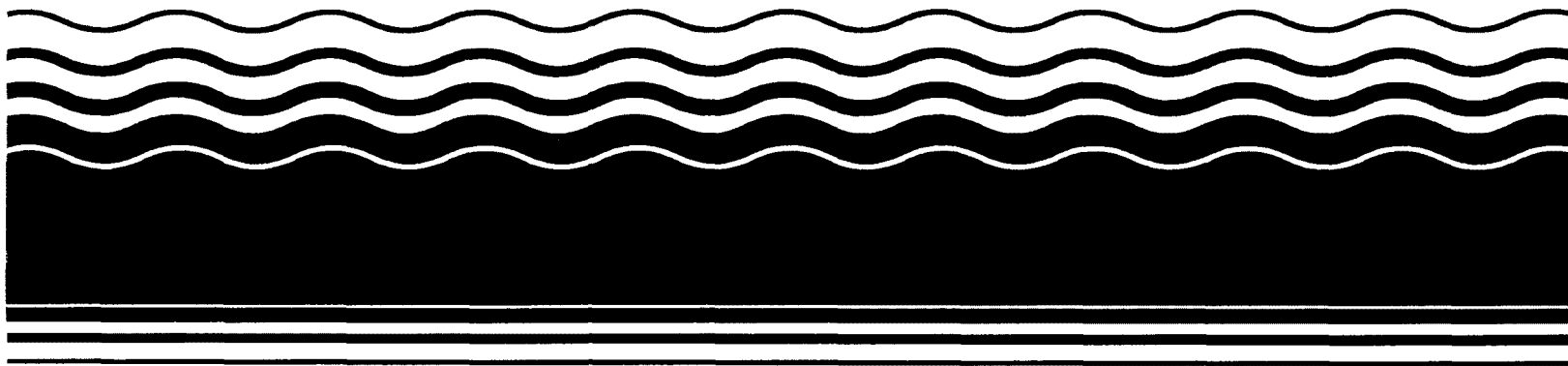


**PB95-964033
EPA/ROD/R04-95/249
February 1996**

**EPA Superfund
Record of Decision:**

**USDOE Oak Ridge Reservation,
Lower Watts Bar Reservoir
Operable Unit, Oak Ridge, TN
9/29/1995**



DOE/OR/02-1373&D3

**Record of Decision for the
Lower Watts Bar Reservoir**



PREFACE

This *Record of Decision for the Lower Watts Bar Reservoir* (DOE/OR/02-1373&D3) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act to present the selected remedy to the public. This work was performed under Work Breakdown Structure 1.4.12.3.1.02 (Activity Data Sheet 9302, "Lower Watts Bar Reservoir"). This document provides the Environmental Restoration Program with information about the selected remedy for Lower Watts Bar Reservoir, which involves continuance of existing institutional controls and long-term monitoring of water, sediment, and fish. Information in this document summarizes information from the remedial investigation/feasibility study (DOE/OR/01-1282&D4) and the proposed plan (DOE/OR/02-1294&D5).

ACRONYMS AND ABBREVIATIONS

| | |
|--------|---|
| Ag | silver |
| ARAR | applicable or relevant and appropriate requirement |
| As | arsenic |
| Ba | barium |
| Be | beryllium |
| Cd | cadmium |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | <i>Code of Federal Regulations</i> |
| cm | centimeter |
| Co | cobalt |
| COE | U.S. Army Corps of Engineers |
| Cr | chromium |
| Cs | cesium |
| Cu | copper |
| DOE | U.S. Department of Energy |
| EPA | U.S. Environmental Protection Agency |
| FFA | Federal Facility Agreement |
| Fe | iron |
| FS | feasibility study |
| g | gram |
| Hg | mercury |
| HQ | hazard quotient |
| IAG | interagency agreement |
| in. | inch |
| lb | pound |
| LWBR | Lower Watts Bar Reservoir |
| Mn | manganese |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| Ni | nickel |
| ORR | Oak Ridge Reservation |
| OU | operable unit |
| oz | ounce |
| Pb | lead |
| PCB | polychlorinated biphenyl |
| Ra | radium |
| RI | remedial investigation |
| ROD | record of decision |
| SARA | Superfund Amendments and Reauthorization Act |
| Se | selenium |
| Sr | strontium |
| TBC | to be considered |
| TDEC | Tennessee Department of Environment and Conservation |
| TRM | Tennessee River mile |
| TVA | Tennessee Valley Authority |
| Zn | zinc |

PART 1. DECLARATION

SITE NAME AND LOCATION

Lower Watts Bar Reservoir Operable Unit
Oak Ridge Reservation
Oak Ridge, Tennessee

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Lower Watts Bar Reservoir (LWBR) Operable Unit (OU). This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) (42 *United States Code* 9601 et seq.), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 *Code of Federal Regulations* (CFR) 300. This decision is based on the administrative record for this site.

The U.S. Department of Energy (DOE) issues this document as the lead agency. The U.S. Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC) are supportive agencies as parties to the Federal Facility Agreement (FFA) for this response action, and they concur with the selected remedy.

ASSESSMENT OF THE OU

If actual or threatened releases of hazardous substances from this OU are not addressed by implementing the response action selected in this record of decision (ROD), they could present substantial endangerment to public health, welfare, and/or the environment.

DESCRIPTION OF SELECTED REMEDY

- The selected remedy for the LWBR OU addresses the contamination of the Watts Bar Reservoir area from Tennessee River mile (TRM) 529.9 at Watts Bar Dam upstream to TRM 567.5 at the confluence of the Clinch and Tennessee Rivers.

- The response action was chosen from a full range of actions that could possibly address the two primary risks identified in the remedial investigation (RI). Risks to human health posed by LWBR include exposure to metals in deep sediment of the main river channel and to polychlorinated biphenyls (PCBs), chlordane, aldrin, arsenic, and mercury in fish tissue. The same response actions are applicable to reducing ecological risk in LWBR.
- The selected remedy uses existing institutional controls to reduce exposure to contaminated sediment; fish consumption advisories to reduce exposure to contaminants in fish tissue; and annual monitoring to detect changes in LWBR contaminant levels or mobility. DOE will be responsible for undertaking any appropriate CERCLA response actions.
- An interagency agreement (IAG) among DOE, TDEC, EPA, Tennessee Valley Authority (TVA), and the U.S. Army Corps of Engineers (COE) became effective in February 1991. The IAG is used to coordinate and review permitting and other use activities resulting from DOE operations that could result in the disturbance, resuspension, removal, and/or disposal of contaminated sediments or potentially contaminated sediments in Watts Bar Reservoir.

STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate requirements (ARARs), and is cost-effective. Hazardous substances above health-based levels will remain on site if this remedy is implemented. A review will be conducted within 5 years after commencement of remedial action, according to CERCLA Section 121, to ensure that the controls and advisories for LWBR continue to adequately protect human health and the environment. Also, DOE has agreed to provide status reports to TDEC and EPA on the monitoring and assessment program for LWBR.

APPROVALS



James Hall, Manager
U.S. Department of Energy
Oak Ridge Field Office

9-15-95

Date



Earl C. Leming, Director, DOE Oversight Division
State of Tennessee
Tennessee Department of Environment and Conservation

9-25-95

Date



for John Hankinson, Regional Administrator
U.S. Environmental Protection Agency
Region IV

9-29-95

Date

PART 2. DECISION SUMMARY

OU NAME, LOCATION, AND DESCRIPTION

The LWBR OU consists of the Watts Bar Reservoir, which is impounded by the Watts Bar Dam in East Tennessee, almost equidistant (about 62 miles) from the cities of Knoxville and Chattanooga. Watts Bar Reservoir flows through portions of four counties in East Tennessee (Loudon, Roane, Rhea, and Meigs). The reservoir extends from the dam at TRM 529.9 upstream on the Tennessee River 72 miles to Fort Loudon Dam (TRM 602.3) near Lenoir City, and an additional 24 miles up the Clinch River to Melton Hill Dam (Clinch River mile 23.1) near Oak Ridge.

The LWBR study area extends from TRM 567.5 at the mouth of the Clinch River to TRM 529.9 at Watts Bar Dam (Fig. 2.1). Under CERCLA, the downstream boundary of the Oak Ridge Reservation (ORR) is Watts Bar Dam. Watts Bar Reservoir is one of nine mainstream impoundments on the Tennessee River between Paducah, Kentucky, and Knoxville, Tennessee. This reservoir provides flood control, hydropower generation, navigation, municipal and industrial water supply, wildlife habitat, and recreation.

The downstream boundary of the ORR was placed at Watts Bar Dam because earlier studies had shown that the vast majority of sediment-associated contaminants released from ORR had collected in lower Watts Bar Reservoir. Consequently, concentrations of sediment-associated contaminants released from ORR are much lower in reservoirs downstream of Watts Bar Dam. The level of Oak Ridge-derived contaminants detected in past studies in the Tennessee River system below the Watts Bar Dam were well below the concentrations determined to be of human health concerns by the baseline risk assessment within the Watts Bar Reservoir.

OU HISTORY

LWBR is contaminated because of past activities at DOE's ORR and other non-DOE sources. ORR is comprised of three major installations—the Oak Ridge National Laboratory, the Oak Ridge Y-12 Plant, and the Oak Ridge K-25 Site (formerly the Oak Ridge Gaseous Diffusion Plant). These facilities were built in the 1940s as research, development, and process facilities in support of the Manhattan Project. Activities at these facilities have resulted in the release of hazardous substances and radioactive contamination to the on-site and off-site environment. In March 1995, DOE presented the public with the proposed plan for LWBR and solicited public comments. The proposed plan presented monitoring and institutional controls as the preferred remedial action.

The current or threatened release of hazardous substances from CERCLA-specific sites on ORR is the focus of current source control actions. These releases are being quantified at the source; similarly, remedies will be effected at the source. The LWBR RI determined contaminant concentrations in LWBR fish, water, and sediment and the threat those contaminants might pose to human health and the environment. The measurement of ambient concentrations in these media inevitably integrates all of the contaminant sources mentioned above for ORR, as well as any non-ORR sources that contribute to LWBR.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

An RI/feasibility study (FS) was conducted in accordance with CERCLA requirements, including the public participation requirements of CERCLA Sections 113(K)(2)(B)(i-v) and 117. Newspaper notices indicated the availability of documents at the Information Resource Center in Oak Ridge, Tennessee, and announced public meetings. The RI/FS and proposed plan were released to the public in March 1995. DOE encourages public participation in commenting on the preferred alternative for LWBR and set a comment period of March 24 to April 28, 1995. An information bulletin was also prepared to summarize this proposed action and facilitate community participation.

Public meetings were held April 4, 1995, in Kingston, Tennessee, and April 11, 1995, in Spring City, Tennessee. The Responsiveness Summary of this ROD provides a summary of the major issues raised during the public comment period. This decision document presents the selected remedial action for management of LWBR in accordance with CERCLA, as amended, and NCP to the maximum extent practicable. The decision for this site is based on the Administrative Record.

SCOPE AND ROLE OF THE OU

LWBR is the first impoundment downstream of ORR. Contaminants from ORR are primarily transported to LWBR by the Clinch River. Any surface waters originating on or passing through ORR flow into the LWBR OU. Because the reservoir is an efficient sediment trap, LWBR OU sediments contain contaminants released from ORR and have the potential of receiving current or future contaminant releases. The selected remedy for the LWBR OU addresses potential risks caused by ingestion of vegetables grown in contaminated sediments and contaminated fish, milk, and meat.

OU CHARACTERISTICS

Construction of Watts Bar Reservoir began in 1939 to provide navigation, flood control, and hydrogeneration of electricity. Land surrounding the reservoir is currently used for residential, agricultural, industrial, resort, and recreational purposes. Waters of the reservoir are used for domestic water supply, industrial water supply, fish and aquatic life, recreation, irrigation, livestock watering, wildlife, and navigation. LWBR is not a direct source of drinking water for municipalities; however, Rockwood and Spring City drinking water intakes could be impacted during high water conditions by reverse flow. Kingston drinking water intake in the Tennessee River above LWBR is also impacted by reverse flow.

The LWBR OU is an integrator of waterborne substances in the Clinch and Tennessee Rivers. Once these substances enter the LWBR OU, they may be found in the water, sediment, or biota. The fate of a substance depends on the flow rate of the reservoir's surface water and the physical and chemical properties of the substance. Dissolved substances are usually flushed through the reservoir in a matter of weeks, whereas particle-associated substances may accumulate in the sediments and remain indefinitely.

Peak concentrations of ^{137}Cs and Hg are found in deep-water sediments in the old river channel. The highest concentrations of each are generally buried 20-80 cm (8-32 in.) in the sediments of the old river channel. Near-shore sediments contain ^{137}Cs near background levels.

Particle-associated and dissolved contaminants accumulate in LWBR OU biota. Contamination of LWBR OU fish with PCBs and pesticides is documented. Sampling data indicate that sediment and surface water contamination by organic compounds is minimal. Inorganic contaminants in LWBR OU sediments are similar to those found in other TVA reservoirs. They include As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, and Zn. Radionuclides detected in sediment, fish, or surface waters include ^{137}Cs , ^{60}Co , ^{90}Sr , and ^{226}Ra .

