities, including the 117-D Filter Building, were shut down.

The 117-D Filter Building, located approximately 30.5 m (100 ft) south of the 105-D Reactor Building (Figure 1), was a reinforced concrete structure 18 m (59 ft) long, 11.9 m (39 ft) wide, and 10.7 m (35 ft) high, of which only 2.4 m (8 ft) was above grade. The concrete walls and floors were generally 20.3 cm (8 in.) thick, with a maximum thickness of 30.5 cm (12 in.).

The 117-D Filter Building received exhaust air from the 105-D Reactor Building exhaust air system via an underground concrete duct that ran from the 105-D Reactor Building exhaust fan discharge to the 117-D Building filter cells (Figures 2 and 3). A discharge duct conveyed the filtered air from the 117-D filter cells to the 116-D stack. The ducts were made of reinforced concrete no more than 45.7 cm (18 in.) thick. Both ducts had inside dimensions of 2.1 m (7 ft) wide by 2.6 m (8.6 ft) high. The inlet duct was 35 m (115 ft) long, and the exhaust duct was 28 m (92 ft) long. The duct roofs were typically 2.4 m (8 ft) below grade. "Turning" vanes installed in the ducts reduced flow turbulence into and out of the filter cells.

The 117-D Filter Building contained two identical filter cells (A and B) separated by a two-story gallery area. The operating gallery contained a small amount of piping and electrical gear. The floor was metal grading. Eight doors on this level provided access to the A and B filter cells. Two doors, one on either end, provided access to the inlet and the exhaust ducts. Fresh air supply manifolds and air flow and radiation level instruments were located on this level.

Figure 1. 132-D-2 Site Location Map.

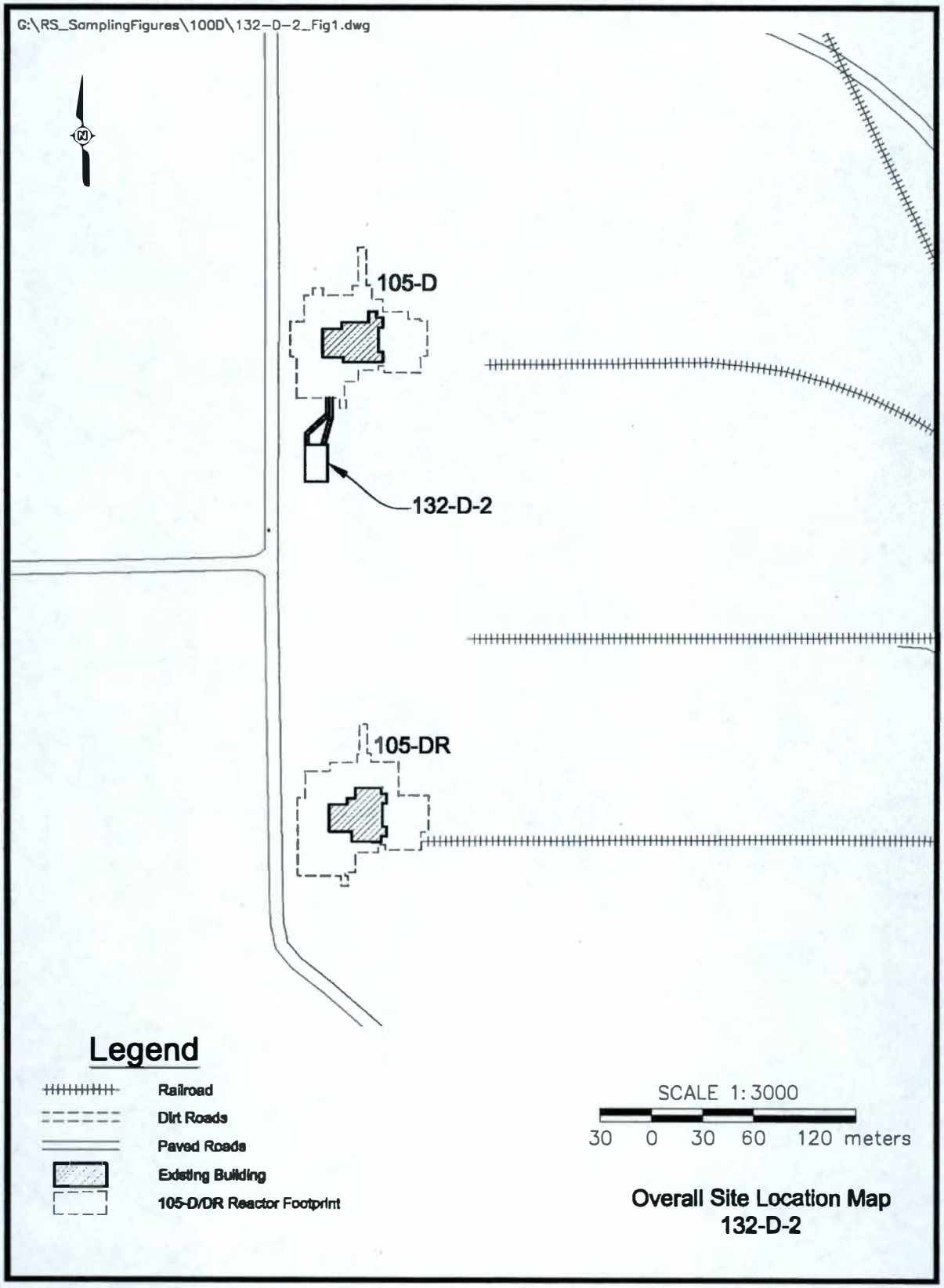


Figure 2. 132-D-2 Detailed Site Plan View.

