United States
Environmental Protection
Agency

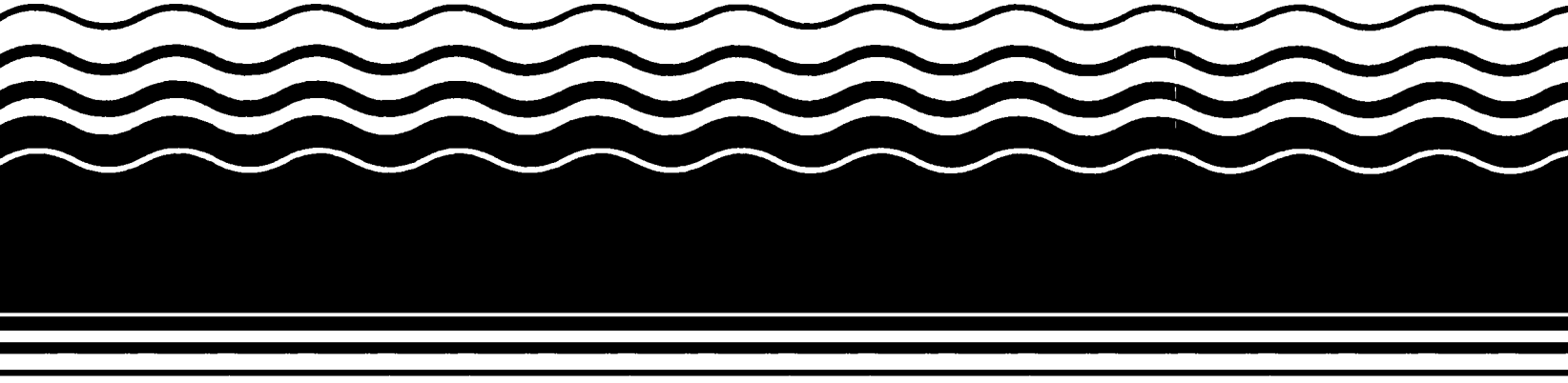
Office of
Emergency and
Remedial Response

EPA/ROD/R04-93/137
October 1992

EPA

Superfund Record of Decision:

USDOE Oak Ridge Reservation (Operable Unit 17), TN



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4. Title and Subtitle SUPERFUND RECORD OF DECISION US DOE Oak Ridge Reservation (Operable Unit 17), TN Seventh Remedial Action	5. Report Date 10/06/92 6.
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15. Supplementary Notes

PB94-964023

16. Abstract (Limit: 200 words)

The 6-acre USDOE Oak Ridge Reservation (Operable Unit 17) site, a former radioactive treatment facility, is part of the Oak Ridge National Laboratory (ORNL) located in Roane County, Tennessee. The site is comprised of eight treatment plots that were used in 1968 as part of a simulated nuclear weapons fallout study in an area known as the Waste Area Group (WAG) 13 cesium plots. During the simulation, four of the treatment plots (Nos. 2, 4, 6, and 7) were seeded with approximately 8.8 Ci of the radioactive compound cesium^{-137}, and the remaining plots were used as controls. In 1987, USDOE conducted a surface radiological investigation at, and around, the site to measure existing levels, and identified elevated levels in onsite soil. Previous 1991 and 1992 RODs addressed the United Nuclear Corporation disposal site, sediment at the Y-12 Plant, sludge at the K-25 Plant, surface water at the K-25 plant, and soil at the Y-12 Plant, as OUs 2, 3, 4, 5, and 18, respectively. This ROD addresses the onsite, radioactively-contaminated soil within the plots, as OU17. Another 1993 ROD addresses contaminated debris, as OU8. The primary contaminant of concern affecting the soil is cesium^{-137}, a radioactive material.

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - US DOE Oak Ridge Reservation (Operable Unit 17), TN
Seventh Remedial Action
Contaminated Medium: soil
Key Contaminants: radioactive materials (cesium^{-137})

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 26
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EPA/ROD/R04-93/137
US DOE Oak Ridge Reservation (Operable Unit 17), TN
Seventh Remedial Action

Abstract (Continued)

The selected remedial action for this site includes excavating approximately 8,712 ft^3 of cesium-contaminated soil from each plot, that exceeds 120 pCi/g, to a depth of 2 feet; containerizing the soil in steel boxes designed to contain low-level radioactive waste, and transporting it onsite to WAG 6; and lining the excavated areas with clean fill and covering them with soil and vegetation. The estimated present worth cost for this remedial action is $709,500.

PERFORMANCE STANDARDS OR GOALS:

Soil contaminated with cesium at levels exceeding 120 PCi/g will be excavated and disposed of onsite at WAG 6.