SUMMARY OF OU RISKS

A baseline risk assessment evaluated potential current and future risk to human health and the environment posed by radioactive and chemical contaminants at LWBR if remedial action was not taken. Results from this assessment were used to determine a need for action at the site.

The greatest risk to human health from contaminants in LWBR is associated with the consumption of certain PCB-contaminated fish species. Mercury, chlordane, aldrin, and arsenic in fish also pose potential risks. Because of their low body weight, children are potentially at greater risk than adults; most contaminants pose a potential threat only to children. If deep-water sediments were dredged and used for farming, several contaminants could pose a risk to human health through consumption of the resulting agricultural products (i.e., vegetables, milk, and meat). In place, these sediments do not pose a risk to human health because no exposure pathway exists. Levels of ORR contaminants in near-shore sediments are low. No unacceptable risk to human health from LWBR surface water was identified for any exposure pathway.

The screening level ecological risk assessment indicated that LWBR sediment is potentially toxic to benthic organisms, although conclusive evidence is lacking and the cause of any toxicity has not been established. Additional data will be collected through a long-term monitoring program as a component of the 5-year CERCLA review of the ROD.

Risk assessment provides the basis for actions and indicates the exposure pathways that need to be addressed by the remedial actions. It serves as the baseline, indicating what risks exist if no action is taken. Table 2.1 lists the exposure pathways and the contaminants that have cancer risks of $> 10^{-4}$ or hazard quotients (HQs) > 1 .

Risk presented by remaining contaminants steadily diminishes through continued decay of radioactive materials, environmental degradation, and the deposition of additional river sediment over existing contaminated areas. Some of the potential problems, particularly with ^{137}Cs , will greatly diminish over time without further action. Monitoring of water, sediment, and fish will continue to detect any change in risk to human health and/or the environment.

HUMAN HEALTH RISKS

The human health risk assessment in the LWBR OU Risk Assessment Report assessed risk to the public based on five scenarios: (1) a fisherman whose family eats his catch most days, (2) a person living near the shore who spends much of each year in contact with (and sometimes ingesting) near-shore sediments and the surface water, (3) a family that uses dredged sediments as topsoil and subsists mostly on livestock and vegetables from their farm, (4) a family that irrigates their farm with surface waters and subsists mostly on livestock and vegetables, and (5) a family that uses raw, untreated surface water as a drinking water source.

For the LWBR OU, the fish ingestion pathway is the most significant exposure pathway for human health risk, even though only PCBs pose a cancer risk greater than 1×10^{-4} . Mercury

concentrations in fish produced an HQ of 1.5 for a child 3–6 years of age. Chlordane and aldrin concentrations in fish produced HQs of 5.4 and 1.0, respectively, for children. Catfish, striped bass, hybrid striped bass-white bass, white bass, sauger, carp, small mouth buffalo, and largemouth bass are the most contaminated fish species.

Human health risk assessment results are interpreted as follows:

- Ingestion of certain fish species from the LWBR OU at an average rate near 54 g (1.9 oz)/day for 30 years can result in carcinogenic and noncarcinogenic health effects.
- Surface waters of the LWBR OU do not present an unacceptable risk from chemical or radionuclide contamination, even in extremely conservative conditions.
- Shallow, near-shore sediments of the LWBR OU do not present an unacceptable risk to the public.
- Sediments in the main channel of the LWBR OU do not present a risk to the public if left undisturbed, but can present a noncarcinogenic hazard to human health if dredged and used as topsoil for agriculture.

Actual or threatened releases of hazardous substances from this OU, if not addressed by implementing the response action selected in this ROD, may present substantial endangerment to public health, welfare, and/or the environment.

ENVIRONMENTAL RISKS

An ecological risk assessment summarized existing information. More conclusive ecological risk assessments will likely be performed using data collected in the Clinch River RI and some LWBR monitoring data. Current data suggest that benthic organisms and piscivorous wildlife might be at risk, but a specific cause is unknown and feasible remedies do not currently exist. After careful review of ecological risk data, DOE has determined that no remedial action to reduce ecological risk is required for the LWBR environment. Data from the Clinch River/Poplar Creek RI and the post-ROD monitoring on LWBR will be used to confirm that this decision remains acceptable.

DESCRIPTION OF ALTERNATIVES

SHORT-TERM EFFECTIVENESS

Regulatory procedures on sediment-disturbing activities and fish consumption advisories are effective in the short term.

LONG-TERM EFFECTIVENESS

The preferred alternative has the best long-term effectiveness. Health risks under this alternative would not exceed current levels and future risks would diminish as natural processes continue (radioactive decay for contaminants in sediment and decrease of contaminant concentrations in fish as source areas on land are removed). Institutional controls on sediment disturbance and fish consumption would remain in place. Additional controls could be implemented if human or ecological exposure to contaminants change.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

Although natural processes would reduce contaminant toxicity, mobility, and quantity under this alternative, active treatment would not take place. The monitoring plan included in this alternative will allow DOE, in cooperation with the state of Tennessee and EPA, to determine any changes in toxicity, mobility, or quantity of contaminants.

IMPLEMENTABILITY

The state of Tennessee and other federal agencies are already implementing the main components of the preferred alternative. The IAG for Watts Bar Reservoir Permit Coordination defines DOE's responsibility to support activities that are above and beyond normal permitting requirements as related to sediments contaminated by DOE activities. The monitoring plan could be easily implemented because similar activities have been in progress for many years at ORR.

COST

The cost of the preferred alternative is much lower and a more effective use of funds when compared to active remediation of sediments.

THE SELECTED REMEDY

DOE, EPA, and the state have determined that controls and advisories are the most appropriate remedy for the LWBR OU, based on a review of CERCLA requirements, detailed analysis of the alternative, and public comments. This alternative represents the best balance among the evaluation criteria for remedial actions when considered in the context of public comments received.