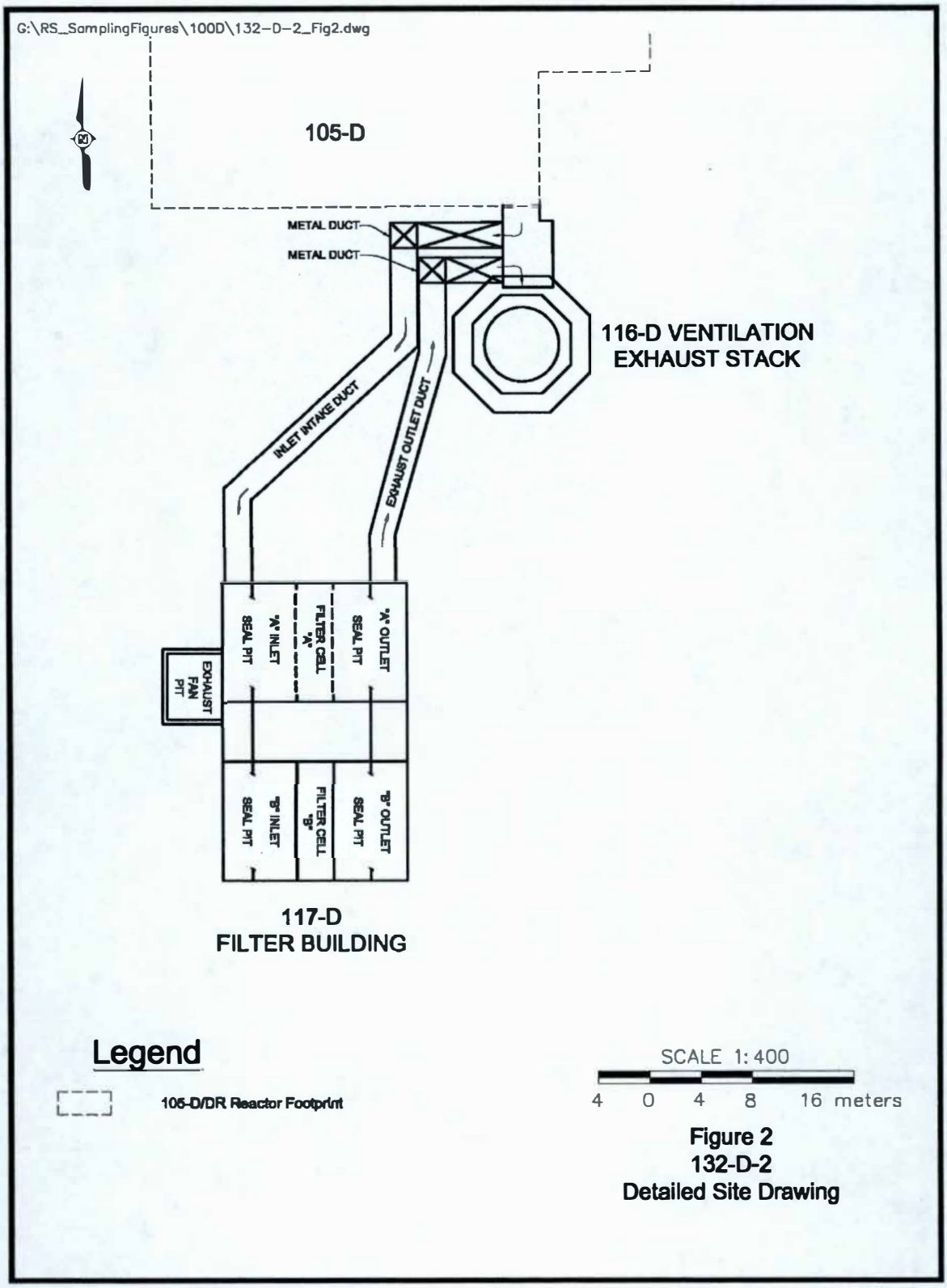
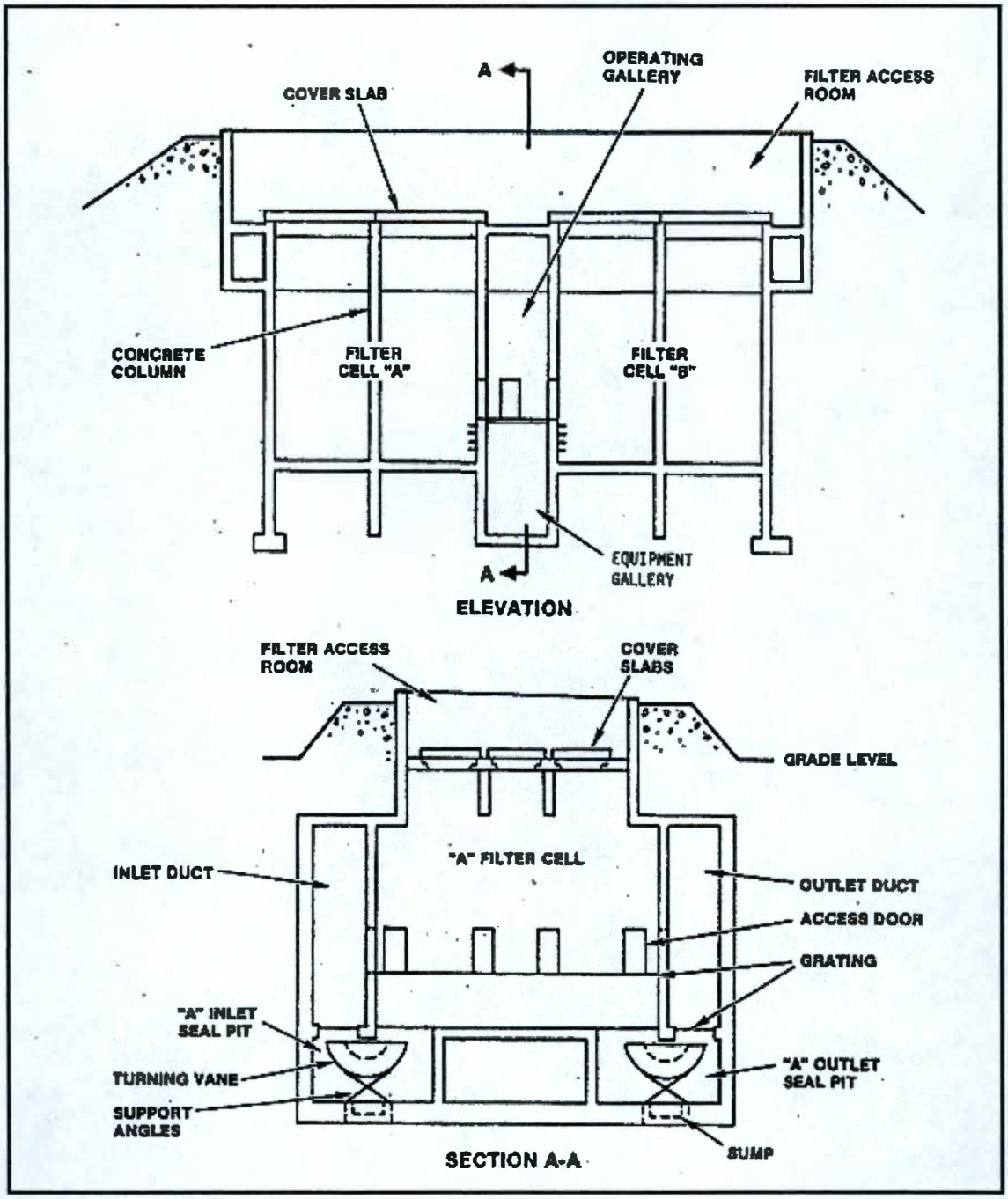


Figure 3. 132-D-2 Site Elevation View.



The equipment gallery, located directly below the operating gallery, contained the majority of the piping and valves, including water lines, drain lines, air lines, sump pump, and the exhaust fan system lines.

Each filter cell had six berths, arranged in three banks with two berths per bank. Each filter berth contained one aluminum filter frame that held 24 HEPA or halogen filters, each of which was 61 by 61 by 30.5 cm (24 by 24 by 12 in.) (UNI 1986a).

DECONTAMINATION AND DECOMMISSIONING BACKGROUND

The 117-D Filter Building and associated below-grade ductwork were decommissioned and demolished in two phases in 1985 and 1986. Dust was vacuumed from the walls and floors to prevent spread of loose contamination. Filter equipment was removed and bagged. The decontamination activities consisted of using Masslin cloth, wire brushes, wet mopping, and other techniques on the equipment and on the vinyl-based coating of the exposed surfaces. Contaminated equipment was packaged and shipped to the Hanford Site 200 West Area burial grounds for disposal.

As part of decommissioning activities, extensive radiological surveys were performed and samples were collected to evaluate the potential radiological dose to a hypothetical maximally exposed site resident if the site was released for unrestricted use after the demolition and burial in situ of the facility. In 1985 radiation surveys were performed on 100% of the internal accessible surface areas of the facility for alpha and beta/gamma radiation. Each section of the 117-D Filter Building was divided into 2- by 2-m (6.6- by 6.6-ft) grids for sampling.

All interior surfaces of the inlet duct, filter cells, seal pits, and exhaust duct had been painted with a coating of vinyl-based paint. Paint samples were collected by removing approximately 30 g (1.1 oz) of paint from each of the sampling grids. Concrete samples were collected from beneath the paint to determine whether any of the contamination had penetrated the vinyl paint coating. A total of 32 paint and concrete samples were collected from the inlet and exhaust ducts, the filter cells and seal pits, the operating gallery, and equipment gallery.

