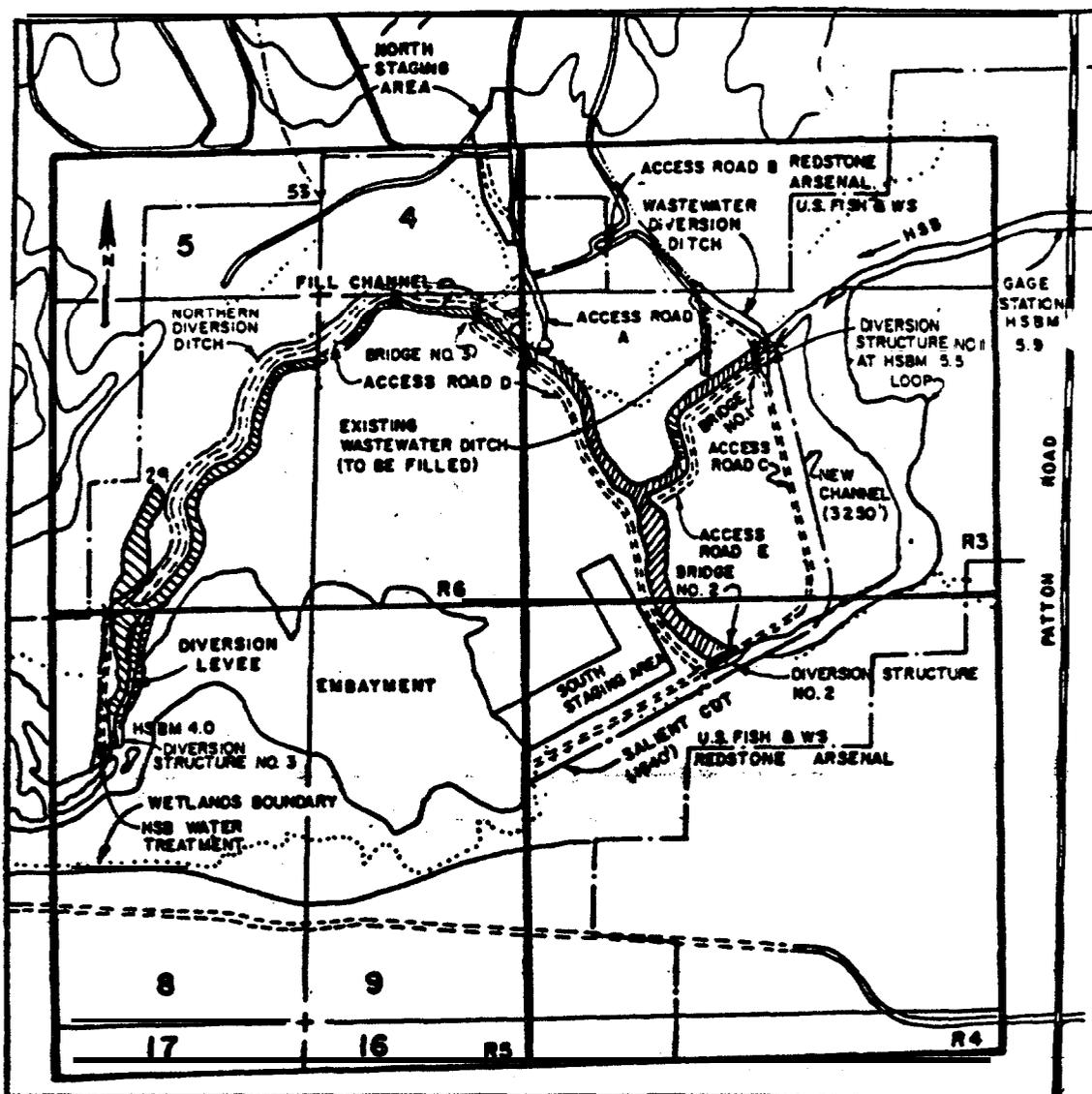


REPORT ON THE REMEDIAL ACTION TO ISOLATE DDT FROM PEOPLE AND THE ENVIRONMENT IN THE HUNTSVILLE SPRING BRANCH-INDIAN CREEK SYSTEM WHEELER RESERVOIR, ALABAMA

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



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30385

The enclosed "Report of Review Panel Activities, United States v. Olin Corporation Consent Decree, May 31, 1983 - June 30, 1986" reflects the significant progress made to date in resolving a complex environmental problem. Just over three years ago the Consent Decree in United States v. Olin Corporation was approved and a Review Panel was established to oversee the implementation of the Decree. Since that time, representatives from the Environmental Protection Agency, Tennessee Valley Authority, Fish and Wildlife Service, Department of the Army, and State of Alabama, together with representatives from the Town of Triana, Alabama; and Olin Corporation have demonstrated that government - federal, state, and local - can work with industry and achieve major environmental results.

I am confident that subsequent Annual Reports will reflect continuing progress.

Sincerely,

A handwritten signature in cursive script that reads "Howard D. Zeller".

HOWARD D. ZELLER
Chairman, Review Panel

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DDT FROM PEOPLE AND THE ENVIRONMENT IN THE
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Acknowledgements

The accomplishments of the Review Panel over the past three years have been made possible by the combined efforts of the members of the Review Panel and staffs of the involved organizations. The Review Panel specifically recognizes Anne L. Asbell, Associate Regional Counsel, EPA, Atlanta, for her advice and counsel, assistance, and dedication over the past three years. In addition, the following people deserve special acknowledgement: Arthur G. Linton, Robert B. Howard Patricia A. Brooks, and Wayne I. Garfinkel, EPA; Morris W. (Bill) Schroder, Redstone Arsenal; E. John Williford, ADEM; Drs. Lee A. Barclay and Donald P. Schultz, and William E. (Ed) Organ, FWS; Walter W. La Roche and John R. Thurman, TVA; William L. James and Ray D. Hedrick, Nashville COE; R. W. (Bob) Hyland and Keith D. Roberts, Olin Corporation.

REVIEW PANEL ACTIVITIES REPORT

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REVIEW PANEL ACTIVITIES REPORT

EXECUTIVE SUMMARY

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, 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 DDT¹ in fillets of channel catfish, largemouth bass, and smallmouth buffalo in specified reaches of the HSB-IC System. This performance standard is to be achieved by a remedy that is consistent with the goals and objectives of the Consent Decree.

-
1. For purposes of the Consent Decree 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 Review Panel,, consisting of members from the United States Environmental Protection Agency (EPA), Tennessee Valley Authority (TVA), United States Fish and Wildlife Service (FWS), the Department of the Army (DA), the State of Alabama (ADEM), and nonvoting participants from the town of Triana, Alabama (Triana), and the Olin Corporation (Olin), was established by the Consent Decree. Review Panel responsibilities include technical overview and approval of Olin's proposals to achieve the requirements of the Consent Decree.

This report summarizes the activities of the Review Panel associated with implementation of Consent Decree requirements from May 31, 1983 through June 30, 1986. In addition to representation on the Review Panel, several of the agencies had responsibilities for issuing permits, licenses and certifications related to the remedial action implementation. Therefore, these activities are also briefly discussed.

Following the establishment of the Review Panel in June 1983, Olin submitted its proposed remedial plan on June 1, 1984 as required by the Consent Decree. The Review Panel held a public hearing on July 14, 1984 in Triana to provide information to the public and receive comments on the proposal.

After thorough review and evaluation by the Review Panel member agencies, the Review Panel accepted the Olin proposal, with modifications, and issued its decision on August 31, 1984. Subsequently, Olin proceeded with the development of the engineering plans and technical specifications and applications for the necessary permits to carry out the remedial activity. Permits from the United States Army Corps of Engineers, the TVA, and the FWS were required. The Nashville District Corps of Engineers (Nashville COE) proceeded with the development of an Environmental Impact Statement (EIS), with EPA, TVA, and FWS, as cooperating agencies. The final EIS was completed in February 1986, and following the comment period, the permitting agencies issued records of decision and the necessary permits on March 31, 1986 and April 1, 1986. ADEM was a participating agency in the EIS process and issued the State certification required for the Federal permits and licenses. The Redstone Arsenal license for Olin activities within the Arsenal boundaries had been issued in December 1985. In January 1986, the FWS had authorized Olin to begin preliminary mobilization activities. After receipt of the required permits and licenses full construction of

the remedy began in April 1986. An official ground-breaking ceremony was held on April 23, 1986 with Review Panel members and Review Panel-represented agencies participating in the ceremony.

In addition to the development and implementation of an environmental remedy, the Consent Decree required Olin to conduct comprehensive studies of fish, water, sediment, and sediment transport to establish baseline conditions which could be used to evaluate the effectiveness of the remedy. Interim goals to indicate progress toward attainment of the performance standard are also a requirement, as is designation of substitute fish species and a long-term monitoring program. Olin has completed the baseline studies and submitted comprehensive reports detailing the analytical data. Proposals and recommendations for the interim goals and substitute fish species and the long-term monitoring program have also been submitted to the Review Panel.

On August 1, 1985, Olin submitted a report outlining several alternate approaches for actions that may be appropriate in the area between HSM mile 4.0 and 2.4, known as lower Reach A. In October 1986, Olin will

submit to the Review Panel a plan for implementation of remedial action in this area.

The Review Panel, in cooperation with Olin, will continue its efforts to ensure implementation of the provisions of the Consent Decree. Thereafter, the activities of the Review Panel will be summarized annually.

REVIEW PANEL ACTIVITIES REPORT

I. INTRODUCTION

On May 31, 1983 the United States District Court for the Northern District of Alabama (Northeastern Division--the Honorable Robert B. Probst 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, a Consent Decree that governs the development and implementation of remedial action for DDT contamination in the HSB-IC System. A copy of the Consent Decree is included in Appendix A.

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 DDT¹ in fillets of channel catfish, largemouth bass, and smallmouth buffalo in specified reaches of the HSB-IC System. Those reaches are:

1. For purposes of the Consent Decree 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 - HSB mile 5.4 to 2.4
- B - HSB mile 2.4 to 0.0
- c - IC mile 5.6 to 0.0

A map identifying the location of these reaches is, shown in Figure 1.

The purpose of the remedy, monitoring and other action which Olin is required to perform under the Consent Decree 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 Consent Decree which are:

- (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 impacts of remedial actions;
- (d) Mitigate effect of DDT on wildlife habitats in the Wheeler National Wildlife Refuge (**WNWR**);
- (e) Minimize adverse effects on operations at Redstone Arsenal (**RSA**), Wheeler Reservoir, and **WNWR**;

(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 the Olin Corporation 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 TVA Act.