CONTINUANCE OF EXISTING CONTROLS, AND ADVISORIES REGARDING LWBR ACTIVITIES

One threat to human health posed by the LWBR OU is consumption of certain species of fish. Under the Tennessee Water Quality Control Act, TDEC 1200-4-3, TDEC is authorized to issue fish consumption advisories to protect the public. The Division of Water Pollution Control in TDEC currently posts two types of fish consumption advisories at approximately 50 public and private access points surrounding the LWBR OU. A precautionary advisory, the mildest form of advisory, warns children, pregnant women, and nursing mothers to avoid eating white bass, sauger, carp, smallmouth buffalo, and largemouth bass. All others are warned to limit consumption of those fish to 1.2 lb/month. A no consumption advisory warns the public to avoid eating catfish, striped bass, and hybrid striped bass-white bass in any amount. LWBR OU advisories are issued because of PCB content in fish tissues. The recent revisions (July 30, 1995) to fish advisory procedures changed the standards so that the no consumption advisory is for typical consumers and protects to a level of 10^{-4} , while the precautionary advisory is for sensitive consumers such as pregnant women and children and protects to a level of 10^{-5} . When an advisory is issued or changed, a press release is issued and signs are placed at highly used access points. A list of advisories is printed in the *Tennessee Fishing Regulations* published by the Tennessee Wildlife Resources Agency. Telephone numbers are provided if the public desires further information regarding an advisory. TDEC provides standards for domestic water supplies and water quality criteria for recreational waters (TCA 69-3-101, et seq. and TDEC 1200-4-3). These standards protect the public by ensuring that drinking water taken from the LWBR OU is treated to a safe level for public consumption and by ensuring that contaminant levels in the reservoir are low enough for safe recreational use.

As lead agency, DOE will continue working with appropriate statutory authorities through the IAG to coordinate and support the implementation of existing institutional controls and advisories. DOE must consider, propose, and implement appropriate response actions if an

existing control or advisory becomes ineffective for any reason or if a sediment-disturbing activity would, because of sediments contaminated by DOE activities, be potentially harmful to human health and/or the environment.

MONITORING PLAN

Monitoring of water, sediment, and biota will be continued to determine if there is a change in the currently calculated risk that would pose a threat to human health and/or the environment. Monitoring will be coordinated with TVA, TDEC, and other federal, state, and local agencies. Monitoring will begin in Fiscal Year 1996 and will continue for as long as necessary. Data summary reports will be produced and made available to the public. Collected data will be used in the CERCLA-required review of the remedial action. If data warrant, a review will be conducted earlier.

THE STATUTORY DETERMINATION

As lead agency, DOE's primary responsibility is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. This remedial action is protective of human health and the environment; complies with CERCLA (as amended by SARA), federal, and state requirements directly associated with this action; and is cost-effective.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Analysis of existing data reveals no unacceptable risk to human health or the environment from sediments, fish consumption, or surface water in LWBR OU under the conditions that this alternative will maintain. This alternative is protective in that DOE will ensure that future activities which disturb sediments within LWBR will be done in a manner that is protective of human health and the environment. Natural sedimentation will continue to cover existing contamination and reduce its availability to the environment. Also, radioactive decay of ¹³⁷Cs will lessen its contribution to risk over time. This alternative will allow DOE to monitor for any increase in contaminant levels and is protective in that DOE could respond to any increases in the overall system or to areas of higher concentrations should such areas be found. There will be no unacceptable short-term risks or cross-media impacts as a result of implementation this remedy.

COMPLIANCE WITH ARARs

There are no chemical-, location-, or action-specific ARARs for the selected remedy; however, there is to-be-considered (TBC) guidance for institutional controls when residual radioactivity is left in place.

INSTITUTIONAL CONTROLS

Institutional controls will continue to limit access and exposure. There are no regulatory requirements specifying institutional controls for CERCLA units. However, DOE Order 5400.5, Chapter IV, requires administrative (institutional) controls for long-term management in areas containing residual radioactivity. Active controls specified in the DOE Order and TBC guidance include restrictions, fences, and warning signs.

COST EFFECTIVENESS

Costs associated with the selected remedy are dependent on the number and location of permit requests for sediment-disturbing activities.

USE OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES

This action provides institutional controls for LWBR sediment disturbance and fish consumption advisories. Such institutional controls are necessary to protect human health and the environment.

PERMANENT REMEDY

This action constitutes a permanent solution. The remedial action defined in this ROD reduces the threat to human health and the environment. Monitoring will indicate whether changes to the remedial action are needed in the future.

The statutory preference for treatment will not be met because removal and treatment of the contaminated soil is not a practical or implementable solution. The implementation of the selected alternative at the LWBR OU satisfies these requirements of CERCLA Section 121.

EXPLANATION OF SIGNIFICANT CHANGES

There are no significant changes to the chosen alternative presented to the public in the proposed plan.

PART 3. RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

This section of the ROD documents formal public comments on the Proposed Plan for Lower Watts Bar Reservoir made during the two public meetings or submitted in writing during the public comment period and presents DOE's response to all comments received. The public comment period was March 24, 1995, through April 28, 1995. A public meeting was held April 4, 1995, in Kingston, Tennessee, and April 11, 1995, in Spring City, Tennessee, as part of the community participation process. In addition to these public meetings, DOE has periodically held briefings and other meetings with public officials, special interest groups, and the public.

This responsiveness summary serves three purposes. First, it informs DOE, EPA, and TDEC of community concerns about the site and the community's preferences regarding the proposed remedial alternative. Second, it demonstrates how public comments were integrated into the decision-making process. Finally, it allows DOE to formally respond to public comments.

This report is prepared pursuant to the terms of the 1992 FFA among DOE, EPA, and TDEC, as well as other requirements, including:

- CERCLA as amended by SARA, 42 *United States Code*, Section 9601, et seq.;
- NCP, 40 CFR, Part 300; and
- *Community Relations in Superfund, A Handbook*, January 1992, EPA/540/R-92/009.

After reviewing transcripts from public meetings and written comments, DOE grouped comments according to common issues, summarized each comment (sometimes direct quotes are provided rather than a summary), and prepared a response to each issue and comment.

ISSUE 1: FISH CONSUMPTION ADVISORIES

Comment: Mark Lenox asked which species of fish are part of the fish consumption advisories for LWBR.

Comment: Katie Lenox asked where the advisories are available to the public.

Comment: An unidentified person asked why DOE is posting fish consumption advisories if DOE isn't responsible for the PCB contamination.

Comment: Robert Cheetham asked if more recent data were available and why a more recent fish consumption advisory brochure wasn't printed (the brochure was dated March 1992).

Comment: Robert Cheetham also asked if fish consumption advisory data showed an improvement in the PCB levels in fish.

Comment: Carl Escabar stated "In relation to the question about the advisory, when we sell licenses to tourists we hand out fishing regulations, or we're supposed to. Many of us do not because we don't want to scare our guests. The statements that were made tonight are printed in the fishing regulations by the state of Tennessee and if you were to read them as a tourist they would scare the hell out of you. You wonder if you should even go near the water. Now tonight we saw on the screen a statement that said that if a thousand people were to eat a half pound of fish fillets for thirty years four would have a statistical probability of having a health risk. The question I have for the people from Tennessee is: Why is a statement like that not included in the fish advisory so that people could make a better judgment as to whether they should stay on Watts Bar Lake, should fish, should spend money in our community? These are important things, but the state of Tennessee has been asked this question many times and has never reacted. My question is: Why and when will we see something that is designed for tourists? Thank you."