Paint and concrete samples were analyzed on a multi-channel analyzer (TN-4000) with a germanium (lithium) detector for gamma energy identification. The isotopes cobalt-60, cesium-137, and europium-152 were identified by this method. Paint samples were sent to the U.S. Testing Company for tritium, carbon-14, and strontium-90 analysis. The samples exhibiting the highest radiological activity were all collected from paint.

No sampling was performed for nonradionuclides. However, the *117-D Filter Building Decommissioning Individual Facility Report* (UNI 1986b) states that no asbestos, mercury, or any other nonradioactive hazardous materials were found in the 117-D Filter Building.

The sample results were used to support calculation of the residual dose contribution for the demolished 117-D Filter Building in accordance with DOE guidelines and *Allowable Residual Contamination Levels for Decommissioning Facilities on the Hanford Site* (Kennedy and Napier

1983). The ARCL calculation indicated that the demolished facility would contribute less than 1 mrem/yr dose to a hypothetical, maximally exposed site resident, if the site was released for unrestricted use after the demolition and burial in situ of the facility.

Demolition and site grading were performed in 1986 using conventional heavy equipment, including a crane with a "wrecking ball," earth-moving bulldozer, and trucks. The 117-D building floors were perforated to allow for drainage and the roofs of the inlet and outlet ducts were collapsed. The building and ducts were then backfilled with demolished concrete and clean fill material. Demolition rubble was buried under at least 1 m (3.3 ft) of clean fill, with rubble from the seal pits buried under at least 5 m (16 ft) of clean fill, and the site graded to blend with the surrounding terrain. Additional information is provided in the associated characterization and closeout reports (UNI 1986a, 1986b).

BASIS FOR INTERIM CLOSED OUT

Allowable Residual Contamination Level Methodology

The ARCL calculation methodology was used in 1985 to determine if further decontamination or remedial action was needed prior to demolition and in situ burial (UNI 1986a). The calculation scenario was designed to represent unrestricted use conditions for a hypothetical, maximally exposed individual to receipt of a dose not exceeding 25 mrem/yr to the whole body or any organ. The radionuclide inventories for the facility were determined from the sampling results and using the following general assumptions:

- Some grids within the 117-D building were not contaminated. However, it was assumed that the entire surface area of the room or section was contaminated and that the contamination within each room or section of the building was uniformly distributed over 100% of the surface area.

- The rubble resulting from the demolition was evenly distributed. The resulting rubble would be approximately one meter below grade.

The ARCL calculations were prepared in accordance with *Allowable Residual Contamination Levels for Decommissioning Facilities on the Hanford Site* (Kennedy and Napier 1983) and the *Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site* (PNL 1988). According to the ARCL methodology used at the time, the final dose assessment was required to be based on the source term contained within the surrounding hectare for comparison with the 25 mrem/yr threshold. At the time of decommissioning of the 117-D Filter Building, the ARCL calculation determined that the site would contribute less than 1 mrem/yr to an overall hectare dose rate and therefore no further decontamination to reduce the source term was necessary and the facility could be buried in situ. Additional information is provided in the decommissioning and ARCL calculation reports (UNI 1986a, UNI 1986b).

RESidual RADioactivity Modeling Methodology

In 2005, RESRAD modeling was performed in accordance with the RDR/RAWP (DOE-RL 2005) to support the interim closed out decision (WCH 2005). The waste site was modeled considering the entire thickness of contaminated materials and all pathways (direct exposure to gamma radiation; dust inhalation; soil ingestion; and ingestion of plants, meat, milk, aquatic foods, and drinking water) in the RESRAD evaluation. Contaminated concrete was buried in a demolished facility that extended 8.2 m (27 ft) below grade and was covered with 1 m (3.3 ft) of soil. The RESRAD evaluation used the 1985 sampling data adjusted for decay from 1985 to 2005. For each radionuclide identified in the samples that were collected, the highest value reported was conservatively used in the RESRAD modeling. Table 1 provides a summary of the maximum radionuclide results from the samples collected in 1985 with the associated correction for decay. The corrected results for the maximum activities were used to represent uniform residual radiological contaminant concentrations over 100% of the rubble layer. Although the contamination was present in the vinyl paint layer coating the concrete on the inner building surfaces, soil distribution coefficients (K_d values) were used in the modeling as conservative inputs to predict future potential groundwater impacts. The RESRAD input parameters are presented in Appendix B.

Table 1. Sample Results with Correction for Decay to 2005.

Radionuclides	1985 Activities (pCi/g)	Activities decayed to 2005 (pCi/g)
Carbon-14	573	572
Cesium-137	3,230	2,040
Cobalt-60	1370	98.7
Europium-152	64	23
Tritium (H-3)	688	223
Plutonium-239	15	15
Strontium-90	561	348

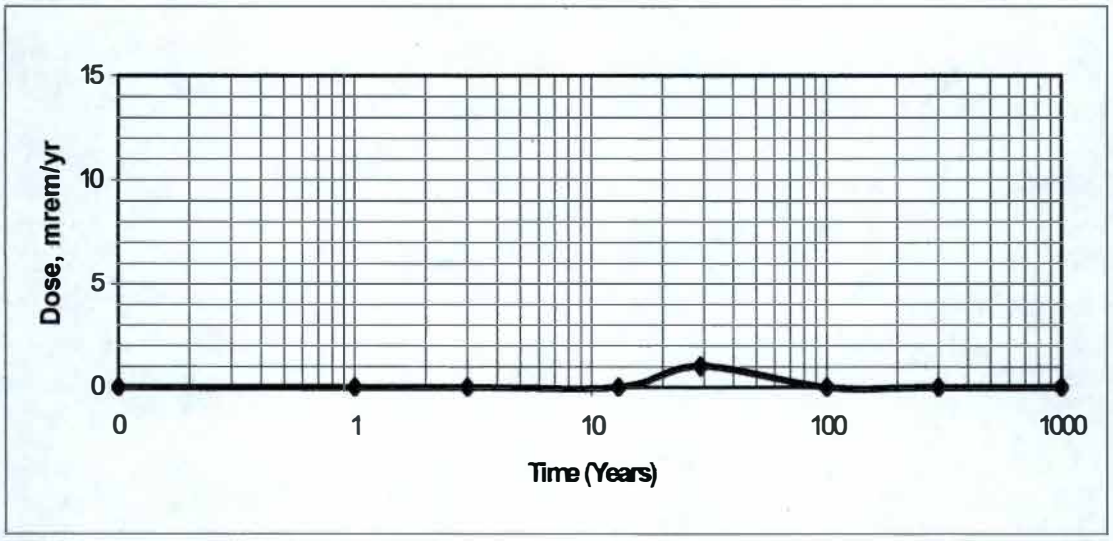
The evaluation predicts that the dose limits will not be exceeded for either the rural-residential scenario (15 mrem/yr) or the groundwater pathway (4 mrem/yr) (Appendix C). Maximum potential dose to a receptor in the rural-residential scenario is predicted to be 1.01 mrem/yr, which is less than the guideline of 15 mrem/yr above background. RESRAD showed that of the contaminants detected only tritium is predicted to reach groundwater within 1,000 years. The maximum tritium concentration in groundwater is predicted to be less than the remedial action goal (20,000 pCi/L). Results are summarized in Table 2 and Figure 3.

Table 2. Summary of Attainment of Dose Limits for Radiological Contaminants of Concern for the 117-D Filter Building Using Soil Distribution Coefficient Values.