A. REVIEW PANEL

The Consent Decree provided for Federal oversight of the remedial activities through the establishment of a Review Panel, chaired by the Environmental Protection Agency and consisting of representatives from Environmental Protection Agency (EPA), Tennessee Valley Authority (TVA), United States Fish and Wildlife Service (FWS), the Department of the Army (DA), the State of Alabama (ADEM), and nonvoting participants from Triana, Alabama (Triana), and the Olin Corporation (Olin).

The Review Panel responsibilities include review of data and taking action on the proposal for

remedial action(s), interim goals, substitute species, long-term monitoring program and other appropriate matters to ensure implementation of the Consent Decree. The Review Panel has the responsibility for the approval or disapproval of the proposed 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.

The Consent Decree required the submission of the initial proposed remedial action plan from Olin by June 1, 1984, and action by the Review Panel to accept, reject, or designate a substitute remedy by September 1, 1984. Olin's proposed remedial action plan was submitted to the Review Panel on June 1, 1984, as required by the Consent Decree. Following internal agency meetings, six Review Panel meetings and a public hearing during the period of June 1, 1984 through August 31, 1984, the Review Panel accepted the Olin remedial plan, with modifications, terms and conditions. The Review Panel issued its Decision Document on August 31, 1984 (Appendix E).

Since August 31, 1984, Olin has continued its studies directed toward the establishment of baseline data and the development of the interim goals and substitute species proposals. In addition, the major efforts of Olin, the Review Panel, and the Review Panel-represented agencies were directed to the development of detailed engineering plans and specifications, environmental reviews, and permitting actions associated with implementation of the remedial action. The Nashville COE and the TVA permits for the remedial action were issued on March 31, 1986, and the FWS permit was issued on April 1, 1986. Construction was begun on April 1, 1986. An official ground-breaking ceremony was held on April 23, 1986 with Review Panel members and Review Panel-represented agencies participating in the ceremony. A remedial action map and photographs of the ground-breaking ceremony and construction activities are shown in Figures 2, 3, and 4 respectively.

B. HISTORIC BACKGROUND

Wastewater discharged from a DDT manufacturing plant operated between 1947 and 1970 at Redstone Arsenal (RSA), Alabama, has resulted in extensive DDT contamination in Huntsville Spring Branch

(HSB) and Indian Creek (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 is 417 tons, of which at least 94 percent is between HSB miles 2.4 and 5.57.

As a result of this DDT discharge, some fish and other wildlife in the HSB-IC vicinity have become heavily contaminated with DDT. Concentrations of DDT in fillets of fish species collected from HSB and IC have exceeded the 5.0 part per million (ppm) action level informally established by the Food and Drug Administration (FDA, 1981). DDT content of channel catfish fillets frequently exceeded 100 ppm, while levels in some other species were generally lower. Studies of sediment and DDT transport in the HSB-IC system have determined that DDT is being transported downstream at a sufficiently high rate to indicate that the existing contamination may become more widespread. A wide range of DDT concentrations has been observed in blood samples from residents living near the contaminated streambed. Centers for Disease Control (CDC) researchers studying these residents were not able to correlate DDT

levels in the blood with any adverse health effects and long-term effects of DDT contamination in humans have not been demonstrated.

CONFIDENTIAL - SECURITY INFORMATION

II. PURPOSE AND SCOPE

The purpose of this report is to summarize the activities of the Review Panel associated with implementation of the Consent Decree requirements from May 31, 1983 through June 30, 1986. This report is intended as information for the interested public and Review Panel agencies. This initial report includes basic background documents and references. The Review Panel intends to issue updated reports annually. Each report will discuss ongoing and completed activities of the Review Panel for the period and will frame the agenda for the following year.

Primary activities of the Review Panel during the report period include the following:

- (1) Development of Review Panel operating procedures,
- (2) Review and approval of Olin's remedial action proposal,
- (3) Issuance of the Decision Document, August 31, 1984,
- (4) Receipt and evaluation of:
 - (a) quarterly reports submitted from September 1, 1983 through March 1, 1986,
 - (b) baseline data conditions from which to measure performance,

- (c) substitute fish species alternatives,
 - (d) interim goals, and
 - (e) long-term monitoring program.
- (5) Oversight of monitoring and remedial activities to ensure implementation of the provisions of the Consent Decree.

The responsibilities of the Review Panel represented agencies also include certification, permitting, and licensing requirements for the remedial action; therefore, these activities have been identified and are briefly discussed in this report. The major activities of the individual Review Panel represented agencies include:

- (1) National Environmental Policy Act reviews and compliance.
- (2) Remedial action certification, permitting, and licensing requirements.

III. HIGHLIGHTS OF REVIEW PANEL ACTIVITIES

The Review Panel has held quarterly meetings and, as the need arose, specially called meetings since the **initial** meeting on June 14, 1983. The meetings have been held at the Redstone Arsenal, and Wheeler National Wildlife Refuge, Alabama, and the cities of Atlanta, Georgia, and Triana, Alabama. The meetings were open to the public and were announced by press releases issued by the EPA to the news media in the Huntsville and Decatur, Alabama area as well as the wire services, AP and UPI.

In August 1983, a technical committee was established by the Review Panel to meet prior to each Review Panel meeting. This committee is chaired by EPA and includes representation from TVA, the FWS, and technical staff of the other Review Panel-represented agencies and non-voting participants. The purpose of the committee is to provide a forum for the discussion of technical issues between the technical staff of the Review Panel agencies and Olin. A report of the discussions and the **resolu-**tion of issues is then presented to the full Review Panel during its formal meetings. This committee has proven effective and will continue its role.

A. REVIEW PANEL

The primary function of the Review Panel is to ensure the orderly and timely implementation of the Consent Decree provisions. In carrying out its responsibilities over the past three years, the Review Panel has taken action to provide guidance and decisions on a variety of matters. Among those items were:

- (1) Development of operating procedures for the conduct of its activities and responsibilities. Operating procedures were developed and adopted by the Review Panel members and nonvoting participants in January 1984. A copy of the Memorandum of Agreement-Review Panel Operating Procedures is included in Appendix C.
- (2) Development of environmental assessment guidance in April 1984 for Olin's use in preparing its remedial action proposal. The guidance document was developed through the combined efforts of the Review Panel agencies.
- (3) Development of public involvement procedures in April 1984 to provide the public an opportunity to receive information and comment on

the environmental issues prior to a final decision on the proposed remedial action.

- (4) Review, evaluation, public hearing and final decision on the Olin remedial action proposal during the period between June 1, 1984 and August 31, 1984.
- (5) Development and issuance of the Review Panel Decision Document on August 31, 1984. A copy of the document is included in Appendix E.
- (6) Review, evaluation, and agreement on the final engineering plans and technical specifications for the remedial action plan.
- (7) Cooperation and assistance to the environmental impact statement and permitting processes for the remedial action plan.
- (8) Development of the quality assurance/quality control program for use in the collection, analysis, and interpretation of monitoring data.

Other items required by the Consent Decree that have been completed or are underway are presented below:

- (1) Under the terms of the Consent Decree, Olin was required to perform a number of studies and to collect baseline data

needed for the development of an **appro-**
priate environmental remedy. Olin has
conducted fish sampling and **analysis**;
sediment sampling and analysis; water
sampling and analysis; sediment transport
studies; laboratory and in situ (**instream**)
fish uptake studies; groundwater sampling
and analysis; and various support
studies. Such data have been used to
establish baseline conditions on the
amounts and distribution of **DDT** within
the HSB-IC System, to determine **DDT** uptake
and depuration rates in fish, and **DDT**
transport within and through the HSB-IC
System. These data will also be used to
evaluate the effectiveness of the remedial
action. Fish collections were conducted
by Olin over a three-year period to deter-
mine **DDT** concentrations in performance
standard (and other) fish and to determine
fish species present in each reach of the
HSB-IC System.

- (2) Water samples during normal flow and
stormflow events were collected by Olin
over a three-year period to characterize

sediment transport. Extensive sediment sampling was conducted to define the quantity and distribution of DDT in the bottom sediments in each reach of the HSB-IC System. A series of DDT uptake studies were conducted to determine the pathway and rates of DDT uptake and depuration in fish. Olin also conducted groundwater studies as required by the Joint Technical Proposal to Implement Remedial Activities (Appendix B to the Consent Decree).

Data collected during the field and laboratory studies were presented to the Review Panel in quarterly reports beginning September 1, 1983. As of March 1, 1986, eleven quarterly reports have been submitted. In addition to the quarterly reports, on July 1, 1985 Olin submitted a five-volume report which detailed the results of the field and laboratory investigations of the HSB-IC System completed to date and the status of ongoing studies.

In March 1986, Olin submitted the following reports to the Review Panel for review, evaluation

and approval: DDT in Fish and Water, Baseline Report; Interim Goals Report; Substitute Species Report; and Long-Term Data Acquisition Report (long-term monitoring report). The data in the DDT in Fish and Water, Baseline Report, include information on HSB-IC water, performance standard fish and potential substitute fish species which will be used to reflect baseline conditions for use in evaluating the effectiveness of the remedial action. The Review Panel has requested the submission of further information and clarification before final action is taken on the baseline report. Appropriate action will be taken on the Interim Goals, Substitute Species and Long-Term Data Acquisition Reports in the near future.

In recognition of the significance of the detailed monitoring studies performed by Olin in the HSB-IC System, the Review Panel has suggested that Olin develop a schedule for compiling the results of its fish uptake and depuration studies for the use and reference of the scientific community.

1. Remedial Action

In accordance with the requirements of the Consent Decree, Olin is to develop and

implement remedy(ies) to achieve and to continue to achieve the performance standard consistent with the goals and objectives established in the Consent Decree.

On June 1, 1984 Olin submitted to the Review Panel its initial proposal for remedial action as required by the Consent Decree. This proposal included (1) monitoring results available through June 1, 1984; (2) a conceptual remedial action plan; (3) a schedule for implementation; (4) a conceptual monitoring plan; and (5) other information as required by the Consent Decree.

On July 14, 1984, after 30 days advance notice to the public through local newspaper advertisements, the Review Panel held a public hearing in the town of Triana, Alabama to provide information to the public and receive comments on Olin's remedial plan. More than 400 people attended the public hearing, 20 people registered to speak and 11 actually made statements. In

addition to oral comments entered into the record, 17 written comments were received by July 28, 1984 (the date the record closed) and 9 were received after that date. All comments, oral and written, were made part of the public record and were considered by the Review Panel in its deliberations on Olin's remedial proposal.

On August 31, 1984, the Review Panel issued its Decision Document which approved Olin's remedial action proposal, with modifications. In arriving at its decision the Review Panel evaluated other alternatives and environmental effects. A copy of the Decision Document is included in Appendix E.