Comment: Bob McHone said that fish advisories should be printed more often and shouldn't have any suppositions—only the facts.

Comment: An unidentified person asked if smallmouth bass have been tested.

Comment: Ernest Brakebill asked if the risk associated with consumption of catfish could be put into perspective by comparing it to secondhand smoke or pesticides on vegetables.

Comment: Robert Cheetham said, "The advisories say catfish should not be consumed. If I caught a catfish next week and ate it would I die? That's what tourists think when they come in here and read this. The advisories are worded wrong and are far too conservative."

Comment: Katherine Marsh asked why commercial fishing for catfish is allowed if there is a no consumption advisory in place. She also asked how can we know that store-bought fish are clean and safe if they are allowed to catch those fish in contaminated lakes.

Comment: James Talley said that the fish consumption advisories are too conservative. He wants DOE/TDEC to be responsible but reasonable. He then asked if the conditions in LWBR are better than the advisories make it seem.

Comment: An unidentified person asked if mercury contamination of LWBR fish is a problem.

Response: The TDEC Division of Water Pollution Control issued the fish consumption advisories to fulfill the requirements of state law and keep the public informed of potential health hazards. There are two types of advisories in place for Watts Bar Reservoir. A "no consumption" advisory is in place for catfish, striped bass, and hybrid striped bass-whitebass. A "precautionary advisory" is in place to limit consumption of whitebass, sauger, carp, smallmouth buffalo, and largemouth bass to less than 1.2 lb/month. Smallmouth bass have not been tested, but a safe assumption would be that they contain similar contaminant levels as largemouth bass. The fish consumption advisories are distributed in several formats. TDEC issues a brochure that describes the advisory program in full. The advisories are listed in the annual *Tennessee Fishing Regulations*, provided in the TVA publication *RiverPulse*, and posted on signs at major boat ramps and public fishing locations throughout the reservoir. PCBs are the primary contaminant that prompted TDEC to issue these advisories. Mercury is in LWBR sediments, but is not concentrated in the fish tissues to the extent that it is a danger to human health. Data for these advisories are collected regularly. There has been little change in the PCB levels in fish tissue. Since the advisory has not changed, a new brochure has not been printed recently. However, a new brochure/advisory may be issued in the near future.

The advisories are based on contaminant levels and risk levels set by the U.S. Food and Drug Administration and EPA. The contaminant levels that could cause risk to human health have been studied for many years. Only widely accepted calculations are used to determine if advisories are or are not needed. The risks incurred by eating certain fish from Watts Bar are considered involuntary. That means the consumer did not put the contamination there and has not chosen to put himself at risk. It is difficult to compare involuntary risk to voluntary risk like smoking or riding a motorcycle without a helmet. Risk numbers used to set these advisories are total excess cancer risks. These numbers exceed the average, everyday risk of developing cancer (1 in 6 will develop cancer on average). The state will consider comments regarding the wording of the advisories. DOE is not in any way in charge of the advisories currently in place. The preferred alternative does not provide for DOE taking over or changing any of the existing advisories. The advisory program is a state of Tennessee program that DOE believes is effective in limiting consumption of contaminated fish. The preferred alternative in this ROD is for this program to remain in place and managed by the state of Tennessee. Changes in the wording for these advisories must be a state of Tennessee activity. If the state of Tennessee stops the advisory program, then DOE would consider what steps would need to be taken to protect the public from any contaminants in fish tissue that were still a human health risk.

The logic behind allowing commercial fisherman to harvest fish that are on the advisory is that the risk calculated for the advisory program assumes that all the fish a person each day for 30 years come from Watts Bar. This risk is higher than the risk for the occasional consumer who goes to the store and purchases fish. At the store a person would get fish from a variety of locations and their total consumption of contaminated fish would be much lower than a fisherman who eats only Watts Bar catfish his entire life.

ISSUE 2: DREDGING AND CONTAMINATED SEDIMENTS

Comment: An unidentified person asked "What is the probability that dredging might occur in LWBR?"

Comment: An unidentified person wanted to know how the sediment would be contained if dredging were to take place.

Comment: Mike Swafford asked how common it was for people to dredge the lake and use the sediments for agricultural purposes.

Comment: Jim Conners said he was told that EPA had to approve a dredging permit and that it would take 5 years, so he couldn't dredge near-shore sediment at his property. He wanted to know if this ROD would change TVA policy.

Comment: Don Reed said he thought he was told previously that the worst contamination was north of Sand Island. The new *RiverPulse* says that sediment quality at the dam is poor, but it shows no other sampling locations until Kingston. "Have contamination locations or sediment quality changed? What constitutes poor sediment quality at the dam?"

Response: TVA and COE records show that no dredging of deep main channel sediments has ever occurred in LWBR. Should dredging be needed, the area to be dredged would be sampled to determine if contamination was a problem. If that area was contaminated, special techniques and equipment could be used to remove the sediment without spreading too much contamination. Once sediment was removed, it would be disposed of in a safe place, depending on state and federal laws. There is an interagency working group in place among EPA, TDEC, TVA, COE, and DOE to review all applications for dredging or other potential sediment-disturbing activities. This review is designed to protect public health and the environment from any contamination that may be in the reservoir from past DOE activities. This working group forwards an opinion to TVA, COE, or TDEC, depending on which agency is responsible for actually approving the particular permit. The agency that approves permits does so based on the

working group opinion and other criteria, which have nothing to do with contaminated sediments. Alterations to floodplains or blockage of a navigation channel would be typical of the considerations for approving a permit.

Past TVA sediment sampling occurred near the dam and near Kingston. The data from these samplings have remained fairly consistent throughout the years. TVA rated sediment quality near the dam as poor, based on conditions such as low oxygen, high levels of ammonia, and general poor living conditions for organisms that live on the surface sediments.

ISSUE 3: HUMAN HEALTH RISK

Comment: Ernest Brakebill asked if the fish could be killed and restocked to protect human health and allow fish consumption.

Comment: Vida Monday asked about the effects on humans harmed by the contaminants found in LWBR, if cancer was the only effect, and if swimming or drinking the water could harm a human.

Comment: An unidentified person asked about the health effects of metals in the sediment.

Comment: Bob McHone asked if loggerhead turtles were safe to eat.

