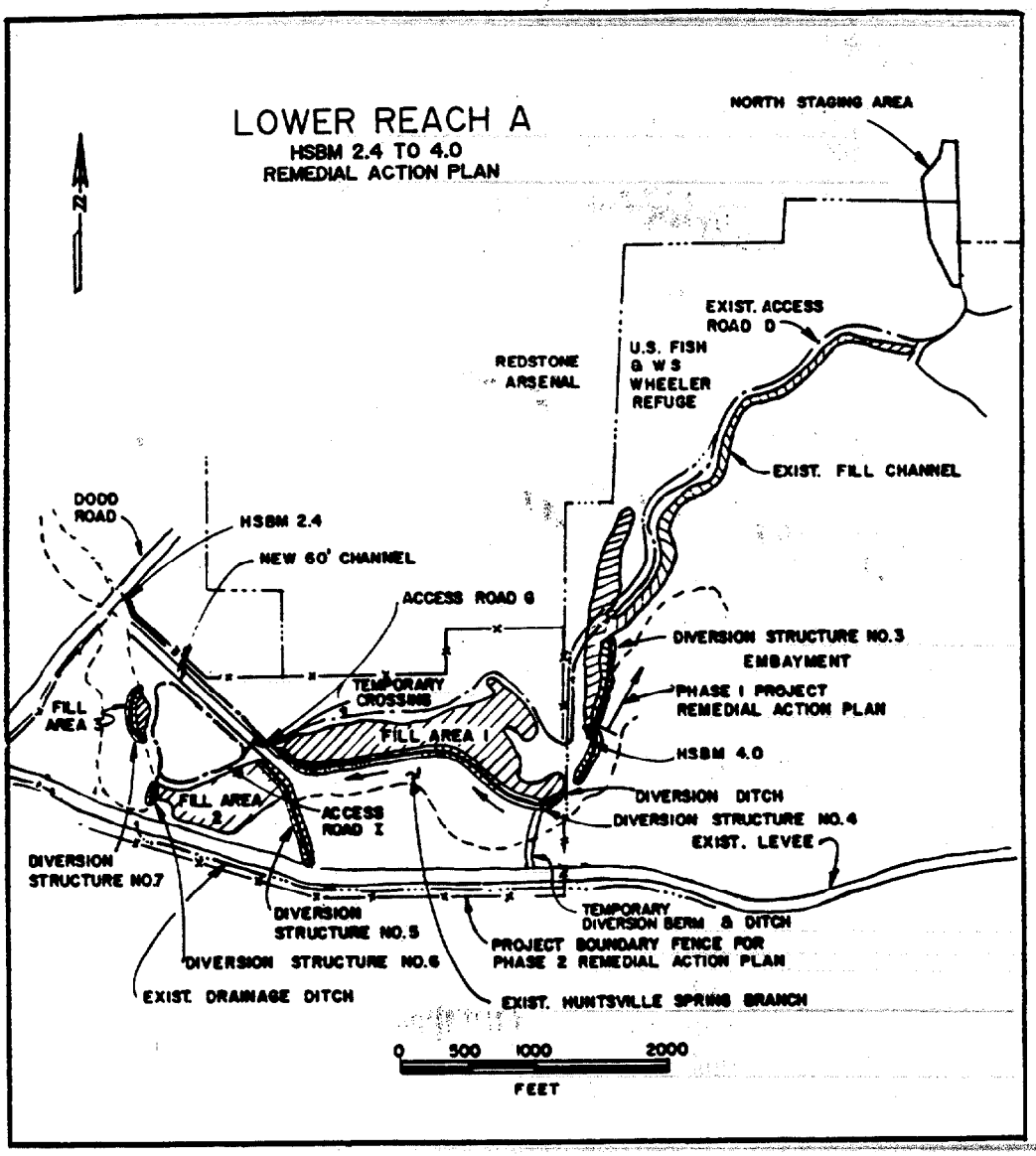
SECOND REPORT ON THE REMEDIAL ACTION
TO ISOLATE DDT FROM PEOPLE AND THE ENVIRONMENT IN THE
HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM, WHEELER RESERVOIR, ALABAMA

REVIEW PANEL ACTIVITIES
(UNITED STATES v. OLIN CORPORATION CONSENT DECREE)
JULY 1, 1986-JUNE 30, 1990



U.S. Environmental Protection Agency, Region IV
Atlanta, Georgia

November 1990

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

This report of Review Panel Activities, United States v. Olin Corporation Consent Decree, July 1, 1986-June 30, 1990, reflects significant progress in resolving a complex environmental problem. The first Report of Review Panel Activities covered the period May 31, 1983-June 30, 1986, during which the Review Panel was established, the remedial project was developed and approved, and the project implementation began. This Report covers the project through completion of the construction of the Remedial Action to ensure compliance with requirements of the Consent Decree. It also covers the results of the long-term monitoring program through the second year following completion of construction.

The Review Panel was established in June 1983. It is comprised of representatives from the U.S. Environmental Protection Agency, U.S. Tennessee Valley Authority, U.S. Fish and Wildlife Service, Department of the Army, and State of Alabama, together with representatives from the town of Triana, Alabama, and Olin Corporation. Its success is attributable to the excellent cooperation of the members and the leadership of Howard D. Zeller, U.S. Environmental Protection Agency. Mr. Zeller was Chair during the four and one-half years from establishment of the Review Panel through completion of construction of the remedial action. His strong environmental interest and dynamic leadership have established the framework that will ensure continued progress in meeting the challenges of this unusual project.

The Review Panel has clearly demonstrated that federal, local, and state governments and industry can work cooperatively to achieve significant environmental improvement.

I am confident that future Review Panel reports will reflect continuing progress.

Sincerely,

Anne L. Asbell

ANNE L. ASBELL
Chair, Review Panel

Printed on Recycled Paper

SECOND REPORT ON THE REMEDIAL ACTION TO ISOLATE DDT FROM PEOPLE AND THE ENVIRONMENT IN THE HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM, WHEELER RESERVOIR, ALABAMA

REVIEW PANEL ACTIVITIES
(UNITED STATES v. OLIN CORPORATION CONSENT DECREE)
JULY 1, 1986-JUNE 30, 1990

U.S. Environmental Protection Agency, Region IV
Atlanta, Georgia

September 1990

ACKNOWLEDGMENT

The reported accomplishments would not have been possible without the combined efforts of the members of the Review Panel and the dedicated staffs of the organizations they represent. The Review Panel specifically recognizes Anne L. Asbell, Associate Regional Counsel, U.S. Environmental Protection Agency, Atlanta, Georgia, for her advice, counsel, assistance, and dedication to the Review Panel from its establishment through the completion of construction on January 1, 1988; and Robert E. James, Assistant Regional Counsel, U.S. Environmental Protection Agency, Atlanta, Georgia, for his advice and counsel to the Review Panel since that date. The following people also merit special thanks and acknowledgment: Arthur G. Linton, Wayne I. Garfinkel, Michael R. Carter, and E. William Loy, U.S. Environmental Protection Agency; Morris W. (Bill) Schroder, Redstone Arsenal; E. John Williford, and John T. Hughes, Alabama Department of Environmental Management; Dr. Lee A. Barclay, Thomas Z. Atkeson, and H. Tucker Stone, U.S. Fish and Wildlife Service; W. Walter La Roche, John R. Thurman, and Donald J. Rucker, U.S. Tennessee Valley Authority; William L. James and Ray D. Hedrick, U.S. Army Corps of Engineers, Nashville District; and R. W. (Bob) Hyland and Keith D. Roberts, Olin Corporation.

The successful completion of this phase of the implementation of the Consent Decree is a tribute to the diligent efforts of several organizations and individuals as follows:

To the cooperative atmosphere, mutual trust, open communication, and integrity of the individual Review Panel members, the town of Triana representative, and the Olin Corporation representatives;

To the Review Panel agencies and to Olin Corporation, which provided technical support to their Review Panel representatives;

To the regulatory agencies and their technical staffs, which expedited the review and issuance of permits necessary for implementation of the remedial action;

To Olin's construction contractor, Johnson Brothers, Inc., whose performance resulted in an excellent project completed well ahead of the original schedule without a lost-time accident and in accordance with the requirements of all applicable permits; and

To Howard D. Zeller, who served as a model of leadership and excellence as Chair of the Review Panel from June 14, 1983 to December 31, 1987.

EXECUTIVE SUMMARY

On May 31, 1983, U.S. District Court Judge Robert B. Propst entered, as part of an order settling litigation against Olin Corporation (Olin), a Consent Decree (CD) governing remedial action for DDT contamination of the Huntsville Spring Branch-Indian Creek (HSB-IC) system. The CD requires Olin to develop and implement a plan, consistent with the goals and objectives of the CD, to meet a performance standard of 5 parts per million (ppm) of DDT in fillets of channel catfish, largemouth bass, and smallmouth buffalo in specified reaches of the HSB-IC system.

The CD established a Review Panel (RP) with voting members from the U.S. Environmental Protection Agency (EPA), U.S. Tennessee Valley Authority (TVA), U.S. Fish and Wildlife Service (USFWS), Department of the Army (DOA), and Alabama Department of Environmental Management (ADEM) and nonvoting participants from Olin Corporation and Triana, Alabama.

Activities before July 1, 1986, reported in the first Report On the Remedial Action to Isolate DDT from People and the Environment in the Huntsville Spring Branch-Indian Creek System Wheeler Reservoir, Alabama (July 1986), included approval by the RP of remedial action for Upper Reach A (URA), Huntsville Spring Branch mile (HSBM) 4.0-5.4; implementation of this remedial action by Olin; studies and reports by Olin of fish, water, sediment, and sediment transport for RP use in establishing baseline conditions for evaluating the effectiveness of the remedy; and proposals by Olin for interim goals, substitute fish species, and a long-term monitoring program.

This second report summarizes activities during the period July 1, 1986-June 30, 1990.

In August 1986, Olin proposed a plan for remedial action in Lower Reach A (LRA), HSBM 4.0-2.4. A public information meeting was held in Triana on October 28, 1986, to inform the public of the status of construction in

URA and solicit public comments on Olin's proposal for LRA. No significant new issues were identified at the public meeting. Following extensive review by the RP and regulatory agencies, the RP approved the Olin proposal on December 9, 1986. Olin began construction in LRA immediately following approval.

A closing ceremony at the project area on July 22, 1987, marked completion of physical construction. The RP later inspected the project and notified Olin on October 14, 1987, that construction was officially accepted as complete. At the same time, the RP directed Olin to identify a date for beginning the long-term monitoring program to evaluate progress in attaining the performance standard as required by the CD; Olin identified and the RP adopted January 1, 1988. Completion of remedial actions in URA and LRA effectively isolated in place approximately 93 percent of the DDT in the HSB-IC system.

On November 19, 1987, Howard Zeller resigned as Chair of the RP effective December 31, 1987, and Lee DeHihns (Acting Regional Administrator, EPA Region IV) designated Anne L. Asbell, who had been serving as legal counsel to the RP, as the new Chair effective January 1, 1988.

During this second reporting period, the RP completed six decision documents addressing baseline conditions, substitute fish species, remedial action in LRA, remedial action in Reaches B and C, long-term monitoring, and quality assurance.

CD requirements allow Olin 10 years, beginning January 1, 1988, to achieve the performance standard of 5 ppm of DDT in fillets of performance-standard fish (or substitute species, if adopted) in each of the designated reaches of the project area (Reaches A, B, and C).

Olin began the long-term monitoring program in 1988 and submitted the first report (1988 monitoring results) on April 15, 1989 and the second report (1989 monitoring results) on April 15, 1990. Olin achieved the 1989 interim goals for total DDT concentrations in surface water at the

two locations in HSB (HSBM 4.85 and 2.4), but not at the two locations in IC (ICM 4.6 and 0.38); however, concentrations at the two IC locations were significantly lower than baseline concentrations.

Olin achieved interim goals for all performance-standard fish in each reach in 1989. All 1989 DDT concentrations were much lower than interim goals. DDT concentrations in largemouth bass were lower than the performance standard in Reach A in 1989, in Reach B in 1988 and 1989, and in Reach C in 1988; however, Olin to date has not requested RP determination of "attainment" for largemouth bass in any reach.

On June 14, 1990, the RP accepted with modifications two recommendations by Olin regarding discontinuing the groundwater portions of the long-term monitoring program. The RP will develop a decision document on the approved changes before the next groundwater monitoring cycle.

RP inspections on June 13, 1989, and June 13, 1990, did not identify any problems of structural integrity; the RP concluded that the site was in excellent condition. The RP will continue to inspect the remedy periodically to evaluate structural integrity, will evaluate long-term monitoring results to determine progress toward attaining the performance standard and compliance with CD provisions, will determine any modifications to the remedy that may be required for compliance with CD provisions, and will determine when CD requirements have been satisfied.

The CD specifically provides that all work must comply with all applicable federal, state, and local statutes, regulations, ordinances, and permits. Although the RP was not involved in administering or ensuring compliance with such environmental requirements or issuing permits, all RP activities were closely coordinated with activities of the regulatory and permitting agencies throughout the environmental review and permitting processes. Certifications, permits, and licenses were issued by USACE, USFWS, RA, TVA, and ADEM.

All short-term goals identified in the first report for the period May 31, 1983, through June 30, 1986, were achieved.

CONTENTS

	Page
Acknowledgment	ii
Executive Summary	iii
Figures	viii
Tables	ix
Introduction	1
Review Panel	3
Historic Background	4
Purpose and Scope	5
Highlights of Review Panel Activities	6
Remedial Actions	6
Remedial Action In Upper Reach A	6
Remedial Action in Lower Reach A	7
Completion of Construction	8
Administrative Actions	9
Baseline Data, Substitute Species, and Interim Goals for Fish and Water	10
Report on DDT in Reach B and Reach C of the Huntsville Spring Branch-Indian Creek System	10
Long-Term Monitoring Program for Remedial Action in Huntsville Spring Branch-Indian Creek System	11
Quality Assurance and Fish Sample Size	11
Change in Review Panel Chair	12
Long-term Monitoring	12
Monitoring Results	13
Site Inspections	15
Related Support Activities	15
Environmental Assessment	15
Certifications, Permits, and Licenses	17
Short-Term Goals	18
Short-Term Goals Achieved	18
Short-Term Goals to be Achieved	18
Long-Term Activities	20
Appendixes	
A. Chronology of Milestones	A-01
B. Review Panel Membership	
1. Current Review Panel Members	B-01
2. Former Review Panel Members	B-09
C. Decision Document (unnumbered, considered No. 1)--Olin Corporation Remedial Plan to Isolate DDT from People and the Environment in Huntsville Spring Branch-Indian Creek System, August 31, 1984	C-01

CONTENTS
(Continued)

		Page
D.	Decision Document No. 2--Baseline Data, Substitute Species, and Interim Goals for Fish and Water, October 28, 1986	D-01
E.	Decision Document No. 3--Remedial Action Plan to Isolate DDT in Lower Reach A of Huntsville Spring Branch, December 9, 1986	E-01
F.	Decision Document No. 4--Report on DDT in Reach B and Reach C of the Huntsville Spring Branch-Indian Creek System, April 16, 1987	F-01
G.	Decision Document No. 5--Substitute Species for Largemouth Bass, July 22, 1987	G-01
H.	Decision Document No. 6--Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System, December 3, 1987, and Modification of Review Panel Decision Document No. 6 Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System, December 7, 1989	H-01
I.	Decision Document No. 7--Quality Assurance and Fish Sample Size June 14, 1990	I-01
J.	Completion of Construction Certification	J-01
K.	Change of Review Panel Chair	K-01
L.	Reports of Annual Inspection Committee	L-01
M.	Regulatory Agency Inspection Summaries	M-01

FIGURES

Number		Page
1.	General site map--Huntsville Spring Branch, Indian Creek, and vicinity	23
2.	Upper Reach A (HSBM 4.0-5.5) remedial action plan	24
3.	Lower Reach A (HSBM 2.4-4.0 remedial action plan	25
4.	Reach A before construction, January 7, 1984	26
5.	Reach A after construction, December 13, 1989	27
6.	Construction photographs	28
7.	Photographs during construction	29
8.	Photographs during construction	30

TABLES

Number		Page
1.	Distribution of DDT in the Sediments and Isolation of DDT by Remedial Action in Reach A	31
2.	Baseline and Interim Goals for DDT Concentrations in Surface Water	32
3.	Baseline and Interim Goals for DDT Concentrations in Performance Standard and Substitute Fish Species	33
4.	Long-Range Monitoring Program Summary	34
5.	Long-Term Monitoring Program Quality Assurance Program Summary	35
6.	Minimum Performance-Standard Fish Sample Size by Reach and Recommended Sample Size for Each Reach	36
7.	Summary of 1988 and 1989 DDT Concentrations in Surface Water, Baseline Concentrations, and 1989 (Year 1) Interim Goals	37
8.	Summary of 1988 and 1989 DDT Concentrations in Fish Fillets, Baseline Concentrations, and 1989 (Year 2) Interim Goals	38

SECOND REPORT ON THE REMEDIAL ACTION TO ISOLATE DDT FROM PEOPLE AND THE ENVIRONMENT IN THE HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM WHEELER RESERVOIR, ALABAMA

INTRODUCTION

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division, the Honorable Robert B. Propst presiding) entered, as part of an overall order settling litigation between the United States of America, the state of Alabama, and four sets of private parties against the Olin Corporation (Olin), a Consent Decree (CD) that governs development and implementation of remedial action for DDT contamination in the Huntsville Spring Branch-Indian Creek (HSB-IC) system. A copy of the CD is included as appendix A to the first report.[1] A chronology of significant milestones from the approval of the CD through the end of the second reporting period (May 31, 1983, through June 30, 1990) is shown in appendix A of this second report.

The CD requires Olin to develop and implement a remedial plan to meet a performance standard of 5 parts per million (ppm) of DDT[2] in fillets of channel catfish, largemouth bass, and smallmouth buffalo in specified reaches of the HSB-IC system:

---

1. Report on the Remedial Action to Isolate DDT From People and the Environment in The Huntsville Spring Branch-Indian Creek System Wheeler Reservoir, Alabama, Review Panel Activities (United States v. Olin Corporation Consent Decree), May 31, 1983-June 30, 1986, Environmental Protection Agency, Region IV, Atlanta, Georgia, July 1986.

2. For purposes of the CD and as used in this report, DDT is defined as 1,1,1-trichloro-2, 2-bis- (p-chlorophenyl) ethane, including its isomers, and the degradation products and metabolites DDD or TDE (1,1-dichloro-2,2-bis (p-chlorophenyl) ethane), and DDE (1,1-dichloro-2,2-bis (p-chlorophenyl) ethylene), and the isomers thereof.

A--Huntsville Spring Branch mile (HSBM) 5.4-2.4,
B--HSBM 2.4-0.0, and
C--Indian Creek mile (ICM) 5.6-0.0.

A map identifying these reaches is shown in figure 1.

The purpose of the remedy, monitoring, and other actions that Olin is required to perform under the CD is to isolate DDT in the HSB-IC system from people and the environment and to minimize transport of DDT out of the HSB-IC system to protect human health and the environment. The performance standard is to be achieved by a remedy consistent with the goals and objectives of the CD, which are summarized below:

1. Isolate DDT from people and the environment;
2. Minimize transport of DDT out of the HSB-IC system;
3. Minimize adverse environmental impacts of remedial actions;
4. Mitigate effect of DDT on wildlife habitats in Wheeler National Wildlife Refuge (WNWR);
5. Minimize adverse effects on operations at Redstone Arsenal (RSA), Wheeler Reservoir, and WNWR;
6. Avoid any increase in flooding, especially at the city of Huntsville and RSA, except those increases in water level that can reasonably be expected in connection with implementation of remedial action, provided Olin takes all reasonable steps to minimize or prevent such increases; and
7. Minimize effect of loss of storage capacity for power generation, in accordance with the TVA Act.

Review Panel

The CD provided for federal oversight of the remedial activities by a Review Panel (RP), chaired by the U.S. Environmental Protection Agency (EPA) and consisting of representatives from EPA, U.S. Tennessee Valley Authority (TVA), U.S. Fish and Wildlife Service (USFWS), the Department of the Army (DOA), the state of Alabama Department of Environmental Management (ADEM), and nonvoting participants from Triana, Alabama (Triana), and Olin (appendix B contains more specific information about RP members).

RP responsibilities include reviewing data and acting on proposals for the remedial action, interim goals, substitute species, long-term monitoring program, and other appropriate matters to ensure implementation of the CD. The RP is responsible for approving or disapproving any proposed remedies. If, during or following implementation of the remedy, the RP determines that modifications are necessary to meet the 5-ppm performance standard established in the CD, the RP may require such modifications.

The CD required that Olin submit an initial plan of proposed remedial action by June 1, 1984, and that the RP accept, reject, or designate a substitute remedy by September 1, 1984. Olin's proposed remedial action plan for Upper Reach A (URA, HSBM 4.0-5.6) was submitted to the RP on June 1, 1984. Figure 2 is a map of the plan for remedial action for URA. Following internal agency meetings, six RP meetings, and a public hearing during the period from June 1, 1984, through August 31, 1984, the RP accepted the Olin plan, with modifications, terms, and conditions, and issued its decision document August 31, 1984.

Following August 31, 1984, Olin continued studies to establish baseline data and develop proposals for interim goals and substitute species. In addition, Olin developed detailed engineering plans and specifications, and the staffs of the agencies represented on the RP completed environmental reviews and permitting actions associated with implementation

of the remedial action. The Nashville District, U.S. Army Corps of Engineers (USACE) and TVA permits for the remedial action were issued March 31, 1986, and the USFWS permit was issued April 1, 1986. Construction began April 1, 1986. An official groundbreaking ceremony was held April 23, 1986. RP members and other employees of the agencies represented on the RP participated in the ceremony.

In August 1983, the RP established a technical committee to meet before each RP meeting. This committee, chaired by EPA, includes members from the technical staffs of the agencies represented on the RP and the nonvoting RP participants (Olin and Triana). The purpose of the committee is to provide a forum for discussion of technical issues. The results of these discussions are reported to the full RP during its formal meetings. This committee has proven effective, and its role has been continued.

Historic Background

Wastewater discharged from a DDT manufacturing plant operated between 1947 and 1970 at Redstone Arsenal, Alabama, resulted in extensive DDT contamination in HSB and IC. The plant was operated under lease from RSA by Olin for most of this period. The most recent estimate of the extent of DDT contamination in stream sediments was 408.8 tons, of which at least 96 percent was between HSBM 2.4 and 5.4.

Some fish and other wildlife in the vicinity became heavily contaminated with DDT. Concentrations of DDT in fillets of fish collected from HSB and IC exceeded the 5.0-ppm guideline informally established by the U.S. Food and Drug Administration (FDA, 1981). DDT content of channel catfish fillets frequently exceeded 100 ppm, while levels in other species were generally lower. Studies of sediment and DDT transport in the HSB-IC system showed that DDT was being transported downstream and thus becoming more widespread.

PURPOSE AND SCOPE

The CD identifies three phases for the project: (1) construction of the remedial action, (2) long-term monitoring to demonstrate attainment of the performance standards, and (3) operation and maintenance of the remedy for an additional seven years of continued compliance. This report summarizes RP activities from July 1, 1986, through June 30, 1990, and contains background documents and references related to these actions. It reports completion of construction in URA that had started during the previous reporting period. It also reports the start and completion of the construction in Lower Reach A (LRA), HSBM 2.4-4.0. Construction was completed for both the URA and LRA in 1987. The long-term monitoring phase of documenting the effectiveness of the constructed remedies began January 1, 1988, and this report summarizes results of the first two years of that monitoring by Olin.

The RP intends to issue future reports approximately every second year, consistent with receipt of results from the long-term monitoring program. Each report will summarize ongoing and completed activities of the RP during the period and will frame the agenda for subsequent reporting periods.

The responsibilities of the agencies represented on the RP include certification, permitting, and licensing requirements for the remedial actions; therefore, these activities are identified and briefly discussed in this report.

HIGHLIGHTS OF REVIEW PANEL ACTIVITIES

The RP met 12 times between July 1, 1986, and June 30, 1990. Before January 1, 1988, meetings were held quarterly or more frequently as needed. After January 1, 1988, meetings were scheduled semiannually (usually in June and December) in accordance with the minimum requirements of the CD. Meetings were held at RSA, WNWR, Triana, and Atlanta. Meetings were open to the public and were announced by press releases issued by EPA to local news media and to the Associated Press and United Press International wire services.

The primary function of the RP is to ensure orderly and timely implementation of the CD provisions. During this reporting period, the RP provided guidance and decisions on four broad categories of actions on matters required by the CD or by earlier RP determinations: remedial actions, administrative actions, long-term monitoring, and related support activities.

Remedial Actions

On August 31, 1984, the RP accepted, with modification, Olin's proposed remedial action for URA. The RP also required Olin to submit, by September 1, 1986, a proposal for remedial action for LRA.

Remedial Action In Upper Reach A

Following development of detailed engineering plans by Olin and completion of an environmental impact statement and issuance of necessary permits by the regulatory agencies, Olin began construction in URA on April 1, 1986. Actions by the RP and regulatory agencies associated with development and approval of the remedial action in URA were documented in the first RP report. The RP actions during this second reporting period primarily involved oversight of continuing construction. Extended drought in the Tennessee Valley during 1986 and 1987 provided favorable weather conditions for construction, and Olin's contractor made excellent progress. No adverse environmental conditions associated with the

construction were experienced. Although the RP's decision document approving the remedial action in URA was issued during the previous reporting period, a copy is included in this report (appendix C) to ensure continuity within one report of all decision documents issued through June 30, 1990 (copies of the other decision documents are included in appendixes D-I).

Remedial Action in Lower Reach A

In its decision document dated August 31, 1984, the RP adopted, with modification, the Olin remedial plan for isolating DDT-contaminated sediments in URA and also required Olin to submit a remedial action proposal for LRA. Olin submitted a proposal on August 14, 1986, and concurrently applied to the appropriate regulatory agencies to begin the permit review and issuance process.

The RP and supporting technical staff reviewed the Olin proposal and supporting data along with data from other sources. The consensus of the RP was that the remedial actions in progress in URA should be extended into LRA to isolate the bulk of the DDT contamination in Reach A. Such action was determined to be consistent with the goals and objectives of the CD.

A public meeting held October 28, 1986, in Triana, Alabama, provided information on progress on remedial action in URA and opportunity for public comment on the proposed remedial plan for LRA. More than 100 people attended the meeting, and the record was held open for receipt of written comments until November 12, 1986. Evaluation of the comments received identified no significant new issues.

The RP asked the regulatory agencies to determine if the proposal for LRA involved any substantive technical or environmental issues that needed to be addressed through permitting processes. The regulatory agencies did not identify any significant issues. Final permits were issued by December 1986. The RP accepted and approved (appendix E) Olin's proposed

remedial action in LRA on December 9, 1986. Olin began construction the same day.

The approved remedial action in LRA included bypassing and burying in place 71 of the 75.6 tons of DDT in that area, which is entirely within the boundaries of RSA and WNWR (figure 3).

The remedial action consisted of constructing four diversion structures; excavating a new channel between HSBM 3.4 and 2.4; filling three areas; constructing a diversion ditch around the fill areas; and excavating portions of the sediments from the channel. The construction area was entirely within the safety fan of one of the missile test ranges at RSA and within the normal fluctuation zone of Wheeler Reservoir. Therefore, construction was closely coordinated with operations of both the test range and the reservoir. Because of activities at the test range, much of the construction work was performed at night under lights.

Completion of remedial action in both URA and LRA, effectively isolated in place approximately 93 percent of the DDT in the HSB-IC system. Table 1 summarizes the distribution of DDT within the HSB-IC system by reach and the DDT isolated by the remedial action.

Completion of Construction

A closing ceremony was held at the project site July 22, 1987, to mark completion of the construction of the remedial action. Representatives of each of the RP agencies represented on the RP, the town of Triana, and Olin participated. Following this ceremony, Olin requested the RP to inspect the project and accept it as completed before Olin released its contractor from the site.

The RP Chair established an interagency inspection committee, composed of representatives of the agencies that had issued permits for the remedial action, to inspect the project to assure compliance with the permit conditions. The Chair also established an RP inspection committee

composed of technical staff from each agency represented on the RP to inspect the project and certify that it had been completed in accordance with the plans and specifications of the RP.

The interagency inspection committee inspected the project August 3, 1987, and submitted its findings to the RP, verifying compliance with all applicable permits.

The RP inspection committee inspected the project August 27, 1987, and certified to the RP Chair on September 14, 1987 (appendix J) that the project was complete subject to certain conditions:

> . . . the as-built Remedial Actions for the Upper Reach A and Lower Reach A meet or exceed the requirements of the design plans and specifications initially approved by the Review Panel. Furthermore, with Olin's commitments for the completion of final project redress, as needed, and the establishment of vegetative cover in conjunction with the planned regulatory agencies' follow-up inspections, it is concluded that Remedial Action construction is completed with respect to further actions required by the Review Panel.

Based on these findings, the RP Chair notified Olin by letter dated October, 14, 1987 (appendix J), that the RP accepted the remedial action as complete. Figures 4 and 5 are aerial photographs showing Reach A before and after construction of the remedial action. Photographs of construction activities are shown in figures 6-8.

In the same letter, the RP Chair requested Olin to designate a date for beginning the long-term monitoring program for evaluating progress in attaining the performance standard as described in the CD. Olin proposed and the RP accepted January 1, 1988, as the date for beginning the long-term monitoring program.

Administrative Actions

During this reporting period, the RP completed several actions associated with administration of the CD requirements following completion of construction. These actions included completing five decision documents

(appendixes D, F-I) in addition to those associated with construction of the remedial action in Reach A (appendixes C and E).

Baseline Data, Substitute Species, and Interim Goals for Fish and Water

The RP considered the information submitted by Olin, recommendations from the technical committee, and the objectives of the joint technical proposal in establishing acceptable baseline conditions for sediment, water and fish; acceptable substitute fish; and interim goals (appendixes D and G). Table 1 summarizes baseline conditions for DDT concentrations in sediment. Table 2 summarizes baseline conditions for DDT concentrations in water along with interim goals for DDT in water. Table 3 summarizes baseline conditions for DDT concentrations in the fillets of performance-standard fish species and designated-substitute fish species, along with the interim goals for each species. Table 3 also shows for each fish species the range of age classes that the RP designated to reduce variability and sample-processing problems. The average DDT concentration in the fillets of fish in these designated age classes were similar to the overall average for all age classes of a specific species; however, the selected age classes had lower variance in average DDT concentrations.

Report on DDT in Reach B and Reach C of the Huntsville Spring Branch-Indian Creek System

The technical committee and the RP, after reviewing the extensive data in the Olin report on DDT in Reaches B and C, concurred (appendix F) with Olin's conclusion that no remedial action was necessary in those two reaches at that time. The RP's decision did not preclude requiring such action in the future if results of the long-term monitoring program indicate remedial actions in Reach A are not sufficient to achieve the CD performance standards.

Table 1 shows sediments in Reaches B and C contained relatively small amounts of DDT compared to the quantity of DDT in Reach A, which was

already undergoing remedial action work. Furthermore, the sedimentation history of these two reaches shows that they are areas of deposition, not scouring. Following completion of remedial action in Reach A, the sediments in Reaches B and C would be covered by clean sediments from upstream and isolated from the aquatic environment. Thus, direct exposure of fish to DDT-containing sediments in these two reaches should diminish over time.

Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System

In August 1987, Olin submitted and the RP approved a revised long-term monitoring program that includes detailed requirements relating to the type, frequency, and location of specific parameters to be monitored and the quality assurance and reporting requirements to be followed (appendix H). It called for the program to begin when the RP determined that construction in Reach A had been completed. It required that reports of the monitoring program be submitted to the RP by March 1 of the year following the monitoring period; however, the RP later modified the reporting date to be April 15 of the year following the monitoring period (appendix H) to ensure that all data for each monitoring period could be included. Tables 4 and 5 summarize the monitoring program and the quality assurance program.

Quality Assurance and Fish Sample Size

The RP requested representatives of Olin and the EPA Environmental Services Division Laboratory in Athens, Georgia, which serves as the referee laboratory for the quality assurance program, to develop jointly a proposal for verifying the quality assurance results of the monitoring program. Olin submitted to the RP the joint recommendation to include in monitoring reports a data verification statement that incorporates an independent review of the interlaboratory quality assurance data by the EPA referee laboratory. The proposal also included revising the minimum sample size (increasing the number) for fish (table 6) to provide a

higher degree of statistical confidence in the DDT concentrations in fish. The RP technical committee and the RP concurred (appendix I) that these recommendations be accepted. The enhanced quality assurance program also provides for EPA periodically to observe and verify Olin's field collection and sample preparation activities. These enhancements are to be incorporated into Olin's next long-term monitoring report.

Change In Review Panel Chair

On November 19, 1987, Howard Zeller resigned as Chair of the RP, effective December 31, 1987, and committed to prepare a summary report of the accomplishments of the RP from its inception through the completion of construction. On November 19, 1987, Lee DeHihns, Acting Regional Administrator, EPA Region IV, designated Anne L. Asbell, who had been serving as legal counsel to the RP, as the new Chair. Copies of these documents are included in appendix K. On January 1, 1988, Anne L. Asbell, EPA, became Chair of the RP.

Ms. Asbell's first action was to request continuation of both the technical committee and the inspection committee. The technical committee was charged to continue technical review of documents submitted by Olin and to make recommendations to the RP on technical matters. The inspection committee was charged to inspect the remedial action periodically and report the results to the RP with recommendations for action.

Long-Term Monitoring

The long-term monitoring program was approved by the RP December 3, 1987. In accordance with the CD requirements, Olin has 10 years beginning January 1, 1988, to achieve the performance standard of 5 ppm of DDT in the fillets of the three performance-standard fish (or the substitute species, if adopted) in each of the designated reaches (Reaches A, B, and C) of the project area.

Monitoring Results

Olin began the monitoring program in 1988 and on April 5, 1989, submitted to the RP the first long-term monitoring report, which included the 1988 monitoring results. In April 1990, Olin submitted to the RP the second monitoring report, which included the 1989 monitoring results. The quality assurance results for all analyses were reviewed and determined to be acceptable for all media. The baseline conditions and the monitoring results for years 1988 and 1989 for surface water and fish fillets are summarized in tables 7 and 8, respectively.

As shown in table 7, Olin achieved the 1989 interim goals in surface water at the two applicable locations in HSB (HSBM 4.85 and 2.4), but did not achieve the goals at the two applicable locations in IC (ICM 4.6 and 0.38). However, DDT concentrations in water at the two IC locations were significantly lower than the baseline concentrations.

Table 8 shows that Olin achieved the interim goals for all performance-standard fish in each reach in 1989. DDT concentrations in largemouth bass were lower than the performance standard in Reach A in 1989, in Reach B in 1988 and 1989, and in Reach C in 1988. However, Olin has not officially requested the RP to make a determination of "attainment" with respect to largemouth bass in any of the reaches.

The increase in average DDT concentration in the largemouth bass in Reach C in 1989 is the result of three fish (out of a total of 26 fish analyzed) having DDT concentrations outside the range of the DDT concentrations observed during the baseline surveys. The RP has requested Olin to review the results for largemouth bass in Reach C and submit a proposal for handling extreme values in the review of data so that an agreed-upon procedure will be in place before receipt of the 1990 monitoring results.

In the April 1990 monitoring report, Olin submitted two recommendations relating to discontinuation of the groundwater monitoring portions of the

long-term monitoring program. The first recommendation relates to the groundwater monitoring requirements specified in the CD, that were originally referred to as the "joint technical proposal requirements" but that are now more commonly referred to as the "far-field" groundwater monitoring requirements. The RP determined that these requirements had been satisfied and concurred with Olin's recommendation to discontinue the "far field" groundwater monitoring program.

The second recommendation relates to groundwater monitoring in the immediate vicinity of the filled channel in URA. The RP's approval of the remedial action for URA required Olin to monitor groundwater conditions in the immediate vicinity of the filled channel to determine if DDT were migrating from the filled channel into the adjacent shallow groundwater. To implement this requirement, 37 "filled-channel" or "near-field" wells were installed along five transects across the filled channel in URA. The long-term monitoring program specifies that these wells be monitored in years 2, 4, 8, and 10 following completion of construction and then again during the last year before termination of the CD.

The "near-field" groundwater monitoring indicates that DDT concentrations along the filled channel are low and decreasing (average total DDT was 0.13 µg/l or ppb in 1988 and 0.07 µg/l in 1989). Based on these results, the low solubility of DDT in water, and the strong tendency of DDT to attach to clay particles, Olin concluded that the potential for future groundwater contamination was very remote and recommended discontinuation of the "near field" monitoring requirements. The RP, not wanting to eliminate all future groundwater monitoring provisions at this stage of the monitoring program, concurred with a recommendation from the technical committee to eliminate the groundwater monitoring requirements in years 4 and 8 subject to Olin's agreement to conduct the groundwater monitoring of the "near-field" wells in year 10 or in the year following attainment of compliance with the performance standard in all reaches, whichever comes first, and to monitor these wells during the year before termination of the CD. Olin concurred with these modifications.

The RP's actions relating to both the "far-field" and the "near-field" groundwater monitoring programs were approved at the June 14, 1990, RP meeting. The RP will develop a decision document formalizing these approvals before the start of the next groundwater monitoring cycle.

Site Inspections

The RP inspection committee inspected the site on June 13, 1989, and June 13, 1990. Both the inspections were conducted jointly with the RP technical committee and the RP. The inspections did not identify any structural problems associated with the integrity of the remedial action. The inspection committee concluded that the site was generally in excellent condition. Copies of the inspection committee's reports to the RP are included in appendix L.

Related Supporting Activities

The CD specifically requires Olin to obtain all necessary permits and perform all work in accordance with all applicable federal, state, and local statutes, regulations, ordinances, and permits. The agencies represented on the RP were responsible for administering most of the applicable federal and state environmental approvals required for implementing the remedial action. Although the RP responsibilities did not include administering or enforcing compliance with environmental requirements or issuing specific permits, it was important that RP activities be closely coordinated with activities of the permitting agencies throughout the environmental review and permitting processes.

Environmental Assessment

Various permits or approvals from several federal agencies and the ADEM were required before the remedial action plan for URA submitted by Olin and approved by the RP could be implemented. The remedial action was subject to the requirements of each agency's regulations for permitting and licensing and their requirements under the National Environmental

Policy Act (NEPA). Nashville District USACE determined that an environmental impact statement (EIS) was required for the remedial action in URA. EPA, TVA, and USFWS participated in the preparation of this EIS as cooperating agencies. ADEM and RSA also had active roles in the environmental review process. The final EIS for the remedial action in URA was issued in February 1986.