DOE/OR-1059&D4

O.U. 17

Interim Record of Decision for Oak Ridge National Laboratory Waste Area Grouping 13 Cesium Plots, Oak Ridge, Tennessee

September 1992

DOE/OR-1059&D4
92-225-161-70

Interim Record of Decision for Oak Ridge National Laboratory Waste Area Grouping 13 Cesium Plots, Oak Ridge, Tennessee

September 1992

Prepared for
U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Prepared by
Radian Corporation
120 South Jefferson Circle
Oak Ridge, Tennessee 37830
under Contract No. DE-AC05-90OR21851
Doc. #F920818.4JM51

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ACRONYMS AND INITIALISMS

ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FS	feasibility study
IROD	Interim Record of Decision
O&M	operation and maintenance
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
pCi/g	picocuries per gram
RI	remedial investigation
RME	reasonable maximum exposure
SR	Tennessee State Route
TBC	to be considered
TCA	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
WAG	Waste Area Grouping

PART 1. DECLARATION

SITE NAME AND LOCATION

Waste Area Grouping (WAG) 13
Oak Ridge National Laboratory (ORNL)
Oak Ridge Reservation (ORR)
Oak Ridge, Tennessee

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the ORNL WAG 13 in Oak Ridge, Tennessee. This action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record file for this site.

The State of Tennessee and the U.S. Environmental Protection Agency (EPA) concur with this interim action for the WAG 13 remediation.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Interim Record of Decision (IROD), may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

The purpose of this interim action is to reduce the risk to human health and the environment resulting from current elevated levels of gamma radiation on the site and at areas accessible to the public and adjacent to the site. To achieve this, only the cesium-contaminated soil within the plot will be addressed. This is not the final action planned for WAG 13. Subsequent actions are planned to fully address the remaining threats posed by the conditions at the site. As mandated in CERCLA, the site will be evaluated during the Remedial Investigation (RI)/Feasibility Study (FS) for the site.

The major components of the interim action remedy are the following:

- excavate cesium-contaminated soil until residual contamination is ≤ 120 pCi/g;
- containerize the excavated soil in steel boxes designed for the storage of low-level radioactive waste;
- transport the excavated soil to WAG 6 low-level waste silos by truck; and
- line each excavated plot with a permeable liner and backfill with a clean compacted fill material and a topsoil layer.

Interim remedial action on WAG 13 prior to completion of the RI/FS will provide additional benefits consistent with the goals of CERCLA, including:

- preventing a known source of cesium-contaminated sediment from producing elevated levels of gamma radiation on WAG 13 and to areas accessible to the public,
- reducing further degradation to the environment by eliminating the source of contamination,
- reducing the difficulty and risk associated with future surveillance, maintenance, and remedial activities on WAG 13.

STATUTORY DETERMINATION

This interim action protects human health and the environment, complies with federal and state applicable or relevant and appropriate requirements (ARARs) for this limited-scope action, and is cost-effective. This action is interim and is not intended to use permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, given the limited scope of the action. Again, this action is not a final remedy for the WAG. Therefore, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed at the time of the final response action. Subsequent actions are planned to fully address the remaining threats posed by the site. Because this is an IROD, review of this WAG and of this remedy will be continuing as part of the development of the final remedy for the site.

APPROVALS

10-2-92

Manager
U.S. Department of Energy (DOE)
Oak Ridge Field Office

Date

10-2-92

Director, DOE Oversight Division
State of Tennessee
Tennessee Department of Environment and Conservation

Date

10/6/92

Regional Administrator
U.S. Environmental Protection Agency, Region IV

Date

PART 2. DECISION SUMMARY

SITE NAME, LOCATION, AND DESCRIPTION

WAG 13 is part of ORNL on the ORR CERCLA Site in Roane County, Tennessee. ORNL is part of the federally owned ORR, managed for DOE by Martin Marietta Energy Systems, Inc. The WAG 13 cesium plots are in an approximately 6-acre grassy field 330 ft north of the Clinch River at mile 20.5 and 1.3 miles south of the intersection of Bethel Valley Road and Tennessee State Route (SR) 95 (Fig. 1).