Comment: Walter Lloyd asked if other laboratories besides DOE have conducted these analyses.

Comment: James Talley asked if there were other health risks in LWBR besides eating fish.

Comment: Valerie Day asked if the risks in LWBR were appreciably higher than in other lakes.

Comment: The Local Oversight Committee wanted to know what the proposed plan meant by stating that the surface water in LWBR was "relatively clean."

Response: Killing the existing fish population in Watts Bar Reservoir would be a drastic measure and it would be difficult for the reservoir to recover from such an action and difficult to implement. Restocked fish would eventually (within 2 or 3 years) have similar contaminant

levels to the fish currently in LWBR (see response to Issue 5). Contaminants in the sediment and water would eventually be concentrated in fish tissues. Water coming into LWBR from the Tennessee River and Clinch River would still contain similar contaminant concentrations. Surface waters of LWBR are relatively clean in that contaminant concentrations are low enough to pass the safe drinking water standards of state and federal laws. There are contaminants present, but their concentrations are very low. Also, there may be bacterial contamination in LWBR from cattle, septic systems, or sewage treatment plants. Across the country, and much of Tennessee, lakes have low levels of toxic metals, pesticides, and PCBs. Many lakes in Tennessee and other parts of the U.S. have fish consumption advisories in place because of PCBs in fish tissue. There are other lakes with more contaminated fish and other lakes with sediment contamination.

PCBs are suspected carcinogens, so exposure at high levels over a lifetime may result in cancer. Chlordane is also a carcinogen. Other than fish consumption, the risk is due to ingestion of vegetables, meat, or milk from the agricultural use of sediments dredged out of the main river channel (which hasn't yet occurred). The metals in these sediments can be carcinogens or toxic. Toxic metals can damage human kidneys, liver, central nervous system, and other organs/tissues. The water in LWBR would not harm humans if they swam or drank the water (unless that area was contaminated by bacteria as mentioned above).

Turtles are thought to accumulate contaminants at about the same rate as fish, so there is a chance that loggerhead turtles are not entirely safe to eat.

Multiple laboratories, including an EPA laboratory, have done the chemical analyses used to prepare the RI. The results from all the laboratories were very similar.

ISSUE 4: ECOLOGICAL RISK

Comment: An unidentified person asked what ecological health meant.

Comment: Barbara Walton asked if there is a plan to reduce the uncertainty associated with the ecological risk assessment.

Response: Ecological health refers to the safety and well-being of animals that live in and around the reservoir (fish, crayfish, worms, birds, mink/otter, insects, etc.). This ecological risk assessment does not consider the impacts that these animals have on humans, but the impact that contamination caused by humans has on the animal itself. The monitoring plan for LWBR will allow collection of additional data that can be used to reduce uncertainties associated with ecological risk. In addition, information from the Clinch River/Poplar Creek RI has been used

as a worst-case scenario for LWBR to determine if DOE contaminants are causing ecological damage. Should additional sampling reveal a significant risk to the ecology posed by DOE contamination, EPA, TDEC, and DOE would consider further actions.

ISSUE 5: POLYCHLORINATED BIPHENYLS

Comment: An unidentified person asked if PCBs were a DOE contaminant.

Comment: Ernest Brakebill asked where PCBs in fish tissue are coming from if the sediment and water don't have much detectable contamination.

Comment: Mike Swafford asked if LWBR would continue to have PCB input.

Comment: An unidentified person asked if the PCBs are coming from industrial waste or where else.

Response: PCBs were widely used in industrial and commercial equipment until their ban in 1976. DOE was one of many users of PCBs around the Clinch and Tennessee Rivers. Because of their widespread use and their tendency to accumulate in fatty tissue, PCBs are routinely detected in fish samples. PCBs are typically higher in lakes and rivers that are below large cities or areas where extensive electrical equipment is used. PCBs enter the water and sediment in extremely low levels that are barely detectable using today's best instruments. Organisms that live in the water and sediment accumulate small amounts of PCBs in their tissue. As large organisms (such as a largemouth bass) eat these smaller animals, the PCBs begin to concentrate and reach higher concentrations that eventually may be a risk to humans. There are probably still small amounts of PCBs coming from the industries and cities that used to have PCB equipment, and the PCB chemical itself was designed to last a very long time without degrading. PCBs will continue to be a problem throughout the world for many more years. Eventually, PCB concentrations in fish tissue should begin to decline.

ISSUE 6: MONITORING AND ASSESSMENT

Comment: Amy Fitzgerald asked how this ROD and the decision DOE has made will be reassessed every 5 years, and if changing the Superfund law would alter that assessment process.

Comment: The Local Oversight Committee stated, "A reliance upon the DOE to fund and help carry out a monitoring program with a long time horizon is questionable given that Congress is currently assessing the functions of the agency, as well as substantially reducing

DOE's environmental management budget. The current plan does not ensure adequate funding for the protection of citizens' health in the event of budgetary cutbacks, or the possible elimination of the DOE.

To ameliorate this concern, it may be necessary to establish a trust fund which would guarantee the availability of funds for long-term monitoring and other institutional controls. The existence of such a fund would provide assurances to down-stream residents that the agencies are committed to the minimization of current and future risks associated with contamination stemming from the Oak Ridge Reservation."

Response: The FFA parties have decided that this ROD will be reviewed yearly when monitoring plan data are provided. Even if the law changes, this legally binding document would still require EPA, TDEC, and DOE to review the monitoring data and assess effectiveness of the preferred alternative. Should DOE be split apart or replaced, this ROD would still be in place, and EPA and TDEC would require the agency that receives this portion of DOE's duties to adhere to the requirements set forth in the ROD and in CERCLA. By documenting this decision in a CERCLA ROD, DOE is committing itself (or DOE's successor) to carrying out the monitoring and assessment and providing the necessary institutional controls should TVA, COE, or TDEC be unable to implement their specific statutory authorities. EPA and TDEC are committed to enforcing this ROD through any legal means necessary, and DOE or a successor will be legally required to fund the DOE activities called for in the ROD. Federal funding from Congress to DOE is based in part on regulatory drivers or legal mandates. A project that DOE is legally required to do (such as that mandated in a ROD) is given a higher priority for funds than other projects that may not have any legal basis.

ISSUE 7: UPSTREAM AND DOWNSTREAM CONCERNS

Comment: Mark Lenox asked when a study would be available that presented the data on contamination of the Clinch River, Melton Hill, and the Emory River.

Comment: An unidentified person asked if this ROD was for areas below Watts Bar Dam.