Scenario	Dose Limit (mrem/yr)	Dose Predicted by RESRAD (mrem/yr)	Is Dose > Dose Limit?
Rural residential	15	1.02	No
Groundwater protection	4	0.95	No
	MCL [a] (pCi/L)	**Concentration Predicted by RESRAD (pCi/L)**	**Is Concentration > Maximum Contaminant Level?**
Carbon-14 in groundwater	2,000	0	No
Cesium-137 in groundwater	60	0	No
Cobalt-60 in groundwater	100	0	No
Europium-152 in groundwater	200	0	No
Tritium (H-3) in groundwater	20,000	17,900	No
Strontium-90 in groundwater	8	0	No

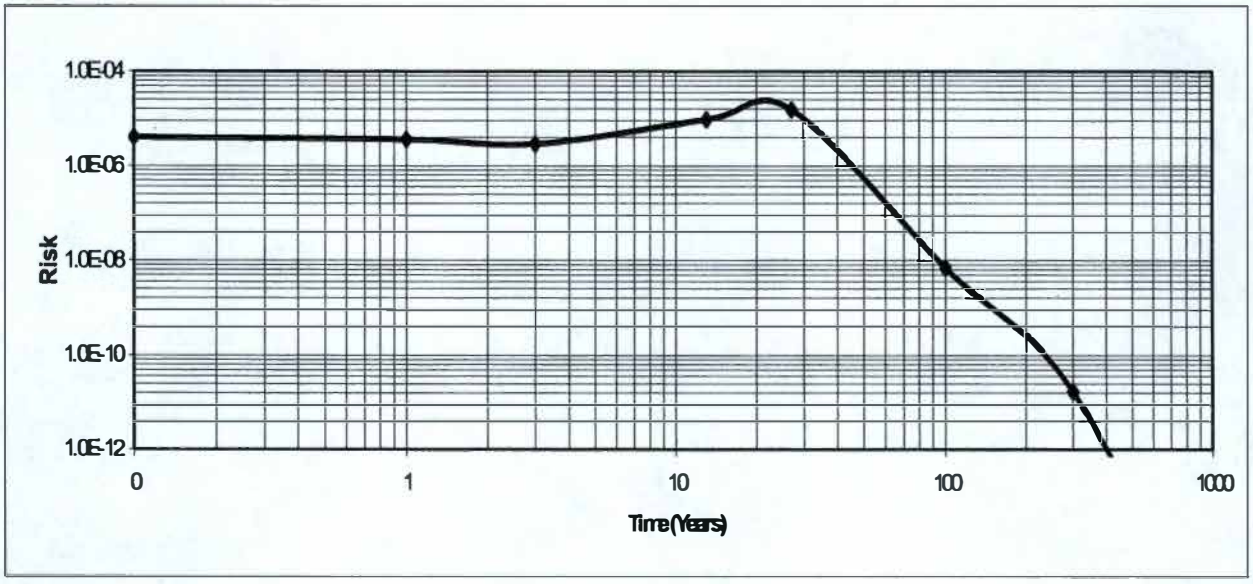
[a] Maximum contaminant levels from Table 2-3 of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2005).
RESRAD = RESidual RADioactivity (dose model)

Figure 3. Radionuclide Dose Rate – All Pathways for the 132-D-2 Site.



The RESRAD model also estimates the excess lifetime cancer risk associated with the radiation dose rates using the U.S. Environmental Protection Agency's Health Effects Assessment Summary Tables (HEAST). The "National Oil and Hazardous Substances Pollution Contingency Plan" (*40 Code of Federal Regulations 300*) presents a target range for residual risk of 10^{-4} to 10^{-6}. The radionuclide excess lifetime cancer risk results are shown in Figure 4. The maximum excess lifetime cancer risk is 1.51×10^{-5} occurs at year 29 (2034). Additional information for the RESRAD modeling is presented in Appendices B and C.

Figure 4. Estimated Radionuclide Cancer Risk for the 132-D-2 Site.



Nonradionuclides

No detailed analysis was performed for nonradionuclides at the 117-D Filter Building. However, the *117-D Filter Building Decommissioning Individual Facility Report* (UNI 1986b) states that no asbestos, mercury, or any other nonradioactive hazardous materials were found in the 117-D Filter Building.

SUMMARY FOR INTERIM CLOSED OUT

The 132-D-2 site residual contaminant levels will be protective of direct exposure, groundwater, and the Columbia River. However, the acceptability of unrestricted direct exposure to below grade structure surfaces in the deep zone has not been demonstrated; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are required. This decision is supported based on reviews of the facility information, historical data, and RESRAD modeling results as summarized below.

1. During decommissioning activities, contaminated material and equipment were removed from the building and transported to the Hanford Site 200 Area for disposal.

2. The residual contamination exists in a thin layer of paint on the surface of the concrete walls and floor of the 117-D Filter Building.

3. Using conservative inputs (e.g., highest activity sample results and assuming uniform contamination levels on the paint and the entire mass of residual concrete), the RESRAD outputs indicate that residual contamination levels do not present unacceptable risk to the maximally exposed individual.

4. Excavation of the site to collect more information (i.e., samples) is not likely to result in a change to the interim closed out decision for the 132-D-2 site because the residual contamination occurred within a thin surface layer of paint on the interior surfaces of the building and would be unlikely to be detected in the deep zone rubble resulting from demolition of the building.

REFERENCES

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations,* as amended.

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, as amended.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, as amended, U.S. Department of Energy, Washington, D.C.

DOE-RL, 2005, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

Kennedy, W. E., Jr. and B. A. Napier, 1983, *Allowable Residual Contamination Levels for Decommissioning Facilities on the Hanford Site*, PNL-4722/UNI-2522, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1988, *Manual for Applying the Allowable Residual Contamination Level Method for Decommissioning Facilities on the Hanford Site*, PNL-6348, Pacific Northwest Laboratory, Richland, Washington.

UNI, 1986a, *ARCL Calculations for Decommissioning the 117-D Filter Building*, UNI-3870, UNC Nuclear Industries, Richland, Washington.

UNI, 1986b, *117-D Filter Building Decommissioning Individual Facility Report*, UNI-4040, UNC Nuclear Industries, Richland, Washington.

WCH, 2005, *132-D-2/117-D Filter Building RESRAD Evaluation of Dose and Risk*, Calculation No. 0100D-CA-V0261, Washington Closure Hanford, Richland, Washington.

APPENDIX A

WASTE INFORMATION DATA SYSTEM GENERAL SUMMARY REPORT

Waste Information Data System
General Summary Report

Site Code: 132-D-2 **Site Classification: Accepted**

Site Names: 132-D-2, 117-D Filter Building

Site Type: Process Unit/Plant
Status: Inactive
Operable Unit: 100-DR-1
Hanford Area: 100D

Start Date: 1961
End Date: 1967
Coordinates:
(E) 573754.500
(N) 151515.281
Washington State Plane

Site Description: The ventilation exhaust filter building housed blowers and particulate filters used to treat the ventilation exhausted from the 105-D Reactor Building. Included in this site are the 117-D Building, the intake ventilation duct from the 105-D Reactor Building, and the exhaust ventilation ducts to the 116-D Reactor Exhaust Stack. The building and ducts have been demolished in place and the site now resembles a gravel parking lot.

The building and below grade duct work were made of reinforced concrete, 0.3 to 0.6 meters (1 to 2 feet) thick. The building was 11.0 meters (36 feet) high with 2.4 meters (8 feet) above grade. A soil berm was built up around the building from grade level to the top of the structure.