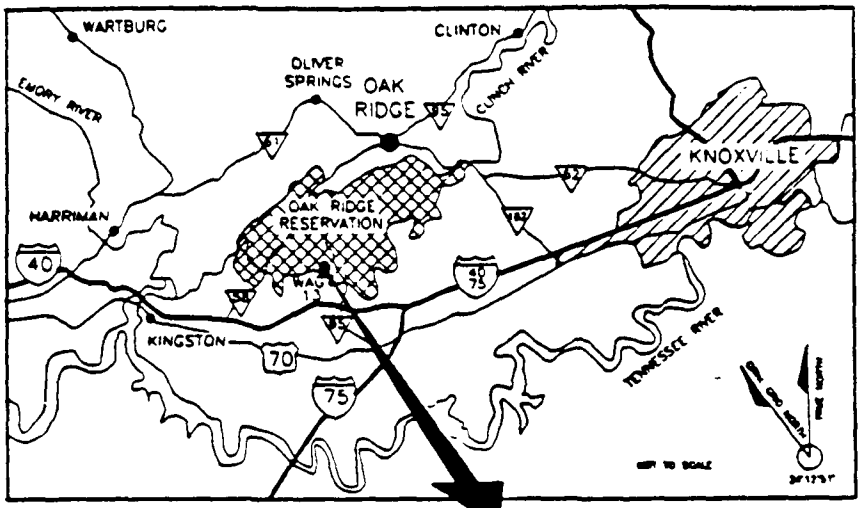
The WAG 13 cesium plots are enclosed by a perimeter fence approximately 1000 ft by 250 ft. There are eight treatment plots that were used for a simulated nuclear weapons fallout study undertaken by ORNL. Each plot is 33 by 33 ft and is fenced with sheet metal extending 18 in. below the surface and 24 in. above surface. There are no other structures on the site. The elevated gamma radiation levels emitted from these plots pose a potential threat to human health and the environment.

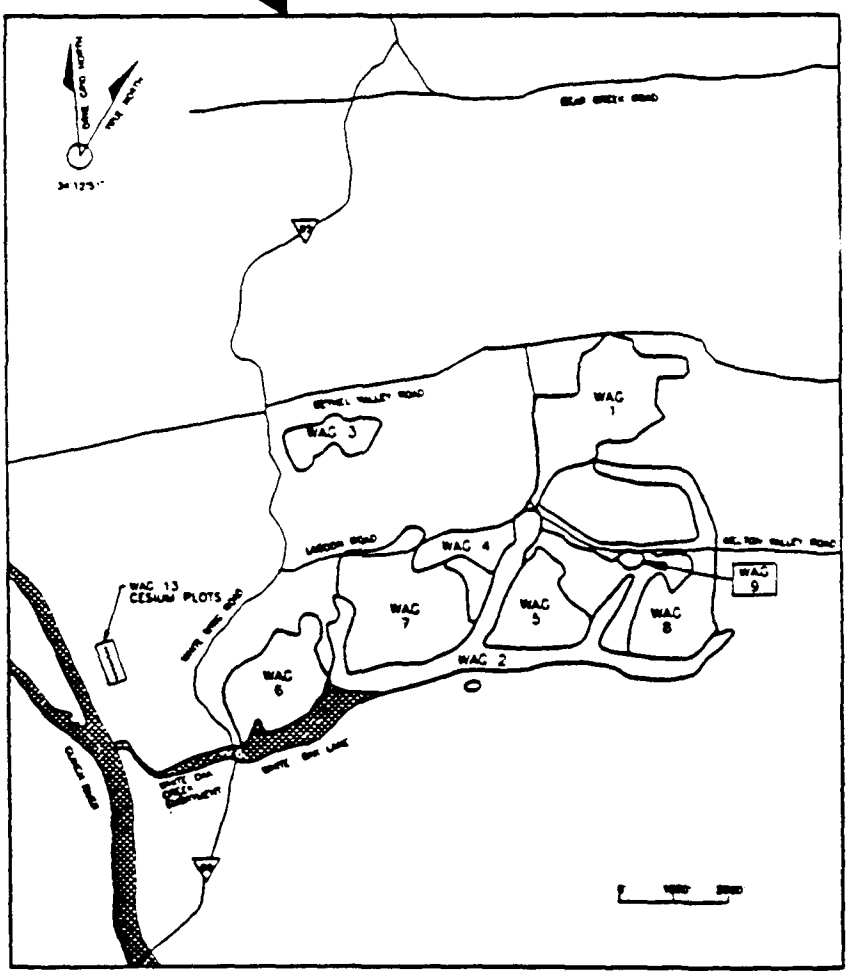
SITE HISTORY AND ENFORCEMENT ACTIVITIES

In August 1968, to simulate conditions of a nuclear fallout, four of the treatment plots (Nos. 2, 4, 6, and 7) were contaminated (seeded) with ^{137}Cs; the remaining four plots were used as uncontaminated controls (Fig. 2). The seeding was achieved by spreading ^{137}Cs-fused sand particles evenly over the plots at 72 g/m^2. Each test plot received 2.2 Ci of ^{137}Cs, while the control plots received none.