Olin's proposal principally involved the construction of a bypass channel to re-route the HSB between miles 5.5 and 4.0 and in situ burial of DDT contaminated sediments within and along the **overbank** of the existing HSB channel. The Consent Decree defined the stream portion between HSBM 5.4 and 2.4 as Reach A. The portion of Reach A

where remedial action has been approved is known as Upper Reach A (HSBM 5.4-4.0). The remaining stream reach between HSBM 4.0 and 2.4 is known as Lower Reach A (see Figure 1).

The most significant Review Panel modification was the requirement for Olin to develop a remedial plan for the removal and/or isolation of the DDT occurring between HSB miles 4.0 and 2.4 (Lower Reach A).

The Decision Document established the schedule for Olin's submission of detailed engineering plans and specifications and permit applications to both the Review Panel and permitting agencies. The document also established the schedule for submission of a detailed long-term monitoring plan, the proposal for interim goals, and a plan for additional remedial action in Lower Reach A. In all cases, Olin has provided information and reports as appropriate in accordance with the schedule identified in the Decision Document.

In compliance with the schedule established by the Review Panel, Olin submitted permit applications and engineering plans and technical specifications to the appropriate agencies. The Nashville COE prepared an EIS. The EPA, TVA, and FWS, were cooperating agencies and ADEM was a participating agency. During the environmental review process, Olin proposed a modification to the alignment of the bypass channel which reduced the adverse environmental effects associated with the implementation of the Review Panel approved remedial action. This modification was incorporated into the final remedial action design with the concurrence of the Review Panel and the permitting agencies (see Figure 2). Additional information concerning the environmental review and permitting process are described in more detail in the section, "Related Support Activities."

The EIS process was completed on March 24, 1986 and all required approvals were issued by April 1, 1986. Olin initiated limited

site mobilization activities on January 28, 1986 and implemented full construction on April 1, 1986.

Olin's schedule for completion of the remedial action was initially projected for March 1, 1988. Following completion of the environmental review and permitting process, the Review Panel, in April 1986, requested Olin to submit a revised construction schedule. On June 30, 1986, Olin submitted a revised schedule which projects a completion date of August 1, 1987. The favorable weather and construction conditions experienced through June 1986 are the primary reasons for the accelerated construction schedule.

2. Substitute Fish Species

In the event any of the three performance standard fish species cannot be obtained in any one of the reaches, the Consent Decree provides that Olin and the Review Panel shall agree upon one or more substitute fish species for that reach. Olin has submitted its proposal and recommendations on substitute species for review and action

by the Review Panel. The proposal was based on the results of the, baseline monitoring program including (1) fish abundance for species other than performance standard fish found in each reach; (2) the levels of DDT in the substitute fish species; and (3) the similarities of the proposed substitute species to the performance standard species. The proposal also includes the conditions upon which Olin would use the substitute species in lieu of performance standard fish species.

The proposal has been reviewed by the Review Panel and Olin has been requested to provide additional information and clarification. Upon receipt of the information, the Review Panel will complete its review and evaluation of the report and reach agreement with Olin on substitute fish species during 1986.

3. Interim Goals

The Consent Decree provides for the establishment of interim goals to evaluate Olin's progress toward attaining the performance standard. On August 1, 1985, Olin submitted

its report "Huntsville Spring Branch-Indian Creek Post Remedial Action Interim Goals."

Following Olin's submission of this report, the Review Panel deferred further action on interim goals until the completion of the environmental review process and permitting actions by the permitting agencies. The proposed interim goals have been reviewed and discussed by the Review Panel, but a decision was again deferred, pending receipt and evaluation of additional information and clarification of the baseline data and substitute fish species reports. Action on this item and establishment of interim goals is expected to be completed in 1986.

4. Long-Term Monitoring Program

The Consent Decree requires the establishment of a monitoring program to obtain data to evaluate the effectiveness of the remedial action. Monitoring data will also be used to determine achievement of interim goals.

The June 1, 1984 remedial action proposal submitted by Olin included a description of

the long-term monitoring program. The Decision Document required the submission of a detailed monitoring plan by February 1, 1985, and Olin submitted the plan as required. The Review Panel deferred action on the proposed plan, pending receipt of the baseline data report from Olin and completion of the environmental statement process and permitting actions by the permitting agencies. Olin subsequently was requested to submit by March 1, 1986 a revised plan which included consideration of (1) results of the baseline data report; (2) the substitute fish species proposal; (3) the interim goal proposal; and (4) the status of the permitting agencies' environmental review and permit requirements. On March 1, 1986, Olin submitted the revised report, "Huntsville Spring Branch-Indian Creek Long-Term Data Acquisition Program." Further action by the Review Panel has been deferred, pending completion of Review Panel approval of the baseline data report, substitute fish species report,

and the interim goals report. Review Panel action on the long-term monitoring program will be completed during 1986.

5. Technical Support for the Review Panel

During the last three years, the Review Panel has received outstanding technical support and assistance from the Review Panel members, the staffs of the Review Panel member agencies, and Olin's technical staff. In addition, the Review Panel has received technical support and assistance from Dr. James Sullivan and the staff of Water and Air Research, Inc. (WAR, Inc.) on a consultation basis.

B. RELATED SUPPORTING ACTIVITIES

The Consent Decree specifically provides that work undertaken pursuant to the Consent Decree is to be performed in accordance with all applicable federal, State, and local statutes, regulations, ordinances, and permits. Olin is required to obtain any permits or authorizations required by applicable Federal, State, and local law in carrying out the work required of Olin by the Consent Decree.

The Review Panel-represented agencies were the agencies vested with the responsibility for the

administration of most of the applicable Federal and State environmental approvals related to implementation of remedial action. Although the activities of the Review Panel members did not include administration and compliance with other environmental requirements and/or the issuance of specific permits, it was important for the Review Panel activities to be closely coordinated with activities of the permitting agencies throughout the environmental review and permitting processes. The following sections summarize these related supporting activities with respect to environmental review under the National Environmental Policy Act and issuance of certifications, permits, and licenses.

1. Environmental Impact Statement

The Olin remedial action plan approved by the Review Panel required various permits or approvals from several Federal agencies and the **ADEM** prior to implementation. The actions were subject to the requirements of each agencies' regulations for permitting and licensing and the National Environmental Policy Act (**NEPA**). The Nashville COE determined that an environmental impact

statement (EIS) covering the permit action was required, and requested the participation of the EPA, TVA, and FWS as cooperating agencies for the EIS. Those agencies agreed to participate with the Nashville COE in the environmental impact statement process. The State of Alabama represented by ADEM, and the DA, represented by Redstone Arsenal, had an active role in the environmental review process. The draft EIS was issued by the Nashville COE in July 1985. Following receipt, review, and evaluation of the public comments, the final EIS was issued in February 1986. Following the conclusion of the public comment period, the permitting agencies issued their respective records of decision and permits with conditions.

The Review Panel maintained an interest and awareness of the actions underway to complete the environmental impact statement and permitting activities, and assisted the permitting agencies and Olin in the timely completion of the process.

2. Certifications, Permits, and Licenses

Olin's remedial action plan required the issuance of certifications, permits, and licenses from the following agencies:

<u>AGENCY</u>	<u>ACTION REQUIRED</u>
Alabama Department of Environmental Management	Section 401 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.
US Fish and Wildlife	Right-of-Way Easement for Olin activities. Service within the boundary of Wheeler National Wildlife Refuge.
Tennessee Valley Authority	Section 26a permit under the Tennessee Valley Authority Act.

Olin made timely application and provided information to each agency to satisfy the agencies' regulations and permit issuance process. Special terms and conditions incorporated in the individual permits were coordinated between the agencies as part of the environmental review process to maintain continuity and avoid conflict between individual permits.

IV. REVIEW PANEL GOALS AND OBJECTIVES FOR THE PERIOD
JULY 1, 1986 THROUGH JUNE 30, 1987

The Review Panel will continue its oversight of the implementation of the remedial action which began in April 1986. The Review Panel will complete action on the baseline data, interim goals, substitute species, long-term monitoring program and approval of the construction schedule. Upon receipt, the Olin plan for Lower Reach A will be evaluated and appropriate action, i.e., approval, rejection, or modification, will be taken by the Review Panel.

The Review Panel will continue to meet on a regular basis, but meetings will be scheduled less frequently. Quarterly reporting by Olin has been changed to semiannual reporting for submission of the data reports. The construction status reports will continue on a quarterly basis during the construction period.

A. Activities Associated with Determination of
Compliance

The activities in this category to be addressed during the next year are as follows:

- (1) review and approval of Olin's revised construction schedule for Upper Reach A,
- (2) approval of baseline data reports for DOT in water and fish,

- (3) approval of substitute fish species and the establishment of conditions when substitute fish species will be used,
- (4) approval of interim goals for DDT levels in water and fish, and
- (5) approval of the long-term monitoring program.

As indicated previously, considerable progress has already been made in each of these areas. Following receipt of the additional information requested from Olin, it is anticipated that each of these activities will be completed by the end of 1986. The Review Panel will continue to review and monitor Olin's construction progress in Upper Reach A.

B. Remedial Action in Lower Reach A (HSBM 4.0-2.4)

In response to the Review Panel Decision Document, Olin submitted a report on August 1, 1985 which identified several alternative approaches for action which may be appropriate and feasible in Lower Reach A (see Figure 1). Among those approaches were: sediment isolation, low level dam (at HSBM 2.4 or 2.01, sediment removal, channel rerouting, modifications to channel cross section, channel

rerouting and sediment isolation, and innovative technologies (onsite fixation, destruction, biological management, sand cover and natural siltation). The Olin report pointed out several difficulties which may be encountered in carrying out any project in the area of HSB between HSBM 4.0 and 2.4.

After evaluation of the August 1, 1985 report, the Review Panel required Olin to proceed with identifying a specific plan for action in Lower Reach A. The plan will be orally presented to the Review Panel at the August 1986 meeting and the formal written plan is due to the Review Panel in October 1986. After evaluation of the October 1986 submission, the Review Panel will proceed with appropriate action.

V. REVIEW PANEL LONG-TERM ACTIVITIES

The Review Panel will continue to monitor Olin's progress toward attainment of the performance standard until the requirements of the Consent Decree are satisfied. These oversight activities will include review of all remedial action implementation measures required for compliance with the Consent Decree provisions, evaluation of progress toward attainment of the performance standard, implementation and evaluation of the long-term monitoring program, and if required, determination of any modifications to the remedy. The Review Panel will be responsible for determining when the requirements of the Consent Decree have been satisfied following the procedures established in the Consent Decree.