Olin submitted its proposed remedial action in LRA to the RP in August 1986 and to the regulatory agencies in September 1986. Each regulatory agency assessed the environmental impacts of the proposal within the context of its own agency regulations for implementing NEPA. Following the period for public review and comment, the individual agencies determined that the proposed action in LRA was a continuation of the action implemented under the EIS for remedial action in URA. In November and December 1986 the individual agencies issued their respective records of decision and permits with appropriate conditions.

The RP monitored progress on the environmental review and permitting activities and assisted the permitting agencies and Olin in timely completion of the process.

Certifications, Permits, and Licenses

Olin's remedial action plans for both URA and LRA required certifications, permits, and licenses from the following agencies:

Agency	Action Required
Alabama Department of Environmental Management	Section 401(a) certification under the Clean Water Act
Department of Army	
Corps of Engineers, Nashville District	Section 10 permit under the Rivers and Harbors Act
	Section 404 permit under the Clean Water Act
Redstone Arsenal	Licenses for Olin facilities and activities within Redstone Arsenal boundary
U.S. Fish and Wildlife Service	Right-of-way easement for Olin activities. Service within boundary Wheeler National Wildlife Refuge
Tennessee Valley Authority	Section 26a permit under Tennessee Valley Authority Act

Olin made timely application and provided information to each agency to satisfy its regulations and permit issuance process. Special terms and conditions incorporated in the individual permits were coordinated among the agencies and the RP to maintain continuity and avoid conflict among the requirements of these permits and the CD.

SHORT-TERM GOALS

The RP achieved all of the short-term goals identified in its first report. Other short-term goals have now been identified and will be addressed during the next reporting period.

Short-Term Goals Achieved

The RP report for the period May 31, 1983, through June 30, 1986, identified seven short-term goals for the RP:

1. Continue monitoring construction activities and schedules for remedial action in URA.
2. Identify and implement remedial actions for LRA.
3. Establish baseline data for evaluating the effectiveness of remedial actions.
4. Establish interim goals to monitor progress towards achieving the CD requirements of 5 ppm in the performance-standard fish species.
5. Establish substitute fish species to be used in the absence or unavailability of performance-standard fish species.
6. Establish a long-range monitoring program to monitor the effectiveness of the remedial actions following completion of construction.
7. Identify remedial action needs in Reaches B and C.

With completion of six decision documents and completion of construction for the remedial actions in both URA and LRA, all of these goals were achieved.

Short-Term Goals to be Achieved

On June 30, 1990, the RP identified the following short-term goals to be addressed during the next reporting period:

1. Document the RP's approval at its June 14, 1990, meeting of a modification to the long-term monitoring program to discontinue the

"far-field" groundwater monitoring requirements and to modify the "near-field" groundwater monitoring requirements.

2. Adopt a procedure for handling "extreme values" in monitoring data for use in reviewing and interpreting the results of the long-term monitoring program.
3. Continue inspecting the remedial action site periodically to confirm its continued structural integrity and take necessary actions if structural integrity issues should be detected.

LONG-TERM ACTIVITIES

The RP will continue to monitor Olin's progress toward attaining the performance standard until the requirements of the CD are satisfied. These oversight activities will include periodically inspecting the remedial action area to evaluate its structural integrity, evaluating the long-term monitoring program results to determine progress toward attaining the performance standard and complying with the CD provisions, and if required, determining any modifications to the remedy that may be required for compliance with provisions of the CD. Following procedures established in the CD, the RP will determine when the requirements of the CD have been satisfied.

The CD specifies the time for compliance with the performance standard and the requirements for termination of the CD. Specifically, Olin shall attain the performance standard of 5 ppm DDT in fillets of specified fish species in Reaches A, B, and C, within 10 years after completion of the construction and implementation of the remedy. Olin shall be deemed to "attain the performance standard" when the average DDT concentration in fillets of the three performance-standard species (or substitute species) is 5 ppm in Reaches A, B, and C of the HSB-IC system for one year.

After attaining the performance standard, Olin shall demonstrate "continued attainment of the performance standard," which will occur when the average DDT concentration in fillets of each of the three fish species is 5 ppm for three consecutive years (including the year of attainment) in Reaches A, B, or C of the HSB-IC system.

The standard for termination of the CD requires that Olin (1) demonstrate to the RP continued attainment of the performance standard; and (2) demonstrate to the reasonable satisfaction of the RP that the remedial action implemented pursuant to the CD has provided, is providing, and will continue to provide achievement of the performance standard. After "achievement of continued attainment" Olin shall operate or maintain the remedies for a period of seven additional years.

At the conclusion of the 7-year period, if Olin is in compliance with the provisions of the CD and the performance standard, Olin shall be deemed to have completely fulfilled all of its obligations, and the CD shall terminate.

FIGURES

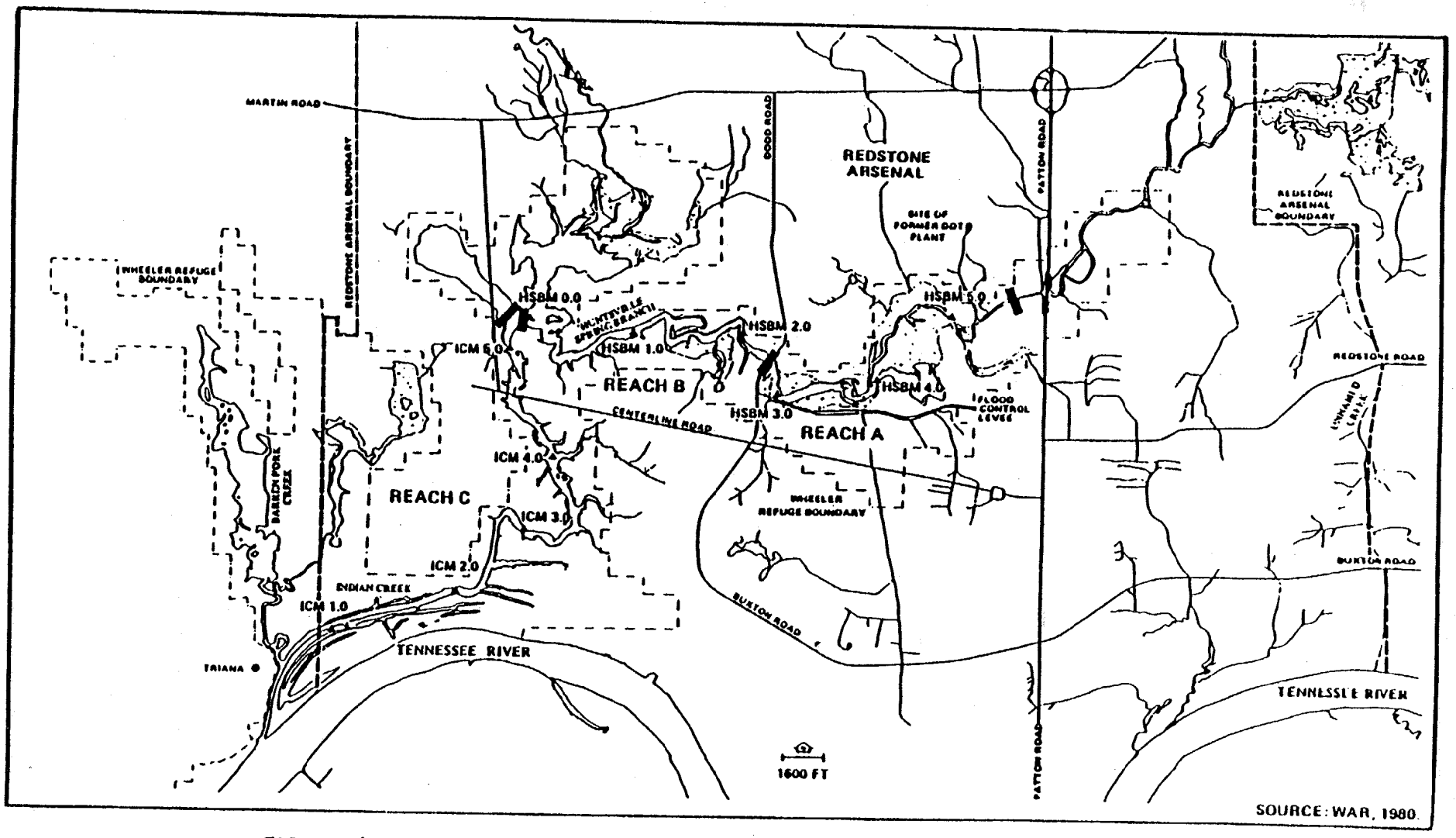


FIGURE I General Site Map – Huntsville Spring Branch, Indian Creek, and Vicinity

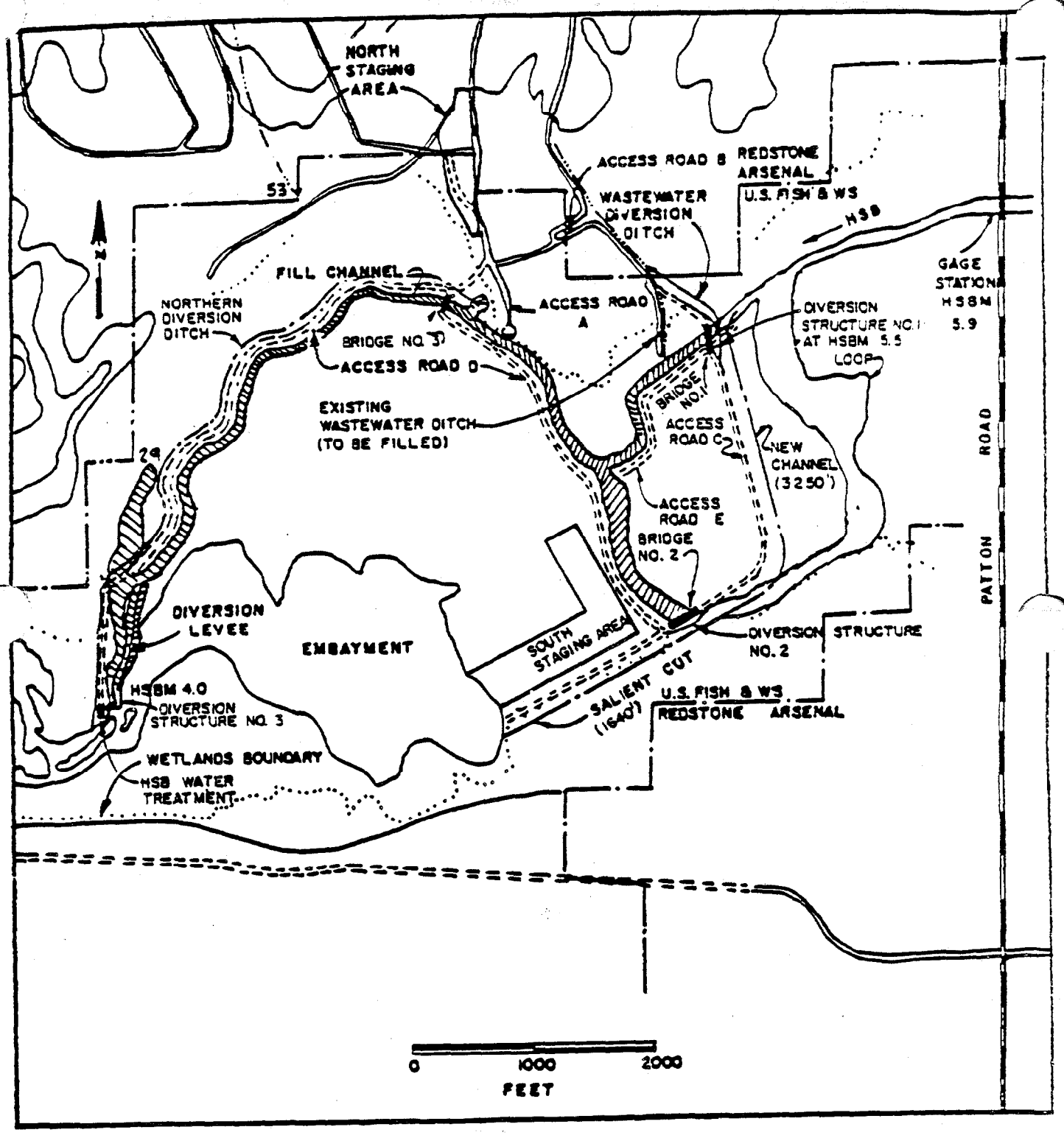


Figure 2. Upper Reach A (HSBM 4.0 - 5.5) remedial action plan.

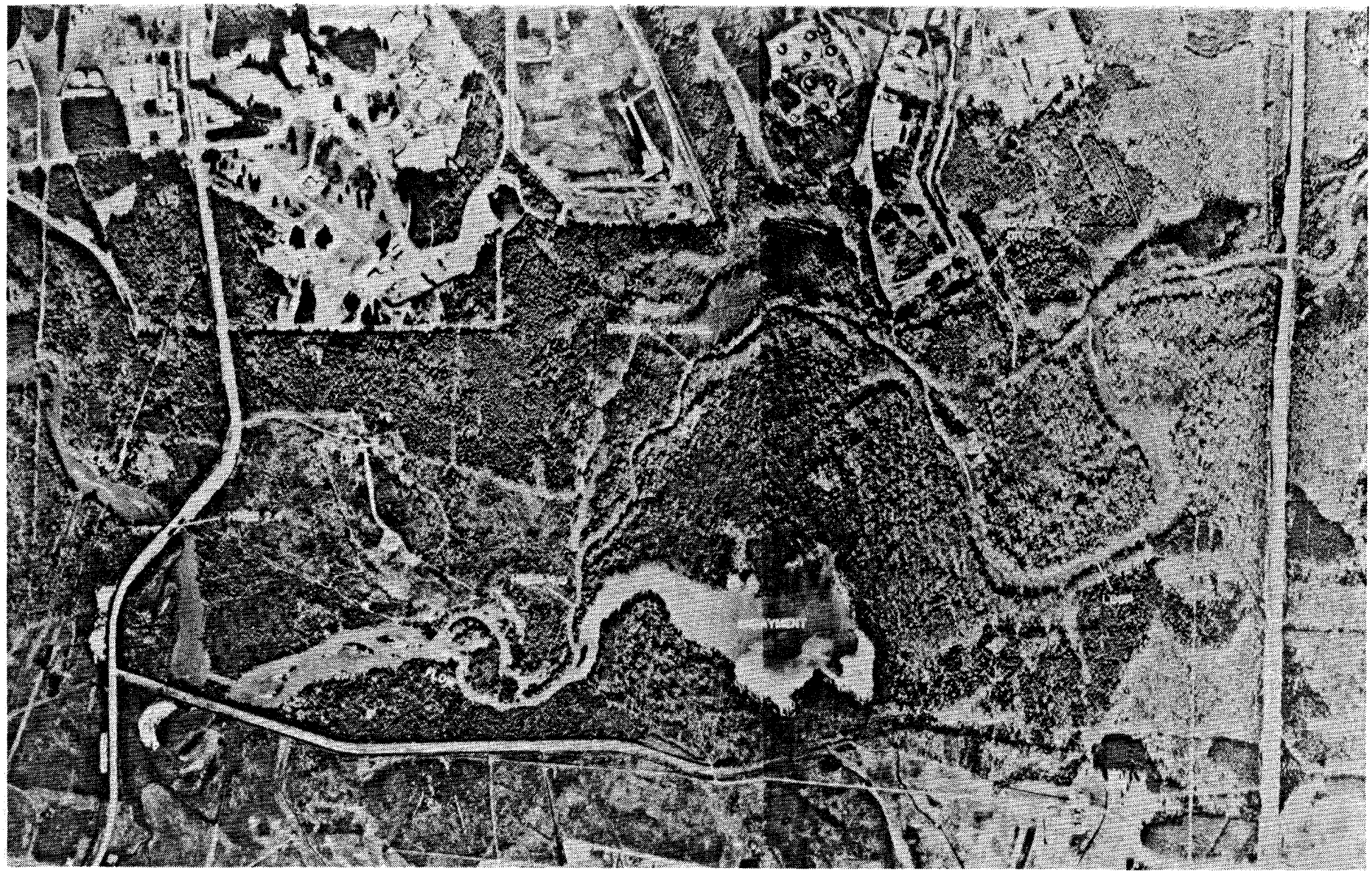


Figure 4. Reach A before construction, January 7, 1984.

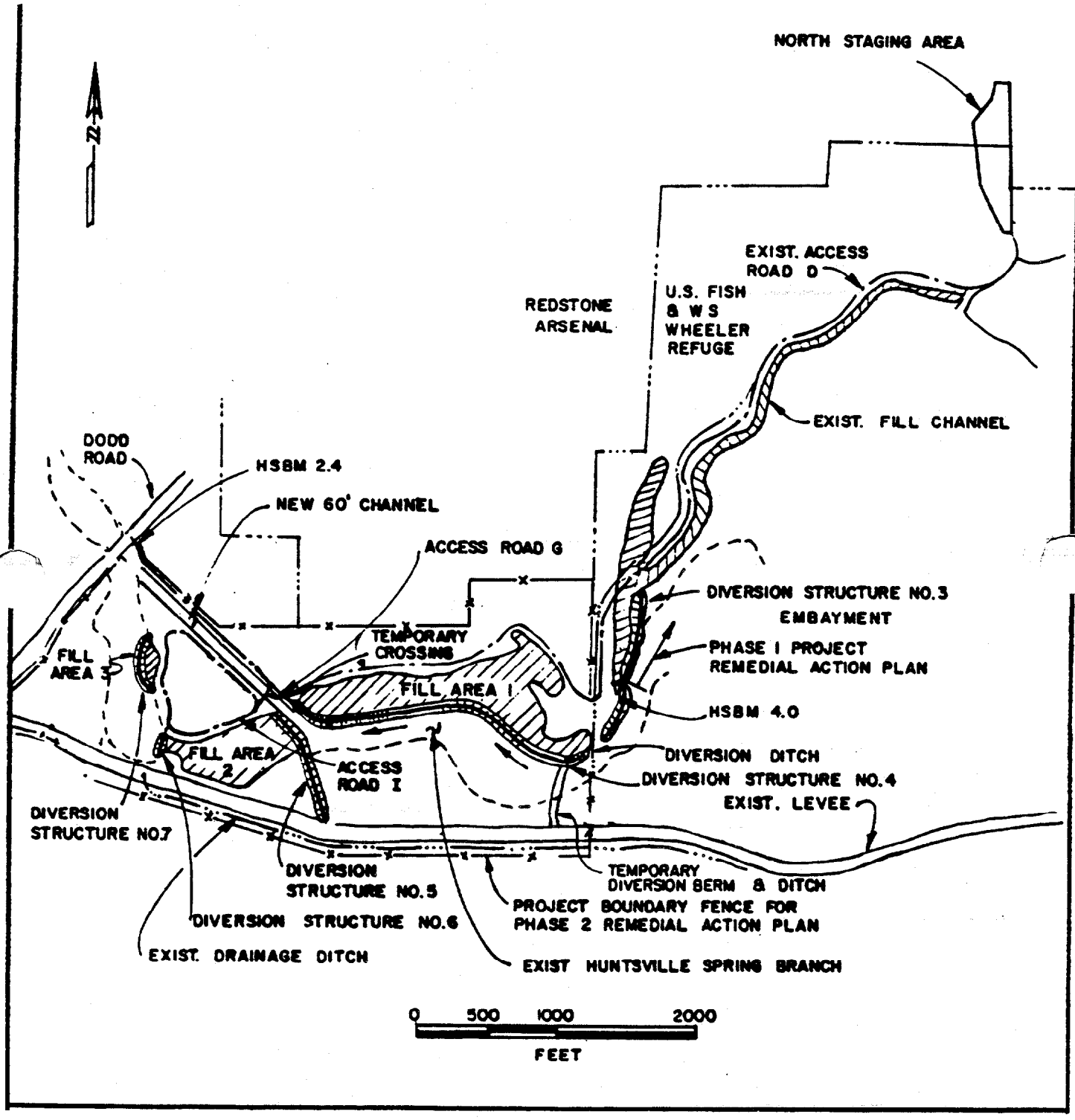


Figure 3. Lower Reach A (HSBM 2.4 - 4.0) remedial action plan.

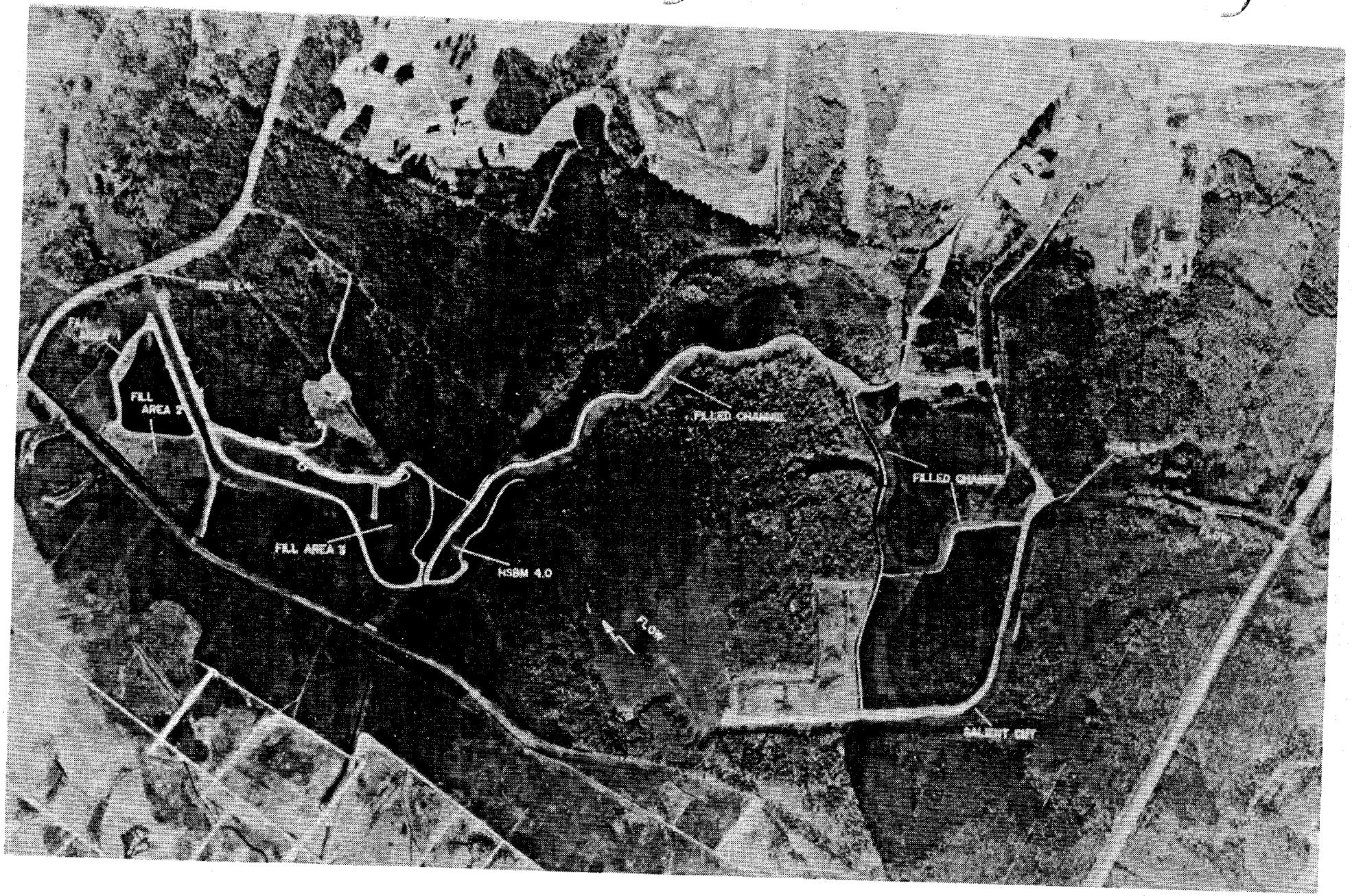
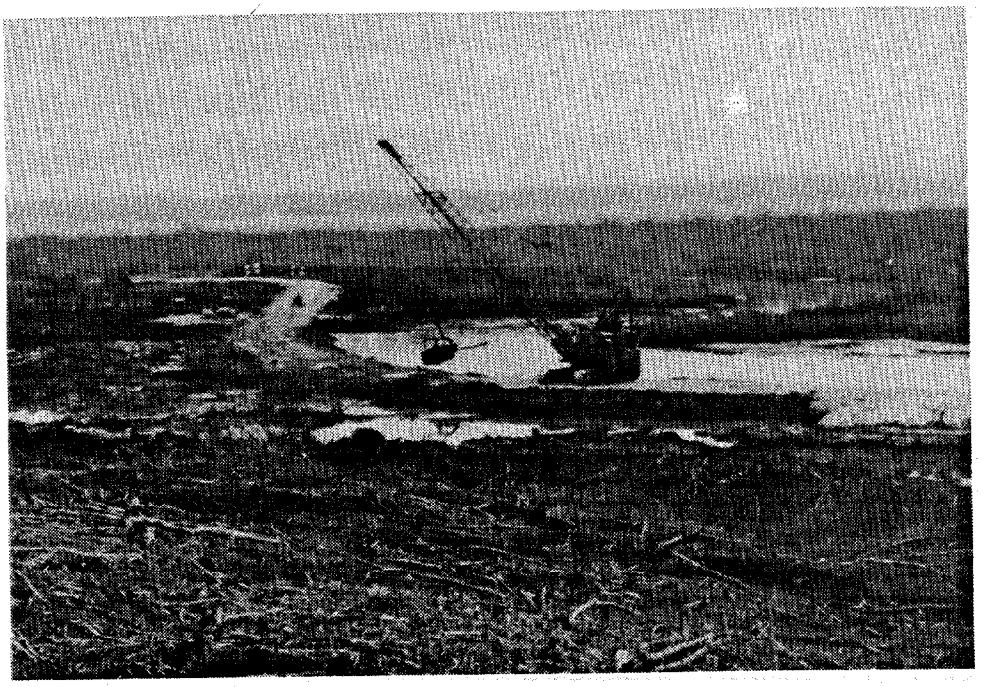
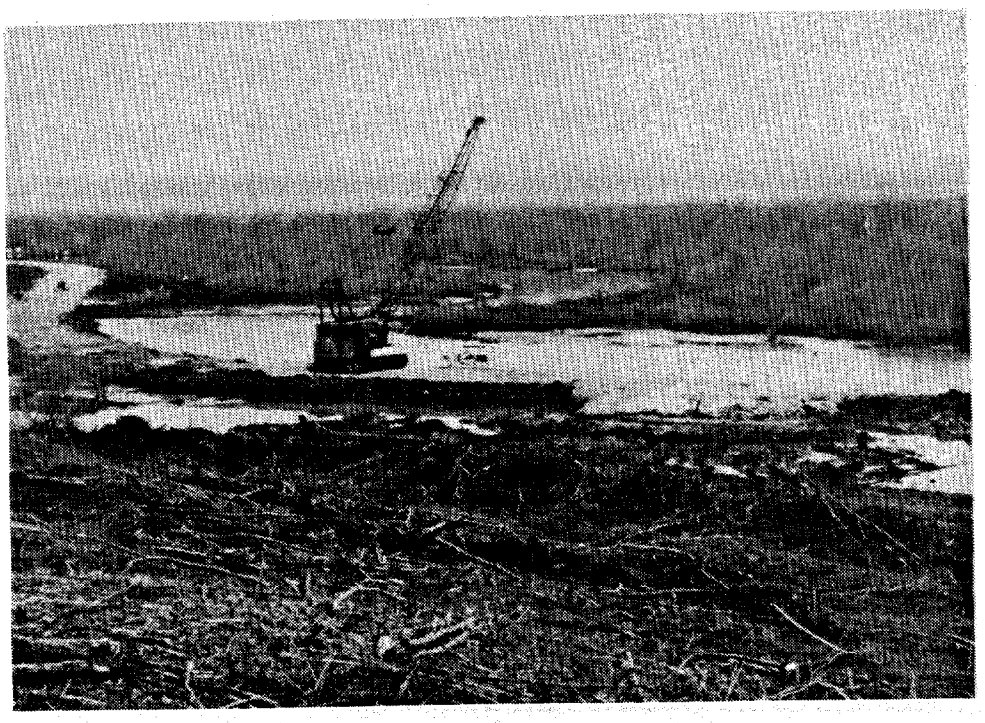


Figure 5. Reach A after completion of construction, December 13, 1989.



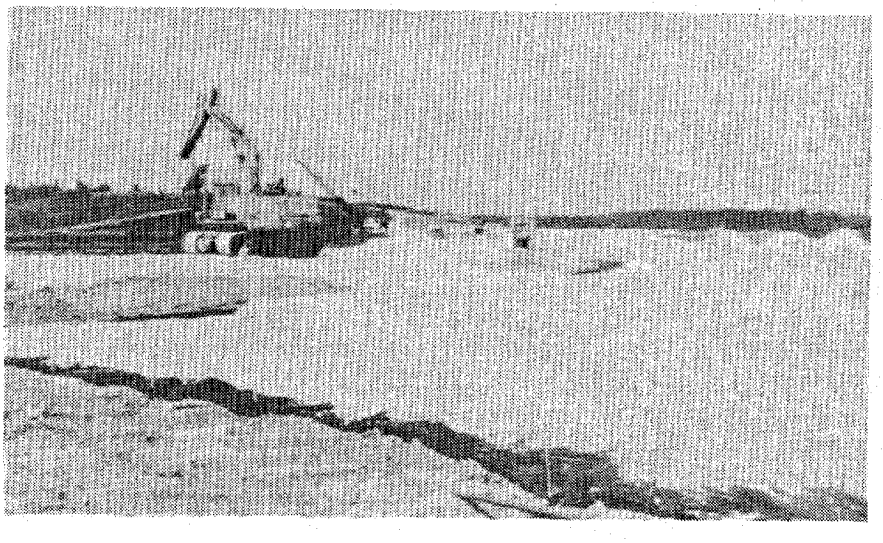
Dredging of stream channel adjacent to fill area 1, Lower Reach A



Disposal of channel dredge material in fill area 2, Lower Reach A

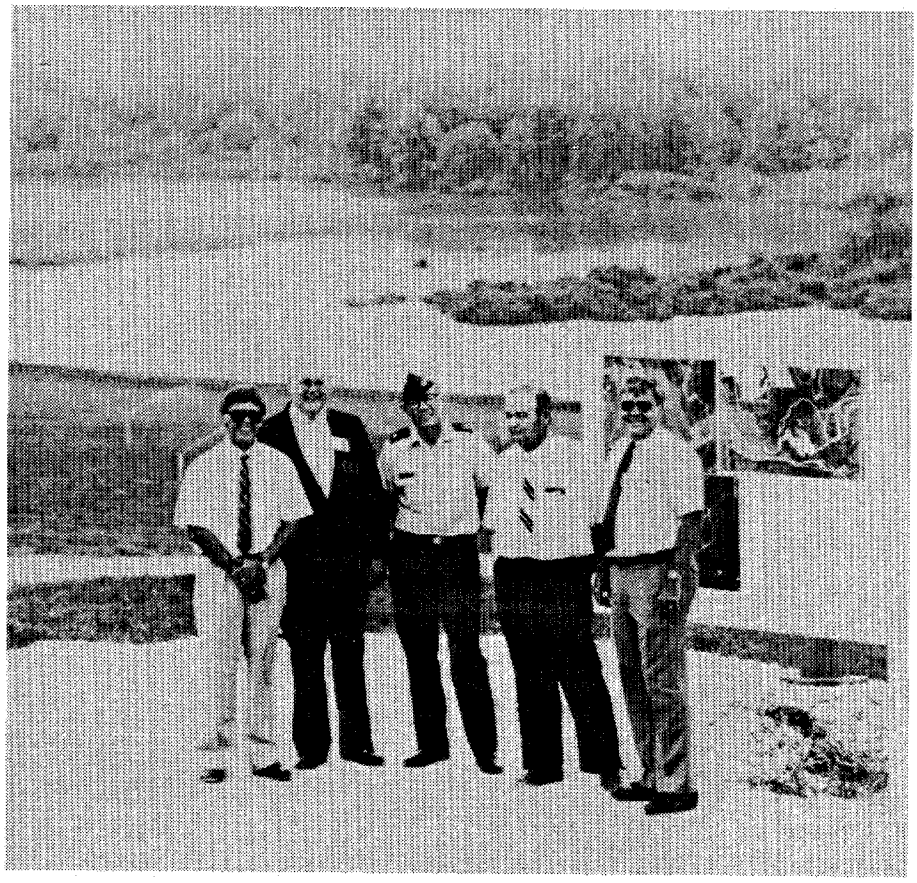
Figure 6. Construction photographs

Excavation of new bypass channel,
to fill area 1, Lower Reach A



Installation of fabric and crushed rock
in fill area 1, Lower Reach A

Figure 7. Photographs during construction



View from overlook showing dredged channel
and fill area 1 at time of completion
of construction ceremony, July 22, 1987

Left to right: John Oertling, Olin; Paul Hancock, RSA;
Colonel James Hall, RSA; Beven Brown, TVA; Frank Eakin, Olin

Figure 8. Photographs during construction

TABLES

Table 1. Distribution of DDT in Sediments and Isolation of DDT by Remedial Action in Reach A

Reach	Location	DDT in sediment		DDT isolated by remedial action	
		Quantity (tons)	Percentage of total	Quantity (tons)	Percent of total
A	Upper Reach A				
	Channel	286.0	70.0	286.0	70.0
	Overbank	29.0	7.1	20.8	5.1
	Ponded	2.9	0.7	1.2	0.2
	Subtotal Upper Reach A	317.9	77.8	308.0	75.3
	Lower Reach A				
	Channel	74.7	18.3	71.0	17.4
	Overbank	0.9	0.2		
	Subtotal Lower Reach A	75.6	18.5	71.0	17.4
	Subtotal Reach A	393.5	96.3	379.0	92.7
B	Channel	7.2	1.8		
	Overbank	0.7	0.2		
	Ponded	0.3	<0.1		
	Subtotal Reach B	8.2	2.0	0	0
C	Channel	6.6	1.6		
	Overbank	<0.1	<0.1		
	Ponded	0.5	0.1		
	Subtotal Reach C	7.1	1.7	0	0
Total HSB-IC system		408.8	100.0	379.0	92.7
Summary HSB-IC					
	Channel	374.5	91.6	357.0	87.4
	Overbank	30.6	7.5	20.8	5.1
	Ponded	3.7	0.9	1.2	0.2
Total HSB-IC system		408.8	100.0	379.0	92.7

Table 2. Baseline and Interim Goals for DDT Concentrations in Surface Water

Reach	Stream mile	Location	Baseline concentration (ppb)	Interim goal,[a] years 2-10 (ppb)
Background				
	HSBM 9.75	HSB at Martin Road	0.77	NA[b]
	ICM 8.2	IC at Martin Road	0.60	NA
Reach A	HSBM 5.0[c]	HSB at boat landing	3.4	0.0
	HSBM 4.0	HSB at mile 4.0	12.0	NA
Reaches A and B boundary	HSBM 2.4	HSB at Dodd Road	13.0	1.5
Reach C	ICM 4.6	IC at Centerline Rd	4.3	0.25
	ICM 0.38	IC at Triana	1.7	0.10

a. Interim goals are net total DDT concentration above background concentrations observed at HSBM 9.75 and ICM 8.2.

b. Not applicable.

c. Original HSBM 5.0 was covered by the remedial action. This station was relocated at the gaging station in the salient cut.

Table 3. Baseline and Interim Goals for DDT Concentrations in Performance Standard and Substitute Fish Species

Reach	Species[a]	Age class range	Baseline[b] (µg/g)	Interim goals, DDT[b] in fish flesh (µg/g) Year 2	Year 4	Year 6	Year 8	Year 10
A	Channel catfish	II-IV	95	77	59	41	23	5
	Brown bullhead	II-IV	35	29	23	17	11	5
A	Smallmouth buffalo	III-VI	140	110	86	59	32	5
	Bigmouth buffalo	III-VI	93	77	59	41	23	5
A	Largemouth bass	II-V	7.1	6.7	6.3	5.8	5.4	5
	Bluegill	II-V	6.4	6.1	5.8	5.5	5.2	5
B	Channel catfish	II-IV	69	56	44	31	18	5
	Brown bullhead	II-IV	39	32	25	19	12	5
B	Smallmouth buffalo	III-VI	180	150	110	75	40	5
	Bigmouth buffalo	III-VI	64	52	40	28	14	5
B	Largemouth bass	II-V	37	31	24	18	11	5
	Bluegill	II-V	7.9	7.3	6.7	6.2	5.6	5
C	Channel catfish	II-IV	66	54	42	29	17	5
	Brown bullhead	II-IV	58	48	38	27	16	5
C	Smallmouth buffalo	III-VI	110	89	68	47	26	5
	Bigmouth buffalo	III-VI	30	25	20	15	10	5
C	Largemouth bass	II-V	8.2	7.4	6.8	6.2	5.6	5
	Bluegill	II-V	6.4	6.1	5.8	5.6	5.2	5

a. Performance standard fish are shown in upper case and substitute species are shown in lower case.

b. Micrograms per gram (µg/g) is equivalent to parts per million (ppm).

Table 4. Long-Range Monitoring Program Summary

Year			
Calendar	Monitoring[a]	Monitoring activity	Frequency
1989	2	Fish collection	Once
		Water collection	Twice
		Groundwater (technical proposal) collection	Twice
		Groundwater (filled channel) collection	Twice
1991	4	Fish collection	Once
		Water collection	Twice
		Groundwater (filled channel) collection	Once
1993	6	Fish collection	Once
		Water collection	Twice
1995	8	Fish collection	Once
		Water collection	Twice
		Groundwater (filled channel) collection	Once
1997	10	Fish collection	Once
		Water collection	Twice
		Groundwater (filled channel) collection	Once
1998	11	Fish collection	Once
1999	12	Fish collection	Once
2005	18	Fish collection	Once
		Water collection	Once
		Groundwater (filled channel) collection	Once

a. Year after completion and implementation of remedial action.