Response: An RI is being conducted on Clinch River, Poplar Creek, Melton Hill, and a portion of Emory River. Results of this investigation will be available to the public in late summer 1995. So far, data appear to be similar to LWBR. This ROD was only for Lower Watts Bar Reservoir, which begins at Watts Bar Dam and includes the reservoir up to the confluence of the Clinch River with the Tennessee River.

ISSUE 8: OTHER CONCERNS

Comment: Don Richardson asked about the TVA aquatic plant management program on Watts Bar and upstream.

Response: Vegetation has declined throughout the system in recent years. During the mid- to late-1980s there was little rain--the low flow and turbidity allowed greater light penetration and plants grew much faster and in areas they hadn't previously grown. Plant eradication was necessary in some instances to maintain navigation. No spraying was done on Watts Bar last year and none is planned for this year. Natural conditions have eliminated the need for weed control. Spraying for weeds is only done when necessary. Upstream reservoirs have little weed growth and have not been sprayed.

Comment: An unidentified person asked if anything regarding this decision will be placed in local papers.

Response: Community relations is an important part of CERCLA projects and DOE activities. Public notices and meetings have been ongoing for this project. Further mention of this project in the papers during the coming years is likely.

Comment: Barbara Walton asked if the risk for sediment disturbance has been assessed in the event of a 100-year rain and breakage of the dam.

Response: These activities were assessed during the RI/FS process. A 100-year rain has occurred during the past two decades, and sampling indicates there was little sediment disturbance. A heavy rain would tend to bring silt from the local land and streams into the reservoir rather than scour the existing sediments from the bottom of the reservoir. In the event of a dam failure, damage to the environment and the loss of life would result from flooding rather than contamination. The sediments that wash downstream during a dam failure would be spread over a wider area; therefore, concentrations of contaminants would decrease. Direct exposure to these sediments is not a significant health threat, and the only scenario of concern would still be the growing of crops or cattle on farmland composed entirely of Watts Bar main channel sediments. The contaminated sediments would be spread over a wider area in diluted form and would not pose a risk to human health in the event of a dam failure or 100-year rain.

Comment: Barbara Walton suggested that longer comment periods should be provided for public review of complex documents.

Response: The public review period that DOE provides is mandated by CERCLA and is legally required to be no less than 30 days. The comment period for this proposed plan was 36 days. However, this comment will be considered for future actions.

Comment: The Local Oversight Committee asked how the cost effectiveness of the alternatives could be compared if a formal cost estimate of the preferred alternative was not prepared.

Response: The cost of active removal or containment of sediments over the majority of the main channel in LWBR was estimated to be \$30–40 billion. The cost associated with the other agencies' institutional controls and advisories cannot be determined. Cost will depend on the particular situations that occur in the permitting of sediment-disturbing activities. The main portion of the cost that DOE will be responsible for is the implementation of a monitoring program. The approximate cost of the annual monitoring is \$1.5 million. Administrative cost for the IAG-coordinated activities has not been determined.

Comment: The Local Oversight Committee asked if the Meigs County executive and DOE can meet to discuss the implementation of this preferred alternative.

Response: DOE would be happy to meet with anyone who desires to do so at a mutually convenient time.

Comment: An unidentified person said that he thought the public meeting was a good one.

Comment: Barbara Walton said that she was in general agreement with the preferred alternative.

Response: Thank you very much.

LETTERS RECEIVED FOLLOWING THE COMMENT PERIOD FROM C. S. SANFORD

Letter Dated April 5, 1995

Comment: What was the developed alternatives time period of analysis?

Response: Based on the questions that follow, we suspect that you are asking if there were distinct time periods over which the advantages or improvements of each alternative were

measured as compared to some other criteria, such as no action. In the case of LWBR, there are no such time periods involved. According to standard EPA guidance, alternatives are judged first on their effectiveness in protecting human health and the environment, then on other criteria. The goals are to reduce or eliminate exposure to contaminants, not to estimate effect over time. The latter is a component of risk assessments.

Comment: Was a cost-benefit analysis or capital investment plan used?

Response: A cost-benefit relationship is built into the risk analysis process performed under CERCLA. Risk action levels for a particular contaminant reflect a cost-benefit decision. Please refer to Chapter 5 in the LWBR RI/FS.

Comment: What was the period of costs? What was the period of health effects? (20, 50, or more years?)

Response: The answers to these questions vary with the contaminant and with the exposure scenario. Specific periods are listed individually in Chapter 5 of the LWBR RI/FS.

Comment: Are there health risk estimates which approach the half-life of the endangering toxics?

Response: None of the contaminants of concern have a "half-life" because none are radioactive.

Comment: Is EPA's intent to remove dredging as a viable alternative?

Response: The responsibility for future activities on LWBR rests with DOE and DOE does not consider dredging a viable alternative at this time. EPA and TDEC must concur with DOE's decision. EPA strongly supports the use of institutional controls for this portion of LWBR contamination.

Comment: Does the law require a preference for permanent treatment of the toxics?

Response: All other things being equal, CERCLA specifies a preference for permanent treatment. However, it is a preference, not a requirement. In the case of LWBR, treatment would create short-term elevation in risk and environmental impacts that outweigh the long-term risk reduction.

Comment: Is EPA's preference in contradiction to permanent treatment?

Response: For reasons explained in the FS and proposed plan, DOE's preference does not include permanent treatment. EPA concurs.

Comment: Is it EPA's position that "No Action" will prevent off-site migration of the toxics?

Response: The chosen alternative for LWBR is not "no action." It is DOE's position that the chosen alternative will prevent risk to the public from the contaminants present in LWBR sediment, and EPA concurs.

Comment: Is it EPA's position that natural events will not disrupt the present river bottom and its layer of contaminated mud.

Response: There is no evidence that natural processes have significantly disturbed the contaminants deposited in the 1950s, and there is no evidence that future disturbance will occur.

Comment: Is it EPA's conclusion that the Clean Water Act has no legal authority over the off-site contamination?

Response: EPA believes that DOE has met or exceeded all requirements of the Clean Water Act [33 U. S. C. Sect. 1251], CERCLA, and the National Contingency Plan with respect to the pending decision for LWBR.

Comment: Does EPA know of drinking water supplies located on this river body?

Response: There are three. All test their water in accordance with state and federal requirements. None show any indication of ORR-related contaminants.

Comment: Did EPA utilize any computer models for clean-up alternatives?

Response: No. Modeling studies of individual sites is not part of EPA's role in the CERCLA process. However, Lockheed Martin Energy Systems, a contractor to DOE, used a one-dimensional model to estimate aspects of sediment transfer in LWBR. Please refer to page 3-70 of the LWBR RI/FS.