The building was divided into two large filter cells with a smaller operating area between them. The filter cells each held six filter frames (two wide and three deep). The filter frames were designed to hold twenty-eight filters that were 0.6 meters (2 feet) square by 0.3 meters (1 foot) thick. There were spaces between the frames to allow access for filter maintenance. The operating area between the two cells was divided into two levels. The upper level, called the access gallery had ten doors that led from it. Four doors opened into each of the filter cells and the two other doors provided access to the intake and exhaust ducts. The operating gallery was located below the access gallery. A sump was located at each end of the operating gallery to collect incidental drainage from above. A large open area extended the full length of the structure above the access gallery and the filter cells. It ranged in height between 2.5 and 2.4 meters (8.1 and 7.8 feet) due to the structure's sloping roof. The space provided access to the cement cover blocks that were positioned over each of the filter frames.

Location Description: The site is located south of the 105-D Reactor (118-D-6), near the 116-D Stack (132-D-4).

Process Description: The 117-D Building was constructed as part of the reactor confinement project. Prior to its use, unfiltered ventilation was exhausted directly from the reactor to the atmosphere. The confinement project diverted the exhaust just before the stack and routed it to the filter building where it passed through a series of filters. The filtered exhaust was then routed back to the ventilation exhaust stack where it was discharged to the atmosphere. Sealwells within the filter building provided the ability to direct the exhaust into one or both of the filter cells.

Associated Structures: The site is associated with the 105-D Reactor (118-D-6), the 116-D Stack (132-D-4), the 119-D Sample Building, and the 117-D Seal Pit Crib (116-D-9).

Site Comment: The site was decommissioned using Allowable Residual Contamination Level (ARCL) methodology. The demolition and site grading were performed in January and February 1986. The building and ducts were excavated and demolished in situ. The contaminated rubble was buried at least 1 meter (3.3 feet) deep, except for rubble from the seal pits, which was buried under a minimum of 5 meter (16.4 feet) of clean earth.

References:

1. P. W. Griffin, 8/5/86 117-D Filter Building Decommissioning Individual Facility Report, UNI-4040.
2. M. S. Kitts, 8/26/91 WIDS Site Addition, 132-D-2.
3. R. W. Carpenter, 09/20/93 100-D Area Technical Baseline Report, WHC-SD-EN-TI-181, Rev 0.
4. General Electric, 1/7/63 PLOT PLAN 117-D FILTER BUILDING, H-1-19802, Rev 4.
5. General Electric, 3/18/63 STRUCTURAL CONCRETE SECTIONS & DETAILS FILTER BUILDING, H-1-19838, Rev 4.
6. General Electric, 8/14/64 PLAN COVER SLAB & DETAILS FILTER BUILDING, H-1-19836, Rev 4.
7. General Electric, 6/25/62 FOUNDATION PLAN & DETAILS FILTER BUILDING, H-1-19835, Rev 6.

Site Code: 132-D-2 **Site Classification: Accepted**

8. General Electric, 4/14/60 VENTILATION SECOND STAGE FILTER BANK ASSEMBLY, H-1-19869, Rev 3.

Waste Information:

Type:	Demolition and Inert Waste
Category:	Radioactive
Physical State:	Solid
Description:	The site contains radiological contamination from 105-D Reactor ventilation exhaust. Total radionuclide inventory in the 117-D building was estimated to be 3.9E-03 curies. The radionuclides comprising this figure are tritium, carbon-14, cobalt-60, strontium-90, cesium-137, europium-152, and plutonium-239.
References:	1. P. W. Griffin, 8/5/86 117-D Filter Building Decommissioning Individual Facility Report, UNI-4040. 2. M. S. Kitts, 8/26/91 WIDS Site Addition, 132-D-2.

Dimensions:

Length:	17.98	Meters	59.00	Feet
Width:	11.89	Meters	39.00	Feet
Depth/Height:	8.23	Meters	27.00	Feet

References: 1. P. W. Griffin, 8/5/86 117-D Filter Building Decommissioning Individual Facility Report, UNI-4040.

Dimensions:

Length:	22.00	Meters	72.18	Feet
Width:	13.00	Meters	42.65	Feet
Sq. Area:	276.80	sqMeters	2,979.45	sqFeet

Site Shape: Rectangle

Comments: These values were obtained from the GPS survey data using ArcInfo and ArcView. This is the area bound by the four signs.

Field Work:

Type:	GPS Surveys		
BeginDate:	04/15/1998	**FieldCrew:**	K.A. Prosser, C. Webb, W. Hayward
End Date:	04/15/1998	**Data Repository:**	HGIS
Purpose:	Mapping		
Comment:	The four signs marking the former location of the "117-D exhaust filter building site" were mapped using a GPS. The reference for this task is an electronic file found under \\BHI002\hgis-gps\job-158.		
Job Number:	158		
Type:	Real-Time Kinematic		

Type:	Surveillance Walkdowns
BeginDate:	04/15/1998
End Date:	04/15/1998
Purpose:	Surveillance

Regulatory Information:

Programmatic Responsibility

DOE Program:	EM-40	**Confirmed By Program:**	Yes

Site Code: 132-D-2 **Site Classification: Accepted**

DOE Division: ERD - Environmental Restoration Division
Responsible Contractor/Subcontractor: BHI. Bechtel Hanford, Inc.

ResponsibleProject:

Site Evaluation

Solid Waste Management Unit: Yes
TPA Waste Management Unit Type: Waste Disposal Unit
This site was consolidated with:

Reason:

Permitting

RCRA Part B Permit:	No	**TSD Number:**	
RCRA Part A Permit:	No	**Closure Plan:**	No
RCRA PermitStatus:			
Septic Permit:	No	**216/218 Permit:**	No
Inert LandFill:	No	**NPDES:**	No
Air Operating Permit:	No	**State Waste Discharge Permit:**	No

Tri-Party Agreement

Lead Regulatory Agency: Ecology
Unit Category: CERCLA Past Practice (CPP)
TPA Appendix: C

Remediation and Closure

Decision Document: Interim Action Record of Decision, 100 Area Remaining Sites (1999)
Decision Document Status: Final
Remediation Design Group: Group 5
Closure Document:
Closure Type:
Post Closure Requirements: **ResidualWaste:**

Images:

Pathname: \\apwids01\widsimg\100D\0232\0232_01.JPG DateTaken: 04/16/1998
Description: Photos shows the site of the demolished 117-D building.

APPENDIX B

117-D FILTER BUILDING
RESRAD INPUT PARAMETERS

Table 1. RESRAD Input Parameters for 132-D-2 / 117-D Filter Building. (3 pages)

Parameter	Units	Rural Residential Scenario Input Parameter Values[a]
Exposure pathways		
External gamma		**Yes**
Inhalation of dust		**Yes**
Plant ingestion		**Yes**
Meat ingestion		**Yes**
Milk ingestion		**Yes**
Aquatic foods		**Yes**
Drinking water		**Yes**
Soil ingestion		**Yes**
Radon		No
Cover		Soil
Cover depth	m	1
Density of cover material	g/cm^3	1.6
Cover erosion rate	m/yr	0
Contaminated zone		
Area of contaminated zone	m^2	214
Thickness of contaminated zone	m	6.0
Length parallel to aquifer flow	m	18
Density	g/cm^3	2.4 (concrete[b])
Erosion rate	m/yr	0
Total porosity	--	0.3 (concrete)
Field capacity	--	0.16 (concrete)
Hydraulic conductivity	m/yr	41 (concrete)
Soil-specific b parameter	--	11.4 (concrete)
Hydrogeologic data		
Evapotranspiration coefficient	--	0.91
Wind Speed	m/sec	3.4
Precipitation	m/yr	0.161
Irrigation	m/yr	0.76
Irrigation mode	--	Overhead
Runoff coefficient	--	0.2
Watershed area (nearby)	cm^2	1E+06
Accuracy for soil/water computations	--	0.001
Saturated zone		Soil
Density	g/cm^3	1.6
Total porosity	--	0.4
Effective porosity	--	0.25
Field capacity	--	0.15
Hydraulic conductivity	m/yr	5530
Hydraulic gradient	--	0.00125
Soil-specific b parameter	--	4.05
Water table drop rate	m/yr	0.001
Well pump intake depth (below water table)	m	4.6
Nondispersion (ND) or mass balance (MB)	--	ND
Well pumping rate	m^3/yr	250
Unsaturated zone		
Unsaturated zone strata		Soil
Thickness	m	18.6