Table 5. Long-Term Monitoring Program Quality Assurance Program Summary

Laboratories

- Primary--Olin Corporation, Charleston, Tennessee
- Secondary--American Analytical Laboratories, Cleveland, Tennessee
- Referee--EPA, Environmental Services Division Laboratory, Athens, Georgia

Analytical procedures--Huntsville Analytical Procedures Manual: same as used previously

Sample handling procedures--Huntsville Analytical Procedures Manual: same as used previously

Intralaboratory quality control

- Standard reference material--one each day per medium
- Duplicates (10%)
- Spikes (5%)
- Surrogate (100%)
- Control charts

Interlaboratory QC

- Split samples--10% to secondary laboratory, 5% to referee laboratory
- Sample blinding

Quality assurance-quality control criteria

- Use control limits developed previously
- Update control limits as work progresses

Table 6. Minimum Performance-Standard Fish Sample Size by Reach and Recommended Sample Size for Each Reach[a]

Performance-standard fish	Statistical minimum sample size by reach			Recommended sample size
	A	B	C	
Channel catfish[a]	25	17	16	25
Smallmouth buffalo[b]	10	11	7	12
Largemouth bass[b]	11	5	10	12

a. Consent Decree originally specified a minimum sample size of 6 fish of each species from each reach.

Table 7. Summary of 1988 and 1989 DDT Concentrations in Surface Water, Baseline Concentrations, and 1989 (Year 1) Interim Goals

Stream mile	DDT concentrations (µg/l)[a] in surface water (unfiltered)			
	Baseline	1988	1989	Interim goal (1989)
HSBM 9.75 (Background)	0.77	0.0[b]	0.0[b]	NA[c]
HSBM 5.0[d]	3.4	-	-	NA
HSBM 4.85[e]	-	0.0[b]	0.0[b]	0.0
HSBM 4.0[f]	12	-	-	
HSBM 3.9	-	0.35	0.05	NA
HSBM 2.4	13	1.23	0.67	1.5
ICM 4.6	4.3	1.51	1.05	0.25
ICM 0.38	1.7	0.54	0.33	0.10
ICM 8.2 (Background)	0.60	0.0[b]	0.0 [b]	NA

a. Micrograms per liter (µg/l) is equivalent to parts per billion (ppb).
b. Practical quantitation limit for DDT in water is 0.1 µg/l (0.0 µg/l used for calculations).
c Not applicable.
d. HSBM 5.0 (baseline) was located in the filled channel.
e. HSBM 4.85 is located in salient cut.
f. HSBM 4.0 was located in the filled channel.

Table 8. Summary of 1988 and 1989 DDT Concentrations in Fish Fillets, Baseline Concentrations, and 1989 (Year 2) Interim Goals

Performance-standard[a] species	Reach[b]	DDT concentration (ppm) in fillet			
		Baseline	1988	1989	Interim goal (Year 2)
Channel catfish	A	95	33	45	77
	B	69	45	45	56
	C	66	36	42	54
Largemouth bass	A	7.1	5.6	4.9	6.7
	B	37	5.0	2.2	31
	C	8.2	2.7	6.4	7.4
Smallmouth buffalo	A	140	NF[c]	31	110
	B	180	82	55	150
	C	110	8	50	89

a. Performance standard is 5 ppm DDT in fillet.
b. Reach A--HSBM 5.4 to 2.4; Reach B--HSBM 2.4 to 0.0; Reach C--ICM 5.6 to 0.0.
c. No fish collected.

APPENDIXES

APPENDIX A

CHRONOLOGY OF MILESTONES

NOTE: For continuity, this appendix incorporates the chronology of significant milestones for the period May 31, 1983, through June 30, 1986, as reflected in the report for that period, followed by the chronology of significant milestones for the period July 1, 1986, through June 30, 1990.

CHRONOLOGY OF MILESTONES

For the period May 31, 1983, through June 30, 1986

May 31, 1983	Court approved CD.
June 14, 1983	RP established; held first meeting.
January 26, 1984	RP adopted operating procedures.
June 1, 1984	Olin submitted to RP remedial action plan .
July 14, 1984	Public hearing held at Triana, Alabama, to receive public comments on Olin's proposed remedial action plan.
August 31, 1984	RP issued first decision document approving Olin's remedial action plan, with modifications.
January 2, 1985	USACE Nashville District initiated EIS public scoping process.
February 5, 1985	Olin submitted draft permit applications to RP and permitting agencies.
July 1, 1985	Olin submitted final engineering drawings and specifications and environmental analysis report.
July 1, 1985	Olin submitted permit applications to USACE Nashville District, TVA, and USFWS.
July 1, 1985	Olin submitted report on field and laboratory investigations of the Huntsville Spring Branch-Indian Creek (HSB-IC) system.
July 17, 1985	USACE Nashville District issued notice of availability of draft EIS for permitting actions.
August 1, 1985	Olin submitted remedial action alternatives report for Lower Reach A (LRA).
August 1, 1985	Olin submitted interim goals report.
December 2, 1985	Department of Army (DOA) issued license to Olin for remedial action construction activities on Redstone Arsenal property.
January 15, 1986	Olin submitted revised permit applications and detailed engineering plans to RP, USACE Nashville District, TVA, and USFWS.

CHRONOLOGY OF MILESTONES (Continued)

For the period May 31, 1983, through June 30, 1986

January 28, 1986	USFWS issued limited authorization to begin site preparation and mobilization within the boundaries of the Wheeler National Wildlife Refuge (WNWR).
February 21, 1986	Final EIS issued by USACE Nashville District.
March 1, 1986	Olin submitted special reports: baseline data for water and fish; substitute fish species; long-term data acquisition program (revised); and interim goals.
March 24, 1986	Close of public comment period on final EIS.
March 25, 1986	Alabama Department of Environmental Management (ADEM) issued certification.
March 31, 1986	Applicable permits issued to Olin.
April 1, 1986	USFWS issued permit.
April 1, 1986	Construction began in Upper Reach A (URA).
April 23, 1986	Groundbreaking ceremony for URA.

CHRONOLOGY OF MILESTONES

For the period July 1, 1986, through June 30, 1990

July 2-8, 1986	RP approved, and regulatory agencies modified, permits for relocation of the northern diversion ditch in URA.
July 16, 1986	HSB diverted to a new channel in URA (salient cut opened June 11, 1986, and oxbow cut opened July 16, 1986).
September 15, 1986	Olin submitted preliminary applications for applicable permits for LRA.
October 1, 1986	USACE issued public notice of remedial action proposal for LRA.
October 2, 1986	Olin, with RP concurrence, committed to start construction of remedial action in LRA beginning December 1, 1986.
October 4, 1986	EPA Region IV, on behalf of RP, issued notice of public meeting for proposed remedial action in LRA.
October 21, 1986	Olin issued preliminary engineering drawings for proposed remedial action in LRA, highlighting areas where construction activities were proposed prior to December 1.
October 28, 1986	RP held public information meeting at Triana concerning proposed remedial action in LRA.
October 28, 1986	RP issued decision document 2, baseline data, substitution species, and interim goals for fish and water.
November 18, 1986	ADEM issued 401(a) certification for remedial action in LRA.
November 21, 1986	USFWS issued permit for LRA.
November 28, 1986	USACE and TVA issued permits for LRA.
December 1, 1986	Construction mobilization began for remedial action in LRA.
December 9, 1986	RP issued decision document 3, remedial action plan to isolate DDT in LRA of HSB.
December 9, 1986	Full construction began for remedial action in LRA.

CHRONOLOGY OF MILESTONES (Continued)

For the period July 1, 1986, through June 30, 1990

January 18, 1987	Construction of diversion structure No. 4 in LRA completed to elevation 558.
February 16, 1987	Mechanical excavation of bottom sediments between HSBM 3.4 and 4.0 in LRA completed.
March 18, 1987	HSB diverted to new channel in LRA.
April 16, 1987	RP issued decision document 4, report on DDT in Reaches B and C of HSB-IC system.
May 20, 1987	Revised plan submitted to RP for demobilization following completion of construction in URA and LRA.
May 20, 1987	Eight-foot alligator captured in LRA and relocated with USFWS assistance.
July 22, 1987	Major construction activities completed; ceremony held at remedial action site.
July 22, 1987	RP issued decision document 5, substitute species for largemouth bass.
August 3, 1987	Interagency committee of regulatory agencies jointly inspected URA and LRA.
August 19, 1987	USACE, Nashville District, issued report of interagency committee inspection conducted August 3, 1987; no major deficiencies of permit conditions identified.
August 27, 1987	RP inspection committee (including representatives of all RP agencies) conducted acceptance inspection of URA and LRA.
September 14, 1987	RP inspection committee issued report of August 27 inspection to RP Chair certifying that the "as built" remedial action for URA and LRA meets or exceeds requirements of the decision documents 1 and 3, plans and specifications approved by the RP.
October 14, 1987	RP Chair transmitted to Olin his concurrence with the interagency regulatory inspection committee and the RP inspection committee certification; requested Olin to submit for approval a proposed date for completion of construction and start of long-term monitoring program.

CHRONOLOGY OF MILESTONES (Continued)

For the period July 1, 1986, through June 30, 1990

October 15, 1987	Olin transmitted letter to RP Chair proposing January 1, 1988, as the date for the "designated event" signifying completion of construction and implementation of the remedy as required by decision document 3 and CD, paragraph 52(j).
December 3, 1987	RP approved January 1, 1988, the date proposed by Olin.
December 3, 1987	RP issued decision document 6, long-term monitoring program for the remedial action in the HSB-IC system.
December 3, 1987	Howard Zeller announced his resignation as Chair of the RP effective December 31, 1987.
December 3, 1987	Anne L. Asbell appointed RP Chair effective January 1, 1988.
December 3, 1987	Anne Asbell requested continuation of the technical committee and inspection committee. RP adopted a semiannual meeting schedule in lieu of the quarterly meeting schedule held through December 3, 1987.
January 1, 1988	Anne Asbell became RP Chair.
January 1, 1988	Official completion of construction and beginning of the initial remedy as required by decision document 3 and CD, paragraph 52(j).
February 9, 1989	Olin requested change in due date for the long-term monitoring reports from March 1 to April 15 of each report year.
February 22, 1989	RP informally concurred with requested change in due date for the long-term monitoring report.
April 14, 1989	Olin submitted long-term monitoring report 1.
June 13, 1989	Technical committee, inspection committee, and RP jointly inspected remedial action project.
June 14, 1989	RP requested Olin and EPA jointly propose data validation for long-term monitoring program.
November 21, 1989	Olin and EPA proposed long-term monitoring program data validation; Olin proposed optimum number of fish to be collected.

CHRONOLOGY OF MILESTONES (Continued)

For the period July 1, 1986, through June 30, 1990

December 7, 1989	RP modified decision document 6 to change due date of "long-term monitoring program" reports to April 15.
April 15, 1990	Olin submitted long-term monitoring program report 2.
June 11, 1990	Inspection committee reported on June 13, 1989, inspection.
June 13, 1990	Inspection committee, technical committee and RP jointly inspected project.
June 14, 1990	RP issued decision document 7, quality assurance and fish sample size.
June 14, 1990	RP approved termination of the "far-field" groundwater monitor program and modification to the "near-field" groundwater monitor program.
June 25, 1990	Inspection committee reported on June 13, 1990, inspection.

APPENDIX B

REVIEW PANEL MEMBERSHIP

APPENDIX B-1

CURRENT REVIEW PANEL MEMBERS

NOTE: Current as of June 30, 1990

REVIEW PANEL MEMBERSHIP

Review Panel Chair

Ms. Anne L. Asbell
Chair, Review Panel
U.S. Environmental Protection Agency
345 Courtland Street, NE.
Atlanta, Georgia 30365

Phone: (404) 347-2641
FTS 257-2641

Period of Review Panel service--January 1, 1988, to present.

Ms. Asbell is the Chair of the Review Panel and the United State's designated Program Coordinator for the implementation of the Consent Decree in U.S. v. Olin Corporation. She is an Associate Regional Counsel for the U.S. Environmental Protection Agency, Region IV, in Atlanta, Georgia. Ms. Asbell represented the Region in the litigation that led to the Consent Decree and the establishment of the Review Panel. Ms. Asbell served as Legal Counsel to the Panel from 1983 until her appointment as Chair. She has been actively involved in all aspects of the Review Panel activities and the implementation of the Consent Degree. Ms. Asbell has a juris doctor degree from Woodrow Wilson College of Law.

Members

Environmental Protection Agency

Dr. Edward S. Bender
EPA Science Advisory Board
U.S. Environmental Protection Agency
401 M Street, SW. A-101F
Washington, DC 20460

Phone: (202) 382-2552

Period of Review Panel service--June 14, 1983, to present

Dr. Bender is an aquatic biologist with the U.S. Environmental Protection Agency in Washington, DC. He chairs the Technical Committee which provides advice and support for Review Panel activities. In 1977, while working for the U.S. Army, Dr. Bender became involved with DDT sampling at Redstone Arsenal. He joined EPA in 1979 and served as the technical coordinator for the litigation that led to the Consent Decree in U.S. v. Olin Corporation, and the establishment of the Review Panel. Dr. Bender has more than fifteen years experience in environmental monitoring, aquatic ecology and toxicology. His dissertation, entitled "Recovery of a Macroinvertebrate Community from Chronic DDT Contamination," studied the toxic effects of DDT runoff from an abandoned manufacturing facility on fish and aquatic invertebrates in a south-central Arkansas stream. Dr. Bender has a bachelor of science degree in biology from Westminster College, a master of science degree in zoology from the University of Florida, and a doctorate in biology from the Virginia Polytechnic Institute and State University.

Tennessee Valley Authority

Mr. Bruce A. Brye
Environmental Engineer
Tennessee Valley Authority
HB 2S 270C-C,
311 Broad Street
Chattanooga, Tennessee 37402

Phone: (615) 751-7297

Period of Review Panel service--June 14, 1983, to present

Mr. Brye is a staff Environmental Engineer in the Tennessee Valley Authority's Division of Water Resources and serves as TVA's senior technical expert on water quality issues. Since 1963, Mr. Brye has been involved in the environmental review, permitting, licensing, and litigation of many major TVA projects. During 1978-1980, Mr. Brye was extensively involved in the data acquisition activities for the DDT studies of the environment in the Huntsville Spring Branch-Indian Creek System. During 1981-1983, he provided assistance to U.S. Environmental Protection Agency and the Department of Justice in the development and review of technical documents during the negotiations which led to the final consent decree in U.S. v Olin Corporation. Mr. Brye has a bachelor of arts in mathematics from Wartburg College, a bachelor of science in civil engineering (sanitary option) from the University of Iowa, and a master of science in sanitary engineering from the University of Iowa. He is a Diplomat in the American Academy of Environmental Engineers, a Certified Hazardous Materials Manager, and a registered professional engineer in 14 states including Alabama.

U.S. Fish and Wildlife Service

Dr. Donald P. Schultz
EC Coordinator, Region 4
U.S. Fish and Wildlife Service
Department of the Interior
75 Spring Street, SW. Suite 1276
Atlanta, Georgia 30307

Phone: (404) 331-6343
FTS 242-6343

Period of Review Panel service--December 3, 1987, to present

Dr. Schultz is the contaminant coordinator for the Southeast Region of the U.S. Fish and Wildlife Service. His responsibilities include the management and coordination of the environmental contaminant operations program in the Southeast. Dr. Schultz's background dealt with the effect of pesticides on plants and animals. He conducted research on pesticides at the University of Missouri from 1967-1970. In 1970, he began working at the U.S. Fish and Wildlife Service's National Fisheries Research Center, Columbia, Missouri. He continued his research from 1971-1980 at the Southeastern Fish Control Laboratory, Warm Springs, Georgia. In 1980, he transferred to the Regional Office in Atlanta, Georgia, where he immediately became a member of the USFWS Task Force on the DDT contamination problems at Wheeler National Wildlife Refuge. He has served as a member of the technical review group since its inception. Dr Schultz has a bachelor of science degree in education from Concordia College and doctorate in botany and plant pathology, with a second major in chemistry, from Auburn University.

REVIEW PANEL MEMBERSHIP (Continued)

Department of Army

Colonel Perry C. Butler
Deputy Post Commander
AMSMI-RA, Building 112
Redstone Arsenal, Alabama 35898-5300

Phone: (205) 876-8861

Period of Review Panel service--July 1988, to present

Colonel Butler was assigned as Deputy Post Commander, Redstone Arsenal, Alabama in July 1988. Previous assignments include the 4th Armored Division in Germany and advisor duty with the 18th ARVN Division and with the Military Equipment Delivery Team in Cambodia. He has had two tours with the U.S. Army Ordinance Missile and Munitions Center and School, one with the Army Logistics Center, and one with Computer Systems Command. Colonel Butler has served in the Office of the DCSLOG, DA commanded the 67th Maintenance Maintenance Battalion at Fort Benning command and the U.S. Army Test, Measurement, and Diagnostic Equipment Support Group and served as Chief of the Requirements Division of Command, Control, Communications, and Computer Systems Staff at HQ, Eighth U.S. Army. Awards and decorations include the Legion of Merit (2 OLC), Bronze Star Medal (1OLC), Meritorious Service Medal (1 OLC), and the Army Commendation Medal (2 OLC). He has a bachelor's degree in electrical engineering from Drexel Institute of Technology and received a graduate degree from the University of Georgia. He attended Command and General Staff College and is a graduate of the Navy War College.

REVIEW PANEL MEMBERSHIP (Continued)

Alabama Department of Environmental Management

Mr. James W. Warr
Deputy Director
Alabama Department of Environmental Management
1751 Cong. W. L. Dickinson Drive
Montgomery, Alabama 36130

Phone: (205) 271-7700

Period of Review Panel service--June 14, 1983, to present

Mr. Warr is the Deputy Director of the Alabama Department of Environmental Management. ADEM, created in August 1982, is responsible for the implementation and consolidation of the state of Alabama's environmental program activities. Mr. Warr was previously the Director of the Alabama Water Improvement Commission, which administered the Alabama Water Pollution Control Act. He joined the AWIC in 1968 and has several years of experience and knowledge concerning the environmental conditions in the Wheeler Reservoir, Huntsville Spring Branch-Indian Creek System. Mr. Warr has a bachelor of science degree in civil engineering, a masters degree in civil engineering, and a master of business administration, all from Auburn University. He is a registered professional engineer in the state of Alabama.

Nonvoting Participants

Town of Triana, Alabama

Honorable Clyde Foster
Town of Triana
480 Zierdt Road
Triana, Alabama 35758

Phone: (205) 772-3553 (home)

Period of Review Panel service--June 14, 1983, to present

Mr. Foster, formerly the Mayor of the town of Triana, Alabama, is a prominent community leader. He was instrumental in the restoration of the town charter for Triana, originally chartered in 1819, and was appointed Triana Mayor in 1964, serving in that capacity until 1984. He has been a strong community advocate and instrumental in focusing community concerns. His efforts on behalf of the town of Triana have been successful in improving many areas of community life.

Mayor Foster has been involved with the resolution of the DDT contamination problem in the Huntsville Spring Branch-Indian Creek System for many years. His contributions include effective and successful coordination of the Review Panel activities with the local community. His efforts have resulted in a spirit of cooperation and understanding within the community.

Mayor Foster was the Director of the Equal Employment Office at the National Aeronautics and Space Agency, George C. Marshall Space Flight Center in Huntsville, Alabama until his retirement in January 1987. He has a bachelor of science degree in mathematics and chemistry from Alabama A & M, and has taken graduate courses at that university.

Nonvoting Participants

Olin Corporation

Mr. Verrill M. Norwood
Vice President, Environmental Affairs
Olin
Post Office Box 248
Charleston, Tennessee 37310

Phone: (615) 336-4395

Period of Review Panel service--June 14, 1983, to present

Mr. Norwood is Vice-President, Environmental Affairs for Olin Corporation and Olin's designated Program Coordinator for the implementation of the Consent Decree in U.S. v Olin Corporation. He was Olin's primary technical representative in the negotiations of the Consent Decree and has directed the data collection activities and the development and implementation of the environmental remedy in the Huntsville Spring Branch-Indian Creek System. For the past thirteen years he has served in various technical and management positions within the Olin Corporation. Mr. Norwood has a bachelor of science degree in chemical engineering from the Massachusetts Institute of Technology and a master of science degree in chemical and metallurgical engineering from the University of Michigan.

NOTE: Mr. Norwood has retired from Olin, although he will continue on a contract basis to be Olin's representative to the Review Panel. His present address and telephone number are as follows:

Mr. Verrill M. Norwood
Vice President, Environmental Affairs
Pioneer Chlor Alkali
700 Louisiana Street
4200 NCNB Center
Houston, Texas 77002

Phone: (713) 225-3831

APPENDIX B-2

FORMER REVIEW PANEL MEMBERS

REVIEW PANEL MEMBERSHIP

Review Panel Chair

Mr. Howard D. Zeller (Retired)
Chair, Review Panel
Environmental Protection Agency
345 Courtland Street, NE.
Atlanta, Georgia 30365

Phone: (404) 656-2795

Period of Review Panel service--June 14, 1983 to December 31, 1987.

(Left Review Panel and submitted his resignation as Chair of the Review Panel on November 17, 1987, effective December 31, 1987, to coincide with his retirement from federal service.)

Mr. Zeller was Chair of the Review Panel and the United States' designated Program Coordinator for the implementation of the Consent Decree in U.S. v Olin Corporation. Mr. Zeller was the Assistant Regional Administrator for Policy and Management for the United States Environmental Protection Agency in Atlanta, Georgia until his retirement in January 1987. He continued as Review Panel Chair as a consultant to the EPA through December 31, 1988. Mr. Zeller has more than thirty years experience in environmental matters. He joined EPA in 1967 as the water quality standards coordinator. He served in several progressively responsible positions and as the Director of the Enforcement Division, he became involved with the initiation and resolution of the litigation that led to the Consent Decree in U.S. v Olin Corporation, and the establishment of the Review Panel. Mr. Zeller has a bachelor of science degree in biology and chemistry from the University of Nebraska and a master of science degree in zoology from the University of Missouri.

United States Fish and Wildlife Service

Mr. W. Waynon Johnson
Senior Staff Specialist
U.S. Fish and Wildlife Service
Richard B. Russell Building
75 Spring Street, SW.
Atlanta, Georgia 30303

Phone: (404) 331-6343
FTS 242-6343

Period of Review Panel Service--June 14, 1983, to March 10, 1987

Mr. Johnson is the Senior Staff Specialist with the U.S. Fish and Wildlife Service in Atlanta, Georgia. His responsibilities include the management and coordination of the environmental contaminant operations program in the Southeast. Mr. Johnson's background is in environmental toxicology and physiology in fisheries. He conducted research on environmental contaminants at the Fish and Wildlife National Fisheries Contaminant Research Service's Center in Columbia, Missouri from 1971 to 1977. In 1978, Mr. Johnson became involved with the investigative efforts by the U.S. Army relating to the DDT contamination problem in the Huntsville Spring Branch-Indian Creek System. Mr. Johnson has a bachelor of science degree in biology from Southeastern State University, Durant, Oklahoma, and a master of science degree in zoology from the University of Oklahoma.

NOTE: Mr. Johnson on September 28, 1987, subsequently transferred from the USFWS to EPA, Region IV, Atlanta, Georgia. His present address and telephone number are:

Mr. W. Waynon Johnson
Life Scientist
Emergency Response and Control Section
Waste Division
EPA, Region IV
345 Courtland Street, NE.
Atlanta, Georgia 30356

Phone: (404) 347-3931
(FTS) 257-3931

U.S. Fish and Wildlife Service

Dr. Lee A. Barclay
Environmental Contaminants Specialist
U.S. Fish and Wildlife Service
P.O. Box 845
Cookeville, Tennessee 38503
Phone: (615) 528-6481

Period of Review Panel service--March 10, 1987, to December 3, 1987

Dr. Barclay is the Environmental Contaminants Specialist with the U.S. Fish and Wildlife Service (USFWS) in Cookeville, Tennessee. His responsibilities include the conduct and management of the environmental contaminants operational program in Kentucky, Tennessee, and the Tennessee River Basin in Alabama. Dr. Barclay's background is in aquatic ecology and fisheries, with emphasis on the assessment of adverse impacts to aquatic ecosystems and development of mechanisms to eliminate and/or mitigate such impacts. Dr. Barclay taught fisheries, aquatic ecology, and ichthyology at California Polytechnic State University from 1973 to 1975. Since joining the USFWS in 1975, he has worked as an environmental specialist in Galveston, Texas; Charleston, South Carolina; and Cookeville, Tennessee. He served as technical advisor to the previous USFWS Review Panel member, Mr. Johnson, from late 1983 until March 1987, concentrating primarily on operational aspects of the Huntsville Spring Branch-Indian Creek remedial action. Dr. Barclay has a bachelor of science degree in biology from the University of Montevallo, a master of science degree in biology from Samford University, and a doctorate in zoology from Auburn University.

NOTE: Dr. Barclay on September 27, 1987, transferred to the USFWS, Division of Environmental Contaminants in Arlington, Virginia. He has subsequently held several other positions within the USFWS and has most recently transferred back to the USFWS Field Office in Cookeville, Tennessee. His present address and telephone number are:

Dr. Lee A. Barclay, Field Supervisor
U.S. Fish and Wildlife Service
P.O. Box 845
9 East Broad Street
Cookeville, Tennessee 38503
Phone: (615) 528-6481

Department of Army

Colonel Dahl J. Cento (Retired)
Deputy Post Commander
DRSMI-XK, Building 112
Redstone Arsenal, Alabama 35898

Period of Review Panel service--June 14, 1983, to October 30, 1985

(Left Review Panel due to retirement from the Army)

Colonel Cento entered the U.S. Army in 1955 and served in progressively responsible positions until his retirement in October 1985. At the time of his retirement he was serving in the dual role as Deputy Post Commander, Redstone Arsenal and Commander, Redstone Arsenal Support Activity. Colonel Cento has a bachelor of science degree in general studies from St. Louis University and a masters degree in guidance and counseling from Washington University. He is a graduate of the NATO Defense College, the Armed Forces Staff College, the Field Artillery Officers Advanced Course, and the Officer's Candidate School.

REVIEW PANEL MEMBERSHIP (Continued)

Department of Army

Colonel John J. Walker (Retired)
Deputy Post Commander
AMSMI-DPC, Building 112
Redstone Arsenal, Alabama 35898

Phone: (205) 876-8861
FTS 876-8861

Period of Review Panel service--November 1, 1985, to August 1986

(Left Review Panel due to retirement from the Army.)

Colonel Walker was named as Deputy Post Commander, Redstone Arsenal, in November 1985. His Army career includes tours of duty at Fort Bliss, Texas; Rock Island Arsenal, Illinois; Germany; Vietnam; Korea; and Redstone Arsenal. He served as Professor of Military Science in charge of ROTC at Austin Peay State University in Clarksville, Tennessee, from 1981-1983. He has a bachelors degree in industrial management from Gannon University, and a masters degree in industrial management from the American University in Washington, DC.

REVIEW PANEL MEMBERSHIP (Continued)

Department of Army

Colonel James A. Hall (Retired)
Deputy Post Commander
AMSMI-RA, Building 112
Redstone Arsenal, Alabama 35898-5300

Phone: (205) 876-8861

Period of Review Panel service--August 1986, to June 1988

(Left Review Panel due to retirement from the Army.)

Colonel Hall was assigned as Deputy Post Commander, Redstone Arsenal, Alabama from August 1986 until his retirement in June 1989. His Army career includes tours of duty at Fort Bragg, North Carolina; Vietnam; Fort Sill, Oklahoma; Fort Riley, Kansas; Newport, Indiana; Fort Leavenworth, Kansas; Fort McClellan, Alabama; Aberdeen Proving Grounds, Maryland; Tooele, Utah; Japan; Fort McPherson, Georgia; United States Army Missile and Munitions Center and School, Redstone Arsenal, Alabama; and Korea. He has a bachelor of arts degree in chemistry from Hardin-Simmons University, Texas. He is a graduate of the Command and General Staff College.

APPENDIX C

DECISION DOCUMENT (unnumbered, considered No. 1)

Olin Corporation Remedial Plan to Isolate DDT
From People and the Environment in Huntsville
Spring Branch-Indian Creek System,
August 31, 1984.

Note: This decision document was included in the review panel report for the period May 31, 1983, through June 30, 1986. It is repeated in this report for continuity, to provide all seven decision documents in a single volume.

Site:
Break: 5.9
Other: 8/31/84

DECISION DOCUMENT

OLIN CORPORATION REMEDIAL PLAN TO ISOLATE DDT FROM PEOPLE AND THE ENVIRONMENT IN HUNTSVILLE SPRING BRANCH - INDIAN CREEK SYSTEM

I. Introduction

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division - the Honorable Robert B. Propst) entered, as part of an overall order settling litigation between the United States of America, the State of Alabama, and four sets of private parties against the Olin Corporation, a Consent Decree that governs the development and implementation of remedial action for the DDT contamination in the Huntsville Spring Branch - Indian Creek (HSB-IC) System. (Figure 1) The Consent Decree requires the Olin Corporation to develop and implement a remedial plan that will meet a performance standard of 5 parts per million (ppm) of DDT in fillets of channel catfish, largemouth bass, and smallmouth buffalo in specified reaches of the HSB-IC System consistent with the goals and objectives of the Decree. Those Reaches are:

A - HSB Mile 5.4 to 2.4
B - HSB Mile 2.4 to 0.0
C - IC Mile 5.6 to 0.0

The Olin Corporation proposed remedial plan, monitoring program, and construction and implementation schedule were submitted on June 1, 1984, as required by the Consent Decree.

A Review Panel, consisting of members from the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana, Alabama, and the Olin Corporation, was established by the Consent Decree. The Review Panel responsibilities include taking action on the Olin proposal to approve it, disapprove it, or designate a substitute remedy. If, during or following implementation of the remedy, the Review Panel determines that modifications are necessary to meet the 5 ppm performance standard established in the Consent Decree, the Review Panel may require such modifications.

Additional detailed information on the environmental aspects of this remedy will be developed through the permitting and environmental review processes of the appropriate federal and state agencies. If appropriate, the remedy will be reevaluated by the Review Panel in light of the additional environmental information.

This document sets out the Review Panel decision. Nothing in this Decision Document is intended to modify the terms of the Consent Decree and in the event of any inconsistencies between this Decision Document and the Consent Decree, the provisions of the Consent Decree will govern.

II. Decision

The decision of the Review Panel is to accept, with modifications, terms and conditions, and a schedule, the Olin Corporation proposal as supplemented by the August 13, 1984, letter from Olin Corporation to the Review Panel Chairman (Appendix 1).

The Review Panel accepts Olin Corporation's basic proposal to isolate the bulk of the DDT-contaminated sediments in place by the following actions:

> Olin Corporation will bypass and bury in place the most heavily contaminated channel area (HSBM 5.4 to 4.0). Implementation of the proposed remedial plan will take place in areas totally within the boundaries of the Redstone Arsenal (RSA) and Wheeler National Wildlife Refuge. Figure 2 depicts the particulars of the remedial plan for this portion of Reach A.
>
> The HSB will be rerouted from above where the former wastewater ditch from the former DDT manufacturing plant enters the channel at HSBM 5.4 to where the large embayment west of the Loop enters the main channel below HSBM 4.0. A new channel will be cut from the west end of the Loop through the salient to the existing shallow ponds and marshy areas of the embayment located south of the present channel. The flow will reenter the HSB below HSBM 4.0. Blocking dams will be constructed at HSBM 5.57 and 4.0 and at the west end of the Loop.
>
> The existing channel, after isolation, will be filled with clean material which will be imported to the site. An additional dam will be installed at HSBM 4.2 to provide a settling basin for water discharged from the existing channel during filling.
>
> To minimize water collection in the fill area, the former wastewater ditch from the manufacturing site will be diverted to a point upstream from the dam at HSBM 5.57, and a rainfall runoff diversion ditch will be installed across the north of the isolated HSB channel from approximately HSBM 5.0 to HSBM 4.0. This ditch will divert local runoff, which would normally enter the HSB system from the north side of the project area, to below HSBM 4.0.
>
> Olin will isolate at least 95% of the DDT estimated to occur between HSBM 5.4 and HSBM 4.0. Olin will isolate and bury the highly contaminated portions of the overbank adjacent to the part of the channel to be filled.

The Review Panel also accepts the Olin Corporation proposal to continue laboratory studies addressing sediment and diet uptake, the instream cage study, and the fish sampling program. In addition, the Review Panel accepts the Olin Corporation proposal as supplemented by the August 13, 1984, letter to the Review Panel Chairman for time-of-travel studies and the water sampling program.

The Review Panel requires the following modifications to the remedial plan submitted by Olin Corporation:

1. Olin shall submit a plan for removal and/or isolation of DDT contaminated sediments in Reach A between HSBM 4.0 and 2.4. The plan shall estimate the quantity of DDT that would be removed or isolated and the effect of such actions on the concentration of DDT in the water column, sediment transport, environmental impacts, and attainment of the performance standard.

2. Olin shall perform a study further identifying the extent of DDT contamination in Reaches B and C.

3. Olin Corporation shall propose interim goals for DDT concentrations in fish, suspended sediment, and the water column for the years 2, 4, 6, and 8 following completion of the remedial action. Olin Corporation shall submit such goals and the basis for these goals to the Review Panel by August 1, 1985.

The decision of the Review Panel includes the following terms and conditions:

1. As additional information becomes available or the state-of-the-art advances, further remedial actions and monitoring in one or more Reaches may be agreed to by the Olin Corporation and the Review Panel or required by the Review Panel to improve the effectiveness of the remedial action plan. Additionally, the Review Panel may direct modifications to the remedy if it becomes apparent that the remedial action is not adequate to meet the performance standard consistent with the goals and objectives of the Consent Decree.

2. Approval of the Olin Corporation remedial action plan, as modified by this decision, is limited to the conceptual approach discussed above and the time schedule set out below. The monitoring program will be further defined and submitted in accordance with the schedule below. The specific actions necessary to implement the modified remedial action plan require further development (e.g., applications to and negotiations with appropriate federal and state agencies on necessary permits, and resolving issues of support from and access to Redstone Arsenal) and are not addressed in this decision.

The following schedule shall be met by the Olin Corporation:

February 1, 1985	Submission of detailed monitoring plan
April 1, 1985	Submission of preliminary engineering
July 1, 1985	Submission of final engineering and design specifications
July 1, 1985	Submission of results of laboratory studies, time-of-travel studies, in-stream cage studies, fish sampling program, and water sampling program
July 1, 1985	Submission of detailed environmental analysis for necessary permits
July 1, 1985	Submission of necessary permit applications
August 1, 1985	Submission of plans for additional remedial actions in Reach A*
August 1, 1985	Submission of interim goals and basis
September 1, 1986	Submission of studies further identifying the extent of DDT in Reaches B and C

*Dates for submission of engineering and design specifications, environmental analyses, and permit applications will be developed.

Additional dates for action will be specified upon issuance of necessary permits for which dates cannot be fixed at this time. However, construction should be completed within 3 years after issuance of necessary permits.

III. Decision Considerations

After careful consideration by Review Panel members of the provisions of the Consent Decree relative to this decision, the features of the plan, the environmental consequences, the alternatives, and the comments submitted by the public, the Review Panel accepts the remedial plan, as modified, as an appropriate action toward achieving the required performance standard of 5 parts per million of DDT in fillets of specified fish species in the HSB-IC System, consistent with the goals and objectives of the Consent Decree.

A. Consent Decree Provisions:

1. Performance standard: The Olin remedial plan for the DDT contamination in HSB-IC shall achieve a performance standard of 5 ppm of DDT in fillets in channel catfish, largemouth bass, and smallmouth buffalo in Reachs A, B, and C of the HSB-IC System.

2. Goals and Objectives:

   a. Isolate DDT from people and the environment in order to prevent further exposure;

   b. Minimize further transport of DDT out of the HSB-IC System;

   c. Minimize adverse environmental impact of remedial actions;

   d. Mitigate effect of DDT on wildlife habitats in the Wheeler National Wildlife Refuge;

   e. Minimize adverse effects on operations at RSA, Wheeler Reservoir, and Wheeler National Wildlife Refuge;

   f. No increase in flooding, particularly at City of Huntsville and RSA, except those increases in water level which can be reasonably expected in connection with the implementation of remedial action, provided Olin takes all reasonable steps to minimize or prevent such increases; and

   g. Minimize effect of loss of storage capacity for power generation, in accordance with the Tennessee Valley Authority Act ("TVA Act").

3. Factors to be Considered by the Review Panel:

   a. The nature of the endangerment to human health and the environment which the remedial action is designed to address;

   b. The extent to which implementation of the remedial action would reduce or increase endangerment to human health or the environment;

   c. Whether implementation of such remedies is unnecessary to satisfy or is inconsistent with the Goals and Objectives set forth in the Consent Decree and the performance standard; and

   d. Whether the remedy chosen is the most cost-effective means of accomplishing the performance standard.

4. Effect of Other Laws

The Consent Decree requires that all work undertaken pursuant to the Decree is to be performed in accordance with all applicable federal, state, and local statutes, regulations, ordinances, and permits.

B. Features of the Modified Remedial Action

The Review Panel and supporting technical staff have reviewed extensive study plans and data from the Olin Corporation and other sources. It is clear that some affirmative remedial actions must be taken to isolate DDT from people and the environment and to meet the performance standard, consistent with the goals and objectives of the Consent Decree. It is equally clear that the complex issues raised by this DDT contamination cannot be resolved simply nor can success be guaranteed prior to implementation. The following features of the remedial plan, as modified, have been considered by the Review Panel:

1. It isolates the major source of DDT in the HSB-IC system.

2. It reduces the transport of DDT in water and sediment, thus reducing overall DDT exposure to humans and the environment.

3. It minimizes the resuspension and movement of DDT contaminated sediments.

4. It is a feasible remedial measure that can be implemented in a relatively short time.

5. It does not adversely affect groundwater.

6. It allows for identification and evaluation of remaining sources of DDT-contamination.

7. It does not preclude the implementation of further actions if deemed necessary.

8. It requires a long term commitment for monitoring and maintenance.

C. Environmental Consequences

The remedial action will involve channel widening, channel deepening, channel creation, access road construction, stormwater diversion, and channel filling. Some unavoidable but temporary adverse environmental impacts will occur as a result of construction. Some DDT will not be isolated and will remain in portions of the channels and wetlands in Wheeler National Wildlife Refuge. The effect of this DDT on people and the environment is not fully discernible at this time. However, the remedial plan, as modified, is believed to be an appropriate action toward achieving the performance standard consistent with the goals and objectives of the Consent Decree.

Construction activities will temporarily reduce water quality through increased turbidity and suspended solids. Some DDT contaminated sediment may be resuspended and transported downstream. Groundwater is not expected to be adversely impacted because of the low solubility of DDT in water, the strong association of DDT with particulates and the limited mobility of particulates in groundwater. Benthic, aquatic, and terrestrial habitat will be altered or destroyed but new habitat will be naturally established. Fish and wildlife will be temporarily disturbed but will ultimately have a less contaminated habitat.

Some wetlands will be destroyed or modified. Alterations in floodplain hydrology may cause changes in wetland vegetative communities. The flow regime in some portions of the HSB will be altered, and flood patterns of the immediate overbank area may change. The overall flood storage capacity is not expected to be significantly altered.