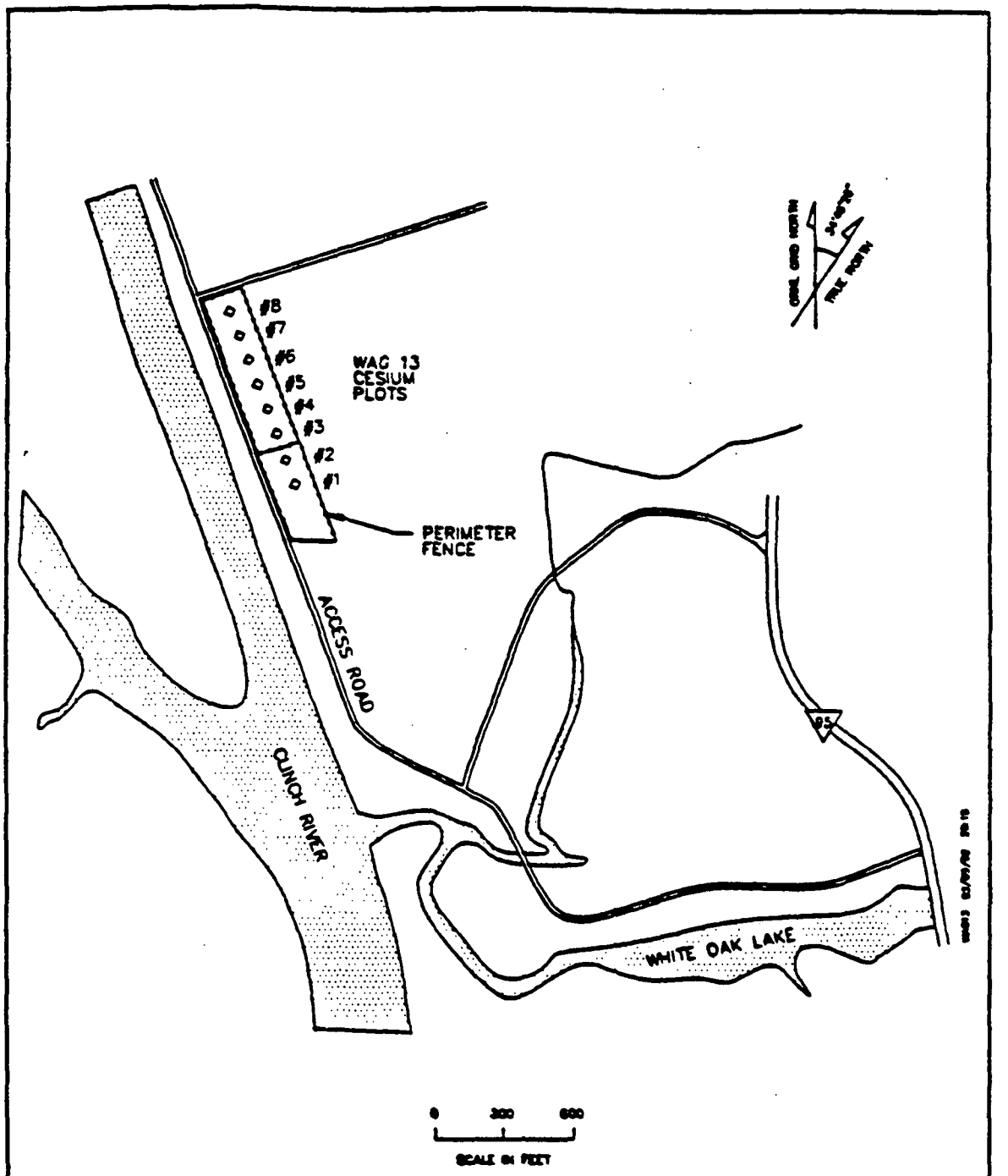
A surface radiological investigation was conducted at and around the site between June 1987 and March 1988 by ORNL's Measurement and Development Group (Yalcintas et al. 1988). Outside the fenced area, radiation levels were measured at 23 locations on the Clinch River and 9 locations along the riverbank. Radiation levels were also measured inside the fenced area. The summary of site characteristics section in this IROD provides more details regarding radiation levels.

On December 21, 1989, the ORR was placed on CERCLA's National Priorities List, which mandates specific requirements that environmental restoration activities must follow. DOE must also operate in compliance with the National Environmental Policy Act. An Interim Remedial Measures Study (Radian July 1992) for the WAG 13 cesium plots was completed in July 1992 to determine the best alternative for reducing the health threat posed by the gamma radiation in the plots.





RADIAN	Location of the WAG 13 cesium plots on the DOE ORR
Date: 1992	
Environmental Restoration Program	Fig. 1



RADIAN	WAG 13 site map showing the location of the cesium plots.
Date: 1992	
Environmental Restoration Program	Fig. 2

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for the ORNL WAG 13 Interim Remedial Action was released to the public in July 1992. The Proposed Plan was made available to the public in the administrative record maintained at the Information Resource Center in Oak Ridge, Tennessee. Notice of availability for the Proposed Plan was published in the *Oak Ridger* on July 10, 12, and 15, 1992; in the *Knoxville News-Sentinel* on July 10, 12, and 15, 1992; and in the *Roane County News* on July 13, 15, and 17, 1992. A public comment period was held from July 14 to August 12, 1992. A public meeting was not scheduled, but opportunity for a meeting was offered in the published notice of availability.