Table 1. RESRAD Input Parameters for 132-D-2 / 117-D Filter Building. (3 pages)

Parameter	Units	Rural Residential Scenario Input Parameter Values[a]
Density	g/cm^3	1.6
Total porosity	--	0.4
Effective porosity	--	0.25
Field capacity	--	0.15
Hydraulic conductivity	m/yr	250
Soil-specific b parameter	--	4.05
Distribution coefficients[c]		Soil
Carbon-14	cm^3/g	200
Cobalt-60	cm^3/g	50
Cesium-137	cm^3/g	50
Europium-152	cm^3/g	200
Europium-154	cm^3/g	200
Tritium (H-3)	cm^3/g	0
Plutonium-239	cm^3/g	200
Strontium-90	cm^3/g	25
Time since material placement	yrs	0
Radionuclide Concentrations (Decayed to July 2005)		
Carbon-14	pCi/g	572
Cobalt-60	pCi/g	13.0
Cesium-137	pCi/g	2035
Europium-152	pCi/g	22.6
Europium-154	pCi/g	0
Tritium (H-3)	pCi/g	210
Plutonium-239	pCi/g	0
Strontium-90	pCi/g	348
Occupancy and Inhalation Data		
Inhalation rate	m^3/yr	7300
Mass loading for inhalation	g/cm^3	0.0001
Exposure duration	yr	30
Shielding factor, inhalation	--	0.4
Shielding factor, external gamma	--	0.8
Fraction of time indoors	--	0.6
Fraction of time outdoors	--	0.2
Food consumption		
Fruits, vegetables, and grain	Kg/yr	110
Leafy vegetables	Kg/yr	2.7
Milk	L/yr	100
Meat	Kg/yr	36
Fish	Kg/yr	19.7
Other aquatic food	Kg/yr	0.9
Soil ingestion	g/yr	73
Drinking water intake	L/yr	730
Contaminated fraction of food and water		
Drinking water	--	1
Household water	--	1
Livestock water	--	1
Irrigation water	--	1
Aquatic food	--	1
Plant food	--	1

Table 1. RESRAD Input Parameters for 132-D-2 / 117-D Filter Building. (3 pages)

Parameter	Units	Rural Residential Scenario Input Parameter Values[a]
Meat	--	1
Milk	--	1
Ingestion parameters, nondietary		
Livestock fodder intake for meat	Kg/d	68
Livestock fodder intake for milk	Kg/d	55
Livestock water intake for meat	L/d	50
Livestock water intake for milk	L/d	160
Livestock soil intake	Kg/d	0.5
Mass loading for foliar deposition	g/cm^3	0.0001
Depth of soil mixing layer	M	0
Depth of roots	M	0.9
Groundwater fractional usage		
Drinking water	--	1
Household water	--	1
Livestock water	--	1
Irrigation	--	1
Storage times of contaminated foodstuffs		Not used
Radon emanation data		Not used

[a] All general 100 Area input parameters (non-site specific) are from Appendix B of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[b] Input parameters for concrete are from Appendix B of the *Guidance for Radiological Release of DOE Real Property at Hanford*, DOE/RL-97-93, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[c] Distribution coefficients for soil are from Appendix E of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

APPENDIX C

SUMMARY OF 117-D FILTER BUILDING RESRAD EVALUATION

CALCULATION COVER SHEET

Project Title 100-D/DR Remedial Action **Job No.** 14655
Area 100-D Area
Discipline Environmental ***Calc. No.** 0100D-CA-V0261
Subject 132-D-2 / 117-D Filter Building RESRAD Evaluation of Dose and Risk
Computer Program RESRAD **Program No.** Version 6.22

The attached calculations have been generated to document compliance with established cleanup levels.
These documents should be used in conjunction with other relevant documents in the administrative record.

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐ **Voided** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover – 1 pg Summary – 6 pg Attm. 1 - 1 pg Attm. 2 - 23 pg Attm. 3 - 27 pg Attm. 4 - 17 pg Total – 75 pages	S. W. Clark *Approved* *7/18/05*	T. M. Blakley *Approved* *7/19/05*	K. E. Cook *Approved* *7/19/05*	R. A. Carlson *Approved* *7/21/05*	*Approved* *7/21/05*
1	Cover – 1 pg Summary – 5 pg Attm. 1 - 1 pg Attm. 2 - 24 pg Attm. 3 - 28 pg Attm. 4 - 9 pg Total – 68 pages	S. W. Clark 9/20/05	T. M. Blakley 9/20/05	K. E. Cook 9/20/05	R. A. Carlson 9/20/05	9/20/05

SUMMARY OF REVISION

1	It was necessary to revise this calculation brief to correct the input value for cobalt-60 in Table 2 and to include plutonium-239 using the gross alpha activity as the plutonium-239 activity. Errors in the thickness of the contaminated zone and unsaturated zone in Table 1 were also corrected. For convenience, the calculation brief has been replaced in its entirety.

*Obtain Calc. No. from DIS

DE01-437.03 (12/09/2004)

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	9/20/05	Calc. No.:	0100D-CA-V0261	Rev.:	1
Project:	100-D/DR Remedial Action	Job No:	14665	Checked:	T. M. Blakley	Date:	9/20/05
Subject:	132-D-2 / 117-D Filter Building RESRAD Calculation					Sheet No.	1 of 5

PURPOSE:

Evaluate the potential dose and risk to a receptor in a rural residential scenario from contaminants in concrete rubble at 132-D-2, the former 117-D Filter Building site, and determine if contamination is predicted to reach groundwater within 1,000 years. Use data available from samples taken in June of 1985 for an Allowable Residual Contamination Level (ARCL) method evaluation of the decommissioned building site.

GIVEN/REFERENCES:

1) Sample data from *ARCL Calculation for Decommissioning the 117-D Filter Building*, UNI-3870, Rev. 0, UNC Nuclear Industries, Richland, Washington.
2) Decommissioning information and dates from *117-D Filter Building Decommissioning Individual Facility Report*, UNI-4040, Rev. 0, UNC Nuclear Industries, Richland, Washington.
3) *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) For the purpose of these RESRAD calculations, there are no nonradionuclide contaminants of concern.
5) RESidual RADioactivity (RESRAD) computer code, version 6.3, to calculate compliance with residual radioactivity guidelines, developed for the U.S. Department of Energy by the Environmental Assessment Division of Argonne National Laboratory, Argonne, Illinois.

BACKGROUND:

The 132-D-2 / 117-D Filter Building was built in 1960 to filter the ventilation air from the 105-D Reactor Building before it was discharged to the 132-D-4 Stack. It operated until the 105-D Reactor was shut down in 1967. Most of the reinforced concrete structure (6.0 m [23 ft]) was below grade and only 2.4 m (8 ft) was above grade. The facility was decommissioned in two phases in 1985 and 1986. During the first phase of decommissioning (in 1985) all filters and equipment were disposed in the 200 Area, the remaining structure was decontaminated, and the facility was sampled.