No changes in land uses are expected, with the possible exception of effects on activities on Redstone Arsenal that are acceptable and approved by the Army. At this time, no significant impacts are anticipated to area residents, cultural resources, or endangered, threatened, or special concern biota. No significant air or noise impacts are anticipated. A more detailed identification of environmental consequences is provided in Appendix 2.

The Olin Corporation will submit additional environmental analyses and information prior to construction as required in connection with securing the specific approvals and permits of various agencies. These analyses will address the effects from the specific engineering and design specifications submitted by the Olin Corporation.

D. Alternatives

Various remedial approaches and specific alternatives have been developed by the the Olin Corporation in the remedial action plan and by Water and Air Research, Inc. (W.A.R.) in a 1980 report. The various approaches for remedial action either isolate the DDT, remove the DDT, or destroy the DDT. Several generic approaches have been considered, including, in-place isolation, dredging and off-site transport, low-level dams, channel rerouting, biological management, out-of-basin diversion, destruction, and natural restoration (no action). In-place isolation and channel rerouting were selected for further evaluation.

Dredging and off-site transport could remove much of the DDT from the HSB-IC System. However, dredging could cause suspension and redistribution of DDT downstream, potentially causing increased contamination of fish, people, and the environment. Dredging would result in significant destruction of benthic, aquatic, and wetland habitat. Transporting this quantity of material would present considerable problems. The nearest permitted hazardous waste landfill is approximately 170 miles away, and the effect on local traffic and roads would be adverse. The combination of these environmental consequences indicates this alternative is not in the best interest of the public.

Low-level dams were found to be insufficient to attain the performance standard. Biological management would have severe adverse effects and would not meet the performance standard. Out-of-basin diversion would have extensive adverse environmental consequences. Destruction was found to be infeasible. Natural restoration would not meet the performance standard. Additional discussion of the alternatives can be found in Appendix 3.

Three specific alternatives were developed from the in-place isolation and channel rerouting approaches:

(1) channel rerouting only by blocking the existing flow channel from HSBM 5.4 to 4.0 and constructing a new channel from the Loop to the embayment area, with flows reentering the HSB just downstream from HSBM 4.0;
(2) channel rerouting as above with the addition of filling in the old channel after isolation; and
(3) covering the existing contaminated sediment between HSBM 5.4 and 4.0 and allowing HSB to find its own channel (no new channel would be constructed).

Alternative (2) was proposed by the Olin Corporation as the most appropriate method to meet the performance standard consistent with the goals and objectives of the Consent Decree. Actions for HSBM 4.0 to 2.4 are to be developed by the Olin Corporation for submittal to the Review Panel.

E. Public Comments and Responses

The comments received from the public relative to the Olin Corporation remedial plan have been considered and are summarized and responded to in Appendix 4.

IV. Conclusion

This Decision Document comprises the decision and Appendices 1-6, which are attached hereto and are incorporated herein.

This Decision is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown by the signatures affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

W. WAYNON JOHNSON
U. S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

COLONEL DAHL J. CENTO
U. S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of
Environmental Management

NONVOTING PARTICIPANTS

MAYOR CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: August 31, 1984

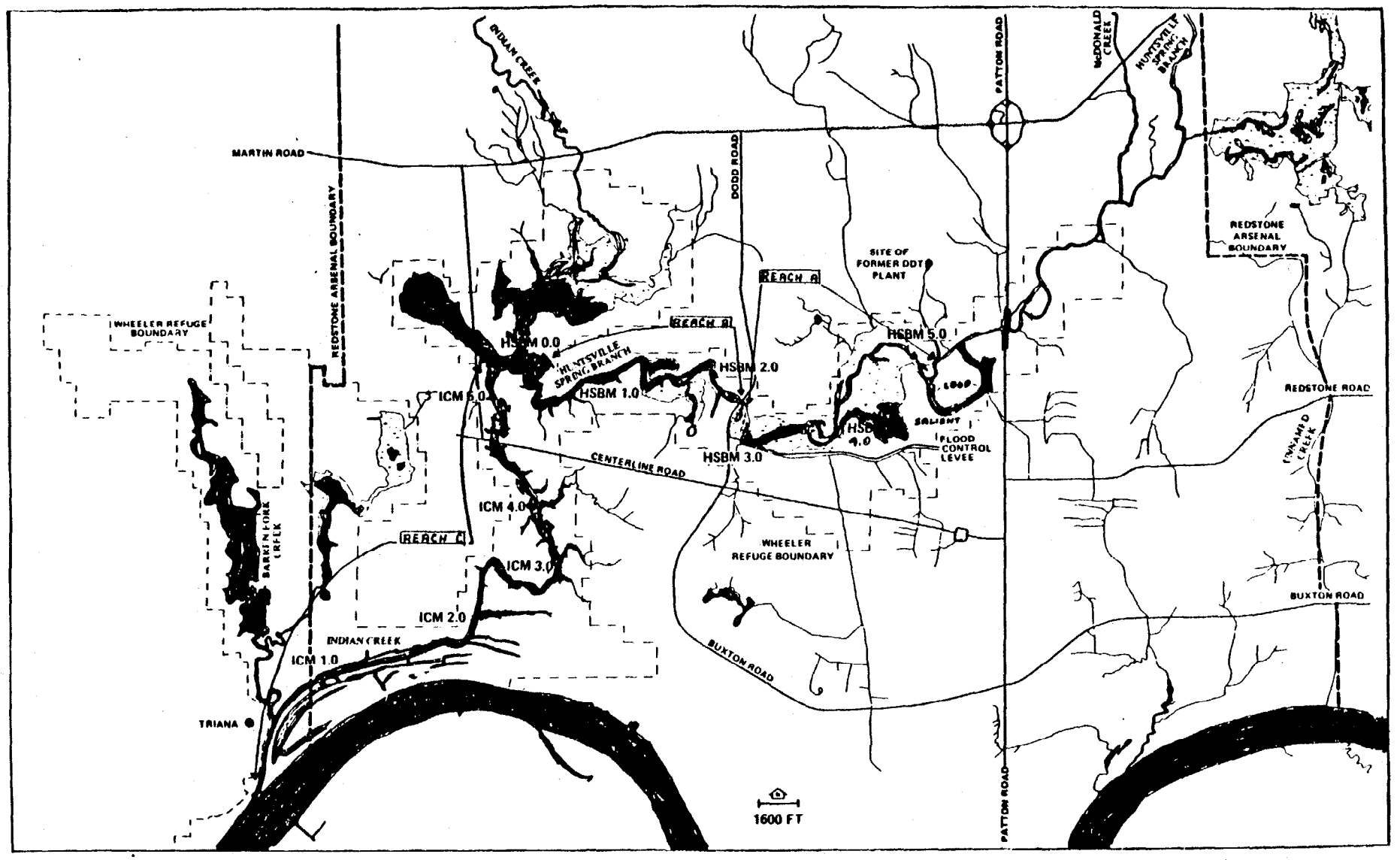


FIGURE 1. GENERAL SITE MAP - HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM

REACH A = HSBM 5.4 to HSBM 2.4

REACH B = HSBM 2.4 to HSBM 0.0

REACH C = ICM 5.6 to ICM 0.0

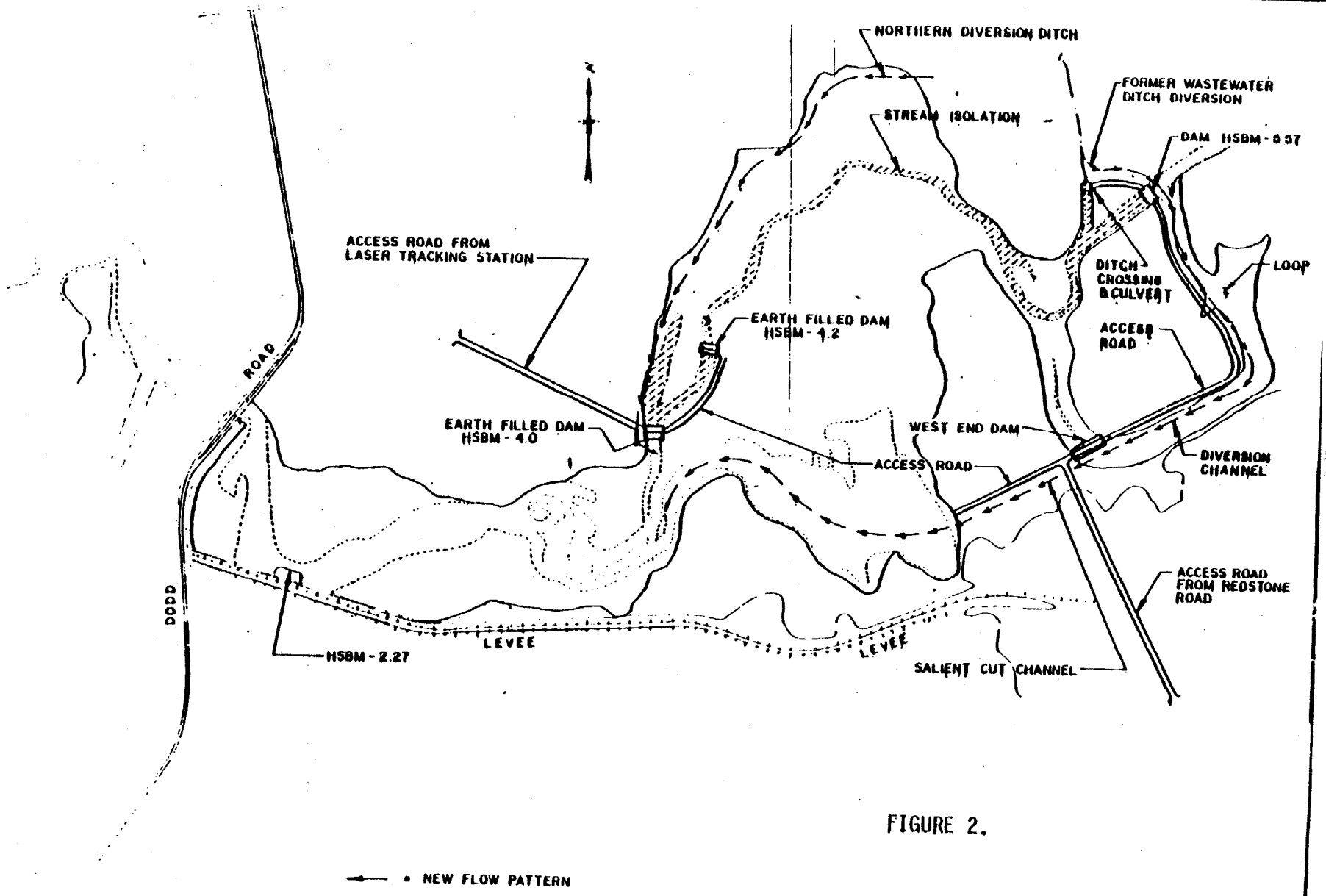

NORTHERN DIVERSION DITCH
FORMER WASTEWATER DITCH DIVERSION
STREAM ISOLATION
DAM HSBM - 6.57
ACCESS ROAD FROM LASER TRACKING STATION
DITCH CROSSING & CULVERT
LOOP
EARTH FILLED DAM HSBM - 4.2
ACCESS ROAD
ROAD
EARTH FILLED DAM HSBM - 4.0
WEST END DAM
ACCESS ROAD
DIVERSION CHANNEL
DODD
ACCESS ROAD FROM REDSTONE ROAD
HSBM - 2.27
LEVEE
LEVEE
SALIENT CUT CHANNEL
NEW FLOW PATTERN

FIGURE 2.

APPENDIX I

Olin CHEMICALS GROUP
120 LONG RIDGE RD., STAMFORD, CONN. 06904

August 13, 1984

Mr. Howard Zeller
Chairman Review Panel
Environmental Agency
345 Courtland St. N.E.
Atlanta, GA 30365

Dear Mr. Zeller:

Pursuant to requests made at the Review Panel meeting on August 7, 1984, we are pleased to submit the following supplemental information to our Remedial Action Plan submitted on June 1, 1984.

After careful review and study of our Remedial Action Plan, we have concluded that additional DDT can and will be isolated in the Plan area, i.e. HSBM 5.4 to 4.0. The tons of DDT involved are:

	DDT isolated, tons	
	Initial	Revised
Channel	286	288
Overbank	0	20.0
Ponded	0	0.2

Approximately nine (9) tons of DDT will remain in the overbank area. This area covers 180 acres. Of the nine (9) tons, approximately 4½ tons are in the 0-3 inch depth fraction. Thus, about 4½ tons of DDT in 180 acres will be potentially available in the overbank area. This overbank area is not very conducive to erosion and little, if any, DDT will be released from the area during the few days in a year (18 in 1983) when the overbank area is covered with water. More than 95% of the DDT in the remedial action area - HSBM 5.4 to 4.0 - is being addressed by our plan.

Additional or on-going laboratory and field studies were addressed in Section IX of the June 1, 1984 Proposal. These studies have been discussed in Quarterly Reports, Technical meetings, and Review Panel meetings as well. These studies include sediment uptake, diet uptake, and in-stream cage studies as well as a consistent-effort fish sampling program. Per the June 1 Proposal the schedule for this latter program is to start in Summer 1984 and continue for 12 months. Additional schedule information is as follows:

In situ cage studies	Complete 6/85
Time-of-travel studies	Complete 3/85
Water sampling	Weekly until 4/85
Sediment studies	Complete 6/85
Diet studies	Complete 6/85

The dates stated are, of course, based upon what we know at the present time. Studies may be shortened or lengthened depending upon test results obtained.

The engineering schedule as best we knew it at the time of plan submission was presented as Figure VII - 2A. It indicated engineering would occur 11/84 to 7/85, during which time we would expect to generate material for review and approval. Since June 1, 1984 we have been selecting and interviewing engineering firms qualified to do the detailed engineering. We have selected four (4) firms and plan to begin on-site interviews the week of August 13th. Our present plan, contingent upon the Review Panel approving our plan on September 1st, is to place an engineering contract by October 1st. By November 30th we would expect to have a detailed schedule so we could inform Review Panel members when specific documents will be available for review. The Consent Decree recognized that detailed engineering could not proceed until after Plan approval. As such we were unable to submit detailed time schedules with our Plan. Beyond the dates on Figure VII - 2A we have developed, per Panel request, a rough estimate of activities as follows:

o Site surveys	November - December 1984
o Preliminary Engineering	January - March 1985
o Preparation of Plans & Specs	April - September 1985
o Salient cut	April 1985
o Flow Division	May 1985
o Roads, Diversion ditch	May - July 1985
o Channel fill	June - July 1985
o Permits	February - November 1985

The long-term monitoring plan was addressed in the June 1, 1984 Remedial Action Plan in Section VIII. The plan was briefly discussed at the Technical Meeting on August 6th. It was agreed that after September 1, 1984 we would cooperatively develop further details of the long-term monitoring program. The comments on our plan from Review Panel members did contain two (2) questions/comments relative to the Section VIII program. Both were answered in our submission of July 14, 1984.

The monitoring plan will be used after October 1987 when the diversion portion of the Plan is scheduled to be completed and after November 1988 when the channel filling operation is scheduled to be completed. We, therefore, do have adequate time to address the long-term monitoring plan and develop it in view of all the test data we have and are continuing to obtain. As discussed at the Technical and Review Panel meetings on August 6 and 7, however, we believe we should give high importance to the development of this program and we agreed to submit the plan with more details by November 1, 1984. The schedule after that is dependent upon the time required for comments, discussion, change, etc. We do have time to develop a program because it is not needed until October 1987.

We believe the above answers the several concerns expressed by the Review Panel at the August 7, 1984 meeting.

Very truly yours,

Verrill M. Norwood

Verrill M. Norwood
Vice President
Environmental Affairs

cc: Review Panel

APPENDIX 2

Environmental Consequences of The Remedial Action Plan

The environmental consequences of the Olin Corporation remedial action plan are described below. They are not specifically quantified, because detailed plans and specifications will not be completed until July 1, 1985. These plans and specifications will be subject to review and approval by the Review Panel. The Olin Corporation will be required to prepare site-specific environmental analyses as part of the required permit applications.

The existing state of the environment in the HSB-IC System is a significant factor in determining the appropriateness of a remedial action. It is important to avoid aggravating the existing environment while implementing the remedial action.

Water Quality and Quantity

Construction activities will cause temporary adverse effects on water quality by increasing turbidity and suspended solids. Some erosion may occur until restabilization is completed. The planned sequence for construction of the dams and diversion channel and for isolation and filling of the old channel should minimize the potential for suspension and transport downstream of DDT contaminated sediment.

Once the filled isolated channel and the overbank area have been stabilized, the potential for future scouring of DDT contaminated sediment is expected to be significantly reduced. No significant changes in sediment erosion are anticipated in Reaches B and C, because the Wheeler Reservoir backwater level, which is the major hydrologic control, and the Dodd Road bridge, which also controls flow, will not be affected by the remedial action. Uncontaminated sediment from upstream will continue to be carried downstream and be deposited over contaminated sediment. As the major source of DDT is isolated, concentrations in the water column will decrease.

There should be only minor changes in the water level of Reach A after completion of the remedial action. The level is determined by the level of Wheeler Reservoir during lower flows and reservoir backwater floods. The level is controlled by the channel constriction at HSBM 2.72 and the Dodd Road bridge during headwater floods at low reservoir pool levels. Since no permanent changes will occur to the operation of Wheeler Reservoir or to the Dodd Road bridge from the remedial actions, no significant upstream water level changes are expected.

The normal HSB channel between HSBM 5.6 and 4.0 is 50-100 feet wide with numerous blockages by sand bars and fallen trees. The diversion channel will be at least 80 feet wide and will have no blockages. Thus, the potential for additional flooding upstream from this area will be minimized.

The new channel to be cut through the salient will be able to handle higher flows than the original channel. The flows from the cut will be routed through the embayment. The flow characteristics through the embayment are being defined and these characteristics will be considered in the engineering design to minimize scouring and downstream transport of DDT contaminated sediment.

Periodic flooding will continue to occur in Reach A as a result of Wheeler Reservoir backwater flooding and during headwater storm events. All dams and the channel stabilization will be designed to withstand repeated flooding. The remedial action is not expected to create any additional ponded areas with elevated DDT concentrations.

The rerouting of HSB in conjunction with future actions in lower Reach A is not expected to change the flow regime downstream from HSBM 2.4. The planned diversion of the Huntsville wastewater treatment plant effluent to the Tennessee River will reduce water flow in the HSB by some 30 million gallons per day. The removal of this effluent will improve the existing low dissolved oxygen problem in the HSB System and will permit additional fish to move further upstream. The decreased flow will have minimal effect on the planned remedial action because water levels are controlled by the level in Wheeler Reservoir.

Aquatic Ecology

The existing benthic habitat in the old channel will be destroyed when it is isolated and filled. Excavation of the Loop area will also destroy existing benthic habitat. Clearing and grubbing will remove natural snags that serve as habitat for existing aquatic invertebrates and provide shelter for fish. The aquatic communities will recover over a period of time; however, the loss of snags and the unique habitats they provide will represent a long-term loss. The new diversion channel will be clear of obstructions that would provide desirable habitat.

Fish will likely move out of the area during construction activities. Once construction has been completed, fish will return but will find less available food. However, the sediment in the Loop and new diversion channel are expected to be relatively free of residual DDT.

The majority of the area is composed of various types of wetlands ranging from standing water marshes to seasonally inundated forested sites. Approximately 55 acres will be impacted directly by construction activities. The proposed diversion channel along with the planned northern rainfall collection ditch will alter the hydrology at the site and may detrimentally affect some of the remaining wetlands. Some wetland areas may receive less water from overbank flooding and runoff waters, resulting in a change to more upland types of vegetative communities. The overall flood storage capacity of this area is not expected to be altered significantly.

Terrestrial Ecology

Existing terrestrial vegetation will be destroyed during construction activities. Less food and habitat will be available to the wildlife in the area. Areas will be revegetated to reestablish habitat after completion of construction.

At this time, no significant impacts to endangered, threatened, or special concern biota are expected within the immediate area planned for remedial action. Two alligators have been sighted downstream at HSBM 2.72 and 2.2, but alligators would probably avoid the area during construction.

Groundwater

The potential for subsurface migration of DDT either laterally or vertically is extremely low because of the low permeability of soils in the contaminated areas, the low solubility of DDT in water (approximately 1.2 micrograms per liter), the strong tendency of DDT to adsorb to clay soils, and the limited mobility of particulates in groundwater. Even if traces of DDT were to migrate into the regolith aquifer, further migration downward to and through the underlying limestone bedrock aquifer is not expected because this area is a groundwater discharge area rather than a recharge area.

Monitoring has not shown DDT contamination of groundwater. In 1979, EPA sampled groundwater from public and private water supply wells in the area and found none to be contaminated with DDT or its metabolites. Further, extensive groundwater monitoring conducted for the Army and described in a report prepared by W.A.R., Inc., in 1983 concluded there was no significant contamination of groundwater by DDT at the Redstone Arsenal. Additionally, the results of the Olin Corporation groundwater sampling agree with earlier results. Considering there is no present indication of groundwater contamination by DDT, the properties of DDT, and the hydrogeology of the area, the potential for contamination of groundwater is considered to be remote.

Other

Exhaust emissions from construction equipment and additional vehicular traffic will occur, but their impact will be minimal. Olin will employ fugitive dust control measures as necessary on unpaved roads. Noise is not anticipated to be a problem because no blasting is planned.

A cultural resource survey has indicated that one site, located approximately 30 meters north of HSBM 4.4, may have potential for listing on the National Register of Historic Places. No activities are planned in the vicinity of this area, and no effect is expected on this site.

Land use will be altered by the construction of access roads and the new diversion channel. These changes should not effect the existing land use in the surrounding area other than approved, scheduled effects to Redstone Arsenal activities.

APPENDIX 3

Alternatives to Proposed Remedial Action Plan

This is a summary of alternatives identified by Olin Corporation and the 1980 study by Water and Air Research Inc. (W.A.R) that have been considered by the Review Panel.

Several generic approaches were examined by Olin. They are in-place isolation, low-level dams, removal of contaminated sediments, channel rerouting, biological management, out-of-basin diversion, and destruction. Specific alternatives, including the Olin proposed remedial action, were then developed from these generic approaches. Alternatives were also addressed by the 1980 W.A.R. report.

In-place isolation involves leaving the contaminated sediment in place and using physical means to render it less mobile. Such techniques would include covering the sediment with material such as rip-rap, gravel, clean earthen fill, or geotextile fabrics. These materials, if properly installed, would inhibit the erosional capacity of the stream and thus reduce migration of DDT-contaminated sediment.

There are a number of problems associated with using this method alone. The wetland nature of the site would provide a poor foundation for heavy equipment. The lack of adequate accessibility to many areas could complicate remedial activities. Isolation of the DDT while attempting to maintain a flow in the channel could be difficult. Significant quantities of DDT-laden sediment could be resuspended and carried downstream should isolation be ineffective.

Placement of fill or gravel underwater would be complicated by snags and debris. Addition of substantial material to the channel bottom would reduce cross-sectional area of the channel, thus increasing velocities and altering hydrology. Rip-rap and earthen cover material would have to be sufficient to resist erosional forces during high flows. Efficient placement of this material would be very difficult.

Geotextile fabric overlain by coarse material would also be very difficult to install. Obstructions on the channel bottom would preclude an even cover. There is limited experience in laying this material in deeper water, and divers would likely be required for portions of the work. Long-term stability would be very difficult or impossible to maintain. Materials could shift or the fabric could tear, either of which could release trapped sediment to be transported downstream.

None of the in-place isolation methods alone was deemed sufficient to meet the Consent Decree performance standard.

Low-level dams were considered to reduce transport of sediment and DDT while allowing flow of water in existing channels. This approach would be most effective in controlling the sediment bed load but would have less effect on fine particles. Olin's analysis indicated that bed load transport may be of lesser importance in DDT transport than clay particles. Additionally, constructing dams while maintaining flow during construction would be difficult.

Removal of contaminated sediments from waterways by mechanical dredges, hydraulic dredges, pneumatic dredges, or mechanical techniques such as backhoes, clamshells, or draglines was considered. These techniques could remove contaminated sediments from the stream channel and the overbank areas. There are several concerns with this alternative, including creating DDT contaminated turbidity, locating a place to dispose the contaminated sediment, and the environmental consequences of significantly altering the stream benthos.

Mechanical and hydraulic dredges can result in high generation of turbidity. Without virtual isolation of the areas being dredged by these techniques, significant additional transport of DDT contaminated sediment could occur. Pneumatic dredges are credited with low generation of turbidity, but are inefficient for removal of consolidated sediments such as those that occur in much of Reach A. In many areas, especially uncontaminated locations or isolated areas, mechanical techniques such as a dragline could be appropriate.

Turbidity and associated DDT transport downstream would be produced not only by the actual removal operation but also by snagging and clearing of trees, stumps, and flotsam. A significant amount of clearing would be required because much of the channel bottom is covered with tree debris and stumps.

Channel rerouting would involve isolation of DDT in channel areas by diversion of flow from the natural channel to a new, uncontaminated area. This method isolates the bulk of the DDT from the water flow and thereby eliminates downstream transport and contact by fish. New channels would be constructed to carry the flow from a range of flow conditions. The design of the new channels would have to consider hydrogeology and hydrodynamics, flood conditions, and runoff effects. Dams, dikes, and levees might be necessary to maintain desired flow patterns. Pumping facilities might also be necessary to transfer local runoff.

This alternative would significantly reduce the potential for increased transport downstream of DDT-contaminated sediment. Habitat destruction would occur, and accessibility and stability required for heavy equipment and construction would be difficult.

A biological management alternative involving the placement of fish barriers and periodic removal of fish contaminated with DDT from Reach A of HSB was considered. The primary use of this alternative alone would not significantly reduce the transport of DDT but would remove from the system fish that had been exposed to the highest levels DDT contamination.

Periodical harvesting and disposal of fish and other waterfowl food would reduce uptake of DDT by predatory waterfowl. Concentrations of DDT in fish removed from HSB would be monitored to determine the effectiveness of the overall remedial action taken.

This program has serious drawbacks. Fish barriers are subject to frequent clogging by debris and require frequent maintenance. Smaller mesh sizes, required to stop smaller fish, are more susceptible to clogging. Harvesting methods cannot be expected to remove all fish, because both electroshocking and rotenone poisoning have limited ranges. This approach would do nothing to isolate DDT from the fish. Additionally, this type of management would not control plankton, which would remain free to drift downstream and be consumed by fish and other organisms.

Under the out-of-basin diversion alternative, the HSB would be diverted from above Reach A into an artificial channel directed to the Tennessee River. This approach would eliminate all flow through Reach A other than local runoff. The W.A.R. report presented this technique in some detail and identified significant environmental impacts including alterations and destruction of large areas of habitat and reduction of flow in IC. Because of the adverse environmental impacts, this technique was not further considered.

Techniques are available for destruction of organic contaminants either in place or after removal. In-place biological or chemical destruction, neutralization, and detoxification have been demonstrated in laboratory-scale demonstrations for certain compounds. However, large scale in situ treatment of DDT or related compounds has not been shown feasible.

Off-site treatment of contaminated soils and sediment is possible through several emerging technologies. Neutralization and detoxification, microbial degradation, and incineration are all possible techniques. However, the techniques have not been developed sufficiently to handle and treat the large quantities of material that would be involved in this remedial action. Additionally, large-scale transport of this amount of contaminated material over an extended period would have adverse impacts on local roads and traffic.

Olin then selected two of the generic approaches, channel rerouting and in-place isolation, for development into three site-specific alternatives. The selected alternative, channel isolation with rerouting of HSB, is described in Section II of this document. The remaining two alternatives examined are described below.

Channel rerouting only was considered. This alternative would consist of blocking the existing flow channel in the HSB from HSBM 5.57 to 4.0 with earth-filled dams to prevent flow from entering that designated area. To compensate for this removal, a new channel would be constructed. The new channel would begin at the southwest portion of the Loop and would be excavated through the peninsula immediately north of the levee protecting Test Area 1 (the salient). Flow would pass through the southern embayment area and return to the HSB immediately downstream from HSBM 4.0.

This alternative would reduce, but not eliminate, the downstream transport of contaminanted sediments. The potential for direct exposure and transport would be curtailed during low flows but not during high flows. The existing contaminated area would remain available to wildlife. Thus, while this alternative would address a portion of the problem, this action alone was not considered to be adequate.

In-Place Isolation with Natural Channel Rerouting was also considered. Under this alternative the contaminated channel of the portion of Reach A between HSBM 4.0 and 5.4 would be isolated by diverting flow through the Loop and the existing shallow ponds and marshy areas of the embayment located south of the present channel. Blocking dams would be constructed at HSBM 5.57 and 4.0 and on the Loop.

The existing channel, after isolation, would then be filled with clean material that would be imported to the site. No new channel would be constructed; instead, the HSB would be allowed to find its own new course. This would avoid the environmental impacts associated with new channel construction. However, the flow could cut back into the isolated channel segment. The contaminated sediment could then be transported downstream. This alternative was determined to be insufficient.

The W.A.R. Report discussed several of the previously described approaches plus some additional alternatives. The approaches considered were natural restoration, dredging and disposal, out-of-basin diversion and removal of contaminated sediments, out-of-basin diversion and containment of contaminated sediments, within-basin diversion and removal of contaminated sediments, and within-basin diversion and containment of contaminated sediments.

Under a natural restoration alternative, isolation of DDT contamination would be left to natural processes. For the existing situation to improve, one of three things would be required: (1) the DDT would have to be degraded to a harmless compound; (2) the DDT would have to become isolated in some manner from the rest of the environment; or (3) the DDT would have to be flushed from the system.

Because of the known persistence of DDT, especially at the high concentrations found in HSB, the natural degradation rate would be very slow. The estimated half-life is on the order of 20-30 years. Under the most optimistic assumptions, DDT could be expected to remain in the system for a long time.

The most likely method of the material becoming naturally isolated from the environment would be burial by natural sedimentation. While the former DDT plant has been closed for over ten years, a substantial amount of DDT is still close to the surface. Thus, natural restoration does not appear to be proceeding at a very rapid rate.

Given the mass of DDT in the system and the current estimates of transport rates, it appears that hundreds of years would be required to flush the system naturally. The negative impacts to the Tennessee River would far outweigh any gains from this approach.

A specific dredging and disposal alternative was developed. The HSB and IC channel sediments would be dredged hydraulically to a depth of 3 feet. The overbank area would be dredged by dragline to a depth of 3 feet. Hydraulically dredged sediments would be pumped to a disposal area, where they would be dewatered. Dragline-dredged sediments would be hauled by truck to the disposal area.

This alternative could result in suspension and redistribution of DDT downstream in HSB-IC. During operations, the contamination of fish and wildlife with DDT could be significantly increased. This action could actually increase contamination of fish caught in lower portions of IC and the Tennessee River.

This alternative would require extensive destruction and alteration of wetland habitat. Fish would be likely to move to avoid dredging. Once dredging were completed and fish returned, there would be a decrease in available food supply for several years. The food available upon their return could be expected to be contaminated with residual DDT, although ultimately at lower concentrations.

During the dredging and dewatering phase, wildlife would be exposed to the disposal area until its closure. Water quality would be somewhat degraded by turbidity, increased suspension and redistribution of DDT, and increased solid loadings as a result of erosion.

Out-of-basin diversion and removal of contaminated sediments was addressed in the 1980 W.A.R. Report. The HSB would be diverted from 3 miles upstream of the highly contaminated area directly to the Tennessee River. Channel sediments between HSBM 2.4 and ICM 0.0 would be hydraulically dredged under near-zero flow conditions. The channel between HSBM 2.4 and 5.6 may be hydraulically dredged or dredged with a dragline if the area were dewatered by construction of a containment dike. Overbank sediments would be dredged by dragline.

This alternative would require considerable destruction or alteration of habitat. Excavation of the diversion channel would be expected to meet bedrock in at least two areas. Flow in IC would be reduced by more than one half, but water levels would not change significantly because they are controlled by Wheeler Reservoir.

Out-of-basin diversion and containment of contaminated sediments is an additional alternative addressed in the W.A.R. Report. The HSB would be diverted from 3 miles upstream of the highly contaminated area directly to the Tennessee River. Channel sediments between HSBM 2.4 and ICM 0.0 would be dredged hydraulically. A containment dike would be constructed. Channel and overbank sediments within the containment area would be covered with compacted clay and clean fill.

Impacts from construction of the diversion channel would be the same as described above. The area to be isolated for containment is largely a wetland system. The areas surrounding that to be filled or covered could be expected to become drier, with associated shifts in species. Lower spots within the area would likely become pools on ponds. The existing contaminated wetland system would become a noncontaminated upland. This alternative would also require significant destruction or alteration of habitat.

Within-basin diversion and removal of contaminated sediments was considered. The HSB would be diverted around the highly contaminated channel between HSBM 3.9 and 5.6. A containment dike would be constructed. HSB and IC channel sediments downstream from the containment area would be dredged hydraulically under near-zero flow conditions, or dredged by dragline if the containment area were dewatered. Overbank sediments would be dredged by dragline.

Dredging would increase turbidity levels and, without careful controls, could significantly increase the distribution downstream of DDT contaminated sediment. A within basin diversion channel would require destruction of significantly less habitat than an out-of-basin diversion.

Another alternative discussed is within-basin diversion and containment of contaminated sediments. HSB would be diverted around the highly contaminated channel between HSBM 3.9 and 5.6. A containment dike would be constructed. HSB and IC channel sediments downstream from the containment area would be dredged hydraulically. Channel and overbank sediments within the containment area would be covered with compacted clay and clean fill. This alternative included an option for constructing, within the containment area, a disposal area for sediments dredged downstream from HSBM 3.9. The impacts of this alternative have been discussed under the removal of contaminated sediments, channel rerouting, and dredging and disposal alternatives. In addition, construction of a permanent disposal area and a longer diversion channel would cause increased loss and alteration of wetlands.

APPENDIX 4

Public Comments and Responses

On July 14, 1984, after 30 days advance notice to the public through local newspaper advertisements, a public hearing was held in the Town of Triana, Alabama, to provide information to the public and receive comments on the Olin Corporation remedial plan. More than four hundred people attended the July 14 public hearing, twenty people registered to speak and eleven actually made statements.

The hearing record was kept open until July 28, 1984, to receive written comments. In addition to the oral comments entered into the record at the July 14, 1984, hearing, seventeen written comments were received by July 28, 1984, and nine were received after that date. All comments, oral and written, have been made part of the public record and have been considered by the Review Panel in its deliberations on the Olin Corporation remedial proposal.

Those comments pertaining specifically to the remedial proposal may be generally classified into three categories: supporting the plan, supporting the plan with modifications, and recommending alternative remedies. The majority of the commenting citizens from the immediate area of the contamination supported the Olin Corporation's proposed remedial plan. They urged the Review Panel to approve the plan and the Olin Corporation to complete the proposed isolation of the DDT as rapidly as possible.

Several people had specific concerns. These concerns dealt with the long term monitoring program, a lack of specificity in the plan, the varying amounts of DDT reported in HSB-IC, the scope of the Olin Corporation remedial action plan, the potential for groundwater contamination, the groundwater monitoring program, the permanency of the isolation of the DDT, and the appropriateness of alternative remedial actions.

Some of the comments made at the public hearing and by mail addressed matters outside the scope of the public hearing and the Review Panel's deliberations on the remedial plan and are therefore not appropriate subjects for consideration by the Review Panel. Comments relating directly to Olin's remedial proposal are addressed below.

The long-term monitoring program will be further defined and resubmitted to the Review Panel on February 1, 1985. The minimum types of samples and the sampling and analytical protocols were set forth in the Joint Technical Proposal to Implement Remedial Activities developed pursuant to the Consent Decree. Comments concerning the statistical analyses to be used to verify reduction of DDT in fish, the adequacy and availability of selected species, sampling periods, and quality assurance will be carefully considered by the Review Panel in its deliberations on the final monitoring plan. Additionally, laboratory studies addressing sediment and diet uptake, the instream cage study, and the fish sampling program will continue, and time-of-travel studies and a water sampling program will be instituted.

Comments concerning a lack of detailed information will be addressed upon submittal by Olin of the preliminary detailed engineering design work on April 1, 1985. The Review Panel has review and approval authority for this engineering design. The Review Panel will take the comments received during this comment period into consideration during its review of and subsequent action on the detailed design.

Several commenters noted the range of numbers reporting the amount of DDT in the HSB-IC system. The figure of 4,000 tons was the result of a preliminary assessment conducted by TVA in 1978. This assessment was used to determine the need for further study. A more detailed engineering study conducted by W.A.R., Inc., 1980, subsequently reported a total of 837 tons in the HSB-IC system. Following the discovery of a mathematical error in calculations, this figure was revised by W.A.R., Inc., to 475 tons. This amount is close to Olin's investigatory results of 422 tons.

Concerns expressed regarding the scope of Olin's remedial action plan as submitted have been considered by the Review Panel. In-house reviews have also been performed by the various agencies involved. These concerns and reviews have resulted in additional discussions and modifications to the proposal as set forth in the August 13, 1984, letter from the Olin Corporation (Appendix 1) and the Review Panel decision. The modifications include isolation of DDT in the overbank area, expansion of the amount of DDT to be isolated or removed in Reach A, and further identification of the extent of DDT contamination in Reaches B and C.

Potential groundwater contamination was a concern of several commenters. This issue has been carefully evaluated. The potential for subsurface migration of DDT either laterally or vertically is extremely low because of the low permeability of soils in the contaminated areas, the low solubility of DDT in water (approximately 1.2 micrograms per liter), the strong tendency of DDT to adsorb to clay soils, and the limited mobility of particulates in groundwater. Even if traces of DDT were to migrate into the regolith aquifer, further migration downward to and through the underlying limestone bedrock aquifer would not be expected because this area is a groundwater discharge area rather than a recharge area.

Monitoring has not shown DDT contamination of groundwater. In 1979, EPA sampled groundwater from public and private water supply wells in the area and found none to be contaminated with DDT or its metabolites. Further, extensive groundwater monitoring conducted for the Army and described in a report prepared by W.A.R., Inc., in 1983 concluded there was no significant contamination of groundwater by DDT at Redstone Arsenal. Additionally, the results of the Olin Corporation sampling agree with earlier results. Considering there is no present indication of groundwater contamination by DDT, the properties of DDT, and the hydrogeology of the area, the potential for contamination of groundwater is considered to be remote.