The Consent Decree sets forth the time for compliance with the performance standard contained in the Consent Decree, and the requirements for termination of the Consent Decree. Specifically, Olin shall attain the performance standard of 5 parts per million (ppm) DDT in fillets of the specified fish species in Reaches A, B, and C, within ten years of completion of the construction and implementation of the remedy. Olin shall be deemed to "attain the performance standard" when the average DDT concentration in the fillets of the three

performance standard species (or substitute species, when used) is 5 ppm (or less) in Reaches A, B, and C of the HSB-IC system.

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

The standard for termination of the Consent Decree requires 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 remedial action 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 or maintain any remedy(ies) for a period of seven additional years. At the conclusion of the 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 thereunder, and the Consent Decree shall terminate.

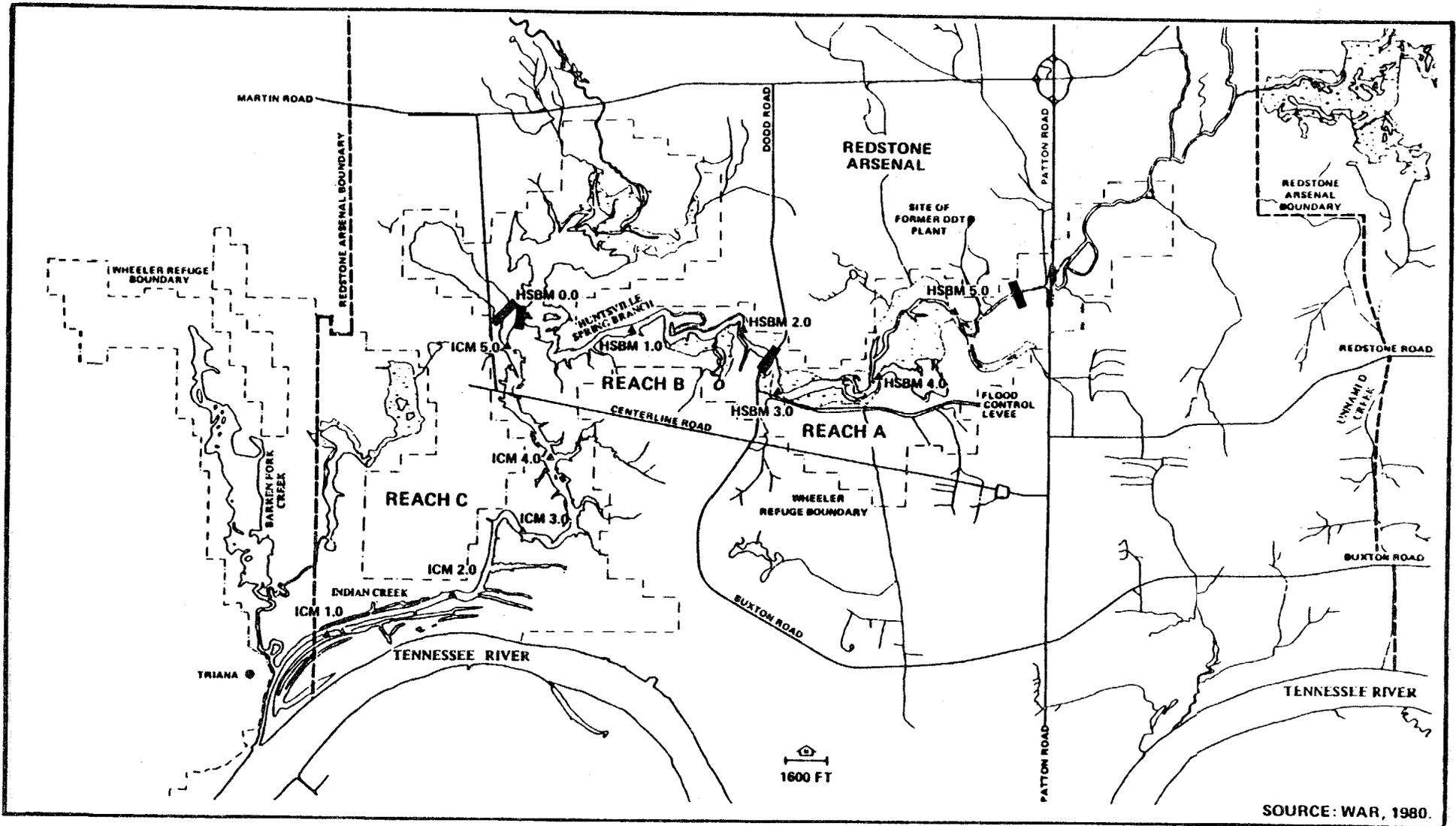
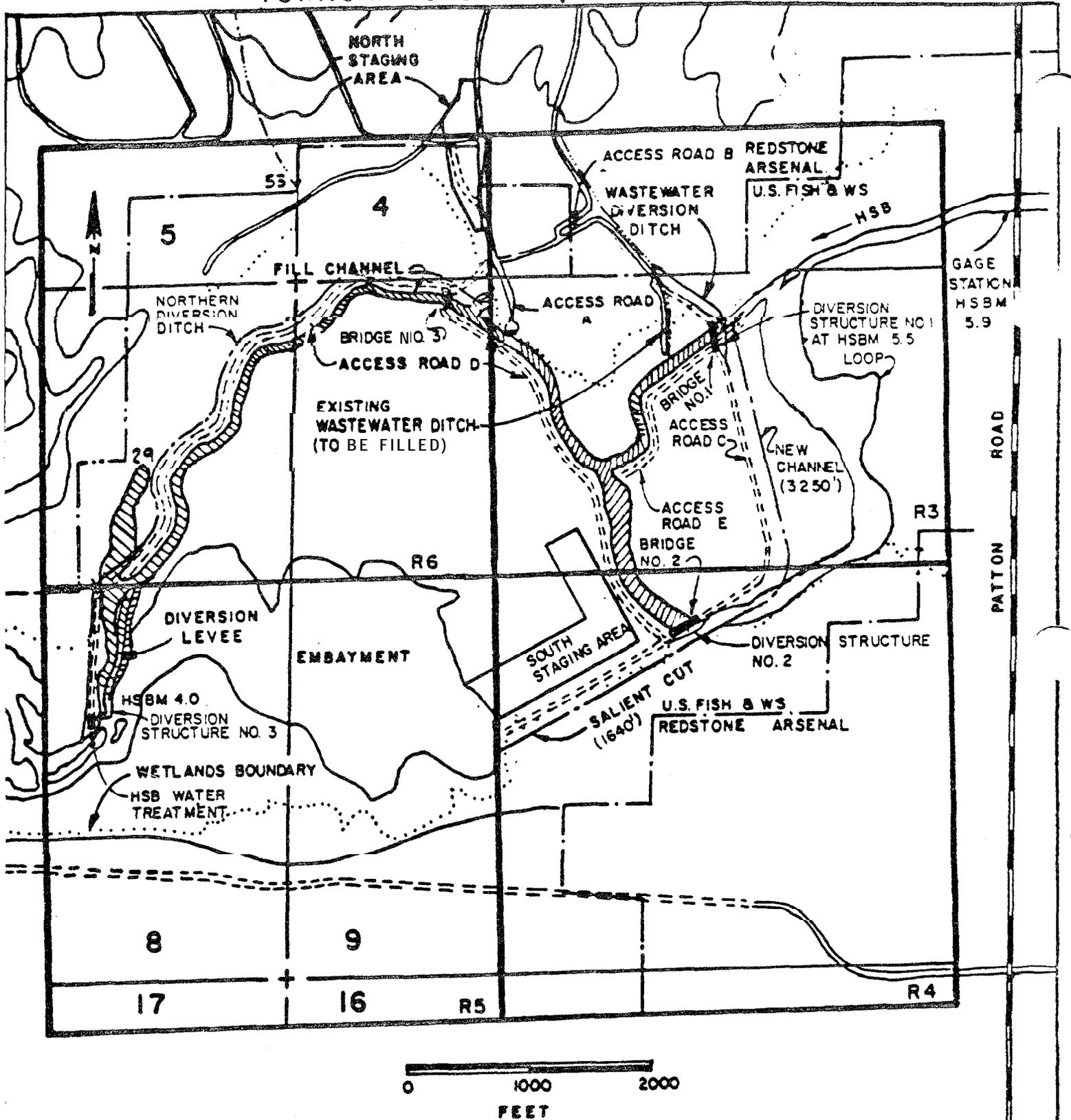


FIGURE 1 General Site Map – Huntsville Spring Branch, Indian Creek, and Vicinity

TOWNSHIP 5 SOUTH, RANGE 1 WEST



HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

LOCATION PLAN

Figure 2



Olin Remedial Project Groundbreaking Ceremony, April 23, 1986, left to Right: Carl L. Baumgartner, Johnson Bros. Constr. Co., Bevan W. Brown, TVA, Verrill M. Norwood, Olin, Howard Benson, FWS, John Ortling, Olin, W. Waynon Johnson, FWS, Dr. Edward S. Bender, EPA, Bruce A. Brye, TVA, Honorable Clyde Foster, Triana, Howard D. Zeller, EPA, Colonel John J. Walker, RSA, Leigh Pegues, ADEM



Construction of
Road F
May 9, 1986



**Road Construction
to Bridge No. 1
April 21, 1986**



**Diking on
Bridge No. 1
April 21, 1986**



**Salient Cut
Opened
June 9, 1986**

Figure 4

APPENDIXES

APPENDIX A

CONSENT DECREE

UNITED STATES v. OLIN CORPORATION
(May 31, 1983)

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ALABAMA
NORTHEASTERN DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

v.

OLIN CORPORATION, A Virginia
Corporation

Defendant,

TOWN OF TRIANA

Intervenor.

STATE OF ALABAMA, ex rel. *MAY 31 1983*
CHARLES A. GRADDICK, Attorney
General, et al.,

Plaintiffs,

v.

OLIN MATHIESON CHEMICAL
CORPORATION, a Virginia
Corporation,

Defendant.