A response to the comments received during the comment period is included in the Responsiveness Summary, which is Part 3 of this IROD. This decision document presents the selected interim remedial action for the ORNL WAG 13 cesium plots. This selection was made in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent feasible, the National Contingency Plan.

SCOPE AND ROLE OF THE RESPONSE ACTION

The goal of this response action is to reduce the risk to human health and the environment resulting from the current elevated levels of gamma radiation on WAG 13. During this interim action, only the cesium-contaminated soil within the plots will be addressed. Excavating these soils and placing them in WAG 6 low-level waste silos will prevent a known source of cesium-contaminated sediment from producing elevated levels of gamma radiation on WAG 13. Subsequent actions under CERCLA are planned to fully address the threats posed by the remaining exposure pathways at the site. These may include, but are not limited to, the soil outside the plot boundaries, the soil beneath the depth of excavations completed during the interim action, groundwater, and surface water. The remaining areas of the site will be evaluated during the RI/FS, as mandated in CERCLA. This interim remedial action is consistent with planned future activities at the site. In particular, this interim action will provide a reduction in the difficulty and risk associated with future surveillance, maintenance, and remedial activities.

SUMMARY OF SITE CHARACTERISTICS

Contamination on WAG 13 has resulted solely from the intentional deposition of ^{137}Cs for the purpose of gaining knowledge of the effects of nuclear fallout. A total of 8.8 Ci was spread over the four test plots and has decayed to 5.1 Ci as of June 1992.

The surface radiological investigation conducted at the site concluded that the maximum exposure to the public would be approximately 0.019 mR/h along the shoreline closest to the ^{137}Cs plots and up to 0.150 mR/h at the perimeter fence. Gamma ray exposure rates measured at plot plot boundaries within the fenced area ranged from 1.3 to 35 mR/h (Yalcintas et al. 1988).

Soil samples taken within the plots indicate that the ^{137}Cs has been detected above 1 pCi/g (detection limit) at depths up to 3 ft.

SUMMARY OF SITE RISKS

A preliminary health risk assessment study was conducted for WAG 13 and the only contaminant of concern was determined to be ^{137}Cs (Radian July 1992). Cesium-137 is a beta emitter (512 KeV) that also releases gamma at 661 KeV and has a 30-year half-life. Although 1987 soil samples from two locations between the contaminated plots and the nearby creek bed show that ^{137}Cs contamination has migrated (ORNL 1988), the scope of this action is limited to contamination in the test plots. Therefore, the risk analysis does not consider possible contributions from ^{137}Cs that may have migrated beyond the test plots. External exposure to ionizing radiation poses the majority of risk to the exposed populations and was determined to be the dominant pathway of concern for all three scenarios.

The exposure scenarios examined in the preliminary health risk assessment were:

- a worker who mows the area,
- a fisherman/boater on the Clinch River who comes within 150 ft of the cesium plots, and
- a future on-site homesteader who lives inside the area that is currently fenced.

Lifetime cancer risks associated with the WAG 13 cesium plots were calculated assuming reasonable maximum occupational exposure for the worker mowing the area, reasonable maximum exposure (RME) for a fisherman/boater on the Clinch River, and RME for an on-site homesteader. RME assumptions for the preliminary health risk assessment were adopted from ORNL's *Radiation Exposure from a Cesium-Contaminated Field* (Yalcintas et al. 1988).

The RME scenario for the worker assumes that an individual spends 25 h/year on-site for 25 years and is exposed to an average gamma rate of 150 μR/h measured on-site. The RME scenario for the fisherman/boater assumes that an individual spends 52 h/year (1 h/week) on the Clinch River near the WAG 13 cesium plots for 30 years and is exposed to a maximum gamma rate of 19 μR/h measured on the Clinch River. The RME scenario for the future on-site homesteader assumes that an individual spends 5600 h/year (16 h/d for 350 d) for 30 years inside the fence and is exposed to an average gamma rate of 4 mR/h.

The risk to the worker was estimated to be 1×10^{-3} (1 in 1000 chances of developing cancer). The risk to the fisherman/boater on the Clinch River was estimated to be 2×10^{-5}, and risk to the on-site homesteader was calculated to be 3×10^{-1}.

Calculated risks from lifetime exposure to radionuclides and chemicals were compared to the EPA's target risk range of 1×10^{-6} to 1×10^{-4}. Any risk values greater than 1×10^{-4} (1 in 10,000 chances of developing cancer) are unacceptable, and any risk values less than 1×10^{-6} (1 in 1,000,000 chances of developing cancer) are acceptable by EPA. Acceptance of risks between 1×10^{-6} and 1×10^{-4} depends on site-specific conditions (i.e., population exposure).

The risk to the fisherman/boater falls within EPA's acceptable risk range. Although exposure to the worker is within DOE guidelines (DOE Order 5480.11), risks to the worker mowing around the cesium plots and to the on-site homesteader exceed EPA's target risk range.