Several questions were raised regarding the groundwater monitoring program and the adequacy of the baseline. The groundwater wells that have been sampled by the Olin Corporation as part of its compliance with the terms of the Consent Decree are wells that were previously installed on Redstone Arsenal for the purpose of detecting any DDT contamination of groundwater that might exist. Olin was required by the terms of the Consent Decree to sample specified groundwater wells in 1983 to establish a baseline for purposes of measuring the results of the remedial action. In addition, groundwater sampling is to be performed by Olin once every two years for up to ten years or until three consecutive samples indicate no contamination.

The wells specified for monitoring in the Consent Decree were selected from the existing wells at Redstone Arsenal. They represent sampling points upgradient from the old outflow ditch and downgradient from where the ditch crossed the former plant site. The public water supply wells specified are located off Redstone Arsenal property on the north, east, and west sides. There are no active public water supply wells to the south between the Arsenal and the Tennessee River.

The comments that addressed sampling frequency, the location of monitoring wells, and the need for unfiltered samples will be considered by the Review Panel in its review of the final long-term monitoring plan, to be submitted by Olin on February 1, 1985.

Some commenters raised concerns regarding the permanency of isolation of DDT contaminated sediment with regard to possible erosion, scouring and/or flooding. DDT has a low solubility in water, and any significant transport of DDT out of the area would primarily occur from transport of contaminated sediment. Soils underlying the area are predominantly clays, to which DDT strongly adsorbs. The covering of contaminated sediments, subsequent revegetation, the diversion of the former wastewater ditch, and the construction of the rainfall diversion ditch should minimize this possibility. All dams, the area isolated, and the channel stabilization will be designed to withstand repeated flooding and erosion.

No significant erosion or scouring of contaminated sediment from the area isolated is expected. Once contaminated sediments are covered with clean fill material and stabilized, the area isolated will have an elevation similar to the overbank area. Historically, the overbank area has not been subject to significant scouring, but rather has been a depositional area. The area isolated also is expected to be a depositional area after completion of the remedial action.

No significant modification of flow is expected to occur from the implementation of the plan that would be expected to alter the frequency of flooding or the potential for scouring. Most flooding events are caused by backwater from Wheeler Reservoir. The new diversion channel will be designed to carry a greater volume of flows than the existing channel and will not cause additional flooding. Further, the removal of the Huntsville wastewater treatment plant effluent will reduce flows in the HSB system by an estimated 30 million gallons per day. These features of the area and the remedial plan indicate that permanent isolation should occur, with minimal scouring and resuspension of DDT-contaminated sediment from the area isolated.

Recommendations for several alternative remedial actions were received as comments, and are discussed below.

1. Dredge and Transport Offsite - This alternative was considered in the W.A.R. Report, 1980. Dredging would result in a significant opportunity for suspension and redistribution of DDT further into the HSB-IC system and into the Tennessee River. During the operations, the contamination of fish and wildlife with DDT could be significantly increased. The added transport could result in higher levels of contamination occurring in downstream areas. This action could increase the contamination of fish in the lower portions of IC and the Tennessee River.

This alternative would involve destruction of the major portion of the existing natural habitat of HSB and much of IC. Aquatic habitats and wetlands covering hundreds of acres would be destroyed or drastically altered. Depending on the alternative chosen, almost 72 acres of stream bank would be converted to access roads, over 12 miles of pipelines with 11 booster pumps would be installed for transporting dredged material, 187 acres of upland habitat would be converted into disposal areas, and a two to three million gallon per day (MGD) water treatment plant and/or a four million gallon per day pumping station would have to be constructed. In all, an estimated 1000 acres of upland and aquatic habitat would be significantly altered.

Following dredging, the material would have to be transported from the site. Transportation of the DDT-contaminated sediments to a licensed hazardous waste landfill would be difficult. The nearest permitted hazardous waste landfill is located at Emelle, in west Alabama, approximately 170 miles away. Local roads and traffic would be adversely affected by the truck traffic necessary to move this amount of material. A large number of specialized trucks would be required. Transport of this material could require as much as five years to accomplish. Prior to hauling, the sediment would require dewatering, which would create an added problem of disposing of the contaminated water and would increase the risk of DDT being released to the environment.

The adverse effects from this remedy, including the potential for redistribution of the DDT into the environment from dredging and transportation, the other severe environmental consequences of dredging, the effect on local roads and traffic, and the questionable additional benefits that might be obtained indicate this alternative is not in the public interest.

3. Destroy Fish and Restock - This method, to be successful, would involve killing fish - not only resident in the HSB-IC System, but also fish resident in the Wheeler Reservoir - because fish migrate from Wheeler Reservoir into HSB-IC and can become contaminated. Methods for accomplishing this approach would be detrimental to the entire system, because the effect could not be limited to fish. Collection and disposal of the contaminated fish would be a considerable problem. Since the typical lifespan of the

fish in this area is approximately ten years, this action could eliminate some of the contaminated fish from HSB-IC faster than normal mortality. However, the benefits to be gained from this approach are not deemed to justify the severe environmental consequences.

4. On-Site or Off-Site Detoxification - In-place biological or chemical destruction, neutralization, and detoxification, have been demonstrated in laboratories but have not yet been proven feasible for large scale treatment. In addition, research performed in the 1970s on incineration of DDT found the method to be feasible for small amounts of material but not manageable for large amounts. Any of these methods would require dewatering the material prior to on-site or off-site treatment. Dewatering would create an added disposal problem and increase the risk of releasing DDT back into the environment. For off-site treatment the material would have to be hauled by truck, with the added risks and environmental consequences inherent in the transport of large quantities of contaminated sediment.

5. Wetlands Mitigation - Mitigation for the loss of wetlands is an alternative that will be considered through the various federal and state permitting processes.

APPENDIX 5

Flood Easement Considerations

TVA has no custody or control of lands within Redstone Arsenal, thus, the proposal as modified would not require any TVA land use authorization. However, TVA has flood easement rights up to elevation 560. The Olin proposal as modified does not appear to have any major effect on TVA reservoir flood storage capacity; however, some compensation may be required for losses of power storage capacity between elevations 550 and 556.3. TVA cannot make any guarantees with respect to water levels in the project area, nor can the water levels resulting from normal reservoir operations be changed except in special circumstances. These circumstances would have to be fully evaluated in advance by TVA and may require compensation for any alterations.

APPENDIX 6

U. S. Fish and Wildlife Service Considerations

The U. S. Fish and Wildlife Service plans to conduct a wildlife monitoring program on Wheeler National Wildlife Refuge to determine residues of DDT in various species of wildlife. The data obtained from this program will be submitted to the Review Panel.

APPENDIX D

DECISION DOCUMENT NO. 2

Baseline Data, Substitute Species, and Interim
Goals for Fish and Water,
October 28, 1986.

REVIEW PANEL DECISION DOCUMENT NUMBER 2 -

BASELINE DATA, SUBSTITUTE SPECIES, AND INTERIM GOALS

FOR FISH AND WATER

I. Introduction:

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division - the Honorable Robert B. Propst) entered, as part of an overall order settling litigation between the United States of America, the State of Alabama, and four sets of private parties against the Olin Corporation, a Consent Decree that governs the development and implementation of remedial action for the DDT contamination in the Huntsville Spring Branch - Indian Creek (HSB-IC) System. The Consent Decree requires the Olin Corporation to develop and implement a remedial plan that will meet a performance standard of 5 parts per million (ppm) of DDT* in fillets of Channel Catfish, Largemouth Bass, and Smallmouth Buffalo in specified reaches of the HSB-IC System consistent with the goals and objectives of the Decree. Those Reaches are:

A - HSB Mile 5.4 to 2.4
B - HSB Mile 2.4 to 0.0
C - IC Mile 5.6 to 0.0

* The term DDT is used here as it is defined in the Consent Decree (p.4), and includes isomers of the compounds DDT, DDD (or TDE), and DDE.

A Review Panel, consisting of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana, Alabama, and the Olin Corporation was established by the Consent Decree. The Review Panel responsibilities include, among other things, evaluation of data collected by Olin, taking action on Olin's remedial proposals and agreement on or establishment of baseline data for fish and water, substitute species, and interim goals, in order to effectively evaluate the progress toward attaining the performance standard of 5 ppm DDT in filets of three species of fish.

The Olin Corporation submitted a proposed remedial plan, monitoring program, and construction and implementation schedule on June 1, 1984 as required by the Consent Decree. The Review Panel evaluated the proposed remedial plan and accepted it, with modifications on August 31, 1984. That Decision Document of August 31, 1984 required Olin to propose by August 1, 1985, interim goals for DDT concentrations in fish, suspended sediment, and the water column for the years 2, 4, 6, and 8 following completion of the remedial action. The Consent Decree, in paragraphs 10 and 12, requires Olin to conduct monitoring studies to obtain baseline data which will be used to evaluate the effectiveness of the remedial action, and to provide information on substitute species in the event the performance standard fish are not available.

Olin has obtained data and developed proposals for Review Panel consideration on the issues of Baseline Data for Fish and Water, Substitute Fish Species, Interim Goals, and Long-Term Monitoring Program. The Technical Committee of the Review Panel has reviewed pertinent data and proposals and made recommendations on these issues to the Review Panel. The Review Panel has considered the recommendations, and the information submitted by Olin, along with the objectives of the Joint Technical Proposal to Implement Remedial Activities (Exhibit B to the Consent Decree) in reaching the decisions set out below.

This document sets out the Review Panel Decisions on the Baseline Data for Fish and Water, Substitute Species, and Interim Goals. The Long-Term Monitoring Program will be addressed in a separate document. Nothing in this Decision Document is intended to modify the terms of the Consent Decree and in the event of any inconsistencies between this Decision Document and the Consent Decree, the provisions of the Consent Decree will govern.

II. Decisions

A. Baseline Data Decision

The Consent Decree requires Olin to obtain baseline data on DDT residues in water, fish, and sediments for the HSB-IC System. The procedures and protocols for monitoring are based on the Joint Technical Proposal (Exhibit B to the Consent Decree) and subsequent revisions. Data were provided by Olin as they were available in quarterly progress reports. As requested by the Review Panel, Olin presented the Baseline Data Report for Fish

and Water for the HSB-IC System on March 1, 1986. Baseline data will be used for comparisons with future data collections to evaluate progress toward attainment of the performance standard. It also provides the basis for establishing interim goals, substitute fish species, and a long-term monitoring program.

The baseline conditions for DDT concentrations in sediment, water, and performance standard fish from the HSB-IC System are summarized in Tables 1-3. Table 1 summarizes the distribution of DDT in sediments from the channel, overbank, and ponded areas in each Reach. Detailed discussions and tabulated data are available in the references cited in Appendices A and B.

Specific ranges of fish age classes were used for performance standard fish to reduce the variability and sample processing problems that were found with fish outside the age class range. The average DDT concentration in the filets of the selected age classes was similar to overall average for all age classes, but the selected age classes had a lower variance associated with the average. The data on individual age classes of each performance standard fish are presented in Appendix B.

The March 1, 1986 report includes DDT residue data for water and fish that were collected during Olin's environmental studies conducted between 1982 and 1985. Additional analyses of stored fish samples have been requested by the Review Panel for determinations of substitute species for Largemouth Bass.

The Review Panel's Baseline Data Decision included in this document is based on data submitted by Olin in references cited in Appendix A. Appropriate revisions to the baseline data decision will be considered for incorporation into the data base as additional analytical results of samples collected during the baseline data studies become available.

B. Substitute Species Decision

The performance standard fish are Channel Catfish, Largemouth Bass, and Smallmouth Buffalo of selected age classes (see Table 3). The purpose of the remedy(ies) required by the Consent Decree is the isolation of DDT in the HSB-IC System from people and the environment. In order to evaluate compliance with the performance standard of 5 ppm DDT in the absence of the performance standard fish, it will be necessary to use a substitute species.

The Technical Committee and the Review Panel considered the following factors in selecting the appropriate substitute species: size, feeding habits, residue levels, abundance, and overall similarity to the performance standard species.

A substitute species shall only be used when a performance standard fish of the proper age class cannot be collected. The Review Panel expects Olin to undertake additional effort whenever necessary to collect the performance standard species. Therefore, in the event that a performance standard fish species of the appropriate age class is not collected from a Reach for three

consecutive years, the levels of DDT in filets of its substitute species of selected age classes,* will be used to evaluate attainment of the performance standard and to demonstrate maintenance of the performance standard. If it becomes necessary to use a substitute species rather than a performance standard fish, the substitute fish species will continue to be used for compliance evaluations, even if the original performance standard species is captured later. If both the performance standard species and its official substitute cannot be collected, the Review Panel will select another substitute species as appropriate.

Brown Bullhead will be the substitute species for Channel Catfish and Bigmouth Buffalo will be the substitute species for Smallmouth Buffalo. Additional analyses of other possible substitute species for Largemouth Bass are being performed by Olin. Upon completion of these analyses, the Review Panel will approve an appropriate substitute species for Largemouth Bass.

C. Interim Goals Decision

The purpose of the interim goals is to evaluate Olin's progress toward achieving the performance standard, so that additional remedial measures, if necessary, can be required by the Review Panel in a timely fashion. The development of interim

---

* The selected age classes would be similar to the age class used for the performance standard fish species (see Table 4).

goals is based on available site specific data and the current state of scientific knowledge about the biological effects of DDT, its transport and the anticipated effect of the remedy on DDT residues in water and fish. The Review Panel recognizes that development of interim goals is also based on exercise of sound professional judgment. Accordingly, while the interim goals set forth in this document are valid, in the future changes may be necessary to account for environmental conditions and circumstances that were unknown at this time.

1. Water

The interim goals for DDT concentrations in unfiltered surface water at four locations in the Huntsville Spring Branch and Indian Creek (HSB-IC) system are as follows:

Location	INTERIM GOALS (Net DDT above background)
HSBM 5.0 (Salient Cut)	0.0 ppb
HSBM 2.4	1.5 ppb
ICM 4.6	0.25 ppb
ICM 0.38	0.10 ppb

These goals are measured at four locations as a net increase above the background concentrations. Background DDT in unfiltered water averaged 0.7 ppb based on measurements at the background stations HSBM 9.75 and ICM 8.2 during the Olin's field investigations during 1982-1985. The interim goals are the same for years

2, 4, 6, and 8. The DDT concentrations in unfiltered water on an average and individual basis will be compared to the interim goals for net DDT at each location. Background will be measured during each sampling period for determination of net DDT.

2. Fish

The interim goals for DDT residues in fish reflect the average DDT concentrations in fish filets that would be expected to occur after the remedial action is completed. If the remedial action successfully isolates DDT from people and the environment, fish DDT residues should decrease each year. The specific rate of decrease is difficult to predict, however, DDT residues in the filets of each performance standard fish species must average 5 ppm or less in all three reaches within ten years after the remedial action is completed. This standard must be attained and maintained in accordance with the provisions of the Consent Decr

Olin presented three approaches for predicting interim goals for DDT concentrations in fish filets. Approach 1 (the kinetic model) assumes that stopping the source of DDT will cause a rapid decrease in fish residues in the early years after the remedy is completed followed by a slower decline. Approach 2 (the age distribution model) assumes no loss or gain of DDT occurs by individuals as they mature. This model predicts a moderate rate of decrease. Approach 3 (the linear model) assumes a constant rate of decrease. This is the most conservative estimate of changes in DDT levels.

The Review Panel will use the linear model to calculate interim goals for the changes in average DDT concentrations in filets of each performance standard fish. The average is calculated for fish of specific age classes for each performance standard species that are caught, retained, and analyzed for each Reach of the HSB-IC System. The interim goals are shown for performance standard species on Table 4. The average filet DDT concentration in year 0 is derived from the Baseline Data. The interim goals for substitute species are shown on Table 5. The interim goals for substitute species are based on selected age classes as indicated in Tables 4 and 5.

III. Conclusion

This Decision Document comprises the decisions on Baseline Data for Fish and Water, Substitute Species and Interim Goals, and Appendices A and B, which are attached hereto and are incorporated herein.

These Decisions are accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown by the signatures affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

W. WAYNON JOHNSON
U.S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

COLONEL JAMES A. HALL
U.S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of
Enviromental Management

NONVOTING PARTICIPANTS

Honorable CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: OCT 28 1986

APPENDIX A

REFERENCES

DDT in Fish and Water Baseline Report, March 1, 1986
Olin Chemicals Group, Charleston, Tennessee

Field and Laboratory Investigations of the Huntsville Spring Branch - Indian Creek System, July 1, 1985
Volumes 1 and 2 Olin Chemicals Group, Charleston, Tennessee

Substitute Fish Species Report, March 1, 1986
Olin Chemicals Group, Charleston, Tennessee

Quarterly Progress Report, Number 11, DDT Investigation Huntsville, Alabama, March 1, 1986 (See Appendix IV-C for Substitute Fish Data) Olin Chemicals Group, Charleston, Tennessee

Huntsville Spring Branch - Indian Creek, Post Remedial Action Interim Goals, August, 1985, Olin Chemicals Group, Charleston, Tennessee

Quarterly Progress Report, Number 12, DDT Investigation Huntsville, Alabama, September 1, 1986 Olin Chemicals Group, Charleston, Tennessee (See IV and VI for new baseline data and IV for progress on substitute species.)

DDT Concentrations in Performance Standard Fish by Age Class, August 13, 1986. Handout from Keith Roberts, Olin Chemicals Group, Charleston, Tennessee

TABLE 1

DDT IN THE SEDIMENTS OF THE HSB-IC SYSTEM

REACH	LOCATION	QUANTITY (tons)	PERCENT OF TOTAL
A	Channel (Upper Reach A)	286.0	88.3
	(Lower Reach A)	74.7	
	Overbank (Upper Reach A)	29.0	7.3
	(Lower Reach A)	0.9	
	Ponded (Upper Reach A)	2.9	0.7
	SUB-TOTAL	393.5	96.3
B	Channel	7.2	1.8
	Overbank	0.7	0.2
	Ponded	0.3	<0.1
	SUB-TOTAL	8.2	2.0
C	Channel	6.6	1.6
	Overbank	<0.1	<0.1
	Ponded	0.5	0.1
	SUB-TOTAL	7.1	1.7
		408.8	100.0
HSB-IC	Channel	374.5	91.6
	Overbank	30.6	7.5
	Ponded	3.7	0.9
		408.8	100.0

TABLE 2

BASELINE DATA FOR DDT IN THE UNFILTERED WATER

Stream Mile	Location	Number of Samples	Average (PPB)	Standard Deviation
BACKGROUND				
HSBM 9.75	HSB at Martin Road	117	0.77	0.97
ICM 8.2	IC at Martin Road	177	0.60	0.89
REACH A				
* HSBM 5.0	HSB at TVA Boat Landing	120	3.4	3.6
HSBM 4.0	HSB at Mile 4.0	88	12	17
REACH A and B Boundary				
HSBM 2.4	HSB at Dodd Road	124	13	14
REACH C				
ICM 4.6	IC at Centerline Rd	121	4.3	2.4
ICM 0.38	IC at Triana	122	1.7	1.6

* HSBM 5.0 was covered by the remedial action. A new station will be selected at the salient cut gaging station.

TABLE 3

BASELINE DDT CONCENTRATIONS IN FISH

A. DDT CONCENTRATIONS IN CHANNEL CATFISH

Age Class Range	Length Range (mm)	Statistical Parameter	Reach A	Reach B	Reach C
* II-IV	217-498	number of samples	29	83	118
		average (DDT as ppm)	95	69	66
		standard deviation	82	89	79
		range	2.1 to 320	1.5 to 530	1.6 to 550
0-VI	0-686	number of samples	104	233	187
		average	65	46	73
(all data)		standard deviation	100	81	120
		range	1.5 to 480	0.4 to 530	1.2 to 920

B. DDT CONCENTRATIONS IN LARGEMOUTH BASS

Age Class Range	Length Range (mm)	Statistical Parameter	Reach A	Reach B	Reach C
*II-V	213-393	number of samples	21	3	34
		average (DDT as ppm)	7.1	37	8.2
		standard deviation	7.8	11	6.0
		range	1.2 to 28	28 to 49	1.2 t
0-VI	0-439	number of samples	22	3	36
(all data)		average	8.3	37	8.0
		standard deviation	9.5	11	5.9
		range	1.2 to 34	28 to 49	1.2 to 24

C. DDT CONCENTRATIONS IN SMALLMOUTH BUFFALO

Age Class Range	Length Range (mm)	Statistical Parameter	Reach A	Reach B	Reach C
*III-VI	318-653	number of samples	12	20	70
		average (DDT as ppm)	140	180	110
		standard deviation	190	190	100
		range	1.8 to 600	2.4 to 620	1.4 to 470
0-XI	0-1073	number of samples	15	40	97
(all data)		average	140	120	110
		standard deviation	180	170	120
		range	1.8 to 600	1.2 to 620	1.4 to 520

* Age classes that will be used to determine compliance, interim goals, and need for substitute species. Presented to Technical Committee 8/13/86.

TABLE 4

INTERIM GOALS FOR DDT CONCENTRATIONS IN PERFORMANCE STANDARD SPECIES
BY REACH BASED ON LINEAR DECREASE IN DDT WITH TIME

			AVERAGE DDT CONCENTRATION (ppm) IN FILET					
REACH	SPECIES	AGE CLASS RANGE	YEAR 0	YEAR 2	YEAR 4	YEAR 6	YEAR 8	YEAR 10
A	Channel catfish	II - IV	95	77	59	41	23	5.0
A	Smallmouth buffalo	III - VI	140	110	86	59	32	5.0
A	Largemouth bass	II - V	7.1	6.7	6.3	5.8	5.4	5.0
B	Channel catfish	II - IV	69	56	44	31	18	5.0
B	Smallmouth buffalo	III - VI	180	150	110	75	40	5.0
B	Largemouth bass	II - V	37	31	24	18	11	5.0
C	Channel catfish	II - IV	66	54	42	29	17	5.0
C	Smallmouth buffalo	III - VI	110	89	68	47	26	5.0
C	Largemouth bass	II - V	8.2	7.4	6.8	6.2	5.6	5.0

TABLE 5

INTERIM GOALS FOR DDT CONCENTRATIONS IN SUBSTITUTE SPECIES
BY REACH BASED ON LINEAR DECREASE IN DDT WITH TIME

		AVERAGE DDT CONCENTRATION (ppm) IN FILET					
REACH	SUBSTITUTE SPECIES	YEAR 0	YEAR 2	YEAR 4	YEAR 6	YEAR 8	YEAR 10
A	Brown Bullhead	35	29	23	17	11	5.0
A	Bigmouth buffalo	93	77	59	41	23	5.0
B	Brown Bullhead	39	32	25	19	12	5.0
B	Bigmouth buffalo	64	52	40	28	14	5.0
C	Brown Bullhead	58	48	38	27	16	5.0
C	Bigmouth buffalo	30	25	20	15	10	5.0

Note: Brown Bullhead is the substitute species for Channel Catfish, Bigmouth Buffalo is the substitute species for Smallmouth Buffalo, and the substitute species for Largemouth Bass is to be determined.

DDT CONCENTRATIONS IN PERFORMANCE STANDARD FISH BY AGE CLASS

DDT CONCENTRATIONS IN CHANNEL CATFISH

Age Class Range	Age (Years)	Length Range (mm)	Statistical Parameter	DDT CONCENTRATION (ppm) BY REACH		
				Reach A	Reach B	Reach C
I-III	1+ - 4	123-404	number of samples	70	167	82
			average	17	19	28
			standard deviation	32	34	39
			range	1.5 to 233	0.4 to 530	1.2 to 170
I-IV	1+ - 5	123-498	number of samples	88	208	149
			average	39	34	54
			standard deviation	62	64	74
			range	1.5 to 320	0.4 to 530	1.2 to 550
II-IV	2+ - 5	217-498	number of samples	29	83	118
			average	95	69	66
			standard deviation	82	89	79
			range	2.1 to 320	1.5 to 530	1.2 to 550
0-VI (all data)	0 - 7	0-686	number of samples	104	233	187
			average	65	46	73
			standard deviation	100	81	120
			range	1.5 to 480	0.4 to 530	1.2 to 920

APPENDIX B

DDT CONCENTRATIONS IN PERFORMANCE STANDARD FISH BY AGE CLASS

DDT CONCENTRATIONS IN LARGEMOUTH BASS

Age Class Range	Age (Years)	Length Range (mm)	Statistical Parameter	DDT CONCENTRATION (ppm) BY REACH		
				Reach A	Reach B	Reach C
I-III	1+ - 4	167-303	number of samples	8	1	10
			average	7.1	35	8.9
			standard deviation	9.1	—	6.7
			range	1.2 to 28	—	1.8 to 21
I-IV	1+ - 5	167-347	number of samples	19	3	26
			average	7.7	37	7.6
			standard deviation	8.0	11	5.5
			range	1.2 to 28	28 to 49	1.2 to 21
II-IV	2+ - 5	213-347	number of samples	19	3	26
			average	7.7	37	7.6
			standard deviation	8.0	11	5.5
			range	1.2 to 28	28 to 49	1.2 to 21
II-V	2+ - 6	213-393	number of samples	21	3	34
			average	7.1	37	8.2
			standard deviation	7.8	11	6.0
			range	1.2 to 28	28 to 49	1.2 to 24
0-VI (all data)	0 - 7	0-439	number of samples	22	3	36
			average	8.3	37	8.0
			standard deviation	9.5	11	5.9
			range	1.2 to 34	28 to 49	1.2 to 24

APPENDIX B

DDT CONCENTRATIONS IN PERFORMANCE STANDARD FISH BY AGE CLASS

DDT CONCENTRATIONS IN SMALLMOUTH BUFFALO

Age Class Range	Age (Years)	Length Range (mm)	Statistical Parameter	DDT CONCENTRATION (ppm) BY REACH		
				Reach A	Reach B	Reach C
II-IV	2+ - 5	235-485	number of samples	6	18	39
			average	140	66	76
			standard deviation	180	160	91
			range	1.8 to 440	1.2 to 620	1.4 to 390
II-V	2+ - 6	235-569	number of samples	9	27	65
			average	100	130	96
			standard deviation	150	190	91
			range	1.8 to 440	1.2 to 620	1.4 to 390
II-VI	2+ - 7	235-653	number of samples	12	29	77
			average	140	130	98
			standard deviation	190	180	100
			range	1.8 to 600	1.2 to 620	1.4 to 390
III-V	3+ - 6	318-569	number of samples	9	18	58
			average	100	200	110
			standard deviation	150	200	90
			range	1.8 to 440	2.4 to 620	1.4 to 470
III-VI	3+ - 7	318-653	number of samples	12	20	70
			average	140	180	110
			standard deviation	190	190	100
			range	1.8 to 600	2.4 to 620	1.4 to 470
III-VII	3+ - 8	318-737	number of samples	14	25	77
			average	140	170	110
			standard deviation	180	180	110
			range	1.8 to 600	2.4 to 620	1.4 to 500
O-XI (all data)	0 - 12	0-1073	number of samples	15	40	97
			average	140	120	110
			standard deviation	180	170	120
			range	1.8 to 600	1.2 to 620	1.4 to 5

APPENDIX E

DECISION DOCUMENT NO. 3

Remedial Action Plan to Isolate DDT in Lower
Reach A of Huntsville Spring Branch,
December 9, 1986.

REVIEW PANEL DECISION DOCUMENT NUMBER 3

REMEDIAL ACTION PLAN TO ISOLATE DDT
IN LOWER REACH A OF HUNTSVILLE SPRING BRANCH

I. Introduction:

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division - the Honorable Robert B. Propst) entered, as part of an overall order settling litigation between the United States of America, the State of Alabama, and four sets of private parties against the Olin Corporation, a Consent Decree that governs the development and implementation of remedial action for the DDT contamination in the Huntsville Spring Branch - Indian Creek (HSB-IC) System (Figure 1). The Consent Decree requires the Olin Corporation to develop and implement a remedial plan that will meet a performance standard of 5 parts per million (ppm) of DDT* in filets of Channel Catfish, Largemouth Bass, and Smallmouth Buffalo in specified reaches of the HSB-IC System consistent with the goals and objectives of the Decree. Those Reaches are:

A - HSB Mile 5.4 to 2.4
B - HSB Mile 2.4 to 0.0
C - IC Mile 5.6 to 0.0

A Review Panel, consisting of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana, Alabama, and the Olin Corporation was established by the Consent Decree. The Review Panel responsibilities include taking action to approve or disapprove Olin remedial proposals or to designate a substitute remedy. If, during or following implementation of the remedy, the Review Panel determines that modifications are necessary to meet the 5 ppm performance standard established in the Consent Decree, the Review Panel may require such modifications.

In its Decision Document dated August 31, 1984, the Review Panel adopted with modification the Olin Corporation remedial action plan for isolation of DDT-contaminated sediments in the area of the HSB-IC System designated as Upper Reach A (HSB 5.4 to 4.0). The

---

* The term DDT is used here as it is defined in the Consent Decree and includes isomers of the compounds DDT, DDD (or TDE), and DDE.

Review Panel required Olin to submit a remedial action proposal for the remainder of Reach A. This area was designated as Lower Reach A (HSB 4.0 to 2.4). Olin proposed a remedial action for Lower Reach A to the Review Panel on August 14, 1986. Engineering plans and technical specifications were submitted on October 30, 1986. The proposed remedial action plan for Lower Reach A has been reviewed and evaluated by the Review Panel.

Olin has submitted permit applications to the appropriate permitting agencies. Additional detailed information on the environmental aspects of this remedy may be developed through the federal and state permitting and environmental review processes. If appropriate, the remedy will be reevaluated by the Review Panel in light of the additional environmental information.

This document sets out the Review Panel decision for the area of HSB designated as Lower Reach A. Nothing in this Decision Document is intended to modify the terms of the Consent Decree and in the event of any inconsistencies between this Decision Document and the Consent Decree, the provisions of the Consent Decree will govern.

II. Decision:

The decision of the Review Panel is to accept the Olin Corporation proposal to isolate in place the bulk of the DDT contaminated sediments in the area designated as Lower Reach A, HSB 4.0 to 2.4. Olin's remedial action plan is described in its Section 404/26a permit application dated September 15, 1986 and revision thereto dated October 27, 1986. The plan consists of the following actions:

- Olin Corporation will bypass and bury in place 71 tons of the 75.6 tons of DDT between HSBM 4.0 and 2.4. Implementation of the remedial plan will take place in areas totally within the boundaries of the Redstone Arsenal (RSA) and Wheeler National Wildlife Refuge. Figure 2 depicts the particulars of the remedial plan for this portion of Reach A.

- The action to bypass and bury in place will be accomplished by construction of four diversion structures, excavation of a new channel between HSBM 3.4 and 2.4, filling in of three areas known as Fill Areas 1, 2, and 3, construction of a specially designed drainage ditch to divert surface drainage around the filled areas, and excavation of portions of the channel sediments.

- Additional project activities will include filling of portions of the HSB channel and other areas between HSBM 4.0 and 2.4 with placement of material excavated on-site and trucked-in fill, construction of earthen diversion structures, runoff diversion channels, access roads, and stockpile areas.

- Olin will isolate approximately 94 percent of the DDT in the channels and other areas of Lower Reach A. This in combination with the remedial action work in Upper Reach A will isolate approximately 93 percent of the DDT in the HSB-IC system. Table 1 sets out the distribution of DDT in sediments in the HSB-IC system.

The decision of the Review Panel includes the following terms and conditions:

1. The Review Panel may direct modifications to the remedial action to improve its effectiveness or if it becomes apparent that the remedial action is not adequate to meet the performance standard consistent with the goals and objectives of the Consent Decree.

2. Approval of the Olin Corporation remedial action plan is limited to the approach discussed above and the time schedule set out below. The specific actions necessary to implement the remedial action plan will be further developed through the necessary permitting actions and negotiations with appropriate federal and state agencies.

Olin Corporation will take all reasonable measures to meet the following schedule:

December 1, 1986	Obtain the necessary permits for the remedial work.
December 15, 1986	Submit any necessary revisions to the construction schedule for the remedial work.
March 15, 1987	Submit any necessary revisions to the long-term monitoring plan for the construction and post-construction period.
Oct. 15, 1987	Identify the "designated event" which Olin proposes will signify "completion" of construction and implementation of the remedy as specified in Paragraph 52(j) of the Consent Decree.

The Review Panel will review Olin's progress to date in implementing the remedial action and other relevant information in making a final decision on the determination of the "designated event."

III. Decision Considerations:

After careful review and consideration of the provisions of the Consent Decree relative to this decision, the features of the plan, the reasonable alternatives, the environmental consequences, and the comments submitted by the public, the Review Panel accepts the remedial plan for Lower Reach A, as revised. The Review Panel finds the Olin remedial plan to be an appropriate remedial action toward achieving the required performance standard of five parts per million of DDT in filets of specified fish species in the HSB-IC system, consistent with the goals and objectives of the Consent Decree.

A. Consent Decree Provisions:

1. Performance standard: The Olin remedial plan for the DDT contamination in HSB-IC shall achieve a performance standard of 5 ppm DDT in filets of channel catfish, largemouth bass, and smallmouth buffalo in Reaches A, B, and C of the HSB-IC System.

2. Goals and Objectives:

a. Isolate DDT from people and the environment in order to prevent further exposure;

b. Minimize further transport of DDT out of the HSB-IC System;

c. Minimize adverse environmental impact of remedial actions;

d. Mitigate effect of DDT on wildlife habitats in the Wheeler National Wildlife Refuge;

e. Minimize adverse effects on operations at RSA, Wheeler Reservoir, and Wheeler National Wildlife Refuge;

f. No increase in flooding, particularly at the City of Huntsville and RSA, except those increases in water level which can be reasonably expected in connection with the implementation of remedial action, provided Olin takes all reasonable steps to minimize or prevent such increases; and

g. Minimize effect of loss of storage capacity for power generation, in accordance with the Tennessee Valley Authority Act.

3. Factors to be considered by the Review Panel:

a. The nature of the endangerment to human health and the environment which the remedial action is designed to address;

b. The extent to which implementation of the remedial action would reduce or increase endangerment to human health or the environment;

c. Whether implementation of such remedies is unnecessary to satisfy or is inconsistent with the Goals and Objectives set forth in the Consent Decree and the performance standard; and

d. Whether the remedy chosen is the most cost-effective means of accomplishing the performance standard.

4. Effect of Other Laws:

The Consent Decree requires that all work undertaken pursuant to the Decree is to be performed in accordance with all applicable federal, state, and local statutes, regulations, ordinances, and permits.

B. Features of the Remedial Action for Lower Reach A:

The Review Panel and supporting technical staff have reviewed plans and data for the remedial action from the Olin Corporation and other sources. The remedial action underway in Upper Reach A has been carefully monitored for compliance with all permits and the quality of the construction work. The performance of Olin Corporation and its construction contractor has been satisfactory in all respects. It is the consensus of the Review Panel that continuation of the remedial action underway in Upper Reach A should proceed in Lower Reach A in order to isolate the bulk of the DDT-contamination in Reach A from people and the environment and to meet the performance standard, consistent with the goals and objectives of the Consent Decree.

It is clear that the complex issues raised by the DDT contamination cannot be resolved simply nor can success be guaranteed prior to implementation. The following features of the remedial plan have been evaluated by the Review Panel:

1. It isolates a significant source of DDT in the HSB-IC system and is a logical extension of the work in Upper Reach A.

2. It reduces the transport of DDT and sediment in water, thus reducing overall DDT exposure to humans and the environment.

3. It minimizes the resuspension and movement of DDT contaminated sediments.

4. It is a feasible remedial measure that can be implemented in a relatively short time.

5. It does not adversely affect groundwater.

6. It does not preclude the implementation of further actions if deemed necessary.

7. It requires a long term commitment for monitoring and maintenance.

8. It does not significantly affect the operation of TVA's flood control and navigation system, nor does it materially alter the effects of upstream flooding.

C. Environmental Consequences:

The environmental consequences of the Upper Reach A remedial action were fully discussed in the August 31, 1984 Decision Document (pp. 6-7 and Appendix 2). There are no new measures proposed in this action that are significantly different from the Upper Reach A remedial action; therefore, no new or increased environmental consequences are expected to result from this project. Based on the work that has taken place, which has been monitored by the Review Panel, it has been determined that no additional environmental analysis is required of the Review Panel for the actions approve by this document.

The remedial action for Lower Reach A will involve channel diversion, channel excavation and creation, access road construction, surface drainage, and filling of channel and other areas. Some unavoidable adverse environmental impacts will occur as a result of construction. Some DDT in Lower Reach A will not be isolated and will remain in portions of the channels and wetlands in Wheeler National Wildlife Refuge. Scour and erosion of DDT-contaminated sediments are not expected to increase. The effect of the amount of DDT remaining after the remedial action on people and the environment is not fully discernible at this time. However, the remedial actions, as revised, for all of Reach A are believed to be an appropriate action toward achieving the performance standard consistent with the goals and objectives of the Consent Decree.

D. Alternatives:

During the review and evaluation period leading to the Review Panel decision on August 31, 1984, the Panel reviewed the various remedial alternatives and specific options developed by the Olin Corporation in the remedial action plan for the HSB submitted on June 1, 1984 and by Water and Air Research, Inc. (W.A.R.) in its 1980 report. At that time, the alternatives for remedial action included either isolation of the DDT, removal of the DDT, or destruction of the DDT. Several generic alternatives were considered

including in-place isolation, dredging and off-site disposal, low-level dams, channel rerouting, biological management, out-of-basin diversion, destruction, and natural restoration (no action). Appendix 3 of the Decision Document dated August 31, 1984 contains the discussion of the alternatives for the Upper Reach A remedial action. During the intervening period since August 31, 1984, there have been no new methods or technology developed that would alter the evaluation of alternatives previously conducted.

For the review and evaluation of the remedial work proposed for Lower Reach A, the following alternatives were examined for limiting DDT dispersion and exposure in the environment.

a. In-place isolation - Leaving the contaminated sediments in place and employing physical means for rendering the contaminated sediments less mobile.

b. Low-level dams - Reducing the transport of sediment and DDT, yet still allowing the flow of water in existing channels, by placement of low level dams.

c. Removal of sediments - Removal of contaminated sediments from waterways by mechanical dredges, hydraulic dredges, pneumatic dredges, or by mechanical techniques such as backhoes, clam-shells, or drag lines.

d. Channel rerouting - Diversion of flow from the natural channel to a new uncontaminated section.

e. Modification of channel cross section - Widening the area at HSBM 2.72 to reduce erosional tendencies.

f. Channel rerouting and sediment isolation - Combination of channel diversion and isolation of areas of contaminated sediments.

g. Innovative technologies

1. In-situ fixation - Stablization of DDT sediments by in-place cementation techniques.

2. Destruction - Destruction of organic contaminants either in place or after removal. In-place biological or chemical destruction, neutralization, and detoxification were considered.