CIVIL ACTION

NO. CV80-PT-5300-NE

FILED

MAY 31 1983

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ALABAMA
JAMES E. VANDEGRIFT, CLERK

CIVIL ACTION

NO. CV79-PT-5174-NE

ENTERED

CONSENT DECREE

The undersigned have agreed and stipulated that a judgment can be entered in these actions incorporating a settlement agreement **containing terms** and conditions which include those set

forth in this Consent Decree. The parties to this Consent Decree have agreed to its terms conditional upon the filing and approval by the Court of the overall settlement of this case and related cases. The Court has reviewed such terms and conditions and has determined that they are reasonable and adequate to resolve the issues raised in these actions and constitute appropriate relief, including: development and implementation of remedial action to achieve the performance standard and to isolate DDT from people and the environment in the area of the Huntsville Spring Branch ("HSB") - Indian Creek ("IC") tributary system of the Tennessee River ("TR") ("HSB-IC System"); provision of health care and monitoring to Claimants; and mitigation of adverse environmental effects. The Court, having subject matter jurisdiction in these actions,

NOW, THEREFORE, ORDERS, ADJUDGES, AND DECREES AS FOLLOWS:

INTRODUCTION

1. The parties to this Consent Decree are:

(a) United States of America, on behalf of all federal agencies, departments and other entities thereof (all collectively referred to as the "United States");

(b) Olin Corporation, a corporation organized and existing under the laws of the Commonwealth of Virginia with its principal place of business in Stamford, Connecticut ("Olin"); and

(c) State of Alabama, on behalf of all branches agencies, departments, establishments, instrumentalities, bureaus,

subsidiaries, boards or commissions and any other entity of the Government of the State of Alabama (**all** collectively referred to as the 'State').

The terms of this Consent Decree shall bind the parties hereto and their successors and assigns.

2. The HSB enters Redstone Arsenal ("RSA") from the City of Huntsville, Alabama. It flows through RSA and **the Wheeler National Wildlife Refuge** and converges with XC at HSB Mile ("**M**") **0.0**. IC flows into the TR near Triana at **TRM 321 (ICM 0.0)**. For purposes of this Consent Decree, the **HSB-IC** System is defined as **that** portion of HSB beginning at HSBM 5.4 to HSBM 0.0, and **that portion of XC** from **ICM 5.6 to ICM 0.0**. The HSB-XC System is **depicted on the Figure** attached hereto as **Exhibit "A."** In the "Engineering and Environmental- Study of DDT Contamination of Huntsville Spring Branch, Indian Creek and Adjacent Lands and **Waters, Wheeler 'Reservoir; Alabama" Vols. 1-3, November, 1980,** by Water and Air Research, Inc. ("**W.A.R.** Report"), the HSB-PC System is divided into three reaches: Reach A-, Reach B, and Reach C. Reaches A, **B**, and C are defined in the W.A.R. Report as follows:

Reach A - Begins at HSBM 5.4 and extends to **HSBM 2.4**;

Reach B - Begins at HSBM 2.4 and extends to HSBM 0.0; **and**

Reach C - Begins at ICM 5.6 and extends to **ICM 0.0**.

For the purposes of this Consent Decree, Reaches A, **B** and C are defined as they are in **the W.A.R.** Report.

3. DDT is defined for purposes of this Consent Decree 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.

4. The United States **filed** a Complaint on December 4, **1980** and an Amended Complaint on February **5**, 1982. The United States' complaint as amended alleges an imminent and substantial endangerment to human health and the environment as a result of **Olin's** alleged discharge **of** DDT into the waters of the United States, the Wheeler National Wildlife Refuge, and the environment from a former manufacturing **plant-located** at RSA in northern Alabama, and seeks appropriate relief under federal statutory law and under common law. The State filed a complaint and amended **complaint alleging these** same facts and seeks relief similar to that requested by the United States. Olin filed answers and motions to dismiss and denied liability in these actions.

5. To resolve this matter constructively, to avoid prolonged litigation, to permit efficient implementation of the remedies to be performed pursuant to this Consent Decree, to provide health care and monitoring to Claimants, and to further the public interest, the United States, Olin, and the State, have agreed to forego *their* respective claims, allegations, responses and defenses to these

actions and to enter into this Consent Decree . This Consent Decree is part of an overall settlement of the following claims and actions:

- a. James Cloud, et al. v. Olin Corporation, In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV79-PT-5128-NE;
- b. Marvelene T. Freeman, et al. v. Olin Corporation, In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV80-PT-5057-NE;
- c. Erskine Parcus, et al. v. Olin Corporation, In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV80-PT-5098-NE;
- d. State of Alabama ex rel Charles A. Graddick, Attorney General, Charles Graddick, Attorney General v. Olin Corporation, a Virginia Corporation, In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV79-PT-5174-NE;
- e. United States of America v. Olin Corporation, a Virginia Corporation, In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV80-PT-5300-NE;
- f. Annie Mae Charest, et al. v. Olin Corporation, a Virginia Corporation, et al., In the United States District Court for the Northern District of Alabama, Northeastern Division, Civil Action File No. CV81-PT-5367-NE; and
- g. Administrative tort claims filed against the United States relating to, among other

things, DDT, allegedly discharged into the waters of the United States, the Wheeler National Wildlife Refuge, and the environment **in** the vicinity of RSA in northern Alabama.

6. The parties to this Consent Decree have agreed to its terms conditional on the filing with and approval by the Court of the overall settlement, including this Consent Decree. The public notice requirements of 28 **C.F.R. §50.7** will be complied with, and this Consent Decree is to be entered only after the provisions of that regulation have **been met.**

PURPOSE OF **THE** CONSENT DECREE

7. The purpose of the remedy(ies), monitoring and other actions which Olin is **required** to perform under this Consent Decree 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.**

REMEDIAL ACTIONS

8. Olin shall implement remedial actions required by this Consent Decree and consistent with the "Joint Technical Proposal to Implement Remedial Activities Pursuant to Consent Decree" (the "Proposal", Exhibit **"B"** hereto).

9. Olin shall develop remedy(ies) pursuant to the requirements of this Consent Decree to achieve and continue to achieve the **performance** standard under the terms of this **Consent Decree.**

10. Olin shall conduct monitoring studies of fish, water, **sediment**, and sediment transport, as set forth in the Proposal and pursuant to this Consent Decree, to obtain baseline data and to evaluate the effectiveness **of the remedy(ies)**. Olin shall **also** conduct studies of groundwater **as** set forth in the Proposal. Selected monitoring activities will continue beyond the time for attainment **of** the performance standard.

11. The baseline monitoring program is to begin no later **than** the date of entry of this Consent Decree.

PERFORMANCE STANDARD

12. The performance standard is a DDT level of 5 parts per million ("**ppm**") in the fillets of channel catfish, largemouth bass and smallmouth buffalo, in Reaches A, B, and **C**. Methods for measuring DDT levels in fish are set forth in the Proposal. In the event that one of the three fish species identified above cannot be obtained **in any** one **of the** Reaches, **Olin** and the **RP** shall agree upon one or more **substitute fish** species for that Reach. In the event of adisagreement, the RP shall **designate** such substitute fish species.

GOALS AND OBJECTIVES

13. The performance standard shall be **achieved** consistent with the following **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 levels which can be reasonably expected in connection with the implementation of remedial action, **provided** Olin takes **all reasonable** steps to minimize or prevent such increase; and
- g. Minimize effect on loss of storage capacity for power generation, in accordance with the Tennessee **Valley** Authority Act ("**TVA Act**").

REVIEW PANEL

14. A Review Panel ("**RP**") is to be established promptly consisting of members designated by each of; United States Fish and Wildlife Service, TVA, EPA, the United States Army, and the State. The Town of **Triana**, Alabama and Olin **shall** serve as non-voting participants *on the RP*. An EPA representative shall be the chairperson of the RP. The **RP** shall meet semiannually and may hold special meetings **as** appropriate, The decisions of the RP shall be by majority vote **of** the members, and the **RP** shall establish its own operating procedures. The **members** of the **RP** shall have the right to deliberate in sessions restricted to members only. Each entity appointing a member to the **RP** **shall** be responsible for its own expenses in connection with its respective member's service on the **RP**.

15. The **RP** shall review the data collected pursuant to the Proposal and this Consent Decree and Olin's proposed **remedy(ies)**. In proposing and reviewing the initial remedy pursuant to the **Consent Decree**, Olin and the **RP** shall act in good faith, shall fully cooperate, and shall use their best efforts to agree upon an initial remedy consistent with this Consent Decree. Pursuant to the schedule in this Consent Decree, **the RP** shall either approve Olin's proposed initial remedy, monitoring plan, and construction and implementation schedule, subject to compliance with applicable law; disapprove the proposed **initial** remedy and monitoring plan, and, pursuant to a designated schedule, require submission of a modified remedy and monitoring plan with a schedule for construction and implementation; **or designate a** substitute remedy and monitoring **plan with** a schedule for construction and implementation.

16. If the **RP** determines, pursuant to paragraph 20 below, that a modification to the remedy implemented by **Olin is** necessary, it shall specify a schedule for Olin's submission of such modification. Olin shall submit such modifications in accordance with the schedule, and thereafter the **RP** shall follow the procedure specified in paragraph 15.

17. Olin must implement the remedy(ies) approved or designated by the **RP** pursuant to the schedule for construction and implementation of the remedy(ies) or seek relief **from the Court** pursuant to paragraph 22 below.

18. Olin shall submit quarterly reports of its monitoring data to the **RP** and reports relating to the development of significant information in a **format to be** agreed upon by the **RP** and Olin. The quarterly reports shall include, at a minimum, a summary of the data collected and the raw data. Olin shall also submit a quarterly report of its progress in meeting the schedule for construction and implementation of the remedy(ies) undertaken pursuant to this Consent Decree.

19. Interim goals **to** indicate progress toward attainment of the performance standard will be set pursuant to paragraph 29 below, after selection of the initial remedy.

20. The **RP** shall, semiannually, review the monitoring data **gathered** pursuant **to** the Proposal and this Consent Decree and the **remedy(ies)** implemented, shall compare the data to the interim goals, and shall determine whether Olin is making appropriate progress in meeting the performance standard. The **RP** shall determine whether a remedy(ies) **or** remedy implementation is inadequate and if it determines that a modification of the remedy is necessary, it shall act in accordance with paragraph 16 above.

21. In determining whether remedial actions are **appropriate**, the **RP** shall consider the following factors:

- (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, or would otherwise affect 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 paragraph 13 herein, and the performance standard; and
- (d) **Whether** the remedy chosen is the most cost-effective means of **accomplishing the performance** standard.

JUDICIAL REVIEW

22. **Olin** shall be required to implement the remedial actions required by the **RP** unless, upon petition by Olin, the Court **determines, upon** the evidence:

- (a) That implementation of such **remedy(ies)** **is unnecessary** to satisfy or is inconsistent with the **Goals** and Objectives set forth in paragraph 13 herein, and the **performance** standard; or
- (b) that considering:
 - (i) **The** nature of the **endangerment** to human health **or** the environment which the remedial action is designed to address;

(ii) The **extent** to which implementation of the remedial action would reduce or increase endangerment to human health or the environment, or would otherwise affect human health **or** the environment; and

(iii) Whether the remedy(ies) chosen is the most cost-effective **means of** accomplishing the performance standard,

it would **be** arbitrary or capricious to require Olin to implement the remedy(ies).