Ecological risk to plants and animals has not been quantitatively analyzed, but removal or shielding of the contaminated soil will have a positive benefit for all risk scenarios. The WAG 13 area will need further evaluation for the CERCLA Ecological Risk Assessment and Natural Resource Damage Assessment during the RI.

If no interim remedial action is taken, actual or threatened releases of hazardous substances from the WAG 13 cesium plots may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF ALTERNATIVES

This section provides a description of how each alternative would address the contamination found at WAG 13. Four alternatives are presented. These alternatives are not intended to remediate the entire WAG 13 site. Rather, they are intended to reduce the threat to human health, and to reduce further degradation of the environment resulting from elevated gamma radiation exposures. Remediation of the entire site will be addressed in future CERCLA actions.

Alternative 1—No Action

CERCLA requires that the no-action alternative be evaluated to serve as a baseline for comparison at each site. Under this alternative, no further action would be taken to reduce the risk to human receptors from the current elevated levels of gamma radiation. Implementing this alternative would involve no additional costs.

Alternative 2—Shielding

Shielding involves placing reinforced concrete boxes over each cesium plot. The boxes will deflect and contain the gamma radiation within the box. After shield installation, gamma radiation exposure rates will be reduced to 9 μR/h at the perimeter fence, thus reducing risk to the general public on or near the Clinch River. Besides reducing the level of gamma radiation to 9 μR/h, the shields would reduce rainwater infiltration into the plots, thereby reducing to some extent potential contaminant transport caused by rainwater percolation to the groundwater.

Fabrication and construction of the shields would take about 2 months. The present worth cost for this alternative, including implementation or capital cost (including engineering design and construction) and operation and maintenance (O&M) cost, is estimated to be $203,000. These costs were developed for comparative purposes only and may not represent actual costs.

Alternative 3—Excavation and Storage at a Currently Operating Waste Management Facility

Alternative 3 entails excavating 5200 ft^3 of cesium-contaminated soil from within the plot boundaries. Excavation of the contaminated soils would reduce radiation exposures to background levels. Excavated material will be containerized in steel boxes designed for the storage of low-level radioactive waste and transported by truck to the Interim Waste Management Facility (IWMF) at ORNL's WAG 6.

Following excavation, each plot will be lined with a (permeable) liner and backfilled with clean compacted fill material and a topsoil layer. Grass will then be established to control erosion from the site.

The remedial action for this alternative will take approximately 2 days. The present worth cost for this alternative, including implementation or capital cost (including engineering design and construction) and O&M cost, is estimated to be $546,000. These costs were developed for comparative purposes only and may not represent actual costs.

Alternative 4—Excavation and Disposal at the WAG 6 Waste Consolidation Area

Excavation and transportation of the soil and construction activities will be conducted using the same volume , techniques, and requirements as Alternative 3. Under this alternative, the soil is transported to the WAG 6 waste consolidation area, which is scheduled for closure under a CERCLA remediation in the near future. The waste consolidation area is an engineered waste disposal site that will be designed and operated using best management practices. The design and operation emphasizes isolation from groundwater, surface water, and infiltration, as well as void control to minimize settling. By placing the soil beneath an engineered cover system, the potential for contaminants to enter the environment is further decreased.

Disposal of the WAG 13 soil at WAG 6 is expected to have only negligible impact; the amount of contamination and material volume to be excavated from the WAG 13 cesium plots is very small in comparison to that already existing at WAG 6. Large amounts of ^{137}Cs and other radionuclides are already present at WAG 6. The total amount of material to be placed in WAG 6 represents about one-twentieth of one percent of the volume and about one-two hundredth of one percent of the radiological contamination present in WAG 6.

Implementation of this remedial action will take approximately 2 days, not including time for waste disposal site construction. The present worth cost for this alternative, including capital cost(including engineering design and construction), O&M cost, is $81,000. These costs were developed for comparative purposes only and may not represent actual costs. The disposal techniques for this alternative has been modified as noted in the section titled Explanation of Significant Changes (page 2-16)

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides a basis for determining which alternative provides the "best balance of tradeoffs" with respect to nine evaluation criteria. These criteria are:

- overall protection of human health and the environment;
- compliance with ARARs;
- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume through treatment;
- short-term effectiveness;
- implementability;
- cost;
- regulatory agency acceptance; and
- community acceptance.

Overall Protection of Human Health and the Environment

Alternatives 2, 3 and 4 reduce the gamma radiation exposure to acceptable levels at the WAG 13 perimeter fence. Alternative 1 does not affect the current level of exposure to human health and the environment due to the plots.

Compliance with ARARs

Table 1 provides a summary of ARARs for the remedial action.

Alternatives 3 and 4 complies with all of the listed ARARs. Alternative 2 complies with all of the ARARs except transportation, which does not apply. Alternative 1 does not meet requirements set forth by DOE orders for exposure of the public and workers to radiation caused by a DOE facility. DOE is responsible for ensuring that all DOE activities are operated so that the radiation dose to individuals will be as low as reasonably achievable (ALARA). Alternative 1 does not allow this.