3. Biological management - Placement of fish barriers and periodic removal of fish contaminated with DDT from Reach A of HSB.

4. Sand cover - Direct cover with sand or gravel.

5. Natural siltation - Natural sedimentation or enhanced sedimentation.

1. Discussion of Alternatives:

Channel dredging and off-site sediment disposal could remove much of the DDT from the HSB-IC System. However, dredging could cause suspension and redistribution of DDT downstream, potentially causing increased contamination of fish, people, and the environment. Dredging would result in more signficant destruction of aquatic and wetland habitat. Transporting and disposal of this quantity of material would present considerable problems. This alternative was considered not to be in the best interest of the public.

In-place isolation would result in disturbance of the contaminated sediments and destruction of benthic habitat. Low-level dams were determined to be insufficient to attain the performance standard. Channel rerouting would result in destruction of some terrestrial habitat, and permanent rerouting would encroach on the test range at the Redstone Arsenal. Modification to the channel cross section could reduce erosion but was considered to be insufficient to meet the performance standard. Innovative technologies were found to be infeasible and natural restoration through siltation would not likely meet the performance standard. Fish barriers would not stop movement of DDT and would not be expected to exclude fish during floods. Sand cover would be unstable and highly susceptible to hydrological impacts.

2. Selected Alternative:

The channel rerouting and sediment isolation alternative was selected for further evaluation. There were four variations of this alternative. All four variations called for diversion of the HSB around the contaminated areas by either the use of diversion structures and/or new channel excavation of the HSB and the filling of contaminated areas. The major differences and variations between the options related to the size of the fill areas and the length and location of the new channel excavation. The environmental effects of these options are substantially similar.

3. The four options are discussed below:

Option 1: The diversion of HSB around the contaminated channel between HSBM 3.4 and 2.4. This option includes the use of the existing staging area, construction of security fences, access roads, two stockpile areas, temporary bridges and the placement of four diversion structures. Three areas containing contaminated sediments would be filled and graded. A new channel, about 1600 feet long would be excavated (30,387 cubic yards of material removed).

Option 2: The construction of a new channel (from HSBM 3.4 to 2.4) and excavation of an existing section of channel. Thi option includes the use of the existing staging area, constructi

of security fences, access roads, two stockpile areas, and the placement of three culverts and diversion structures. Two areas containing contaminated sediments would be filled and graded. Drainage structures would remove surface water. A shallow channel section between HSBM 3.6 and 3.4 would be excavated. A new channel, about 1,490 feet long would be excavated (24,300 cubic yards of material). The primary detracting factor of Option 2 is that excavation of the existing channel could resuspend DDT.

Option 3: The construction of a new channel from the edge of the embayment (HSBM 4.0) to HSBM 2.4 and filling of three sections of the existing channel. This option includes the use of the existing staging area, construction of security fences, access roads, two stockpile areas, the placement of two sets of culverts and five diversion structures. Three areas containing contaminated sediments would be filled and graded. Drainage structures would remove surface water. The new channel would be 6,640 feet long and substantial material would be removed. A comparison of Option 1 and Option 3 shows that Option 3 has a longer construction schedule and affects a larger area. More extensive channelization is also involved.

Option 4: The construction of a new channel (between HSBM 3.9 and 2.5), filling the existing channel, and building of a new levee. Road construction would cover 15,240 feet. The existing pump station at Test Area 1 (RSA) would be relocated. A new channel (8,300 feet long) would be excavated (103,055 cubic yards), much of which would be within Test Area 1. Three temporary culverts and two diversion structures are involved. Filling of the existing channel would encompass 44.35 acres. This option involves a protracted construction schedule, could be delayed by test range activities, and affects a larger area.

Option 1 was the alternative selected for implementation, with some modifications to increase the amount of DDT removed and to moderate construction impacts.

E. **Public Comment:**

A public meeting was held on October 28, 1986 in Triana, Alabama, to provide information on the progress to date on the remedial work and an opportunity to comment on the proposed remedial plan for Lower Reach A. More than one hundred people attended the meeting. The meeting record was held open until November 12, 1986 to receive written comments. Comments received during the comment period included a proposal for a research and development effort on the project area and a letter regarding consumption of fish. The Corps of Engineers, Nashville District, forwarded a copy of a letter received during its permit application public notice comment period. That letter commented on the efficacy of the proposed remedial action. The comments were evaluated and no new issues were surfaced.

IV. Conclusion:

This Decision Document comprises the Review Panel decision and is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown above by the signature affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

Donald P. Schultz for W. Waynon Johnson
W. WAYNON JOHNSON
U.S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

COLONEL JAMES A. HALL
U.S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of
Environmental Management

NONVOTING PARTICIPANTS

Honorable CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: DEC 9 1986

TABLE 1

DDT IN THE SEDIMENTS OF THE HSB-IC SYSTEM

REACH	LOCATION	QUANTITY (tons)	PERCENT OF TOTAL
A	Channel (Upper Reach A)	286.0	88.3
	(Lower Reach A)	74.7	
	Overbank (Upper Reach A)	29.0	7.3
	(Lower Reach A)	0.9	
	Ponded (Upper Reach A)	2.9	0.7
	SUB-TOTAL	393.5	96.3
B	Channel	7.2	1.8
	Overbank	0.7	0.2
	Ponded	0.3	<0.1
	SUB-TOTAL	8.2	2.0
C	Channel	6.6	1.6
	Overbank	<0.1	<0.1
	Ponded	0.5	0.1
	SUB-TOTAL	7.1	1.7
		408.8	100.0
HSB-IC	Channel	374.5	91.6
	Overbank	30.6	7.5
	Ponded	3.7	0.9
		408.8	100.0

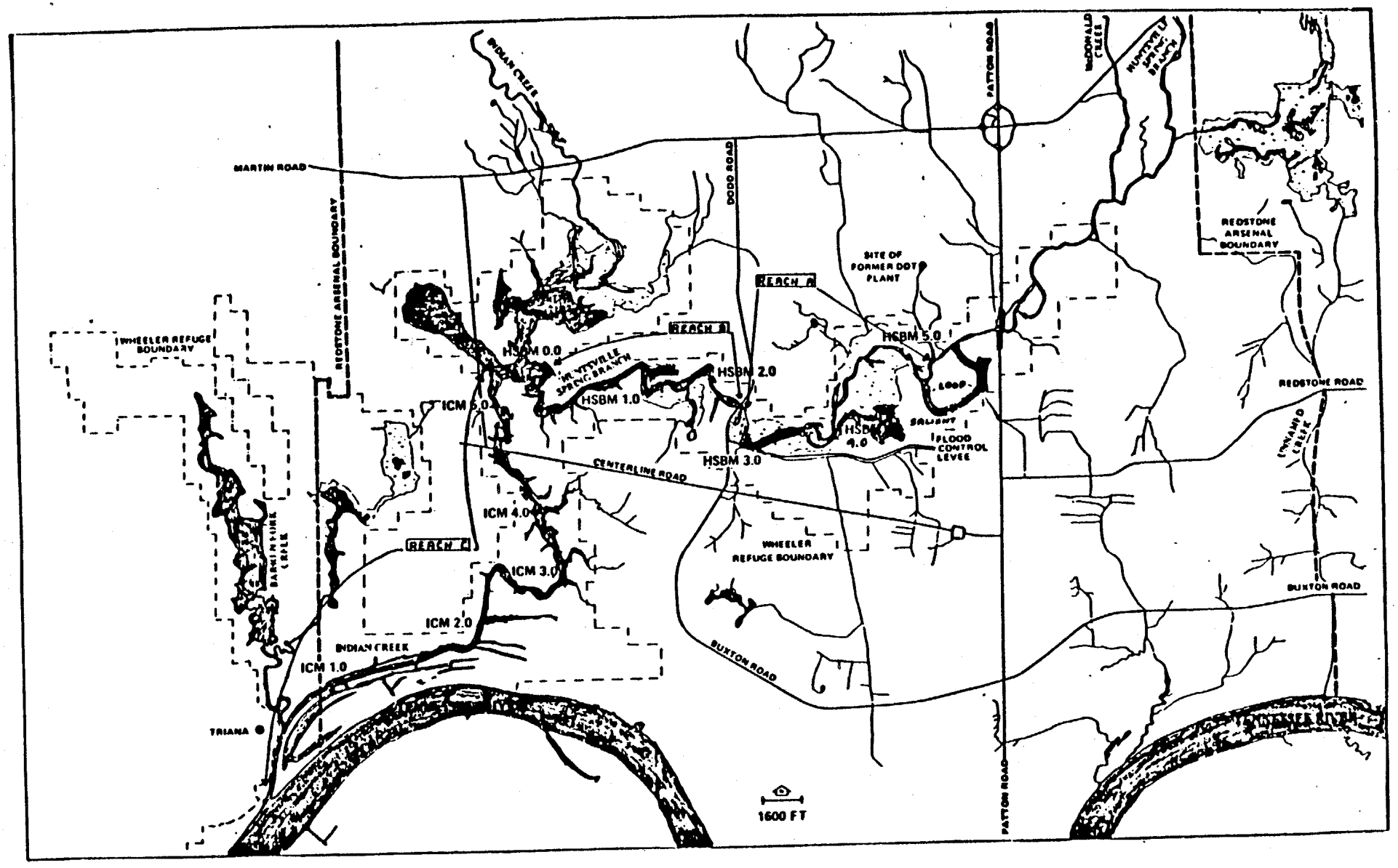


FIGURE 1. GENERAL SITE MAP - HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM

REACH A = HSBM 5.4 to HSBM 2.4

REACH B = HSBM 2.4 to HSBM 0.0

REACH C = ICM 5.6 to ICM

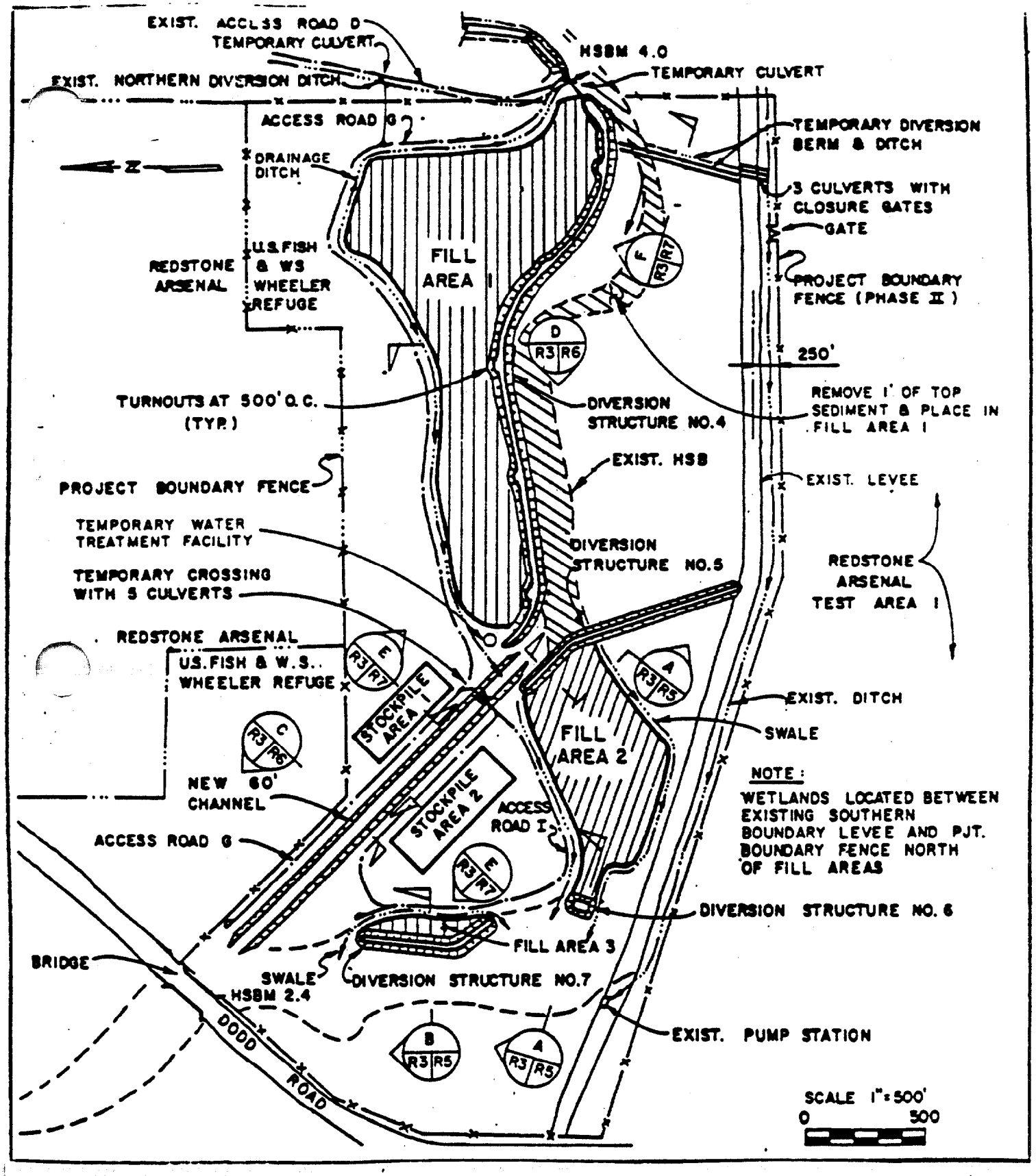

EXIST. ACCESS ROAD D
TEMPORARY CULVERT
HSBM 4.0
TEMPORARY CULVERT
EXIST. NORTHERN DIVERSION DITCH
ACCESS ROAD G
TEMPORARY DIVERSION BERM & DITCH
DRAINAGE DITCH
3 CULVERTS WITH CLOSURE GATES
GATE
REDSTONE ARSENAL
U.S. FISH & WS WHEELER REFUGE
FILL AREA 1
PROJECT BOUNDARY FENCE (PHASE II)
250'
TURNOUTS AT 500' O.C. (TYP.)
DIVERSION STRUCTURE NO.4
REMOVE 1' OF TOP SEDIMENT & PLACE IN FILL AREA 1
EXIST. HSB
EXIST. LEVEE
PROJECT BOUNDARY FENCE
TEMPORARY WATER TREATMENT FACILITY
DIVERSION STRUCTURE NO.5
REDSTONE ARSENAL TEST AREA 1
TEMPORARY CROSSING WITH 5 CULVERTS
REDSTONE ARSENAL
U.S. FISH & W.S. WHEELER REFUGE
STOCKPILE AREA 1
EXIST. DITCH
SWALE
FILL AREA 2
NEW 60' CHANNEL
STOCKPILE AREA 2
ACCESS ROAD I
NOTE:
WETLANDS LOCATED BETWEEN EXISTING SOUTHERN BOUNDARY LEVEE AND PJT. BOUNDARY FENCE NORTH OF FILL AREAS
ACCESS ROAD G
DIVERSION STRUCTURE NO. 6
FILL AREA 3
BRIDGE
SWALE
DIVERSION STRUCTURE NO.7
HSBM 2.4
EXIST. PUMP STATION
DODD ROAD
SCALE 1" = 500'
0
500

FIGURE 2

APPENDIX F

DECISION DOCUMENT NO. 4

Report on DDT in Reach B and Reach C
of the Huntsville Spring Branch-Indian Creek
System, April 16, 1987

REVIEW PANEL DECISION DOCUMENT NUMBER 4

Report on DDT In Reach B and Reach C of the Huntsville Spring Branch - Indian Creek System

I. Introduction:

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division - the Honorable Robert B. Propst) entered, as part of an overall order settling litigation between the United States of America, the State of Alabama, and four sets of private parties against the Olin Corporation, a Consent Decree that governs the development and implementation of remedial action for the DDT contamination in the Huntsville Spring Branch - Indian Creek (HSB-IC) System (Figure 1). The Consent Decree requires the Olin Corporation to develop and implement a remedial plan that will meet a performance standard of 5 parts per million (ppm) of DDT* in filets of Channel Catfish, Largemouth Bass, and Smallmouth Buffalo in specified reaches of the HSB-IC System consistent with the goals and objectives of the Decree. Those Reaches are:

A - HSB Mile 5.4 to 2.4
B - HSB Mile 2.4 to 0.0
C - IC Mile 5.6 to 0.0

A Review Panel, consisting of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana, Alabama, and the Olin Corporation was established by the Consent Decree. The Review Panel responsibilities include, among other things, evaluation of data and studies performed by Olin and taking action on Olin's remedial proposals. If, during or following implementation of the remedy, the Review Panel determines that modifications are necessary to meet the 5 ppm performance standard established in the Consent Decree, the Review Panel may require such modifications.

---

* The term DDT is used here as it is defined in the Consent Decree and includes isomers of the compounds DDT, DDD (or TDE), and DDE.

In its Decision Document dated August 31, 1984 and in Decision Document Number 3 dated December 9, 1986, the Review Panel accepted the Olin Corporation remedial action plans for isolation of the DDT contaminated sediments in Reach A of the HSB-IC System. The Decision Document dated August 31, 1984 required Olin to perform a study further identifying the extent of DDT contamination in Reaches B and C by September 1, 1986.

As required, Olin submitted its report on DDT in Reaches B and C.[1] That document is a comprehensive presentation of the data gathered on the extent and distribution of DDT contamination in those two Reaches.

This Document sets out the Review Panel decision on the Olin Corporation Report on DDT in Reach B and Reach C of the Huntsville Spring Branch - Indian Creek System. Nothing in this Decision Document is intended to modify the terms of the Consent Decree and in the event of any inconsistencies between this Decision Document and the Consent Decree, the provisions of the Consent Decree will govern.

II. Decision:

The Review Panel accepts Olin's Report on DDT in Reach B and Reach C of the Huntsville Spring Branch - Indian Creek System and agrees with the conclusion that no remedial actions in Reach B and Reach C appear necessary to meet the performance standard. The Review Panel's decision to accept Olin's Report will not preclude further actions should compliance monitoring indicate the remedies implemented in Reach A are not sufficient to achieve the performance standard as set forth in the Consent Decree.

The Review Panel's decision is based on the extensive data collected and presented in Olin's Report of DDT in Reach B and Reach C. These data show that Reach B and Reach C contain approximately the same quantity of DDT. Reach B contains 8.2 tons and Reach C contains 7.1 tons. Reach B was calculated to contain 2.0% of the DDT in the HSB-IC system while Reach C contains 1.9%. The balance of DDT, greater than 96%, is found in Reach A, currently undergoing remedial action work.

---

1 Report on DDT in Reach B and Reach C of the Huntsville Spri Branch - Indian Creek System, Olin Corporation - Environmenta Affairs Department (September 1, 1986).

Evaluation of the sampling and analytical data indicated that Reach B and Reach C were very similar in terms of DDT concentrations and distribution found in the sediment. Greater than 87% of the DDT in Reach B and Reach C is found in the channels. DDT concentrations decreased rapidly with depth; concentrations over 100 ppm were rare at depths greater than 3 or 4 inches. The higher DDT concentrations were usually found adjacent to the deepest (sub-channel) areas of HSB.

The sedimentation history determined from Olin's evaluation of the sediment and physical properties data indicate that Reach B and Reach C are areas of deposition. Reach B and Reach C have wide channels and limited flow velocities that are strongly affected by the backwaters of the Tennessee River and Wheeler Reservoir. These backwater effects enhance sediment deposition and minimize scouring. Following completion of the remedial actions in Reach A, it is expected that clean sediments will cover existing sediments in Reach B and Reach C.

Olin predicts and the Review Panel agrees that reducing DDT concentrations in the water column should significantly reduce DDT concentrations in fish filet. Filtration studies indicated that 90% or more of the DDT in the water is attached to suspended sediment particles scoured from the channel between HSBM 5.4 and 4.0 and that Reaches B and C do not significantly contribute DDT to the water column. Consequently, DDT concentrations should not increase in the water column as the water passes through Reaches B and C. As clean sediment covers the DDT-containing sediment present in Reaches B and C, less DDT will be available for resuspension into the water column. Thus, exposure of fish directly to DDT-containing sediments should diminish over time.

III. Conclusion:

This Decision Document comprises the Review Panel decision and is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown below by the signature affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

DR. LEE A. BARCLAY
U.S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

COLONEL JAMES A. HALL
U.S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of
Environmental Management

NONVOTING PARTICIPANTS

Honorable CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: APR 16 1987

APPENDIX G

DECISION DOCUMENT NO. 5

Substitute Species for Largemouth Bass,
July 22, 1987

Review Panel Decision Document Number 5

Substitute Species for Largemouth Bass

I. Introduction

The Consent Decree (paragraph 12) states that in the event that one of the three performance standard fish species cannot be obtained in any of the Reaches of the HSB-IC system, Olin and the Review Panel will agree on one or more substitute species for that Reach. Substitute fish species were proposed by Olin in "Huntsville Spring Branch-Indian Creek Substitute Fish Species Report" dated March 1, 1986. Brown bullhead and bigmouth buffalo were accepted as substitute fish species for channel catfish and smallmouth buffalo respectively (Review Panel Decision Document No. 2 - "Baseline Data, Substitute Species and Interim Goals for Fish and Water"). The Olin proposal also recommended bluegill as a substitute species for largemouth bass. The Review Panel requested that Olin evaluate other fish species as potential substitutes for largemouth bass.

As requested, Olin submitted an "Evaluation of Substitute Fish for Largemouth Bass" on February 6, 1987. The report presents DDT analyses for specimens of white bass and yellow bass and a comparison of the ecology, abundance, and DDT residue levels of these species and bluegill to the largemouth bass. Subsequently, Olin provided supplemental data on DDT residues in Bluegill by letter dated June 8, 1987. Additional supporting data for the results were provided in Olin's June 8, 1987 supplemental data by letter dated June 25, 1987.

This document sets out the Review Panel decision on the substitute species for largemouth bass. This decision supplements Decision Document No. 2 and completes the selection of substitute species.

II. Decision

The Review Panel accepts Olin's report "Evaluation of Substitute Fish Species for Largemouth Bass", and agrees that of the fish species currently available in the HSB-IC system, the bluegill sunfish, *Lepomis macrochirus*, is the best substitute fish species for largemouth bass that is currently available in the HSB-IC System. The bluegill is smaller but has simliar DDT residue levels to the largemouth bass in all Reaches. Previously, questions were raised about the use of the bluegill because their smaller size would not provide sufficient filet weight for individual analysis. However, Olin has demonstrated that bluegills of sufficient size can be collected so that individual filets can be analyzed for DDT concentrations.

The baseline DDT level in the filets of bluegill for Reaches A, B, and C is shown in Table 1. Table 2 shows the interim goals for average DDT concentrations in bluegill in each Reach, starting with the baseline condition (year 0) and ten years after completion of construction (year 10). These interim goals are based on the linear depuration model that was adopted in Decision Document Number 2. The interim goals for brown bullhead and bigmouth buffalo, the other substitute species, were approved and reported in Decision Document Number 2, Table 5.

The Review Panel considered several factors in selecting the appropriate substitute species: size, feeding habits, residue levels, abundance, and overall similiarity to the performance standard species. After reviewing Olin's evaluation, the Review Panel has concluded that the bluegill is the best substitute species for largemouth bass based on these factors and, in particular, because it is a food fish and it has been found abundantly in the HSB-IC system. If a substitute species is needed for largemouth bass and the abundance of bluegill has declined significantly, the Review Panel will select another substitute species for largemouth bass.

III. Conclusion

This Decision Document, consisting of 2 pages of text and two tables, comprises the Review Panel decision and is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown below by the signature affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

DR. LEE A. BARCLAY
U.S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

for COLONEL JAMES A. HALL
U.S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of Environmental Management

NONVOTING PARTICIPANTS

Honorable CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: JUL 22 1987

Table 2

Interim Goal for DDT Concentrations in Bluegill
By Reach Based on Linear Decrease in DDT with Time

		Average DDT Concentration (ppm) in Filet					
Reach	Species	Year 0	Year 2	Year 4	Year 6	Year 8	Year 10
A	Bluegill	6.4	6.1	5.8	5.5	5.2	5.0
B	Bluegill	7.9	7.3	6.7	6.2	5.6	5.0
C	Bluegill	6.4	6.1	5.8	5.6	5.2	5.0

* Table 1

Baseline DDT Concentrations in Filets of Bluegill

Reach	Number of Samples	DDT Concentration (ppm) in Filet of Bluegill		
		Average	Standard Deviation	Range
A	18	6.4	8.8	1.2 to 32
B	17	7.9	8.9	1.2 to 28
C	13	6.4	5.7	1.2 to 16

* Source: Olin letter, June 8, 1987, supplementing Olin's February 6, 1987 report entitled "Evaluation of Substitute Fish for Largemouth Bass."

APPENDIX H

DECISION DOCUMENT NO. 6

Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System, December 3, 1987,

and

Modification of Review Panel Decision Document No. 6 Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System, December 7, 1989

REVIEW PANEL DECISION DOCUMENT NUMBER 6

LONG-TERM MONITORING PROGRAM FOR THE REMEDIAL ACTION IN THE HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM

I. Introduction:

On May 31, 1983, the United States District Court for the Northern District of Alabama (Northeastern Division - the Honorable Robert B. Propst) entered, as part of an overall order settling litigation between the United States of America, the State of Alabama, and four sets of private parties against the Olin Corporation, a Consent Decree that governs the development and implementation of remedial action for the DDT contamination in the Huntsville Spring Branch - Indian Creek (HSB-IC) System. The Consent Decree requires the Olin Corporation to develop and implement a remedial plan that will meet a performance standard of 5 parts per million (ppm) of DDT* in filets of Channel Catfish, Largemouth Bass, and Smallmouth Buffalo in specified reaches of the HSB-IC System consistent with the goals and objectives of the Decree. Those Reaches are:

A - HSB Mile 5.4 to 2.4
B - HSB Mile 2.4 to 0.0
C - IC Mile 5.6 to 0.0

A Review Panel, consisting of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana, Alabama, and the Olin Corporation was established by the Consent Decree. The Review Panel responsibilities include taking action to approve or disapprove Olin remedial proposals or to designate a substitute remedy. If, during or following implementation of the remedy, the Review Panel determines that modifications are necessary to meet the 5 ppm performance standard established in the Consent Decree, the Review Panel may require such modifications.

In its Decision Document dated August 31, 1984, the Review Panel adopted with modification the Olin Corporation remedial action plan for isolation of DDT-contaminated sediments in the area of the HSB-IC System designated as Upper Reach A (HSBM 5.4 to 4.0). That Decision Document required the Olin Corporation to submit, among other documents, interim goals for DDT concentrations in fish, suspended sediment and the water column, a remedial

---

* The term DDT is used here as it is defined in the Consent Decree and includes isomers of the compounds DDT, DDD (or TDE), and DDE.

action proposal for the area designated as Lower Reach A (HSB 4.0 to 2.4), a study on DDT in Reach B and Reach C of the HSB-IC System and a long-term monitoring program to provide data upon which to evaluate the effectiveness of the remedial action. Olin Corporation provided the reports, proposals and studies as required. The Review Panel, in its Decision Documents Number 2, 3, 4, and 5, provided decisions on the interim goals, baseline data, substitute species, Lower Reach A, and Reach B and Reach C.

Olin submitted its initial long-term monitoring program in February 1985. The program was subsequently revised to incorporate comments from the Review Panel. The program was resubmitted on February 1, 1987 and, following review and evaluation by the Review Panel, Olin Corporation incorporated the Review Panel comments and recommendations and resubmitted the final monitoring program dated August 1987. The Review Panel has considered the August 1987 Long-Term Monitoring Program, along with the objectives of the Joint Technical Proposal to Implement Remedial Activities (Exhibit B to the Consent Decree), in reaching the decision set out below.

This document sets out the Review Panel Decision on the Long-Term Monitoring Program for the remedial action in the HSB-IC System. Nothing in this Decision Document is intended to modify the terms of the Consent Decree; however, Olin's efforts in three areas of the Joint Technical Proposal to Implement Remedial Activities (Exhibit B to the Consent Decree) have been redirected to improve the Review Panel's ability to assess compliance with the performance standard. The three areas relate to the use of the arithmetic average for fish, the groundwater monitoring locations and schedules, and the schedule for the fish monitoring.

II. Decision:

The decision of the Review Panel is to accept Olin Corporation's Long-Term Monitoring Program, dated August 1987, which includes the comments and recommendations of the Review Panel. The Long-Term Monitoring Program will measure DDT concentrations in fish, surface water and groundwater.

A. Long-Term Monitoring Program

1. The Long-Term Monitoring Program will begin upon completion of construction and implementation of the remedial action in Reach A. Pursuant to paragraph 26 of the Consent Decree, within ten years of completion of construction and implementation of the remedy, Olin shall attain the performance standard of 5 ppm DDT in filets of performance standard fish (or substitute species, if utilized) in Reaches A, B, and C. The Long-Term

Monitoring Program will be used to evaluate Olin's progress in attaining the performance standard. Interim goals have been established in Decision Documents Number 2 and Number 5 for DDT concentrations in fish and water for years 2, 4, 6, and 8 to evaluate Olin's progress toward achieving the performance standard.

2. The Long-Term Monitoring Program will provide data upon which the Review Panel will make its decision on attainment and continued attainment of the performance standard. Olin shall be deemed to have attained the performance standard when the average DDT concentration in the filets of each of the performance standard fish species is five ppm (or less) in Reach A, B, and C. Continued attainment of the performance standard will occur when the average DDT concentration in the filets of each of the performance standard fish species is five ppm (or less) for three consecutive years, including the year of attainment in Reach A, B, and C. Olin may attain and demonstrate continued attainment of the performance standard in some or all of the performance standard species and in some or all of the three Reaches at any time during the ten year period following completion of construction and implementation of the remedy. However, for purposes of compliance with the Consent Decree, Olin shall attain the performance standard in all three species and in all three Reaches by the conclusion of the ten year period and shall demonstrate continued attainment of the performance standard in all three species and in all three Reaches as defined by paragraph 27 of the Consent Decree by the conclusion of the twelth year following the completion of construction and implementation of the remedy. When Olin attains the performance standard in a species, annual monitoring is required until continued attainment has been demonstrated.

3. During the time period prior to attainment of the performance standard in each fish species in each Reach, Olin will conduct biennial monitoring of fish and surface water. Sampling will continue on a biennial basis until attainment of the performance standard in each fish species in each Reach. Groundwater monitoring of the public water supplies will continue until three consecutive sampling events which show no significant concentration of DDT have been completed. Groundwater monitoring in the remedial action area will be conducted in Years 2, 4, 8, and 10. The overall long-term monitoring program is summarized in Table 1.

4. Fish will be collected in the years 2, 4, 6, 8 and 10 following completion of the construction and implementation of the remedial action at the locations shown in Figure 1 and identified in Table 2. Fish sampling will be conducted annually during the period of continued attainment and in the last year prior to termination of the Consent Decree. Both performance standard

fish and substitute species fish will be collected and retained for each sampling site. The sampling locations are the same collection sites used during the 1984 and 1985 fish abundance surveys. Fish collection will be conducted during the spring (April-May) in the years of fish monitoring. This sampling period takes into consideration the seasonal factors of water surface elevations, food supply availability, and water temperatures which affect fish distribution patterns. Past monitoring experience has demonstrated the presence of performance standard species fish in each of the three Reaches during this period.

5. Surface water monitoring will be conducted twice during the same year as fish monitoring in each Reach until the performance standard has been attained in all species in all Reaches. Samples will be collected during the second week of June and the second week of November at the locations shown in Figure 2 and identified in Table 3. Surface water monitoring will not be conducted during the continued attainment period, but will be conducted during the year prior to termination of the Consent Decree.

6. Groundwater monitoring will consist of three separate components: (a) monitoring of existing Redstone Arsenal groundwater wells (Figure 3); (b) monitoring of public drinking water wells (Figure 4); and (c) monitoring of wells in the remedial action area (Figure 5).

7. Monitoring of the existing Redstone Arsenal groundwater wells (5) and drinking water wells shown in Figures 3 and 4, and described in the Joint Technical Proposal, Section 7.3.1, will be conducted biennially for up to ten years following completion of construction and implementation of the remedial action or until three consecutive samples show no significant concentration of DDT on a well by well basis.

8. Groundwater monitoring of the 37 wells installed in the filled channel area in Reach A (Figure 5) will be conducted. Following completion of well installation, the water table elevation and DDT concentration of each of the wells will be monitored quarterly for one year. Thereafter, monitoring will be conducted and one sample will be collected from each well during years 2, 4, 8, and 10 following completion of construction and during the year prior to Consent Decree termination. If DDT is detected in wells along the filled channel area in Reach A, the Review Panel will evaluate the situation and may require further monitoring.

9. The Review Panel has reviewed the collection, preservation, storage, and analytical methodologies and procedures proposed by Olin in the August 1987 long-term monitoring program for fish, surface water, and groundwater samples. The Review Panel accepts the methodologies and procedures proposed by Olin and believes that such methodologies and procedures will provide data comparable in quality to the baseline data.

10. Quality Assurance will be a part of the Long-Term Monitoring Program, consistent with the quality assurance program for the baseline data collection. Olin shall discuss quality assurance results for each set of monitoring data submitted. The Review Panel accepts Olin's program for Quality Assurance as set forth in Table 4. Details on the program are provided in Appendix B of the Long-Term Monitoring Program, dated August 1987.

B. Monitoring Program Review

1. During its routine review of the monitoring reports, the Review Panel will compare DDT residues with the interim goals and the baseline data in conjunction with other appropriate data (e.g. number of fish caught, individual residues), to determine if the monitoring program requires adjustment.

2. At the conclusion of Year 6 following the completion of construction and implementation of the remedial action, the Review Panel will evaluate the analytical data for fish and water, along with other appropriate information, such as the depositional characteristics of the HSB-IC System and the diversion of the publicly-owned treatment system, to determine if additional monitoring or studies may be required to assess the operational characteristics of the remedy.

3. If problems develop in the collection and analysis of data or if unforeseen issues arise that affect the schedule of monitoring or the overall adequacy of the monitoring program, Olin will immediately advise the Review Panel. The Review Panel will evaluate the information and may direct or approve, as necessary, modifications to the Long-Term Monitoring Program.

C. Reporting by Olin

1. Olin will prepare a report each year presenting all data collected and summarizing the activities for that year. The reports will be submitted to the Review Panel by March 1 of the following year.

2. Olin will submit progress reports, 30 days prior to scheduled Review Panel meetings, covering Olin's operations, maintenance, studies and monitoring activities.

3. Within six months following demonstration of continued attainment, as defined in this Decision Document and the Consent Decree, Olin will provide a comprehensive report of all data and analyses, and studies completed during the period of July 1985 through the completion of the continued attainment period.

III. Attainment and Continued Attainment of the Performance Standard

A. Performance Standard

1. The Consent Decree requires Olin to attain a performance standard of 5 ppm DDT in filets of performance standard fish species or substitute species, if utilized, within ten years following completion of construction and implementation of the remedial action. The Joint Technical Proposal to Implement Remedial Activities provides that the average DDT concentration within a species will be determined as an arithmetic mean concentration in the filets within a species adjusted for the weight of each individual specimen. However, the Review Panel has used the unadjusted arithmetic mean to describe baseline conditions and establish interim goals for the remedial action. This decision was predicated on the unadjusted arithmetic mean being more easily calculated and comprehended, and is consistent with regulatory approaches to measuring compliance with established standards.

2. To compare values for the adjusted and unadjusted arithmetic means, the Review Panel requested Olin to provide the adjusted and unadjusted mean values for each performance standard and substitute fish species. At high DDT residue levels, the adjusted mean values were generally higher than the unadjusted values; however, there was little difference between the two values when DDT residue levels were near the performance standard value of 5 ppm.

3. The Review Panel has determined that use of the arithmetic average is an appropriate technical alteration. Therefore, the Review Panel will continue to use the unadjusted arithmetic mean concentration of DDT in fish filets to assess compliance with the performance standard.

4. Age classes for analysis of the performance standard fish species have been established to eliminate the very small and very large specimens from the sample collections. This will limit the range of DDT concentrations and reduce variability

of the sampling data. Similar size or age classes will be established for substitute fish species if their use becomes necessary.

5. The Review Panel has determined that the application of statistical confidence intervals to the average will not measurably improve the assessment of compliance with the performance standard. In evaluating the data presented, the Review Panel will consider analytical variability, the effect of individual fish residues, overall trends in residue values, and other factors consistent with accepted compliance evaluation procedures and sound scientific principles in arriving at a decision on compliance with the performance standard.

B. Attainment and Continued Attainment of the Performance Standard.

1. Olin will be deemed to have attained the performance standard when the average DDT concentration in filets of performance standard or substitute species fish, if utilized, is 5 ppm (or less) in Reaches A, B, and C. Continued attainment of the performance standard will occur when the average DDT concentration in the filets of each of the performance standard or substitute species fish, if utilized, is 5 ppm (or less) for three consecutive years, including the year of attainment, in Reaches A, B, and C.

2. Olin will notify the Review Panel when it determines it has attained the performance standard and when it has fully demonstrated continued attainment of the performance standard, as those terms are defined in the Joint Technical Proposal and set out above.

3. The Review Panel will evaluate Olin's notification of attainment and continued attainment of the performance standard in each species in each Reach, along with other relevant data and appropriate factors, and determine if attainment and continued attainment of the performance standard have been satisfactorily demonstrated for purposes of compliance with the Consent Decree.

4. After attainment of and continued attainment of the performance standard, Olin shall operate and maintain, as necessary, the remedy until termination of the Consent Decree pursuant to paragraph 54 of the Decree.

IV. Compliance With the Consent Decree

Compliance with the terms of the Consent Decree will be determined by the Review Panel based on monitoring data and other appropriate factors. The Review Panel will follow the provisions of paragraphs 32 through 40 of the Consent Decree in evaluating and reaching decisions on compliance with the Decree.

V. Termination of the Consent Decree

A. The Consent Decree (paragraph 54) provides that after Olin (1) demonstrates to the Review Panel continued attainment of the performance standard and (2) demonstrates to the reasonable satisfaction of the Review Panel that the remedy(ies) implemented pursuant to the Consent Decree has provided, is providing and will continue to provide achievement of the performance standard once the Consent Decree terminates, Olin shall operate and maintain the remedy(ies) for a period of seven additional years. At the conclusion of this seven year period, if Olin is in compliance with the provisions of the Consent Decree and the performance standard, Olin shall be deemed to have completely fulfilled all of its obligations under the Consent Decree and it shall terminate.