Comment: Was active bottom transport of mud for streambed over-burden considered a positive or negative benefit?

Response: Please refer to Chapter 5 in the LWBR RI/FS.

Comment: If a computer model was used, then what was the time period of consideration and were seasonal variations used?

Response: Please refer to Chapter 5 in the LWBR RI/FS.

Comment: Did any computer model utilize a time period which included the "100 year flood" or its counter-part, the 100 year drought?

Response: Yes. The model was used to estimate the effects of a localized 100-year storm and a regional 100-year storm.

Comment: Does any computer model have the capability to analyze the results of a flash flood during a drought?

Response: Although such modeling might have some value on land or in small feeder streams, reservoirs are controlled bodies of water that have neither flash floods nor droughts. Please see previous question on high-water events.

Comment: Were epidemiological studies used which placed a weighing factor on groups involved in water recreation as being more at risk than other groups?

Response: CERCLA uses an assessment of potential risk process rather than conducting epidemiological surveys in determining potential threats of contaminants to human health. Please refer to Chapter 5 of the LWBR RI/FS, particularly pages 5-14 through 5-16.

Comment: Does the annual average dose of toxics include probabilities of occurrence for specific upset conditions which could affect the water recreation user community?

Response: To allow for such variations in exposure, the CERCLA risk process selects a relatively high value (reasonable maximum exposure) to ensure that the risk assessment results approach the worst-case exposure possible from the contaminants.

Comment: Is it EPA's position that DOE's miscellaneous discharge of radioactive materials into the non-radiological treatment plant is a safe practice?

Response: DOE does not discharge to local treatment plants. All DOE discharges are regulated by local, state, and federal laws.

Comment: Does EPA know of any law which prohibits this practice from polluting the navigable waterways?

Response: The Clean Water Act prohibits the discharge of certain pollutants into navigable waters. However, ORR conforms to all CWA regulations and is regulated by NPDES and other discharge requirements.

Comment: Does the EPA have knowledge of COE's comments on dredging cost estimates? Does EPA have records of requesting COE comments on dredging activity for the cost study?

Response: COE was provided the opportunity to review the drafts of the RI/FS, proposed plan, and ROD.

Comment: Does EPA believe that COE is qualified in giving cost estimates for dredging?

Response: COE is one of many groups capable of preparing an appropriate cost estimate for dredging LWBR.

Letter Dated May 22, 1995

Comment: (To Victor Weeks) Would you please supply information that addressees proposals that would reduce health risks over the projected life-of-the-plant of Watts Lake with consideration of the time constraints for natural de(cay?) of the radioactivity?

Response: Please refer to Chapter 5 of the LWBR RI/FS.

Comment: Does EPA possess the definitive and all-inclusive model or does it exist on a Martin Marietta/DOE main-frame or super-computer on the DOE reservation at ORNL?

Response: No. Modeling studies of individual sites is not part of EPA's role in the CERCLA process. However, Lockheed Martin Energy Systems, a contractor to DOE, used a

one-dimensional model to estimate aspects of sediment transfer in LWBR. Please refer to page 3-70 of the LWBR RI/FS.

Comment: Presuming that the models portray increasing sophistication and accuracy for decision making, then what role does your office have in recommendations for model improvement or for rejection of results?

Response: The model used for LWBR provided useful information, but decisions on alternatives are only based in small part on the results of such models. The principal basis for such decisions is risk assessment. Please refer to Chapter 5 of the LWBR RI/FS.

Letter Dated July 7, 1995

Comment: I must presume that there are 10,000 Ac-ft to be dredged. Is this a continuous operation or are there several mobilization requirements with intermittent and seasonal constraints.

Response: Dredging would be more or less continuous until the remediation is completed. Obviously, many movements of equipment would be necessary to dredge the entire reservoir. The estimated time to complete the work through the final disposal of the sediments was over 20 years.

Comment: Does your referenced one-dimensional "computer" model have a variable river flow rate for a constant-mass or constant-volume unit of measure?

Response: Please refer to page 3-70 in the LWBR RI/FS.

Comment: It was my understanding that there was contamination down to a three foot mud depth; so, was the "depth of 2 ft" just a generalization, an average thus implying different depths; hence, an extant hydro survey.

Response: The 2-ft depth was used as a general estimate of the overall volume involved in the dredging approach. Many areas will have no sediments or contaminants. The actual depth that would be required would be determined during the initial phase of the work.

Comment: How accessible is the Oak Ridge Environmental Information System database?

Response: Currently, there is no mechanism for the public to directly access the Oak Ridge Environmental Information System (OREIS). Eventually, the state of Tennessee will have direct access and will serve as a conduit for public access. Hard copy data are available as part of the administrative record file and can be retrieved as needed. The DOE OREIS staff can process specific electronic requests. Some reimbursement of costs incurred in handling data may be required.

Comment: Do fields (i.e., matrices) of computer information, as discussed above, exist on the referenced database (previous sentence)?

Response: Data from the LWBR study are currently on the data base.

Comment: Are there any plans to evaluate the conditions as discussed in the main body of this letter? Computer models for four dimensional analysis of sediment deposition and the use of these models to compare costs of alternatives.

Response: This level of modeling is not required for this site. Sufficient information for assessment of risk is available from other sources. Please refer to Chapter 5 of the LWBR RI/FS.

Comment: What have been the time periods of analysis for computer or manual calculations?

Response: For the sediment transport modeling, 1991 to 2021. Please see page 3-70 in the RI/FS.

Comment: Have these calculations or any cost-benefit calculations included: loss of use, reserved contingencies, impairment of use, secondary positive economic activities, etc.?

Response: These factors are not involved in the sediment transport model.

Letter of August 18, 1995

Comment: Re. OREIS database; does this database supply information to other databases (e.g., EPA GIS, etc), especially regarding off-migration of pollutants?

Response: Not at present.

Note: A meeting was held September 14, 1995, in Oak Ridge, Tennessee, to discuss certain aspects of the Clinch River/Poplar Creek/Lower Watts Bar environmental restoration program. Mr. Sanford attended and he was briefed and questions were answered by DOE, EPA, TDEC, Lockheed Martin Energy Systems, and Jacobs ER Team. Mr. Sanford feels that there are many issues regarding the process followed in reaching the decision (the CERCLA process) that need to be addressed. All of the meeting participants agreed to continue responding to his requests for information and answering his questions as best possible; however, this document will continue onward for regulatory approval.

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- TVA. 1990. *Tennessee River and Reservoir System Operation and Planning Review, Final Environmental Impact Statement*, TVA/RDG/EQS-91/1. Knoxville, TN.