Long-Term Effectiveness and Permanence

Alternatives 3 and 4 permanently reduces the radiation risk posed by the WAG 13 cesium plots. Alternative 2 provides only a temporary solution and does not prevent potential groundwater contamination. Alternative 1 provides no long-term effectiveness.

Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives reduce toxicity, mobility or volume through treatment. Viable treatment options for low-level radioactive waste do not exist at this time.

Short-Term Effectiveness

By removing the contamination, Alternatives 3 and 4 both provide effective short-term solution to the gamma radiation emanating from the plots. Alternative 2 will require a short period for the construction of the concrete boxes and will then provide the required reduction in off-site radiation exposure. Alternative 1 provides no short-term solution. Alternatives 2, 3 and 4 would result in some remedial activity worker exposure.

Implementability

Alternatives 2 and 4 are equally implementable using conventional materials and construction techniques. Alternative 3 is not currently implementable due to current DOE and Martin Marietta operational restrictions which prohibit the storage of soils at the Interim Waste

Table 1. Summary of ARARs

ARAR category	Requirement	Citations
Location-Specific		
Floodplains	Must act to avoid adverse impact and minimize potential harm due to diversion of floodwaters	40 CFR 6 Appendix A 10 CFR 1022 (Applicable)
Action-Specific		
On-site construction/excavation or handling of materials	Precautions must be taken to prevent particulate matter from becoming airborne. Fugitive dust emissions must be controlled	40 CFR 50.6 and TCA 1200-3-8-.01 (Applicable)
Surface water controls	Must ensure compliance with the substantive requirements of the state permitting process. Implement good site planning and best management practices to control storm water discharges	TCA 69-3-108 TCA 1200-4-3 TCA 1200-4-4 TCA 1200-4-10-.05 40 CFR 122 (Applicable)
Worker protection	Must adhere to health and safety standards	Radiation protection standards, 29 CFR 1910, (Applicable) and DOE Order 5480.11 (TBC)
Public health protection	Must keep radiation doses for individuals ALARA	DOE Orders 5400.5 and 5820.2A (TBC)
Transportation	Must meet requirements that address preparation of shipping papers, container marking, labeling, vehicle placarding, packaging, testing of packages and containers, and carriage by public highway	49 CFR 172, 173, 177, and 178 and 10 CFR 71 (Applicable) DOE Order 5480.3 (TBC)
Waste Packaging and Handling	Must adhere to packaging and handling requirments	*10 CFR 61.56(a)(1)-(7) and .56(b)(2) and (3) (relevant and appropriate)
Waste management	Must handle and dispose of waste in a manner that is protective of public health and the environment	DOE Order 5820.2A (TBC)

*While DOE fully plans to comply with the relevant and appropriate requirements of 10 CFR Part 61, it is the Department's position that NRC regulations are not applicable to DOE. DOE must meet the requirements of DOE Order 5820.2A, which, in this instance, are equivalent technical requirements to those found in the NRC regulations.

ALARA = as low as reasonably achievable
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
TBC = to be considered
TCA = Tennessee Code Annotated

Management Facility. (Bill Adams of DOE and representatives of Energy Systems agreed that soils should not be stored at the Interim Waste Management Facility.)

Cost

Alternative 1 involves no cost. Alternative 2 costs $203,000. Alternative 3 costs $546,000. Alternative 4 costs $81,000.

State Acceptance

The State of Tennessee has reviewed the alternatives proposed for interim action at WAG 13. TDEC concurs with the selection of Alternative 4.

Community Acceptance

During the public comment period for the Proposed Plan, a single comment was presented about the proposed alternative. The Responsiveness Summary of this IROD addresses the questions and comments from the public in detail.

The Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, the most appropriate remedy for the WAG 13 cesium plots is a variation of Alternative 4, Excavation and Disposal at WAG 6 Waste Consolidation Area. The disposal techniques for the selected remedy have been modified as noted in the section titled Explanation of Significant Changes (Page 2-16)

Contaminated soil will be excavated from each plot until the residual contamination is < 120 pCi/g, and containerized in steel boxes designed for the storage of low-level radioactive waste. The boxes will be transported to WAG 6 by truck. WAG 6 is scheduled to be closed under a CERCLA remediation in the near future. Each excavated plot will be lined with a permeable liner, backfilled with clean compacted fill material, covered with topsoil, and revegetated.

The purpose of this interim action is to reduce the current human health and environmental risk to off-site receptors immediately outside the perimeter fence and at the banks of the Clinch River. Existing conditions at the site have been determined to pose a lifetime

cancer risk that exceeds EPA's target risk range to a worker mowing around the cesium plots and an on-site homesteader. Following the remedial action, the risk due to the cesium plots will be reduced to the equivalent of that posed by nonoccupational exposure limits.