B. The Review Panel will consider the following principal factors, among others, in determining that the remedy(ies) has provided, is providing and will continue to provide achievement of the performance standard once the Decree terminates:

1. the useful life of the implemented remedy(ies);

2. changes in DDT levels in monitored fish species which occur from the attainment of the performance standard to the date of the demonstration;

3. changes in DDT levels in media monitored as part of the Long-Term Monitoring Program;

4. the amount of DDT isolated by the implemented remedy(ies); and

5. the situations in which the isolated DDT could be released to the environment, including the effects of hydrologic, meteorologic and geologic events on the integrity of the implemented remedy(ies).

C. Following a Review Panel decision that the remedy has provided, is providing and will continue to provide achievement of the performance standard, Olin will operate and maintain the remedy for seven additional years. In the seventh year of the seven year period, Olin will conduct monitoring of fish, surface water and groundwater. Within sixty days of completion of the verification of the monitoring data, Olin will submit a report of the monitoring data and its recommendations on the termination of the Consent Decree to the Review Panel.

D. Within sixty days following receipt of the report, the Review Panel will review the Olin report and recommendation

and determine if Olin is in compliance with the provisions of the Consent Decree and the performance standard. The Review Panel will notify Olin and the United States District Court for the Northern District of Alabama of its determination of compliance.

VI. Conclusion

This Decision Document, consisting of nine pages of text, five figures, and four tables, comprises the Review Panel decision and is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown below by the signatures affixed hereto.

MEMBERS

HOWARD D. ZELLER
Chairman, Review Panel

for DR. LEE A. BARCLAY
U. S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D.C.

COLONEL JAMES A. HALL
U. S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of Environmental Management

NONVOTING PARTICIPANTS

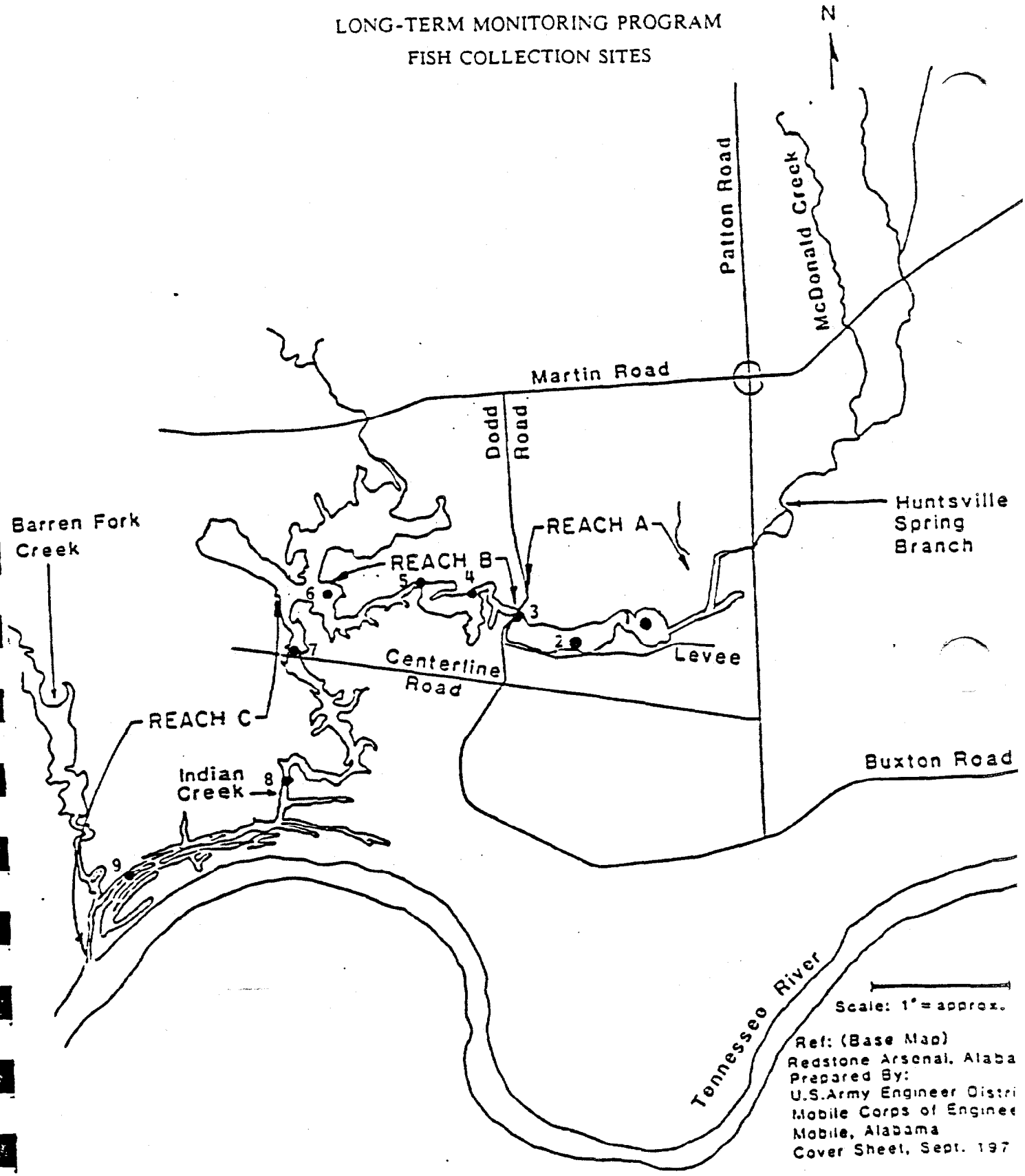
HONORABLE CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATED: DEC 0 3 1987

FIGURE 1

LONG-TERM MONITORING PROGRAM
FISH COLLECTION SITES



Huntsville Spring Branch-Indian Creek
Long-Term Monitoring Program

FIGURE 2

LONG-TERM MONITORING PROGRAM
WATER SAMPLING LOCATIONS

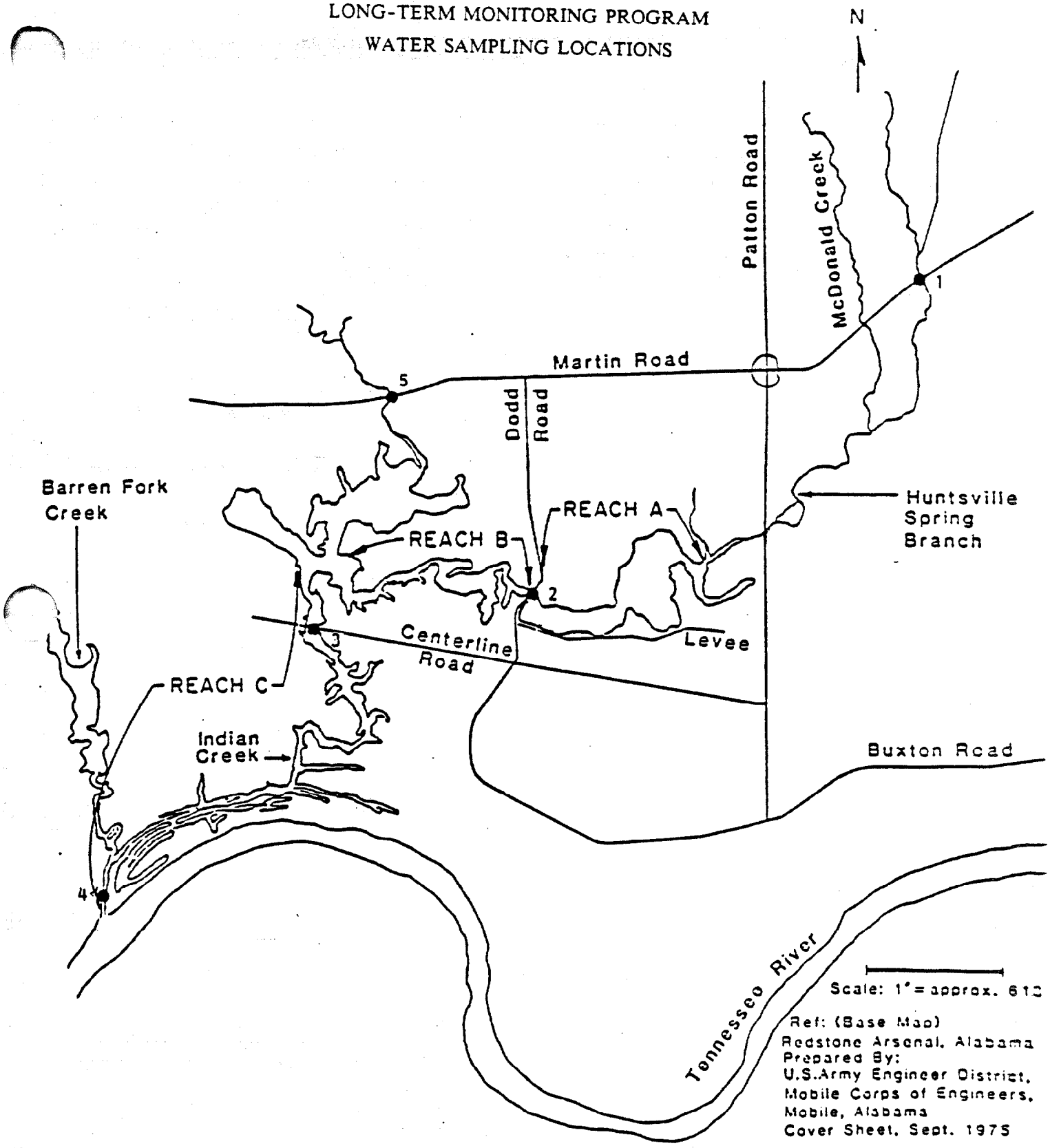
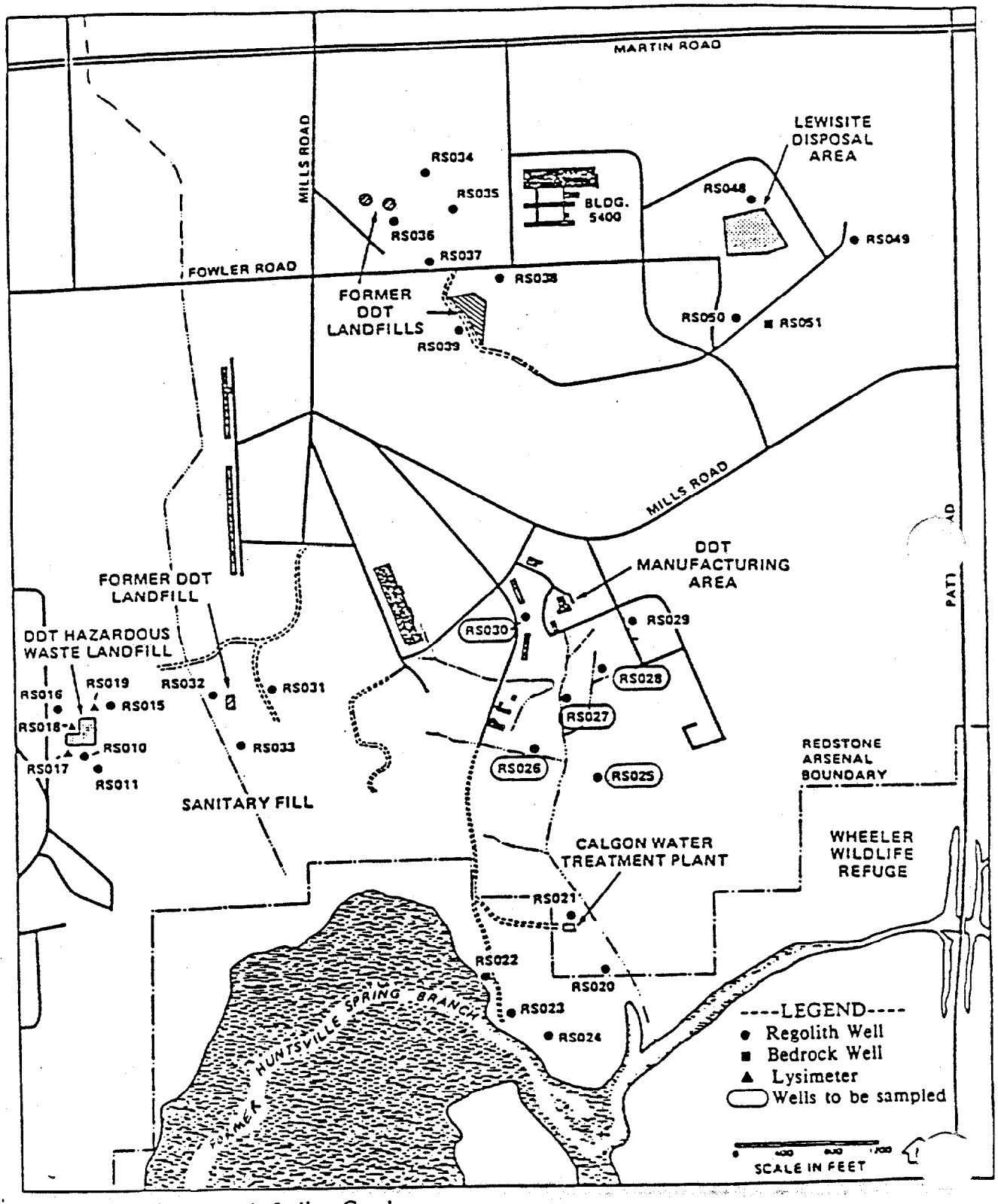


FIGURE 3

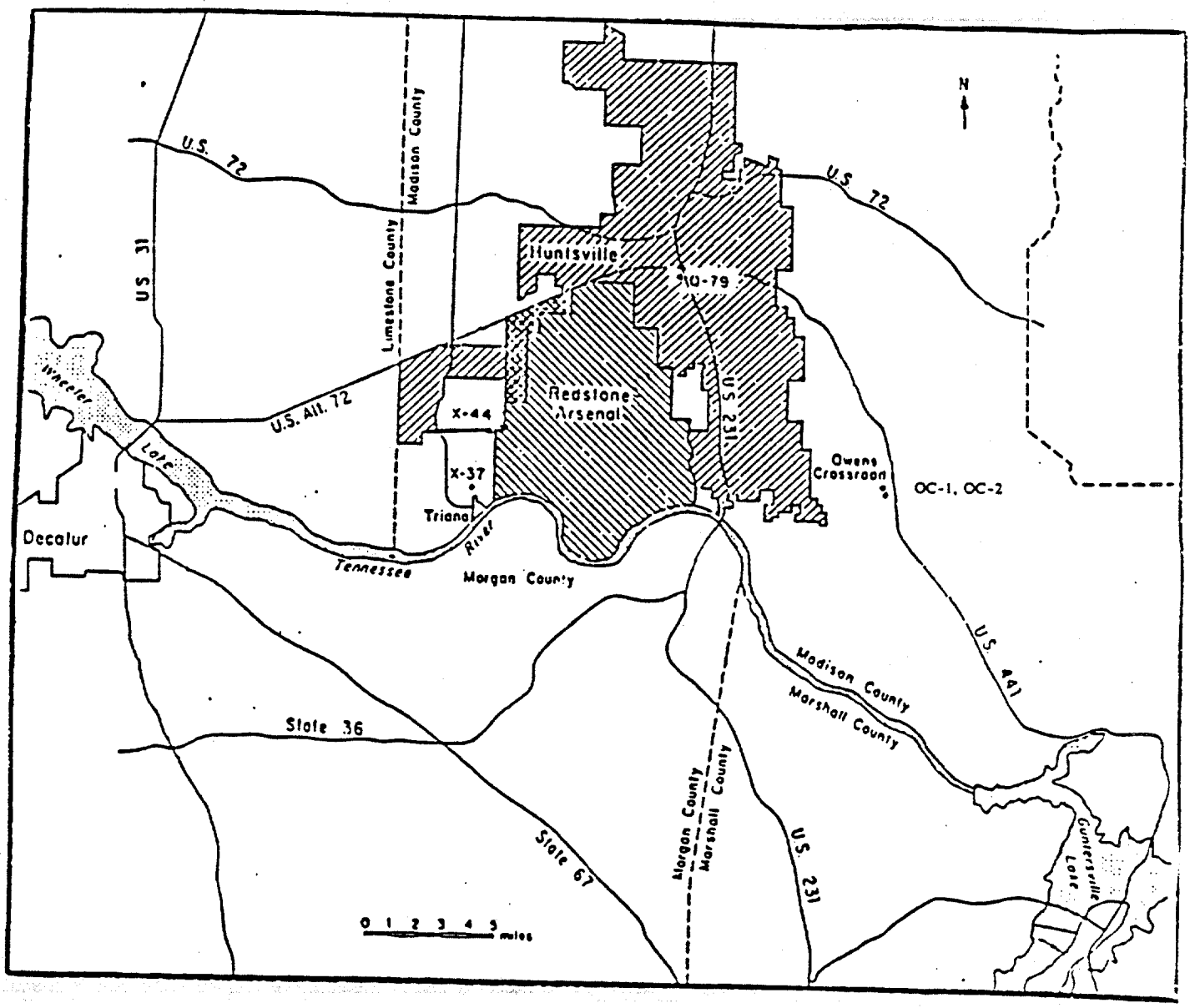
RSA MONITORING WELL LOCATIONS



Huntsville Spring Branch-Indian Creek
Long-Term Monitoring Program

FIGURE 4

PUBLIC SUPPLY WELL SAMPLING LOCATIONS



Huntsville Spring Branch-Indian Creek
Long-Term Monitoring Program

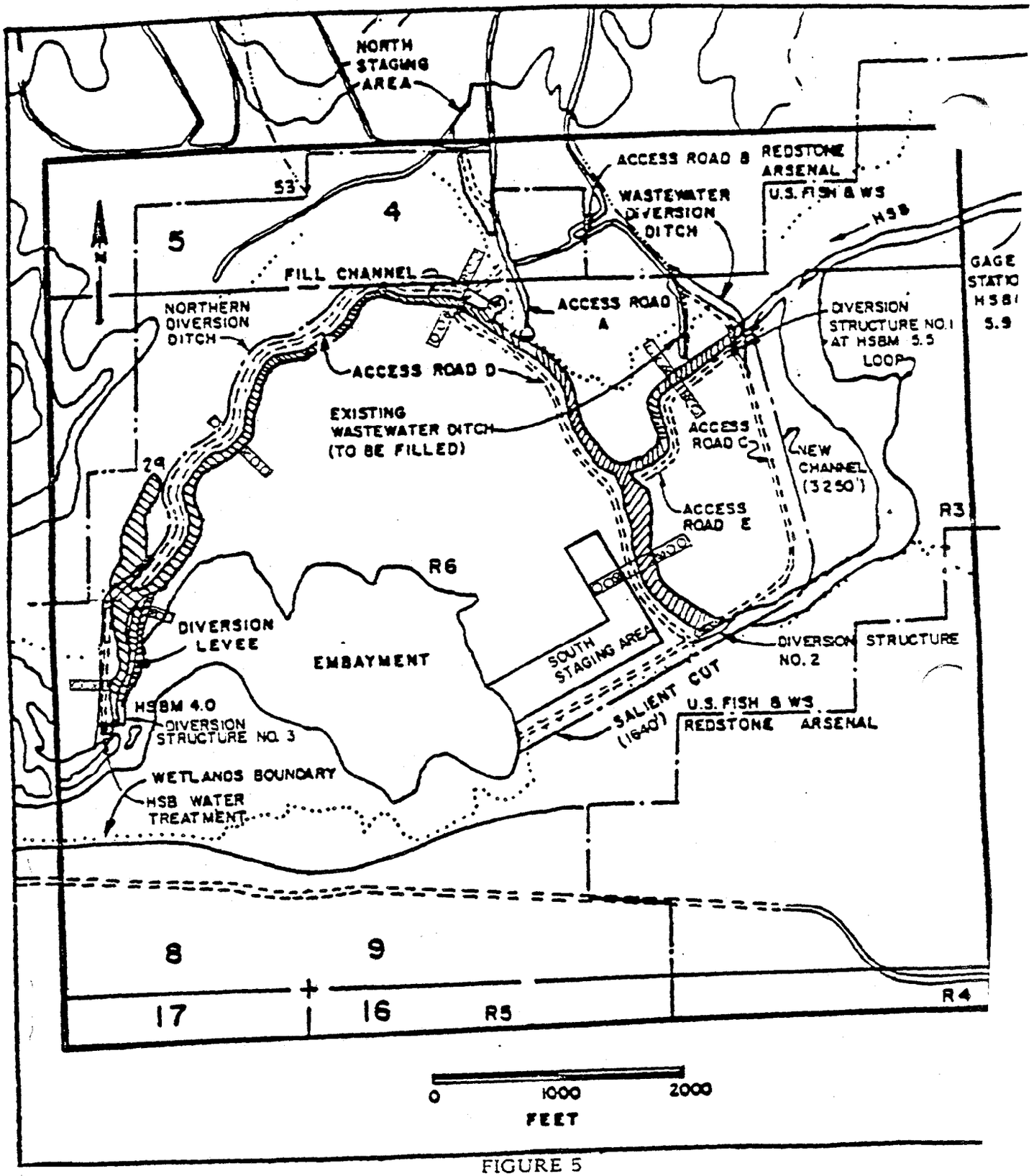


FIGURE 5

GROUNDWATER MONITOR WELLS:

LOCATION OF CHANNEL TRAVERSES

Huntsville Spring Branch-Indian Creek
Long-Term Monitoring Program

TABLE 1
LONG RANGE MONITORING SUMMARY

Calendar Year	Monitoring Year*	Monitoring Activity	Frequency
1989	2	Fish Collection	Once
		Water Collection	Twice
		Groundwater (Technical Proposal) Collection	Once
		Groundwater (Filled Channel) Collection	Once
1991	4	Fish Collection	Once
		Water Collection	Twice
		Groundwater (Filled Channel) Collection	Once
1993	6	Fish Collection	Once
		Water Collection	Twice
1995	8	Fish Collection	Once
		Water Collection	Twice
		Groundwater (Filled Channel) Collection	Once
1997	10	Fish Collection	Once
		Water Collection	Twice
		Groundwater (Filled Channel) Collection	Once
1998	11	Fish Collection	Once
1999	12	Fish Collection	Once
2005	18	Fish Collection	Once
		Water Collection	Once
		Groundwater (Filled Channel) Collection	Once

* Year after Completion and Implementation of Remedial Action

TABLE 2

FISH SAMPLING LOCATIONS FOR
LONG-TERM MONITORING PROGRAM

SITE NO.	LOCATION	REACH
1	Embayment at HSBM 4.0	A
2	HSBM 3.7 to HSBM 4.0	A
3	HSBM 2.4 (Dodd Rd. vicinity) to HSBM 2.7	A
4	HSBM 2.0 to HSBM 2.3	B
5	HSBM 1.0 to HSBM 1.3 including embayment at HSBM 1.3	B
6	HSBM 0.0 (in HSB above IC-HSB confluence) to HSBM 0.3	B
7	ICM 4.4 to ICM 4.7 (vicinity of Centerline Road)	C
8	ICM 2.4 to ICM 2.7	C
9	ICM 1.4 to ICM 1.7 (near RSA boundary)	C

TABLE 3

WATER SAMPLING LOCATIONS FOR
LONG-TERM MONITORING PROGRAM

SITE NO.	LOCATION	MILE MARKER	REACH
1	HSB at Martin Rd. bridge	HSBM 9.75	Above A
2	HSB at Dodd Rd. bridge	HSBM 2.4	A
3	IC at Centerline Rd. bridge	ICM 4.6	B/C
4	IC at Triana	ICM 0.38	C
5	IC at Martin Rd. bridge	ICM 8.2	Above C

TABLE 4

HUNTSVILLE LONG-TERM MONITORING
QUALITY ASSURANCE PROGRAM
SUMMARY

- Laboratories
  - Primary - Olin Corporation, Cheshire, CT (formerly New Haven, CT)
  - Secondary - Olin Corporation, Charleston, Tennessee
  - Referee - EPA Region IV, Athens, Georgia
- Analytical Procedures - Huntsville Analytical Procedures Manual; same as used previously (See Appendix B)
- Sample Handling Procedures - Huntsville Analytical Procedures Manual; same as used previously
- Intralaboratory QC
  - SRM - One each day per medium
  - Duplicates (10%)
  - Spikes (5%)
  - Surrogate (100%)
  - Control Charts
- Interlaboratory QC
  - Split samples - 10% to secondary laboratory, 5% to referee laboratory
  - Sample blinding
- QA/QC Criteria
  - Use control limits developed previously
  - Update control limits as work progresses

MODIFICATION OF REVIEW PANEL DECISION DOCUMENT NO. 6

LONG-TERM MONITORING PROGRAM FOR THE
REMEDIAL ACTION IN THE HUNTSVILLE
SPRING BRANCH-INDIAN CREEK SYSTEM

I. The Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch-Indian Creek System was approved by the Review Panel and Decision Document No. 6 was signed and issued on December 3, 1987. Section II.C.1. of that Document provides for the submission, by Olin Corporation, of reports of the monitoring activities by March 1 of each year to the Review Panel.

II. Following discussion with members of the Review Panel, the Olin Corporation has proposed a change in the March 1 reporting date based on the following factors: (a) samples are collected in the fall of the year; (b) sample preparation and analysis time periods; (c) the amount of time required for the necessary quality assurance/quality control activities; and (d) the time required for data analyses, interpretations, conclusions and comparisons with the interim goals.

III. The Review Panel has evaluated the proposed change in the March 1 reporting date and has determined that a modification to the date set forth in Section II.C.1. of Decision Document No. 6 is appropriate.

IV. Therefore, effective upon the signing of this Modification to Decision Document No. 6, the annual reporting date of March 1 shall be changed to April 15 of each year. Section II.C.1. of Decision Document No. 6 is hereby modified to change the reporting due date and will read as follows:

> Olin will prepare a report each year presenting all data collected and summarizing the activities for that year. The report will be submitted to the Review Panel by April 15 of the following year.

Members

ANNE L. ASBELL
Chairperson, Review Panel

DR. DONALD P. SHULTZ
U.S. Fish and Wildlife Service

DR. EDWARD S. BENDER
EPA - Washington, D. C.

COLONEL PERRY C. BUTLER
U.S. Army, Redstone Arsenal

BRUCE A. BRYE
Tennessee Valley Authority

JAMES W. WARR
Alabama Department of
Environmental Management

NONVOTING PARTICIPANTS

HONORABLE CLYDE FOSTER
Town of Triana, Alabama

VERRILL M. NORWOOD
Olin Corporation

DATE: DEC 7 1989

APPENDIX I

DECISION DOCUMENT NO. 7

Quality Assurance and Fish Sample Size,
June 14, 1990

REVIEW PANEL DECISION DOCUMENT NUMBER 7
QUALITY ASSURANCE AND FISH SAMPLE SIZES

I. Introduction

In its Decision Document Number 6, dated December 3, 1987, the Review Panel accepted Olin Corporation's Long-Term Monitoring Program with modifications and recommendations. The Long-Term Monitoring Program requires the measurement of DDT concentrations in fish, surface water, and groundwater. Olin's Long-Term Monitoring Program included a description of the quality assurance procedures (Appendix B of that report) which were similar to the procedures used to collect baseline data. Decision Document Number 6 required Olin to submit reports on data collected to monitor the effectiveness of the remedy and to discuss the quality assurance results for each set of monitoring data submitted to the Review Panel.

The first report from the Long-Term Monitoring Program included quality assurance data that were reviewed by the Technical Committee of the Review Panel. Samples of fish and groundwater split among three laboratories provided information which the Committee believed needed further interpretation. The Technical Committee recommended that Mr. E. William Loy from the EPA Laboratory at Athens, Georgia, which serves as the referee laboratory, and Mr. Keith Roberts from Olin Corporation which serves as the primary laboratory for sample analysis, jointly develop a recommendation for verifying that the data in the annual report meet the requirements of the quality assurance program. They have jointly recommended that the quality assurance program be expanded to require statistical analysis for evaluating interlaboratory split sample results and standard nomenclature for reporting fish analytical data. In addition, Olin provided the Technical Committee with the results of their statistical analysis of the number of performance standard fish that should be collected to measure compliance in each reach.

II. Decision

The decision of the Review Panel is to accept the recommended enhancements to the quality assurance program to include 1) data verification process and 2) establish targets for the number of fish collected for each reach. In addition the Review Panel recommends that the quality assurance procedures be revised as appropriate to reflect these enhancements.

A. Verification Process

1. Each Annual Report will include a statement from Olin

certifying that all data were collected and analyzed in accordance with approved methods and procedures, that the analysis and the results are within acceptable quality control limits, and that the data are considered valid for use in evaluating compliance with the appropriate consent decree provisions. If any data in the annual report do not meet the quality assurance criteria, they will be noted with a brief explanation or footnote addressing the reason for the exception. When these data are used as part of an evaluation, recommendation, or conclusion, the consequences of using this data should be discussed in the report. Quality assurance should include a statistical evaluation to identify significant or systematic bias in sample results within and among laboratories and to identify sample results which may be outliers.

2. Each year the EPA referee laboratory will analyze 10% of the split samples of fish and as appropriate 5% of the split water samples for DDT and evaluate the interlaboratory split sample data to verify that they meet the quality assurance requirements for interlaboratory results. The referee laboratory shall advise Olin of its evaluation in writing. Olin and EPA shall investigate all discrepancies found in this evaluation.

3. EPA will periodically observe the field collection and the preparation of monitoring samples by Olin and its contractors. Other Review Panel represented parties may arrange for similar oversight as they deem appropriate, by coordinating with Olin Corp.

B. Fish Sample Collection Size

The Review Panel concurs with Olin's recommendation for the number of performance standard fish from each reach as identified in the attached Table 1. Such sample sizes will provide a much higher degree of statistical confidence to estimate concentrations of DDT in fish than the number of samples referenced in the Consent Decree. Olin shall include statistically appropriate sample sizes with any subsequent recommendations for the use of substitute fish species. The Review Panel recommends that Olin continue to exert its best efforts to collect these revised numbers of fish from each reach during its Long-Term Monitoring Program.

C. Procedure Revision

Both Olin and EPA should revise their quality assurance procedures for activities undertaken under this Consent Decree to reflect the modifications identified in this Decision Document.

Olin should advise the Review Panel in writing when the changes have been made. The implementation of these changes should be reflected in the next Long-Term Monitoring Program Annual Report that is prepared after the date of this decision document.

III. **Conclusion**

This decision document, consisting of 3 pages of text and one table comprises the Review Panel decision and is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown by the signature affixed hereto.

MEMBERS

Ms. Anne L. Asbell
Chairperson, Review Panel

Dr. Donald P. Schultz
U.S. Fish and Wildlife Service

Dr. Edward S. Bender
EPA - Washington, D.C.

Col. Perry C. Butler, U.S. Army, Redstone Arsenal

Bruce Brye
Tennessee Valley Authority

James W. Warr
Alabama Department of Environmental Management

NONVOTING PARTICIPANTS

Honorable Clyde Foster
Town of Triana, Alabama

Verrill M. Norwood, Jr.
Olin Corporation

DATED: June 14, 1990

Table 1. Performance Standard Fish Sample Sizes-
Targets for each reach and overall recommended
Catch for each fish species.

Performance Standard Fish Species	Stream Reach A	B	C	Overall Recommendation
Channel Catfish	25	17	16	Catch 25/Reach
Smallmouth Buffalo	10	11	7	Catch 12/Reach
Largemouth Bass	11	5	10	Catch 12/Reach

APPENDIX J

COMPLETION OF CONSTRUCTION CERTIFICATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

October 14, 1987

Mr. Verrill M. Norwood
Vice President, Environmental Affairs
Olin Chemicals
Post Office Box 248
Charleston, Tennessee 37310

Re: Olin Huntsville Remedial Project

Dear Mr. Norwood:

At the July 22, 1987 Review Panel meeting at Redstone Arsenal, Alabama, I established an Interagency Inspection Committee to inspect the Huntsville Remedial Project and assure compliance with the U.S. Army Corps of Engineers permit under Section 404 of the Clean Water Act and the U.S. Fish and Wildlife Service Special Use Permit. I also established a Review Panel Committee, chaired by Mr. Bruce A. Brye, a registered Professional Engineer in Alabama, to review the results of the inspection, verify compliance and certify completion of construction in accordance with Review Panel-approved plans, or to identify remaining items to be completed.

The Interagency Committee inspected the Remedial Action Project Area on August 3, 1987 and submitted its findings to the Review Panel by letter dated August 19, 1987 from Mr. William L. James, U.S. Army COE, Nashville District. Dr. Lee A. Barclay, FWS, and Mr. John T. Hughes, ADEM, concurred in the Committee's findings by separate letters dated September 10, 1987 and August 19, 1987, respectively.

On August 27, 1987, the Review Panel Committee visited the project area and reviewed the findings of the Interagency Committee and the tables, summarizing construction modifications for Upper Reach A and Lower Reach A, contained in your letter of August 27, 1987. The Committee also performed a field inspection to determine the overall project status. The results of the final inspection are included in Mr. Brye's letter dated September 14, 1987 (copy attached).

I have reviewed the findings of the Interagency Committee and the Review Panel Committee, along with your letter of September 14, 1987 which advised of minor changes in the Northern Division ditch around HSBM 4.2 to provide additional protection from beaver activity in that area and of your commitment to the establishment of the vegetative cover in the project area.

I concur in the findings of the two Committees and agree with the certification provided by Mr. Brye. With the concurrence of the other members of the Review Panel Committee, Mr. Brye certified that:

> the as-built Remedial Actions for Upper Reach A and Lower Reach A meet or exceed the requirements of the design plans and specifications initially approved by the Review Panel. Furthermore, with Olin's commitments for the completion of final project redress, as needed, and the establishment of acceptable vegetative cover in conjunction with the planned regulatory agencies' follow-up inspections, it is concluded that Remedial Action construction is completed with respect to further actions required by the Review Panel.

Please be further advised that Review Panel Decision Document Number 6, Long-Term Monitoring Program for the Remedial Action in the Huntsville Spring Branch - Indian Creek System, has been conceptually approved by the Review Panel. Since the Long-Term Monitoring Program will be used to evaluate progress in attaining the performance standard as described in paragraph 26 of the Consent Decree, and in accordance with Decision Document Number 3, it is necessary for Olin to establish a date for completion of construction and implementation of the Long-Term Monitoring Plan. The date proposed will be submitted to the Review Panel for concurrence at the next Review Panel meeting, now scheduled for Thursday, December 3, 1987, at 10:00 a.m. in the Regional Administrator's Conference Room, EPA, Atlanta.

Sincerely,

Howard Zeller

Howard D. Zeller
Chairman, Review Panel

Enclosure

cc: Review Panel Members

TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

270 Haney Building

September 14, 1987

Mr. Howard D. Zeller
Chairman, Review Panel
U.S. Environmental Protection Agency
345 Courtland Street, NE.
Atlanta, Georgia 30365

Dear Mr. Zeller:

FINAL REVIEW PANEL SITE INSPECTION REPORT AND CERTIFICATION OF REMEDIAL ACTION ON THE HSB-IC SYSTEM

The Review Panel Final Inspection Committee conducted an inspection of the Remedial Action in the HSB-IC System on August 27, 1987. This committee, established at the July 22, 1987 Review Panel meeting, was charged to make a final inspection of the Remedial Action on behalf of the Review Panel and to certify completion of construction in accordance with Review Panel approved plans or to identify remaining items to be completed. All Review Panel agencies and Olin were represented at the inspection as identified below.

Bruce A. Brye Chairman, Review Panel Final Inspection Committee	TVA
W. Waynon Johnson	F&WS
Arthur G. Linton	EPA
John T. Hughes	ADEM
William L. James	COE
Morris W. (Bill) Schroder	RSA
Keith D. Roberts	Olin
Robert W. Hyland	Olin
W. Marvin Brown	Olin

As the initial step of the inspection, the committee conducted an office review and discussion of the following documents.

1. The tables summarizing construction modifications for Upper Reach A and Lower Reach A as contained in Olin's Eleventh Quarterly Report of Engineering and Construction Activities transmitted to the Review Panel by Verrill M. Norwood, Jr., Olin Corporation, by letter dated August 27, 1987.

2. Letter from William L. James, COE, to Arthur G. Linton dated August 19, 1987, summarizing the results of the joint regulatory agency inspection conducted on August 3, 1987.

The construction modifications reflect departures from the plans as originally submitted by Olin and approved by the Review Panel for Upper Reach A Remedial Action in response to the Review Panel Decision Document No. 1 dated August 31, 1984, and for Lower Reach A in response to Decision Document No. 3 dated December 9, 1986. All modifications fall into one of two categories. The first category includes major modifications which either Olin identified and brought to the attention of the Review Panel (and the regulatory agencies) for approval, or which the Review Panel (with the concurrence of the regulatory agencies) identified and requested Olin to implement. The second category includes minor "in field" modifications of the type which are normally associated with any major construction project. It was the conclusion of the Inspection Committee that all of the modifications implemented were enhancements to the originally approved Remedial Action plans, which improved the overall effectiveness and long-term stability of the Remedial Action. Olin is to be commended for identifying and implementing these modifications even though many of them involved added expense beyond that required to meet the requirements of the Review Panel approved plans.

Following the office review, the committee conducted a field inspection to visually inspect the areas where modifications had been made and to determine the overall project status. With the exception of minor project redress activities, many of which are associated with project demobilization, and the establishment of vegetative cover, particularly in fill areas 2 and 3, the project is essentially completed.

The establishment of vegetative cover has been hampered by the drought. Olin has installed an extensive irrigation system and is fully committed to the establishment of vegetative cover prior to leaving the site. The regulatory agencies have also committed to conduct follow-up inspections, as appropriate, to verify the status of the revegetation efforts and to identify what, if any, additional revegetation actions may be necessary.

With the concurrence of the other members of the Review Panel Site Inspection Committee, I hereby certify that the as-built Remedial Actions for Upper Reach A and Lower Reach A meet or exceed the requirements of the design plans and specifications initially approved by the Review Panel. Furthermore, with Olin's commitments for the completion of final project redress, as needed, and the establishment of acceptable vegetative cover in conjunction with the

planned regulatory agencies' follow-up inspections, it is concluded that Remedial Action construction is completed with respect to further actions required by the Review Panel.

Sincerely yours,

Bruce A. Brye, P.E.
Chairman, Review Panel
Final Inspection Committee

ALABAMA REGISTERED NO. 12044 PROFESSIONAL ENGINEER BRUCE A. BRYE

September 14, 1987

cc: Review Panel
Review Panel Final Inspection Committee

Prepared by Bruce A. Brye and concurred with by the Review Panel Final Inspection Committee members.