SCHEDULE FOR REMEDIAL ACTION DEVELOPMENT

23. By June 1, 1984, Olin shall complete the necessary monitoring studies outlined in the **Propqsal, shall submit the data** gathered pursuant thereto, and shall specify an initial remedy to the **RP**. Olin's proposal **for** an initial remedy shall include a schedule **for** implementation, a monitoring **plan**, and the other information required in paragraph 52 below.

24. By September 1, 1984, the **RP** shall take action in accordance with paragraph 15.

25. Olin shall complete **construction and implementation of** the initial remedy and any subsequent remedies required under this Consent Decree pursuant to the schedule established under paragraph **15**.

26. Within **10** years from the date of "completion" of the construction and implementation of the initial remedy (as that event is determined pursuant to paragraphs 15 and 52(j)), Olin shall attain the performance standard in Reaches A, **B**, and C. The definition of "attain the performance standard" is set **forth in** the Proposal in Section 7.0.

27. After attainment of the performance standard, Olin shall demonstrate "continued attainment of the performance standard". The definition of "continued attainment of the performance standard" is set forth in the Proposal in Section 7.0.

20. Once Olin attains the performance standard, it shall **operate** or maintain, as necessary-, **any remedy(ies)** (including bird **repelling devices**) implemented pursuant to this Consent Decree until termination of the Consent Decree **pursuant to** paragraph **54** below.

29. To **evaluate Olin's progress** toward attaining the performance standard within the schedule set forth in paragraph 26, interim performance goals shall be established. Interim performance goals **will** be agreed upon by Olin and the **RP**; in the unlikely event that Olin and the RP cannot agree on interim performance goals, the RP shall set such goals after selection and approval of the initial remedy. The interim performance goals shall be expressed, in terms of reductions of DDT levels or particular ranges of DDT levels in fish fillets, as specified in paragraph 12 above, for certain time periods.

FINANCIAL SECURITY

30. If at anytime prior to the completion of construction and implementation of the initial remedy **and any subsequent remedy(ies)** required under **this** Consent Decree, **(i)** the consolidated net worth of Olin declines by fifteen percent **(15%)** or more in any one fiscal quarter, or **(ii)** over a period of three consecutive fiscal quarters the consolidated net worth of Olin declines by a total of fifteen percent **(15%)** or more as compared with the consolidated net worth of Olin as of the beginning of the first of such quarters, or **(iii)** **if** the **consolidated net worth** of Olin declines by fifteen percent **(15%)** or more in anyone **fiscal** year, or **(iv)** if the consolidated net worth **of** Olin declines at any time to five hundred million dollars **(\$500,000,000)** or below, Olin shall immediately notify the United States and shall promptly provide security in an amount **equal** to one hundred and twenty-five percent **(125%)** of the estimated cost to **complete such construction and implementation.** **if** such event occurs prior to the identification and estimation **of** the cost of the initial remedy(ies), the amount of such security shall be twenty million dollars **(\$20,000,000)**. Such security shall take the form of a first **lien on** valuable assets, a performance bond, a surety bond, a letter of credit or a cash bond. The parties may hereafter agree upon other forms of similar security. **if at** any time the United States believes the foregoing **"net worth"** test **is** insufficient security **for** Olin's performance under **the** Consent Decree, **it** may

petition the Court to order Olin to produce the security set forth above.

INSURANCE

31. Olin agrees to be responsible **for** the liability arising from its acts and omissions occurring during the term of this Consent Decree. Olin agrees that it, and independent contractors **employed by** it to perform any work pursuant to this Consent Decree, shall maintain **for** the duration of this Consent Decree general liability and automobile insurance with limits of ten million dollars (**\$10,000,000**) combined single limit, with no sudden and accidental pollution exclusion clause, and Alabama Statutory **Workmans** Compensation Insurance. Olin and independent contractors employed by it further agree to perform all work pursuant to this Consent **Decree in a workmanlike manner.**

DELAY OR PREVENTION OF PERFORMANCE

32. Olin shall take all reasonable measures to minimize or avoid any delay or prevention of the performance of its obligations pursuant to this Consent Decree. If any event occurs, or if Olin anticipates that an event will occur, which would delay or prevent the performance of Olin's obligations pursuant to this Consent Decree ("Delaying Event"), Olin shall notify the United States Program Coordinator in writing as soon thereafter as possible, but in *no event* later than **20 days** after becoming **aware** of such Delaying Event. The written notice shall fully describe the actual or

anticipated length and cause of such Delaying Event, the actions Olin has taken, and proposes to take, to prevent and to minimize the impact of the Delaying Event, and the schedules for taking such actions.

33. To the extent that Delaying Events have been or will be **caused by force majeure, i.e.,** acts of God, strikes, fires, war, or other causes beyond Olin's control, the time for performance hereunder shall be extended **as** appropriate. Increased costs or expenses associated with the implementation of actions required by this Consent Decree shall not alone be considered a ~~force majeure~~ event.

34. If the United States and Olin agree on the occurrence and length of a Delaying Event, **they shall** file with this Court a **stipulation and proposed** order extending the *time* for Olin to perform the **activity(ies)** affected by the Delaying Event. **If,** however, Olin and the United States do not so stipulate or the United States advises Olin **in** writing that it does not agree that a Delaying Event occurred or to the extension **of** time sought by Olin, either Olin or the United States may submit the matter to the Court **for** resolution. Olin shall have the burden of proof, based upon a **preponderance** of the evidence, (i) that the Delaying Event excused or extended the time for Olin's performance under the terms of this paragraph and (ii) that the **time extension sought is appropriate.** Any extension of the schedule for performance of an intermediate

requirement agreed or ordered pursuant to this paragraph shall not result in the automatic extension of a subsequent requirement.

35. If a Delaying Event is not **excusable** under the terms of this **Consent Decree** or if after an excusable Delaying Event occurs, the time extension sought by Olin is unjustified, Olin shall be subject only to the following stipulated penalties for such unexcused failure to comply with the following paragraphs of this Consent Decree:

A. Paragraphs 16 and 18

(i) Fifty dollars (\$50) per day for the first fifteen days; and

(ii) **Two** hundred fifty dollars (\$250) per day thereafter.

B. Paragraphs **23**, 25, 27, 20, and 41

(i) Five hundred dollars (\$500) per day for the first fifteen days;

(ii) Seven hundred **fifty** dollars (\$750) per day for the sixteenth to ninetieth days; **and**

(iii) Up to twenty five hundred dollars (\$2500) per day thereafter.

c. Paragraph 26

(i) One thousand dollars (\$1000) per day for the first sixty days; and

(ii) Up to five thousand dollars (\$5000) per day thereafter.

36. In determining the amount of any penalty which the United States seeks to assess under subparagraphs **35.B.(iii)** and **C.(ii)**,

the United States shall consider the economic savings, if any, to Olin for its delay or failure to comply with such paragraphs, the degree or seriousness of the delay or non-compliance, the duration of the delay or non-compliance, the degree of endangerment to human health or the environment, if any, resulting from the delay or non-compliance, and other relevant factors. Provided, however, that no payment shall be assessed for each day that compliance is delayed or excused pursuant to this Consent Decree, or by order of the Court.

37. If the United States seeks to assess penalties pursuant to paragraph-35 of this Consent Decree, it shall give written notice to Olin of the requirement with which Olin has not timely complied or has failed to comply, the amount of the proposed penalty and, in the case of penalties to be assessed pursuant to subparagraphs 35.B.(iii) and C.(ii), the basis for such amount, taking into account the factors set forth in paragraph 36. Such notice from the United States shall be a condition precedent to the United States' right to seek enforcement of such penalty assessment under paragraph 38 of this Consent Decree. Within ten (10) days of its receipt of such notice, Olin shall notify the United States whether it agrees to pay such proposed penalty. If Olin agrees to pay such penalty, it shall do so within twenty (20) days from receipt of such notice by check payable to the Treasurer of the United States and sent to the Assistant Attorney General at the address specified in paragraph 51.

38. If the United States and **Olin** do not agree to the amount of the penalty which the United States seeks to assess against Olin, the United States may petition the Court to enter judgment against Olin for **the amount** of the penalties it seeks hereunder. The foregoing petition by the United States shall set forth the requirement with which **Olin** has failed to comply, shall propose amounts to be paid and, in the case of penalties sought pursuant to subparagraphs **35.B.(iii)** and **C.(ii)**, the basis for such proposed amounts, taking account of the factors set forth in paragraph 36 of this Consent Decree. The United States shall have the **burden of proof**, by a preponderance of the evidence, that the amounts of money it seeks under **subparagraphs 35.B.(iii) and C.(ii)** are justified; the United States shall have no burden of proof with respect to the stipulated penalties set forth in subparagraphs **35.A., 35.B.(i), (ii), and 35.C.(i)**.

39. Any **penalty payments** made or collected pursuant to paragraphs 35 through 38 shall be payable only to the United States and shall be in full satisfaction of all civil claims by any party or **the Town of Triana, Alabama** for fines, penalties, or other monetary assessments arising out of Olin's failure to comply with this Consent Decree, except those specific monetary obligations imposed pursuant to paragraphs 41, 42 and 43. Olin shall be subject to **civil** fines, penalties, or other monetary assessments arising out of its failure to comply with this Consent Decree only as provided in

paragraph 35. **Notwithstanding anything** in this Consent Decree to the contrary, the provisions of **paragraphs 35 through 39 shall not** be construed to **limit** any **equitable** or other **non-monetary** relief which **may** be available to the United States for **violations** of this **Consent Decree** or **bar** the **United States** from seeking any appropriate relief, equitable, monetary or otherwise, which may be available to the United States for **violations of law arising during and in connection with Olin's performance under this** Consent Decree.

40. If Olin and the United States agree that Olin has acted in good faith consistent with the **schedule** set forth in this-Consent Decree but **has failed to meet the performance standard** within the time set forth herein, Olin and the United States shall agree to an **extension of time for meeting the performance standard, shall jointly petition the Court for a modification of the schedule and Olin shall not be liable** for penalties set forth in paragraph 35 based solely on its **failure to meet** the performance standard within the time required during such extended period. In the event of a disagreement concerning whether Olin has **acted in good faith, Olin shall have the burden of proof, by a preponderance of the evidence, that it has acted in good faith.**

REMEDIAL ACTION MITIGATION MEASURES

41. Olin agrees to **install and maintain bird repelling measures or bird repelling devices as required by remedial actions** undertaken pursuant to this Consent Decree. Olin further agrees

upon entry of this Consent Decree to pay into a trust fund the sum of **\$375,000** for the purpose of funding mitigation measures. (such as studies or structures) to be selected by the United States in furtherance of the goals of the statutes cited in the first amended complaint of the United **States in** the above-styled action.