The cost of the selected remedy, outlined in Table 2, is based on an estimated excavation depth of 2 ft. The cost estimate was made assuming that there would be no waste preparation activities before disposal. If waste preparation is required, there will be a one-time fee based on the total volume of waste placed in WAG 6. Other changes may be made to the remedy as part of the remedial design and construction processes. Such changes, in general, reflect modifications resulting from the engineering design process.

STATUTORY DETERMINATIONS

Under its legal authorities, DOE's primary responsibility at CERCLA sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Sect. 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy provides protection of human health by mitigating the existing risk to off-site receptors on the Clinch River that results from gamma radiation emissions from the WAG 13 cesium plots. It also reduces the radiological emissions at the plot perimeter fence to acceptable levels. Excavating the contaminated soil also provides reduced risk to future on-site workers by reducing the radiation levels at the plots. The risk associated with an on-site worker (25 h/year on-site for 25 years) after the remediation is complete is estimated to be 2.9×10^{-6}. The estimated short-term radiological risk to on-site workers associated with the remedial action is estimated to be 7×10^{-5}.

Table 2. Estimated cost of the Selected Remedy

Item	Cost ($)
Construction cost (labor, materials, and equipment)	
Soil excavation and containerization	220,500
Soil transportation and silo construction	113,000
Restoration of pits	4,000
Subtotal	337,500
Mobilization @ 25%	84,000
Contractor's overhead and profit @ 20%	68,000
Total construction cost	489,500
Engineering design cost @ 20%	98,000
Contingency @ 25%	122,000
Total present worth cost	709,500

Assumptions: 8,712 ft^3 soil excavated
40% expansion factor
127 B-25 boxes @ $1,500 each
11 silos @ $10,000 each

The environment will benefit from the selected remedy through the elimination of a source of continued contamination. Radiation exposures to local animal and plant life will be reduced, and contaminated vegetation will be removed and replaced with a grass cover, resulting in a better animal habitat.

Compliance with ARARs

The selected remedy will comply with all the ARARs shown in Table 1, and a waiver is not requested. Also, compliance with applicable U.S. Department of Transportation regulations will be maintained. The 0.2-mile segment of SR 95 between the WAG 13 cesium plots and WAG 6 access roads may be closed temporarily while the contaminated soils are being transported. This will be done during the day and should not adversely affect traffic during shift change.

Cost Effectiveness

Because the selected remedy will involve removing the contamination from the site, it will provide a permanent solution and is therefore the most cost-effective alternative available.

Use of Permanent Solutions and Alternative Treatment Technologies

The selected remedy provides a permanent solution to the existing and future threats posed by the existing WAG 13 cesium plots. It does not utilize a treatment technology because a viable method is not available. This will be discussed in the following section.

The selected remedy will be effective immediately after the initial construction period. After the contaminated soil is removed and transported to WAG 6, only residual contamination is expected to remain.

Among the alternatives, the selected remedy is equally implementable using conventional materials and construction techniques.

Preference for Treatment

At this time, viable technologies for treatment of low-level radioactive waste are not available; containment and storage allows the radioactivity to decay and appears to be the most desirable method of low-level radioactive waste mitigation.

Two treatment methods exist for soils: stabilization and vitrification. However, these methods are more costly than the selected alternative, would present greater risks to workers, and would not mitigate the toxicity of the ^{137}Cs further than the selected alternative.

EXPLANATION OF SIGNIFICANT CHANGES

Following the release of the Proposed Plan for public review, it was found that the Waste Consolidation Area may not be ready to receive wastes in time to be used for this interim remedial action. Another disposal option, low level waste silos, consistent with the intent of the preferred alternative was identified and selected. The new disposal option provides better confinement of the wastes from the environment than the Waste Consolidation Area. Silo disposal is a currently utilized disposal technology utilizing an engineered facility within WAG 6 designed and operated to isolate the waste material from surface water and groundwater, control subsidence, and provide radiation protection. Additional costs, as shown in Table 2, for silo disposal are attributed to the cost of containers and the inclusion of silo construction costs. Containers were not planned for disposal in the consolidation area and facility construction costs were assumed to be included in the WAG 6 remedial action effort.

BIBLIOGRAPHY

ORNL 1988. *Environmental Data Package for the Environmental Research Areas (WAG 13)*, ORNL/RAP-48.

Radian (Radian Corporation) July 1992. *Interim Remedial Measures Study for ORNL WAG 11*, DOE/OR-1015D2, Oak Ridge, Tenn.

Radian July 9, 1992. *Proposed Plan for the ORNL WAG 13 Interim Remedial Action*, DOE-OR-1022D3, Oak Ridge, Tenn.

Yalcintas et al. 1988. *Radiation Exposures from a Cesium-Contaminated Field*, ORNL/RAP-46.