The decontaminated facility surfaces were sampled on 2 m by 2 m (6.6 x 6.6 ft) grids to determine if ARCL criteria for decommissioning were met. Residual contamination was confined to the paint and concrete on the surface of the walls and the floor of the building, with the floor having the majority of the contamination. However, the RESRAD evaluation used the maximum concentrations of radionuclides from the 1 mm (0.04 in) paint layer and the surface concrete to conservatively model the residual concrete as if the entire mass of the concrete was contaminated. This was the conceptual model for evaluations of dose, risk, and groundwater protection (shown in Attachment 1). The facility was demolished to 1 m (3.3 ft) below grade and covered with at least 1 m (3.3 ft) of clean fill. Holes were punched in the floor to allow precipitation to drain.

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	9/20/05	Calc. No.:	0100D-CA-V0261	Rev.:	1
Project:	100-D/DR Remedial Action	Job No:	14655	Checked:	T. M. Blakley	Date:	9/20/05
Subject:	132-D-2 / 117-D Filter Building RESRAD Calculation					Sheet No.	2 of 5

SOLUTION:

1) Table 1 shows the waste site parameters used for RESRAD modeling. The conceptual model for the RESRAD runs assumes that the maximum concentrations of radionuclides from the data set for the paint layer and surface concrete are representative of the entire mass of residual concrete from decommissioning of the building as described in *ARCL Calculation for Decommissioning the 117-D Filter Building*, UNI-3870, Rev. 0.

2) Table 2 shows the maximum radionuclide activities from UNI-3870. A statistical sample design was not implemented so maximum activities for each radionuclide were used for RESRAD evaluations. Radionuclide activities were decayed from June 1985 to the present date (20 years) to be used as shown in Table 2. Input factors for each RESRAD run are shown in the "Summary" section of the RESRAD "Mixture Sums and Single Radionuclide Guidelines" printouts which are included as Attachments to this Calculation Summary.

3) The year where the peak dose (or groundwater concentration) occurs from each individual radionuclide was determined by a preliminary run. This year was then included in all final RESRAD runs. For the direct exposure pathway (i.e. soil ingestion and inhalation and external radiation), the peak year occurred at year zero (year 2005) for all radionuclides. For the water pathways (i.e., drinking water and food ingestion) the peak year was year 29 (2034) for tritium (H-3) for drinking water (only). The 29-year time period was included in all of the RESRAD runs.

Table 1. Waste Site Dimensions for RESRAD Modeling

Parameter	Units	Value	Comments
Cover Depth	m	1	Minimum cover for conservative evaluation
Area of Contaminated Zone	m^2	214	Based on site area including building and ducts [a]
Length Parallel to Aquifer Flow	m	18	Based on groundwater flow direction
Elevation: Surface	m	143.0	NAVD88
Elevation: Bottom of waste	m	136.0	Bottom of structure 7.0 m (23 ft) below grade.
Elevation: Groundwater	m	117.4	NAVD88
Thickness: Contaminated Zone	m	6.0	Based on 1 m cover [a]
Thickness: Unsaturated Zone	m	18.6	From foundation bottom to groundwater

[a] *ARCL Calculation for Decommissioning the 117-D Filter Building*, UNI-3870, Rev. 0, UNC Nuclear Industries, Richland, Washington.

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	9/30/05	Calc. No.:	0100D-CA-V0261	Rev.:	1
Project:	100-D/DR Remedial Action	Job No:	14655	Checked:	T. M. Blakley	Date:	9/20/05
Subject:	132-D-2 / 117-D Filter Building RESRAD Calculation					Sheet No.	3 of 5

METHODOLOGY:

1) Runs of RESRAD version 6.22 were completed for the shallow zone using the radionuclide concentrations shown in Table 2. RESRAD numerical output reports for dose, risk, and concentration for the shallow zone are presented in the Attachments to this calculation summary.

Table 2. Radionuclide Activity.

Radionuclides	1985 Activities (pCi/g)	Activities Decayed to 2005 (pCi/g)
Carbon-14	573	572
Cesium-137	3230	2040
Cobalt-60	1370	98.7
Europium-152	64	23
Tritium (H-3)	688	223
Plutonium-239	15	15
Strontium-90	561	348

RESULTS:

1) Radionuclide "All Pathways" Dose Rate: The "all pathways" dose rates are shown in Table 3. The maximum all-pathways dose rate for the shallow zone is 1.01 mrem/yr occurring at year 29 (2034).

Table 3. All Pathway Dose Rate (mrem/yr)

Vadose Zone Horizon	"All Pathways" Dose Contributions in mrem/yr at each time slice (yr)							
	0	1	3	13	29	100	300	1000
Shallow Zone Total Dose	5.07E-03	4.56E-03	3.73E-03	1.58E-03	1.01E+00	4.42E-04	1.04E-06	1.05E-12

2) Radionuclide Excess Cancer Risk: The radionuclide excess lifetime cancer risk results are shown in Table 4. The maximum excess lifetime cancer risk (1.51×10^{-5}) occurs at year 29 (2034).

Table 4. Radionuclide Excess Lifetime Cancer Risk

Vadose Zone Horizon	Excess Cancer Risk at Each Time Slice (yr)							
	0	1	3	13	29	100	300	1000
Shallow Zone Total Excess Cancer Risk	4.00E-06	3.58E-06	2.86E-06	9.46E-06	1.51E-05	6.87E-09	1.68E-11	2.09E-17

Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	9/21/05	Calc. No.:	0100D-CA-V0261	Rev.:	1
Project:	100-D/DR Remedial Action	Job No:	14655	Checked:	T. M. Blakley	Date:	9/20/05
Subject:	132-D-2 / 117-D Filter Building RESRAD Calculation					Sheet No:	4 of 5

3) Figures 1 and 2 show the all pathways dose rate and radionuclide excess cancer risk for the rural residential scenario.