EXPENSES

42. Olin shall bear the reasonable expenses incurred by the United States for contracts to monitor Olin's activities, including data collection and analysis, in connection **with this** Consent Decree. **From** and after the date of entry of this Consent Decree, Olin shall bear, without its prior approval, such expenses in an amount not to exceed \$10,000 per year until it demonstrates continued attainment of the **performance** standard as provided for herein **with prior notice of** such expenditures to be given to Olin: Upon **request** of Olin, the United States shall provide a brief description of the work to be performed under contracts entered into pursuant to this paragraph and substantiation for the expenses thereof. In any event, if the Government does not expend the sum of \$10,000 in any one year, the Government may not carry over such unused sums in any subsequent year, it being expressly **understood** that Olin's obligations under this paragraph are limited to a total of \$10,000 per year. Olin shall reimburse **such** expenses in excess of **\$10,000 per** calendar year only if it has given prior approval to such expenditures.

43. In addition, **Olin agrees to pay for the** cost of developing any environmental impact statements or environmental- assessments which may be required pursuant to **NEPA** in order to implement any remedies under this Consent Decree.

EMPLOYMENT PREFERENCE

44. Olin agrees to give employment preference (consistent with applicable **law**) for all work related to development and implementation of this settlement **including**, but not limited to, construction work, to **"Claimants,"** as the term is defined in the **"Comprehensive** Agreement Regarding Compromise of Claims" and to anyone else who resides **in the** immediate area of Triana, Alabama who agrees to sign a release and waiver **of** any liability against the **United** States and Olin, arising **from** the presence of **DDT** in the **HSB-IC System. The parties hereto** do not **intend this paragraph to** create and the provisions of this paragraph shall not create any enforceable **rights of action or** any remedies on behalf of either **the** parties to this Consent Decree or individuals or entities who are not parties to this Consent Decree.

INSPECTION

45. The United States, the State, and their agencies and authorized representatives, including contractors and consultants, shall, upon notice, be provided reasonable access at all times to the site of any actions taken within the HSB-IC System pursuant to this Consnt Decree to **observe** and monitor **the** work performed by

Olin, to collect samples, to inspect records and for any other lawful purpose relating to assuring compliance by Olin with the terms of this Consent Decree. Nothing in this paragraph is intended to limit any other lawful rights of **áccess** or inspection which the United States or **the** State of Alabama may have with respect to the site or to affect the right of the United **States** Army to restrict access **as** necessary.

EFFECT OF CONSENT DECREE

46. Nothing contained in this Consent Decree shall constitute an admission of law or fact or may be introduced into evidence as proof of same, or constitute proof of the violation of any law **or** regulation. **The parties hereto may rely upon this Consent Decree** only in this **action** or in any of the other actions **listed** in paragraph 5, above. The parties hereto **may not rely upon this** Consent Decree in any other action or proceeding, and neither this Consent Decree nor any **part hereof** may be introduced into evidence in any other action or proceeding. Except for the right of the Town of Triana, **Alabama** to enforce this Consent Decree, as provided in an order entered contemporaneously herewith, **it** is intended that this Consent Decree shall **neither create nor have** any **effect** upon rights **of** persons or entities **not** parties to this Consent Decree.

PROGRAM COORDINATOR.

47. **The** United States and Olin shall each **designate** a program coordinator and **an alternate** within 15 days following the date of

entry of this Consent Decree. At any time, Olin and the United States may appoint new coordinators, alternates or both, and notice thereof shall be given in writing,

48. Olin and the United States intend that communications between them to carry out the terms and conditions of this Consent Decree shall be by and between the program coordinators or alternates. The coordinators designated by the parties shall be deemed agents for purposes of receiving proposals, reports and notifications from **other** parties, except that the coordinators shall not constitute agents for the purpose of receiving service of **process**, subpoenas, or other judicial or administrative process, and each coordinator shall **be responsible** for assuring that all communications from the other are appropriately disseminated and processed.

COMPLIANCE WITH ALL LAWS

49. All work undertaken pursuant to this Consent Decree is to be performed in accordance with all **applicable** federal, state and local statutes, regulations, ordinances and permits, including, but not limited to the following statutes **which may** be applicable to the work undertaken pursuant to this Consent **Decree**: the National Environmental Policy Act, 42 U.S.C. §§4371, et seq., the Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666c, the Endangered Species Act, Pub. L. No. 93-205, 87 Stat. 884 (codified as amended in scattered sections of 7 and 16 U.S.C.), the National Wildlife Refuge

System Administration Act, 16 U.S.C. §§668dd-668ee, the Tennessee Valley **Authority Act**, 16 U.S.C. §831 as amended by Pub. L. No. 96-97, 93 Stat. 730, the Clean Water Act, 33 U.S.C. §§1251 et seq., the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq., the Comprehensive Environmental Response, Compensation and Liability Act, ("CERCLA"), 42 U.S.C. §§9601 et seq., the Occupational Safety and Health Act, 29 U.S.C. §§651 et seq., the Hazardous **Waste** Management Act of 1978, Code of Ala. 1975, §§22-30-1 et seq. (1982 cum. **supp.**), the Alabama Water Pollution Control Act, Code of Ala. 1975 §§22.22-1 et seq. (1982 cum. **supp.**), and all applicable regulations promulgated thereunder, including without **limitation**, the revised National Contingency Plan, 40 C.F.R. Part 300 et seq., as published in 47 Fed. Reg. 31180 (July 16, 1982). Olin shall apply for and use its best efforts to obtain any permits or authorizations required by applicable federal, state or local law in carrying out the work **required of Olin under** this Consent Decree.

EXPENSES UNDER CERCLA

50. In consideration of the entry of this Consent **Decree**, Olin agrees not to make any claims pursuant to Section 112 of CERCLA, 42 U.S.C. §9612, against the Fund established by that Act for expenses related to this case and this **Consent Decree**.

NOTICES

51. All notices and documents required to be provided to **the** United States, Olin and the State pursuant to this Consent Decree, unless otherwise stated, shall be addressed as follows:

Assistant Attorney General
Land and Natural Resources Division
Department of Justice
9th & Pennsylvania Avenue, N.W.
Washington, D.C. 28530

United States Environmental Protection Agency
Regional Administrator
Region 4
Atlanta, GA 30309

State of Alabama
Attorney General
250 Administrative Building
Montgomery, Alabama 36130

Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

DOCUMENTS

52. In submittixig its initial proposed remedy and any subsequent or modified remedies to the RP, Olin **shall submit, in addition** to the other information **required** by this Consent Decree, **ataminimum the following information:**

- (a) References to **all** scientific and/or technical **literature** usedinpreparation **of** the remedy;
- (b) **Engineering diagrams, chemical analyses, and all othertechnicaldata usedinproposing the remedy;**
- (c) Names, titles and disciplines of **all professionals** engaged inpreparation of the remedy;
- (d) A description of **all** analytical techniques and protocols usedinpreparing the remedy;

(e) Anticipated effects on people and the environment of any actions to be implemented under the remedy, **including, as applicable, the information described in section 8** of the Proposal;

(f) Cost and **time** to implement the proposed **remedy(ies)**;

(g) A discussion of all alternative remedies examined but rejected including, where developed, cost, time to implement, and **other data and the reasons for concluding** that each alternative remedy is not **necessary** or appropriate to attain the performance **standard**;

(h) A specific monitoring **plan for** determining the efficacy **of** the remedial action implemented, including monitoring activities continuing beyond the time **for attainment** of the performance standard;

(i) Any health and safety plans required by law to implement the remedy(ies);

(j) Construction and implementation schedules, including a schedule for the development and submission of detailed engineering **specifications and a designation of the event which** signifies "completion" of construction **and** implementation of the initial remedy; and

(k) The assumptions on which the **remedy(ies)** are **based**.

RETENTION OF JURISDICTION

53. This Court retains jurisdiction over the **parties to this** Consent Decree to enforce compliance with its terms, to construe the

Consent Decree, and to resolve disputes in accordance with its provisions.

TERMINATION OF CONSENT DECREE

54. After Olin (1) demonstrates to the RP continued attainment of the performance standard and (2) demonstrates to the reasonable satisfaction of the RP that the remedy(ies) implemented pursuant to this Consent Decree has provided, is providing and will *continue to* provide achievement of the performance standard once this **Consent Decree** terminates, Olin shall operate or maintain such remedy(ies), **as** set forth in paragraph 28, *for* a period of seven additional years. At **the conclusion** of this seven year period, if Olin is in compliance with the provisions of this Consent Decree and the performance standard, Olin shall be deemed to **have** completely fulfilled all of its obligations hereunder, and this Consent Decree shall terminate.

MISCELLANEOUS PROVISIONS

55. All information and documents **submitted by** Olin to the United States, State or RP pursuant to this Consent Decree shall be **subject to public inspection.**

56. The terms and conditions of this Consent Decree shall include the terms and conditions contained in the Proposal attached hereto, which **are incorporated herein by reference.**

~~57. In the event of changed material circumstances of law or environmental or health standards, arising after the entry of this~~

57. In the event of changed material circumstances of law or environmental or health standards, arising after the entry of this Consent Decree, the **United States or Olin may petition** the Court for a modification **of** the Consent Decree.

58. Each party **shall** bear its own costs, disbursements and attorneys' fees of this **action**.

59. The parties represent **to** the Court that their respective **undersigned counsel** and the other signatories have **full au**thority to approve the terms- **and conditions of** this Consent **Decree** and to execute and legally bind **the respective parties to this** Consent Decree.