APPENDIX K

CHANGE OF REVIEW PANEL CHAIR

Resignation letter of Mr. Howard Zeller
as Chair of the Review Panel,
dated November 19, 1987;

Report from the Chair, Olin Review Panel,
1983-1987, dated December 3, 1987;

and

Memorandum from Lee A. DeHihns, III,
Acting Regional Administrator, EPA Region IV
dated November 19, 1987, designating
Ms. Anne L. Asbell as Review Panel
Chair, effective January 1, 1988.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 19 1987

Mr. Lee A. DeHihns, III
Acting Regional Administrator
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

RE: Review Panel, U.S. V. Olin Corp., Consent Decree

Dear Mr. DeHihns:

I have had the pleasure of serving as Chairman of the Review Panel since its establishment following the approval of the U.S. v. Olin Corporation Consent Decree. The Review Panel and the Olin Corporation have made significant progress in carrying out the requirements of the Decree.

As you may know, the construction of the Remedial Action Plan to isolate DDT in the Huntsville Spring Branch - Indian Creek System, Wheeler Reservoir, Alabama, was certified complete on October 14, 1987. Olin has proposed January 1, 1988 as the "designated event" required under the Consent Decree to signify completion of construction and implementation of the remedy. This date will be presented to the Review Panel at the December 3, 1987 meeting and I expect the Panel to officially accept the date. At that same meeting, the Review Panel will formally adopt Decision Document Number 6, which details the long term monitoring program required of Olin. The Decision Document outlines the monitoring necessary to ultimately assess compliance with the performance standard of 5 ppm of DDT in three species of fish as described in the Consent Decree.

With completion of construction and implementation of the remedy, my "personal agenda" regarding this important activity is essentially completed. I am therefore submitting my resignation as Chairman of the Review Panel, effective December 31, 1987. I am pleased with the accomplishments of the Review Panel over the past four and one-half years that I have served as Chairman, and I believe the remedial action proposed and implemented by Olin and approved by all members of the Review Panel will accomplish the stated objectives of the Consent Decree.

I recommend that Ms. Anne L. Asbell be appointed to succeed me. Ms. Asbell has served as Legal Counsel to the Review Panel and has contributed significantly to the success of the Review Panel since its inception. She is highly regarded by its members. Future success of this important activity would be assured with Ms. Asbell as Chairperson.

My final action as Chairman will be submission of a bri report at the December meeting with recommendations to EPA an the Review Panel regarding future activities.

Again, it has been a pleasure to serve the EPA as Chairman of the Panel.

Sincerely,

Howard D. Zeller
Chairman, Review Panel

cc: Ms. Anne L. Asbell
Review Panel Members

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

DEC 3 1987

Mr. Lee A. DeHihns, III
Acting Regional Administrator
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. DeHihns:

In my letter of resignation as Chairman of the Review Panel, I indicated my final action as Chairman would be the submission of a brief report and recomendations to the Review Panel and EPA regarding future activities. That report is attached for your review and action as appropriate.

The past four and one-half years as Chairman of the Panel have been rewarding, and I leave this project with a firm sense of accomplishment and personal pride in what the individuals and agencies have accomplished. If I can be of service to you or the U.S. Environmental Protection Agency in the future, please let me know.

Sincerely,

Howard D. Zeller
Chairman, Review Panel

cc: Review Panel Members
Thomas W. Devine, EPA
Leigh Pegues, ADEM
Bevan W. Brown, TVA
James W. Pulliam, FWS
Lewis D. Walker, U.S. Army
John M. Henske, Olin Corp.
John W. Johnstone, Olin Corp.

REPORT FROM THE CHAIRMAN

OLIN REVIEW PANEL

1983-1987

BY: HOWARD D. ZELLER

BACKGROUND

The Olin Review Panel was established under the terms of a Consent Decree entered in May 1983 by the United States District Court for the Northern District of Alabama, as an overall order settling litigation by the United States of America, the State of Alabama, and four sets of private parties, against the Olin Corporation. The Consent Decree requires, among other objectives, that Olin develop and implement a remedial plan that will meet a performance standard of 5 parts per million (5 ppm) in fillets of selected species of fish endemic to specified reaches of the Huntsville Spring Branch-Indian Creek System, Wheeler Reservoir, Alabama.

The Review Panel consists of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, the State of Alabama, and nonvoting participants from the Town of Triana and the Olin Corporation. The Chairman of the Review Panel is appointed by the U.S. Environmental Protection Agency.

The Review Panel responsibilities include taking action to approve or disapprove Olin remedial proposals or to designate a substitute remedy. The Review Panel also has authority to request modifications and take other actions as necessary to meet the performance standard as described in the Consent Decree. The Review Panel member agencies have provided technical support throughout the past years and additional support has been provided to the Review Panel by the Nashville District, Corps of Engineers. Legal counsel has been provided by the EPA, Region IV, and legal support has been provided by the TVA, Redstone Arsenal and other Review Panel member agencies.

ACCOMPLISHMENTS

Since its first meeting on June 14, 1983, the Review Panel has carried out its responsibilities in a timely and efficient manner. The first major accomplishment was the approval of the remedial action plan on August 31, 1984 as required by the Consent Decree. In further actions, the Review Panel has also accepted the proposed date of January 1, 1988, submitted by Olin as the "designated event" which signifies completion of construction and implementation of the remedy.

The remedial action approved by the Review Panel was a significant accomplishment. Project highlights include the isolation of 379 tons of DDT or approximately 93% of the total DDT-contaminated sediments in the Huntsville Spring Branch-Indian

Creek System. (A total of 408.8 tons of DDT had been deposited in the project area). To accomplish the remedial action, over five miles of access roads, approximately one and one-quarter miles of new stream channel with a base width of 60 feet, over one mile of diversion structures and almost two miles of diversion ditches were constructed. A total of 55.6 acres of isolated stream channel was covered and filled with five layers of material (geotextile fabric, crushed stone and soil) and revegetated. Overall, the remedial action involved 150,000 cubic yards of soil cut, 217,000 cubic yards of soil fill, and 190,000 cubic yards of rock fill. This activity required the transport of 28,000 truck loads of off-site fill to the remedial action construction site. In accomplishing the remedial action described above, all applicable requirements of Federal and State statutes were met.

The Review Panel and the agencies represented were involved in the following activities over the four and one-half year period:

- 26 Formal Review Panel Meetings.
- 30 Technical Committee Meetings.
- Two Public Hearings.
- One Major Environmental Impact Statement (EIS); Developed, Reviewed and Approved.
- Two Comprehensive Permits issued by the Corps of Engineers, Nashville District, under Section 404 of the Clean Water Act.
- Section 401(a)(1) Certification issued by the Alabama Department of Environmental Management.

- Two Section 26(a) Permits issued by the Tennessee Valley Authority.
- Two Refuge Use Permits issued by the U.S. Fish and Wildlife Service.
- Six Major Decision Documents; Developed and Approved.
- Numerous manyears of review of documents, field inspections, and discussions by all members of the Review Panel and technical support groups.

Olin Corporation has acknowledged expenditures of $30 million on the remedial action, environmental studies and monitoring activities. Other major activities, in addition to the construction previously described, include the following:

25,000 Water analyses for DDT, TOC, etc.

22,000 Fish analyses for DDT, lipids, etc.

42,000 Sediment analyses for DDT and physical properties

7,000 Groundwater analyses for DDT, pH, etc.

17,000 Fish uptake analyses for DDT, lipids, etc.

2,000 Macroinvertebrate analyses for DDT.

Major environmental studies involving fish collection, tagging and migration, time-of-travel studies, macroinvertebrate surveys, laboratory uptake and depuration studies, computer modeling, and quality assurance have also been conducted. Approximately 10,000 pages of reports, technical documents, plans, drawings, and correspondence have been submitted by Olin Corporation to the Review Panel. A summary of the activities described above are attached as Appendix I.

THE FUTURE

The Consent Decree (paragraph 26) requires that within 10 years of completion of construction and implementation of the remedy, Olin shall attain the performance standard of 5 ppm DDT in fillets of performance standard fish in Reaches A, B, and C of the Huntsville Spring Branch-Indian Creek System. Review Panel Decision Document Number 6 outlines the long-term monitoring program for collection of data upon which the Review Panel will reach a decision on the attainment and continued attainment of the performance standard. The basic requirement is for Olin to attain the performance standard in all three species of fish in the specified areas by conclusion of the ten year period. Olin has proposed, and the Review Panel has accepted, January 1, 1988 as the "designated event" required under the Consent Decree to signify completion of construction and implementation of the remedy. Therefore, January 1, 1988 will be the beginning of the ten year period for attainment of the performance standard.

The remedial action adopted by the Review Panel clearly represents best available technology for this site. More than 96 percent of the DDT-contaminated sediments in Upper Reach A (the most heavily contaminated area) have been isolated and buried. In Lower Reach A, more than 93 percent of the contaminated sediments were similarly isolated. The overall total percentage of DDT-contaminated sediments isolated by the remedial action is 92.71 percent, i.e., 379 tons out of a total of 408 tons in the System.

The accomplishments to date have been noteworthy. A key ingredient of the successes of the Panel has been the use of indepth reviews and discussions and a balanced decision making process to meet the missions and objectives of the member agencies and the Olin Corporation. It is important that this commitment continue into the future. A sound data base and good science is critical to the decision-making process. The implementation of the U. S. v. Olin Corporation Consent Decree has been an outstanding accomplishment to date and the process is expected to continue.

Future success of the Review Panel will be contingent on the following:

1. A continued "spirit" of cooperation by all Review Panel members. Restoration of environmental quality should continue to take precedence over individual and agency conceptions.

2. The Consent Decree and Decision Documents developed by the Review Panel provide sound guidance for the final decision on assessment of compliance with the performance standard. Procedures in these documents should be adhered to by the Panel.

3. A reasonable approach, based on good science and Review Panel member agency evaluations, should be followed in assessing progress toward achievement of interim goals and final compliance.

4. Cooperation and mutual trust, open communication and integrity of the Federal and State Review Panel members, the Town of Triana, and the Olin Corporation have been key factors in meeting present objectives and will continue to be important in future deliberations.

5. The Technical Committee or a "Standing Committee" appointed by the Chairman should inspect the project area at least once a year and file a report of its findings.

SUMMARY

Completion of remedial action, as defined in the Consent Decree, has resulted in the isolation and cover of 379 tons (93%) of the total DDT-contaminated sediments in the Huntsville Spring Branch-Indian Creek System. A total of approximately 30 tons of DDT remains in the system, widely dispersed and at low concentrations. The development and implementation of a sound remedial action plan, project construction and a long-term monitoring program within the past four and one-half years is one of the most significant "Superfund" accomplishments to date, and a credit to the Federal, State and Local Governments and the Olin Corporation. Of greater importance, however, is the restoration of environmental quality to the Huntsville Spring Branch-Indian Creek System, Wheeler Reservoir, Alabama.

APPENDIX I

HUNTSVILLE ENVIRONMENTAL STUDY

FISH COLLECTING 6 YEARS - 6000 FISH
FISH ABUNDANCE STUDIES - 1 YEAR
FISH TAGGING AND MIGRATION STUDIES - 4 YEARS +
FISH AGE STUDY
MACROINVERTEBRATE SURVEY - 2 YEARS
HYDROLOGICAL MONITORING OF HSB-IC - 5 YEARS
WATER SAMPLING - 6 YEARS+
TIME-OF-TRAVEL STUDIES - 1½ YEARS
DYE TRACER STUDIES - 3 STUDIES
WATER QUALITY MONITORING - TEMP. D.O., ETC. - 6 YEARS
SEDIMENT SAMPLING - 3 PHASES
TRANSECT NETWORK SURVEYED - 125 TRANSECTS
3 FISH LABORATORY UPTAKE STUDIES - SEDIMENT, DIET, DEPURATION
5 CAGE FISH STUDIES (IN-STREAM)
LIVING STREAM STUDY (FISH UPTAKE)
COMPUTER MODELLING - SEDIMENT TRANSPORT
COMPUTER MODELLING - FISH UPTAKE
GROUNDWATER SAMPLING
WATERFOWL STUDY
QUALITY ASSURANCE - PRIMARY, 2 SECONDARY AND REFEREE LABS
HSB VEGETATION SURVEY
EXTENSIVE LITERATURE SEARCHES

NUMBER OF ANALYSIS

MADE FOR HUNTSVILLE STUDY

WATER	25,000*	(DDT, TOC, HARDNESS, ETC.)
FISH	22,000	(DDT, LIPIDS, AGEING)
SEDIMENT	42,000	(DDT, PHYSICAL PROPERTIES)
FISH UPTAKE	17,000*	(DDT, LIPIDS)
MACROINVERTEBRATE	2,000	(DDT)
GROUNDWATER	2,000	(DDT, pH, CONDUCTIVITY)
	110,000*	

* DOES NOT INCLUDE D.O., pH, TEMPERATURE, AND CONDUCTIVITY MEASUREMENTS.

HUNTSVILLE

REPORTS SUBMITTED TO REVIEW PANEL

Huntsville Quarterly Assurance/Method Equivalency Report	August 1, 1983
Huntsville Quarterly Report No. 1	September 1, 1983
Huntsville Groundwater Report	November 17, 1983
Huntsville Quarterly Report No. 2	December 1, 1983
Huntsville Analytical Methods Manual	February 22, 1984
Huntsville Quarterly Report No. 3	March 1, 1985
Huntsville Quarterly Report No. 4	June 1, 1984
Huntsville Remedial Action Report	June 1, 1984
Huntsville Quarterly Report No. 5	September 1, 1984
Huntsville Quarterly Report No. 6	December 1, 1984
HSB-IC Long-Term Data Acquisition Report	February 1, 1985
Draft 404/26a Permit Application	February 5, 1985
Huntsville Quarterly Report No. 7	March 1, 1985
Huntsville Engineering Quarterly Report No. 1	March 1, 1985
Huntsville Preliminary Engineering Drawings	April 1, 1985
Second Draft 404/26a Permit Application	April 19, 1985
A Cultural Resource Survey for the Huntsville Remedial Action Plan	May 13, 1985
Huntsville Quarterly Report No. 8	June 1, 1985
Huntsville Engineering Quarterly Report No. 2	June 1, 1985
Final Engineering Drawings and Design Specifications	July 1, 1985
404/26a Permit Application	July 1, 1985
Environmental Analysis for the Huntsville Remedial Action Plan	July 1, 1985
Field and Laboratory Investigations of the Huntsville Spring Branch-Indian Creek System	July 1, 1985
Report on DDT in HSBM 4.0 to 2.4 (Lower Reach A)	August 1, 1985
HSB-IC Post Remedial Action Interim Goals	August 1, 1985
Huntsville Quarterly Report No. 9	September 1, 1985
Huntsville Engineering Quarterly Report No. 3	September 1, 1985
Huntsville Groundwater Monitoring Program	November 20, 1985
Springs Report	November 27, 1985
Huntsville Quarterly Report No. 10	December 1, 1985
Huntsville Engineering Quarterly Report No. 4	December 1, 1985
Huntsville Remedial Action Plan Policy and Procedures Manual	January 6, 1986
Cultural Resources Survey Report (Oxbow Alternative)	January 7, 1986
Assessment of Revegetation Needs for the Olin Corporation Huntsville Remedial Action Plan	January 15, 1986
Final Engineering Drawings (Oxbow Alternative)	January 15, 1986
Huntsville Quarterly Report No. 1	March 1, 1986
Huntsville Engineering Quarterly Report No. 5	March 1, 1986
HSB-IC Long-Term Data Acquisition Report	March 1, 1986
HSB-IC Substitute Fish Species Report	March 1, 1986
HSB-IC DDT in Fish and Water Baseline Report	March 1, 1986
Huntsville Engineering Quarterly Report No. 6	June 1, 1986
404/26a Permit Modification	June 29, 1986
Catastrophic Subsidence Action Plan	July 30, 1986

Draft 404/26a Permit Application (Lower Reach A)	August 18, 1986
Huntsville Quarterly Report No. 12 (Semiannual No. 1)	September 1,1986
Huntsville Engineering Quarterly Report No. 7	September 1, 1986
Report on DDT in Reach B and Reach C of the Huntsville Spring Branch-Indian Creek System	September 1, 1986
404/26a Permit Application	September 15, 1986
Environmental Analysis for Huntsville Remedial Action Plan (Lower Reach A)	September 15, 1986
Preliminary Engineering Drawings (Lower Reach A)	October 1, 1986
Technical Specifications for the Huntsville Remedial Action Plan (Lower Reach A)	October 1, 1986
Cultural Resource Assessment	October 15, 1986
Endangered Species Monitoring Report	October 20, 1986
Revised 404/26a Permit Application	October 27, 1986
Huntsville Engineering Quarterly Report No. 8	December 1, 1986
HSB-IC Long-Term Monitoring Program (DRAFT)	February 1, 1987
Evaluation of Substitute Fish for Largemouth Bass	February 6, 1987
Huntsville Semiannual Report No. 2	March 1, 1987
Huntsville Engineering Quarterly Report No. 9	March 1, 1987
HSB-IC Long-Term Monitoring Program (DRAFT)	May 5, 1987
HSB-IC Long-Term Monitoring Program	August 14, 1987
Huntsville Semiannual Report No. 3	September 1, 1987
Huntsville Engineering Quarterly Report No. 10	September 1, 1987

HUNTSVILLE REMEDIAL ACTION PROJECT

PROJECT HIGHLIGHTS

DDT ISOLATED

- Isolated 308 out of 317.9 tons of DDT in Upper Reach A (96.89%).
- Isolated 71 out of 75.6 tons of DDT in Lower Reach A (93.92%).
- 92.71% of DDT in HSB-IC system isolated (379 out of 408.8 tons).

PROJECT FEATURES

Access Roads: 5 miles of access roads constructed with crushed stone and geotextile fabric.

New River Channels: 6490 feet (1.23 mile) of new channels constructed with a base width of 60 feet.

Diversion Structures: 7 diversion structures of crushed rock constructed. Total length was 5441 feet. Individual lengths ranged from 130 feet to 2600 feet plus a 1250 foot diversion levee was constructed.

Diversion Ditches: 1.8 miles of diversion ditches constructed. Most of the ditches were "beaver-proofed" with drainage tile.

Channel Fill Areas - 55.6 acres filled and covered with five layers of soils, stone and geotextile fabric plus vegetation.

Channel Excavation - Sediment removed from 3170 feet of HSB channel.

Overall:
150,000 cubic yards of soil cut
217,000 cubic yards of soil fill
190,000 cubic yards of rock fill
Required 28,000 truckloads of off-site fill

OTHER FACTS

- HSB water quality protected during construction.
- Endangered species protected.
- Archaeological resources protected.
- Minimized impact on operations of TVA, RSA, Wheeler Refuge.

HUNTSVILLE

% DDT ISOLATED

REACH A 393.5 TONS

UPPER REACH A 317.9 TONS
308 TONS ISOLATED

308/317.9 = 96.89%

LOWER REACH A 75.6 TONS
71 TONS ISOLATED

71/75.6 = 93.92%

REACH B 8.2 TONS

REACH C 7.1 TONS

HSB-IC 408.8 TONS

% ISOLATED 379/408.8 = 92.71%

- 581 days of construction work without lost time accident.

DOCUMENTATION

- 10,000 pages of reports, technical documents, plans, drawings, and correspondence submitted to Review Panel.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 19 1987

Ms. Anne L. Asbell
Associate Regional Counsel
U.S. Environmental Protection Agency
345 Courtland Street NE
Atlanta, Georgia 30365

RE: Review Panel, U.S. v. Olin Corporation Consent Decree

Dear Ms. Asbell:

I have designated you to succeed Howard D. Zeller as Chairperson of the Review Panel, which was established by the Consent Decree entered on May 31, 1983 by the United States District Court for the Northern District of Alabama. The Review Panel, consisting of members of the United States Environmental Protection Agency, Tennessee Valley Authority, United States Fish and Wildlife Service, the Department of the Army, State of Alabama and non-voting participants from the Town of Triana, Alabama and the Olin Corporation, has demonstrated significant progress in implementing the Consent Decree during the past four and one-half years. Construction of the remedial action project has been completed and the long-term monitoring program will begin in January 1988.

The future activities of the Review Panel include the important task of assessment of compliance with the Consent Decree in meeting the 5 ppm performance standard in the fish species designated by the Decree. The long-term monitoring program for this task is outlined in Decision Document Number 6.

Your duties as Chairperson will begin on January 1, 1988. Your past service as Legal Counsel to the Review Panel has been exemplary. I am confident the same high standards of performance will be met in the future as the Review Panel continues the implementation and compliance with the requirements of the Consent Decree.

You have my continuing support in this important endeavor.

Sincerely,

Lee A. DeHihns III

Lee A. DeHihns, III
Acting Regional Administrator

cc: Review Panel Members

APPENDIX L

REPORTS OF INSPECTION COMMITTEE

June 13, 1989, Inspection

June 13, 1990, Inspection

TENNESSEE VALLEY AUTHORITY

2S 270C Haney Building
311 Broad Street
Chattanooga, Tennessee 37402-2801

June 11, 1990

A 6/26/90

Ms. Anne L. Asbell
Review Panel Chairperson
Associate Regional Counsel
Environmental Protection Agency
Office of Regional Council
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Ms. Asbell:

REVIEW PANEL INSPECTION COMMITTEE REPORT OF JUNE 13, 1989 INSPECTION

The Review Panel Inspection Committee was originally established by Mr. Howard Zeller, former Chairperson of the Review Panel, on July 22, 1987, to conduct a final inspection of the Remedial Action on behalf of the Review Panel and to certify completion of construction in accordance with the plans approved by the Review Panel. That inspection was conducted August 27, 1987, and certification of completion of construction was issued by letter report to Mr. Howard Zeller dated September 14, 1987. At the December 3, 1987, Review Panel meeting you as the Review Panel Chairperson Designee effective January 1, 1988, authorized continuation of the Inspection Committee to conduct periodic technical inspections of the Remedial Action on behalf of the Review Panel.

The Inspection Committee conducted an inspection of the Remedial Action in the Huntsville Spring Branch-Indian Creek system on June 13, 1989.

All Review Panel agencies and Olin were represented at the inspection conducted June 13, 1989, as identified below:

Bruce A. Brye	TVA
Chairman, Review Panel Inspection Committee	
Donald B. Schultz	F&WS
Arthur G. Linton	EPA
John T. Hughes	ADEM
Morris W. (Bill) Schroder	RSA
William L. James	COE
Keith D. Roberts	OLIN

This inspection was conducted concurrently by the Inspection Committee, the Review Panel Technical Committee, and the Review Panel. At the June 14, 1989, Review Panel meeting I, as Chairman of the Inspection Committee, recommended to the Review Panel that the June 13 inspection be considered the official Inspection Committee inspection for 1989. Dr Donald Schultz, F&WS, requested that the Review Panel's acceptance of this recommendation be conditioned upon receipt of concurrence from the representatives of the Wheeler National Wildlife Refuge (WNWR), who were unable to be present at the June 13 inspection. The Review Panel accepted the recommendation subject to this condition.

The June 13 inspection focused on two principal areas, the structural integrity of the Remedial Action and the redress activities, including vegetative cover as identified in the Inspection Committee's September 14, 1987, certification of completion of construction report. These areas are discussed in the following paragraphs.

Structural Integrity

No conditions observed during the inspection would raise any question concerning structural integrity within the area of this Remedial Action. However, there was some evidence of buildup of a sediment bar within the channel of Huntsville Spring Branch at the first bend of the Salient Cut at the upstream end of the Remedial Action area (approximately HSBM 5.5). This condition did not present a problem at that time, but continued growth of this bar, especially if heavy vegetation should become established on it, could in the future become a potential significant channel obstruction to the flow of Huntsville Spring Branch at the point where the channel was diverted around the Remedial Action area. This condition warrants continued observation to determine if channel maintenance may be appropriate at some time in the future.

In addition, development of sediment bars was noted in the "4.0 embayment" through which Huntsville Spring Branch was rerouted as part of the Remedial Action. This condition would be expected, because this embayment is within the normal fluctuation zone of Wheeler Reservoir and now serves as the initial zone of sedimentation for Huntsville Spring Branch. Therefore it replaces the sedimentation zone that occurred before implementation of the Remedial Action.

Once sedimentation within and along the edges of this embayment area reaches equilibrium and vegetation becomes established on the bars, it is expected that the silt load being carried by Huntsville Spring Branch will be transported through the embayment and lower Reach A and deposited into Reach B. This would represent reestablishment of the natural sediment transport and deposition conditions that were occurring within the Huntsville Spring Branch system before the Remedial Action. Reestablishment of these conditions would enhance the future isolation of those DDT-contaminated sediments in

Reach B. Thus, the occurrence of the bars within the "4.0 embayment" should not be considered as an item of concern with respect to the continued integrity of the Remedial Action.

Site Redress Including Vegetative Cover.

At the time of the August 27, 1987, inspection following completion of construction, Olin had not released its contractor or begun demobilizing activities because the Review Panel had not yet accepted the project as complete. In addition, the vegetative cover on fill areas 2 and 3 had not become fully established, primarily because of extended drought. The Review Panel did certify that construction of the Remedial Action per se had been completed and did accept the project as complete, subject to Olin's commitments to complete project demobilization and final site redress and to continue efforts to establish vegetative cover on fill areas 2 and 3 and the site redress areas.

At the time of the June 13, 1989, inspection, it was determined that Olin had fulfilled its commitments relating to project demobilization and site redress and the establishment of appropriate vegetative cover on all areas of the project.

Specific Recommendation

Subsequent to the June 13, 1989, inspection, representatives of WNWR conducted a separate inspection of the Remedial Action site. Attached is a copy of WNWR's September 12, 1989, letter to the Chairperson of the Review Panel, documenting their inspection. WNWR concurred with most of the inspection committee's June 13 observations. WNWR raised and deferred to the Inspection Committee a policy question relating to the establishment of woody growth along the edges of the new channel cuts.

The Inspection Committee considers the establishment of an opinion or position on this policy question to be beyond the scope of it's responsibility. The Committee is aware that the type of vegetative cover to be maintained within the Remedial Action area has been a topic of discussion by both the Review Panel and the regulatory agencies. The Inspection Committee recommends the Review Panel and the regulatory agencies review this question, establish an appropriate policy, and communicate this policy to the Inspection Committee for guidance in future inspections.

With the concurrence of the other members of the Review Panel Inspection Committee, I hereby certify that this letter report, although dated June 6, 1990, reflects the results of the June 13, 1989, inspection of the Remedial Action site as supplemented by the results of the WNWR staff's subsequent inspection documented in their September 12, 1989, letter. In essence, the Committee found the site to be in excellent condition. However, the Committee does seek the guidance of the Review Panel and the regulatory agencies with respect to the policy question raised in the report concerning vegetative cover.

Sincerely,

Bruce A. Brye, P.E.
Chairman, Review Panel
Inspection Committee

ALABAMA
REGISTERED
NO. 13044
PROFESSIONAL
ENGINEER
BRUCE A. BRYE

June 11, 1990

Attachment:
cc (Attachment):
Review Panel
Review Panel Inspection Committee

Prepared by Bruce A. Brye and concurred with by the Review Panel Inspection Committee members

0016N

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Wheeler National Wildlife Refuge
R.R. 4, Box 250
Decatur, Alabama 35603

TAKE PRIDE IN AMERICA

September 12, 1989

A 9/19/89

Ms. Anne L. Asbell
Chairperson, Review Panel
Environmental Protection Agency
Office of Regional Counsel
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Ms. Asbell:

Don Schultz, of our Division of Technical Services, informed us that he did not want to speak for this office when the review committee inspected the Olin DDT Remedial Site this summer. Richard Bays and I recently inspected the area and found the grass vegetation to have satisfactorily covered all "fill-areas".

We did have a question as to what will eventually happen along the new cut channel where woody growth has already become established. We probably need to make an early decision as to whether this will be allowed to revert to trees, or should it be kept brushed back for maintenance reasons. We do not have any strong feelings either way, but was wondering what the committee's feeling was.

Overall, the project looked good and we saw no problem spots. We were delayed in making a proper inspection because waters from an overly full reservoir had backed up over much of the area.

If we can be of further help, please let us know.

Sincerely,

H. T. Stone

H. T. Stone
Refuge Manager

cc: Don Schultz

TENNESSEE VALLEY AUTHORITY

2S 270C Haney Building
311 Broad Street
Chattanooga, Tennessee 37402-2801

June 22, 1990

6/26/90

Ms. Anne L. Asbell
Review Panel Chairperson
Associate Regional Counsel
Environmental Protection Agency
Office of Regional Council
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Ms. Asbell:

REVIEW PANEL INSPECTION COMMITTEE REPORT OF JUNE 13, 1990, INSPECTION

The Review Panel Inspection Committee conducted an inspection of the Remedial Action in the Huntsville Spring Branch-Indian Creek system on June 13, 1990.

All Review Panel agencies and Olin were represented at the inspection as identified below:

Bruce A. Brye Chairman, Review Panel Inspection Committee	TVA
Harry T. Stone	F&WS
Arthur G. Linton	EPA
E. John Williford (representing John T. Hughes)	ADEM
Morris W. (Bill) Schroder	RSA
William L. James	COE
Keith D. Roberts	OLIN

The June 13, 1990, inspection consisted of both an aerial helicopter overflight, arranged through the courtesy of Col. Butler, RSA, and a ground tour of the Remedial Action site. The inspection was conducted concurrently by the Inspection Committee, the Review Panel Technical Committee, and the Review Panel. At the June 14, 1990, Review Panel meeting I, as Chairman of the Inspection Committee, recommended that the June 13 inspection be considered the official Inspection Committee inspection for 1990. The Review Panel accepted the recommendation.

Also, at the June 14, 1990, Review Panel meeting E. John Williford, ADEM, (representing James W. Warr, ADEM at the Review Panel meeting) concurred that his participation in the June 13 inspection constituted ADEM participation in the inspection in lieu of John T. Hughes, ADEM, who was unable to attend.

The June 13, 1990, inspection focused on two principal areas, the structural integrity of the Remedial Action and the status of the vegetative cover, including the rooted vegetation along the banks of the relocated stream channels as identified in the Inspection Committee's report of the 1989 inspection. The inspection did result in the reporting of one General Observation for informational purposes. These areas are discussed in the following paragraphs.

Structural Integrity

No conditions observed during the inspection would raise any question concerning the structural integrity of the Remedial Action. Somewhat elevated streamflows and turbid water conditions in conjunction with the summer pool elevation of Wheeler Reservoir were occurring at the time of the inspection. Thus, the status of the sediment bar within the channel of Huntsville Spring Branch at the first bend of the Salient Cut at the upstream end of the Remedial Action area (approximately HSBM 5.5), as identified in the 1989 inspection report, could not be determined. This sediment bar did not appear to be presenting a problem at that time. However, the continued growth of the bar, especially if heavy vegetation should become established on it, could in the future become a potential significant channel obstruction to the flow of Huntsville Spring Branch at the point where the channel was diverted around the Remedial Action area. This condition warrants continued observation to determine if channel maintenance may be appropriate at some time in the future.

A considerable amount of ponded water was observed at several locations in the Remedial Action area. These conditions are related primarily to the saturated surface conditions resulting from the higher than normal rainfall conditions and the associated frequent flooding conditions experienced during the past months and to the occurrence of increased beaver activity in the drainageways of the area. No portions of the filled channel were subjected to ponded water at the time of the inspection. These conditions will continue to be monitored in future inspections to ensure that any potentially associated impacts to the structural integrity of the Remedial Action are detected as soon as possible.

Vegetative Cover.

At the time of the June 13, 1990, inspection, it was determined that appropriate vegetative cover is being maintained in all areas of the project.

Prior to the June 13, 1990, inspection, the issue related to the occurrence of woody vegetation along the edges of the riprapped new channel cuts, as identified in the Inspection Committee's 1989 inspection report, was discussed with the Review Panel Technical Committee and the technical representatives of the regulatory agencies. Both the Technical Committee and the regulatory agency representatives concluded that the riprap along the new channel banks was basically armoring to protect the banks from erosion and was not an integral part of the protection of the Remedial Action filled channel. In addition, both the Technical Committee and the regulatory agencies expressed the opinion that the occurrence of woody vegetation along the cut channel banks had environmental advantages that would contribute to the restoration of natural conditions along and within the relocated channels. The general policy of the regulatory agencies is to encourage the occurrence of such growths along stream channel cuts where the vegetation would not be detrimental to the structural integrity of the specific structure.

The Technical Committee reported these views to the Review Panel at the June 14, 1990, meeting. The Technical Committee recommended that any decisions relating to the control of such growths be deferred at this time to the regulatory agencies for the implementation of any action deemed appropriate in accordance with their standard practices and policies. The Review Panel concurred with this recommendation. Based on this action, the Inspection Committee in subsequent inspections will continue to observe the status of the vegetation along the channel cuts and will report the observations to the Review Panel for information.

General Observation

During the 1990 inspection, the Inspection Committee did observe large amounts of trash, litter, and other debris in the Remedial Action area. This material, which primarily originates within the City of Huntsville, is the result of stormwater runoff from the portion of the Huntsville Spring Branch drainage located upstream from the Remedial Action area. Although regulation of this condition is outside the scope of the Review Panel's responsibilities, it is noted as a matter of record because it does detract from the aesthetics of the Remedial Action site.

With the concurrence of the other members of the Review Panel Inspection

Committee, I hereby certify that this letter report, although dated June 22, 1990, reflects the results of the June 13, 1990, inspection of the Remedial Action site. In essence, the Committee found the site to be in excellent condition with respect to those matters for which the Review Panel has responsibility.

Sincerely,

Bruce A. Brye, P.E.
Chairman, Review Panel
Inspection Committee

ALABAMA REGISTERED NO. 10011 PROFESSIONAL ENGINEER BRUCE A. BRYE

June 22, 1990

cc: Review Panel
Review Panel Inspection Committee

Prepared by Bruce A. Brye and concurred with by the Review Panel Inspection Committee members

0040N

APPENDIX M

REGULATORY AGENCY INSPECTION SUMMARIES

U.S. Army Corps of Engineers, Nashville District
Redstone Arsenal
U.S. Tennessee Valley Authority
U.S. Fish and Wildlife Services
Alabama Department of Environmental Management

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202-1070

IN REPLY REFER TO

Regulatory Branch

June 27, 1990

SUBJECT: Inspections of the Olin Remedial Action Project

Ms. Anne L. Asbell
Olin Review Panel Chairperson
U.S. Environmental Protection Agency
Office of Regional Counsel
345 Courtland Street
Atlanta, Georgia 30365

Dear Ms. Asbell:

This is in regard to the Nashville District Corps of Engineers' inspections of the Olin Remedial Action Project.

Since July 1, 1986, we have conducted numerous inspections of the Olin project to determine compliance with the terms and conditions of the Department of the Army permits. The majority of these inspections consisted of driving through the project site with Olin personnel and stopping at various locations to observe the status of the work. Since completion of construction, our primary areas of interest have been the status of vegetation on the fill areas and the stability of the channels. Vegetation has been adequately established on the fill areas and no items of significant concern have been noted during our inspections. As discussed during the June 1990 Review Panel meeting, the presence of vegetation in the riprap does not appear to us to be a concern at this time. Likewise, the formation of sediment bars on the inside of the bends in the oxbow cut is not a concern unless a substantial amount of vegetation begins to grow on the bars and impede flow. Both of these situations will be monitored during future inspections. Overall, we have been pleased with both the construction and post-construction phases of the project.

If you have any questions or comments concerning these inspections please let me know. You can contact me at the above address or telephone (615) 736-5181.

Sincerely,

William L. James
Chief, Western Regulatory Section
Operations and Readiness Division

DEPARTMENT OF THE ARMY
UNITED STATES ARMY MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

JUN 2 9 1990

REPLY TO
ATTENTION OF

Directorate of
Engineering and Housing

7/9/90

Ms. Anne L. Asbell
Review Panel Chairman
Associate Regional Counsel
Environmental Protection Agency
Office of Regional Counsel
345 Courtland Street, Northeast
Atlanta, Georgia 30365

Dear ~~Ms. Asbell~~ Anne:

The Olin Corporation has complied with the requirements of the Department of the Army License with Redstone Arsenal No. DACA 01-3-86-144, December 1, 1985. It should be noted that this license expires on November 30, 1990. The Olin Corporation should coordinate with the Redstone Arsenal Land Manager as soon as possible to extend this license for continued use of Army property for their trailer/laboratory at Building 8038, and access to the installation for the next 5 years.

Inspections of the project site by Mr. Schroder, U.S. Army Missile Command Environmental Office, and member of the Technical Inspection Committee, indicate that Olin has complied with all aspects of the construction project requirements.

Sincerely,

Perry C. Butler
Colonel, U.S. Army
Commander, Redstone Arsenal
Support Activity

Copy Furnished:
Mr. Bruce A. Brye, PE

TENNESSEE VALLEY AUTHORITY

NORRIS, TENNESSEE 37828

JUN 26 1990

6/28/90

Ms. Anne L. Asbell
Review Panel Chairperson
Associate Regional Counsel
Environmental Protection Agency
Office of Regional Counsel
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Ms. Asbell:

This is in response to Bruce A. Brye's June 11 request for a statement summarizing TVA's inspection activities during the report period.

TVA representatives have inspected the project site and have determined that the project has been completed in accordance with the plans TVA approved March 31, July 15, and November 28, 1986.

Please let us know if we may be of further assistance.

Sincerely,

for Russell Harrison

Truitt M. Fore, Manager
Property Management and Administration
Department
Land Resources

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Wheeler National Wildlife Refuge
R.R. 4, Box 250
Decatur, Alabama 35603

June 15, 1990

6/18/90

Ms. Anne L. Asbell
Chairperson, Review Panel
Environmental Protection Agency
Office of Regional Counsel
341 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Ms. Asbell:

On June 13, 1990, Refuge Forester Bays and myself inspected the Olin DDT Remedial Site. We found everything to be in satisfactory condition with no problem noted.

Sincerely,

H. T. Stone

H. T. Stone
Refuge Manager

ADEM

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Guy Hunt
Governor

Leigh Pegues, Director

1751 Cong. W. L.
Dickinson Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

P.O. Box 953
Decatur, AL
35602
205/353-1713

2204 Perimeter Road
Mobile, AL
36615
205/479-2336

June 22, 1990

6/27/90

Ms. Anne L. Asbell
Review Panel Chairperson
Associate Regional Counsel
Environmental Protection Agency
Office of Regional Council
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Ms. Asbell:

The Alabama Department of Environmental Management issued two letters of water quality certification, including conditions, to Olin Corporation which were incorporated as a part of the Nashville District Corps of Engineers 404 permit. The first letter of certification was issued on Mary 25, 1986, for Upper Reach A and the second letter was issued on November 12, 1986, for Lower Reach A. Based upon materials submitted and Departmental on-site inspections, Olin met the conditions of State certification.

On-site inspections that have been conducted since project completion have not revealed any problems with the structural integrity of the remedial action.

Sincerely,

E. John Williford

E. John Williford, Chief
Field Operations Division

EJW/mpt