Figure 1. RESRAD Analysis – All Pathways Dose Rate

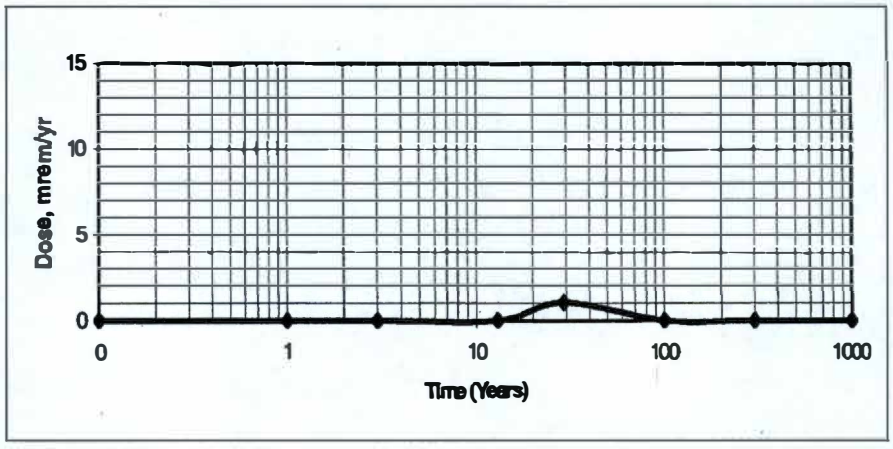
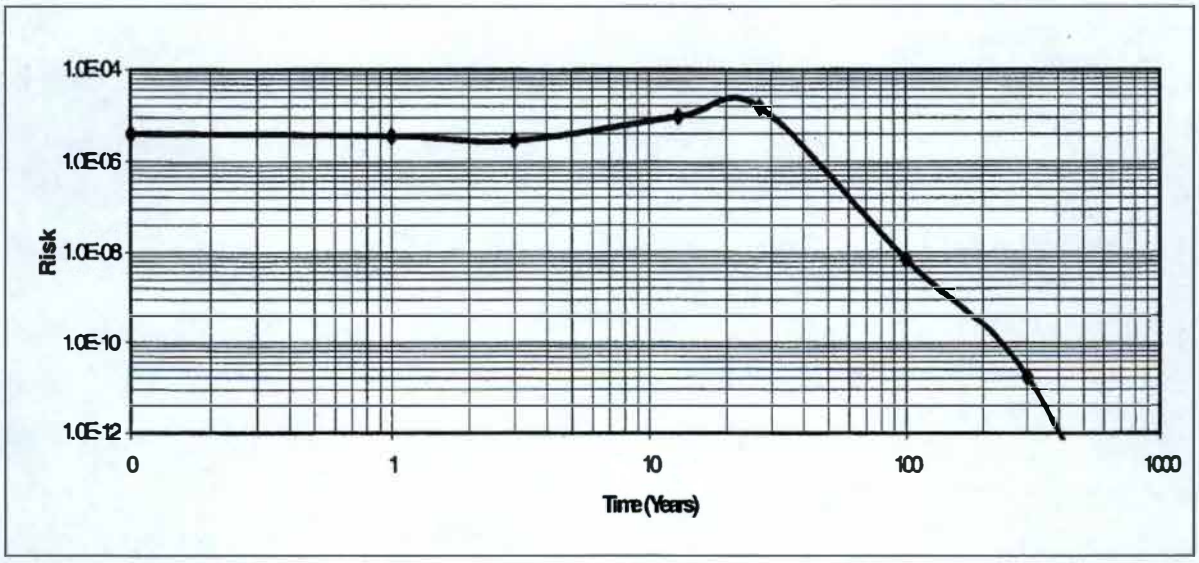


Figure 2. RESRAD Analysis – Radionuclide Risk, All Pathways.



Washington Closure Hanford CALCULATION SHEET

Originator:	S. W. Clark	Date:	9/20/05	Calc. No.:	0100D-CA-V0261	Rev.:	1
Project:	100-D/DR Remedial Action	Job No:	14655	Checked:	T. M. Blakley	Date:	9/20/05
Subject:	132-D-2 / 117-D Filter Building RESRAD Calculation					Sheet No.	5 of 5

4) Radionuclide Groundwater Protection: The radionuclide concentrations in groundwater calculated by the RESRAD model are summarized in Table 5. Of the radionuclides, only tritium (H-3) is predicted to reach groundwater within 1,000 years.

Table 5. RESRAD Predicted Radionuclide Groundwater (Well Water) Concentrations

Radio-nuclides	Vadose Zone Horizon	Groundwater Concentrations in pCi/L at Each Time Slice (yr)								RAGs From RDR (pCi/L)
		0	1	3	13	29	100	300	1000	
C-14	Total	0	0	0	0	0	0	0	0	2,000
Cs-137	Total	0	0	0	0	0	0	0	0	60
Co-60	Total	0	0	0	0	0	0	0	0	100
Eu-152	Total	0	0	0	0	0	0	0	0	200
H-3	Total	0	0	0	0	1.79E+04	6.60E+00	1.08E-09	0	20,000
Pu-239	Total	0	0	0	0	0	0	0	0	15
Sr-90	Total	0	0	0	0	0	0	0	0	8

CONCLUSIONS:

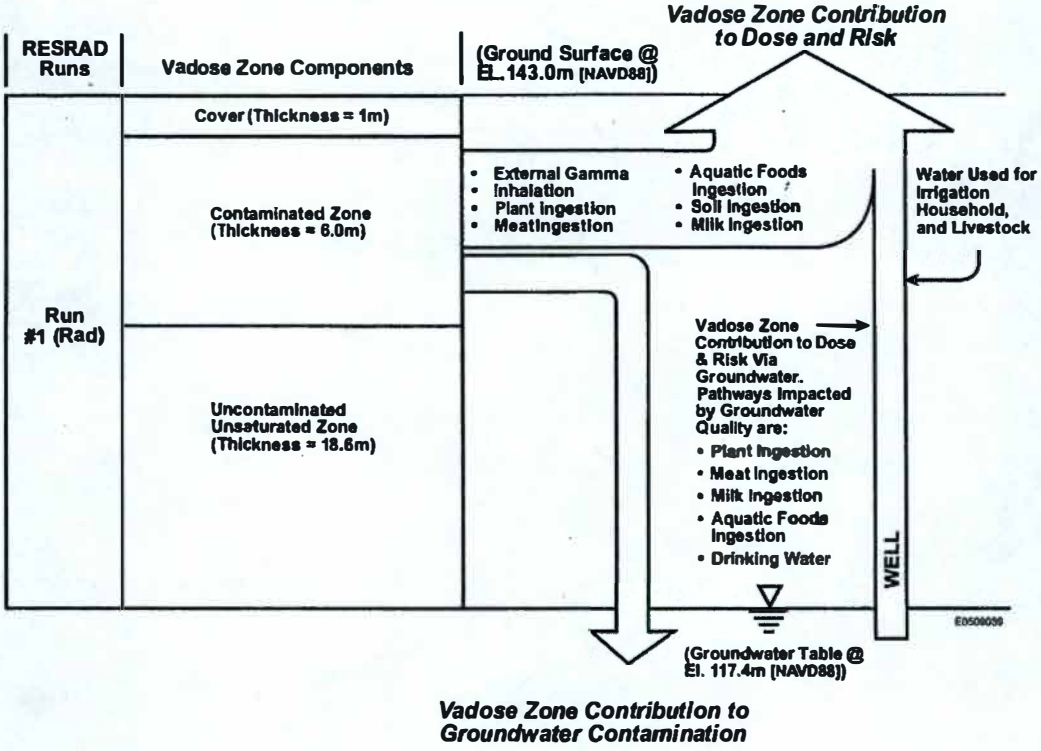
- The maximum all-pathways dose rate for the shallow zone is 1.01 mrem/yr which occurs at year 29 (2034).
- The dominant pathway for the dose rate is drinking water.
- The primary radionuclide contributing to the drinking water pathway is tritium (H-3).
- None of the site radionuclides are projected to exceed remedial action goals (RAGs).
- The maximum excess lifetime cancer risk (1.51×10^{-5}) occurs at year 29 (2034).
- Of the radionuclides, only tritium (H-3) is predicted to reach groundwater within 1,000 years.

ATTACHMENTS:

1. Graphic showing 132-D-2 RESRAD Evaluation Model (1 page)
2. RESRAD Output: 132-D-2 Radionuclides, Mixture Sums and Single Radionuclide Guidelines (24 pages)
3. RESRAD Output: 132-D-2 Radionuclides, Intake Quantities and Health Risk Factors (28 pages)
4. RESRAD Output: 132-D-2 Radionuclides, Concentration of Radionuclides, (9 pages)

ATTACHMENT 1

132-D-2 RESRAD Calculation Conceptual Model



Attachment	1	Sheet No.	1 of 1
Originator	S. W. Clark	Date	7/28/05
Chk'd By	T. M. Blakley	Date	7/28/05
Calc. No.	0100D-CA-V0261	Rev. No.	1