UNITED STATES OF AMERICA

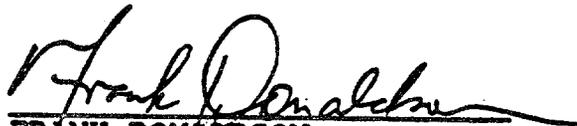
By:



ANTHONY C. LIOTTA
Deputy Assistant Attorney General
Land and Natural Resources Division
United States Department of Justice

DATED:

4/13/83



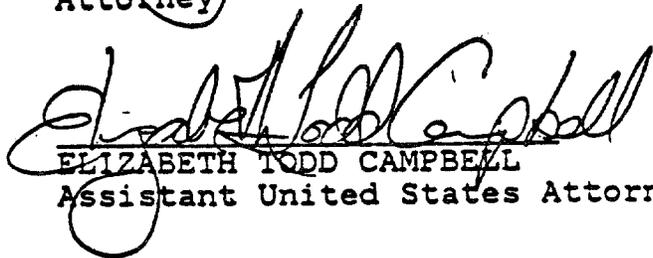
FRANK DONALDSON
United States Attorney
Northern District of Alabama

DATED:

4/15/83


HENRY FROSHIN
First Assistant United States
Attorney

DATED: 4/15/83


ELIZABETH TODD CAMPBELL
Assistant United States Attorney

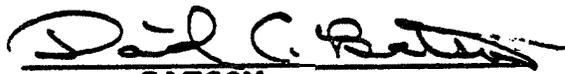
DATED: 4/15/83


KENNETH A. REICH
Attorney
United States Department of Justice

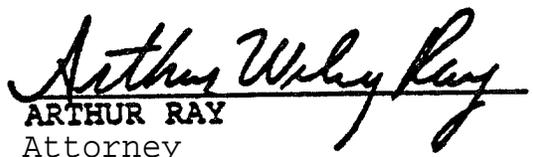
DATED: 4/13/83


LOIS J. SCHIFFER
Attorney
United States Department of Justice

DATED: 4/13/83


DAVID BATSON
Attorney
United States Environmental
Protection Agency

DATED: 4/12/83


ARTHUR RAY
Attorney
United States Environmental
Protection Agency

DATED: 4/12/83

ELIZABETH TODD CAMPBELL
Assistant United States Attorney

DATED: _____

KENNETH A. REICH
Attorney
United States Department of Justice

DATED: _____

LOIS J. SCHIFFER
Attorney
United States Department of Justice

DATED: _____

DAVID BATSON
Attorney
United States Environmental
Protection Agency

DATED: _____

ARTHUR RAY
Attorney
United States Environmental
Protection Agency

DATED: _____


ANNE L. ASBELL
Assistant Regional Counsel
United States Environmental
Protection Agency
Region IV

DATED: April 14, 1983

ANNE L. ASBELL
Assistant Regional Counsel
United States Environmental
Protection Agency
Region IV

DATED: _____

STATE OF ALABAMA

By: Charles A. Graddick
CHARLES A. GRADDICK
Attorney General of the
State of Alabama

DATED: 4/14/83

R. Craig Kneisel
R. CRAIG KNEISEL
Assistant Attorney General
State of Alabama

DATED : 7/14/83

OLIN CORPORATION

By: _____
E. MCINTOSH COVER
Group Counsel
Olin Chemicals Group

DATED: _____

MYRON B. SOKOLOWSKI
Counsel
Olin Chemicals Group

STATE OF ALABAMA

By:

CHARLES A. GRADDICK
Attorney General of the
State of Alabama

DATED: _____

R. CRAIG KNEISEL
Interim General Counsel
Department of Environmental
Management

DATED : _____

OLIN CORPORATION

By:

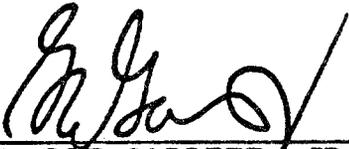
E. McIntosh Cover
E. MCINTOSH COVER
Group Counsel
Olin Chemicals Group

DATED: 4/22/83

Myron B. Sokolowski
MYRON B. SOKOLOWSKI
Counsel
Olin Chemicals Group

Stuart N. Roth
STUART N. ROTH
Associate Counsel
Olin Chemicals Group

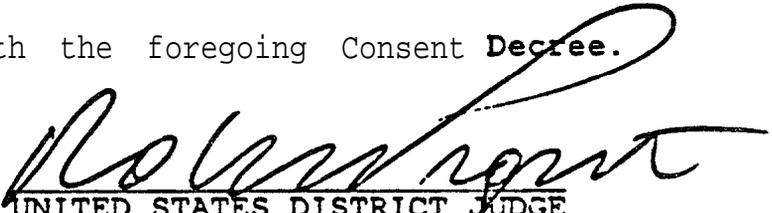
DATED: 4/21/83



G. LEE GARRETT JR.
Hansell & Post
Attorneys for Olin Corporation

DATED: 4/15/83

Entered in accordance with the foregoing Consent Decree.



UNITED STATES DISTRICT JUDGE

DATED: May 31, 1983

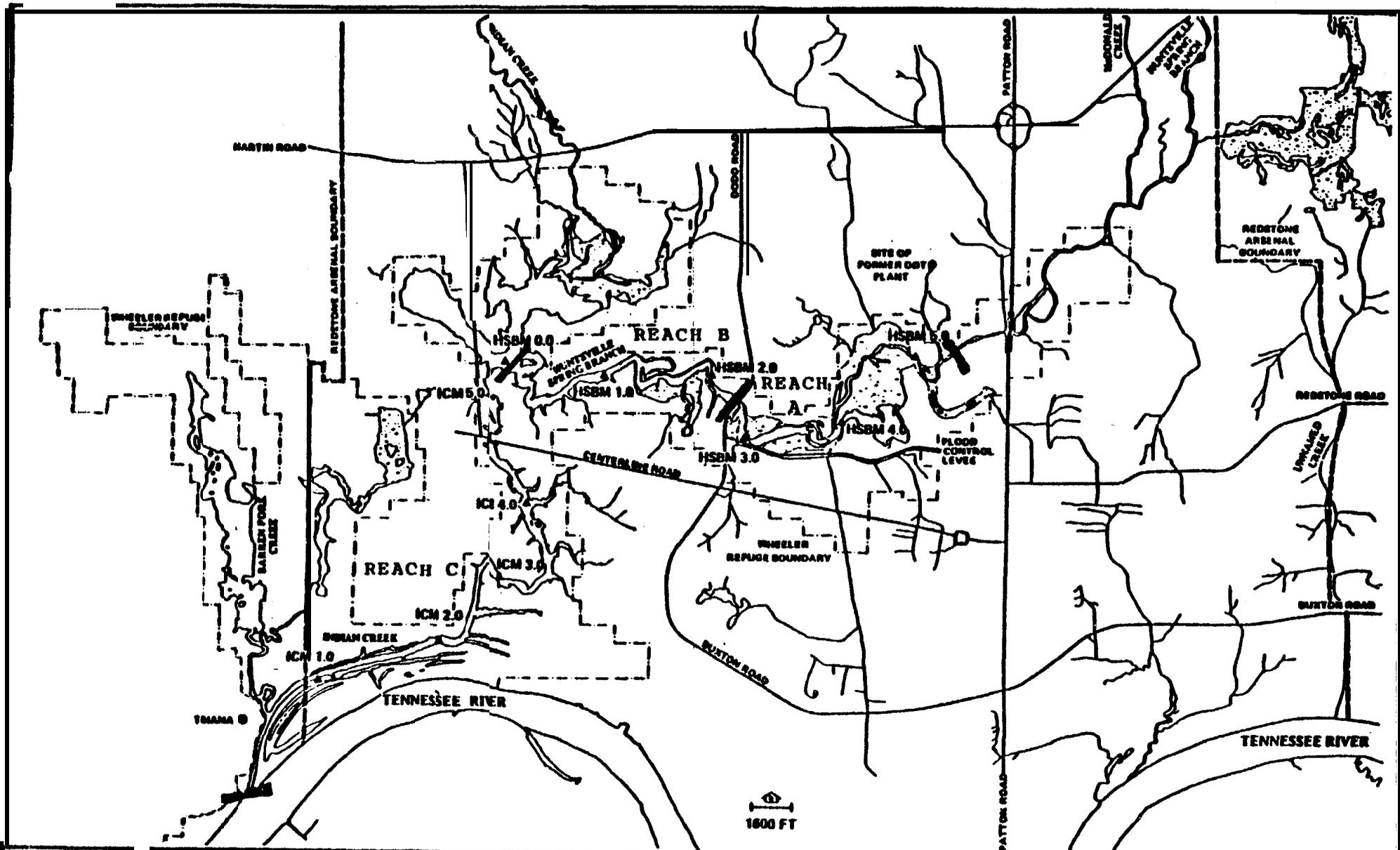


FIGURE 4. General Site Map - Huntsville Spring Branch, Indian Creek, and Vicinity

SOURCE: WATER AND AIR RESEARCH, INC. 1988

U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT
 Engineering and Environmental Study of DDT Contamination of Huntsville Spring Branch,
 Indian Creek, and Adjacent Lands and Waters, Wheeler Reservoir, Alabama

APPENDIX B

REVIEW PANEL MEMBERSHIP

REVIEW PANEL MEMBERSHIP

Review Panel Chairmanship

**Mr. Howard D. Zeller
Chairman, 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 present**

Mr. Zeller is the Chairman 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 January 1986. He is presently on temporary assignment to the State of Georgia Department of Natural Resources. 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.

REVIEW PANEL MEMBERSHIP (Continued)

Members

Environmental Protection Agency

Dr. Edward S. Bender
U.S. Environmental Protection Agency
401 M Street, SW.
Washington, DC 20460

Phone: (202) 475-8331
FTS 475-8331

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

Dr. Bender is an aquatic biologist with the United States 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 which 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.

REVIEW PANEL MEMBERSHIP (Continued)

Tennessee Valley Authority

Mr. Bruce A. Brye
Environmental Engineer
Tennessee Valley Authority
Room 248, 401 Building
Chattanooga, Tennessee 37401

Phone: (615) 751-7297

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

Mr. Brye is a staff Environmental Engineer in TVA's Division of Air and 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 EPA 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 registered professional engineer in 14 states including Alabama.

REVIEW PANEL MEMBERSHIP (Continued)

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) 221-6343
FTS 242-6343

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

Mr. Johnson is the Senior Staff Specialist with the United States 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 Research Laboratory in Columbia, Missouri from 1971 to 1977. In 1978, Mr. Johnson became involved with the investigative efforts by the United States 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 of Zoology from the University of Oklahoma.

REVIEW PANEL MEMBERSHIP (Continued)

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 (Continued)

Colonel John J. Walker
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 present

(Note: Colonel Walker
has announced retire-
ment from the Army in
August 1986.)

Colonel Walker was named as Deputy Post Com-
mander, 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 Clarks-
ville, 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)

Alabama Department of Environmental Management

Mr. James W. Warr
Deputy Director
Alabama Department of Environmental Management
1751 Federal 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). 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 (AWIC), 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.

REVIEW PANEL MEMBERSHIP (Continued)

Nonvoting Participants

Town of Triana, Alabama

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

Phone: (205) 772-3553 (home)
(205) 544-4927 (work)

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 is currently the Director of the Equal Employment Office at the National Aeronautics and Space Agency, George C. Marshall Space Flight Center in Huntsville, Alabama. He has a Bachelor of Science Degree in Mathematics and Chemistry from Alabama A & M, and has taken graduate courses at that university.

REVIEW PANEL MEMBERSHIP (Continued)

Nonvoting Participants (Continued)

Olin Corporation

Mr. **Verrill M. Norwood**
Vice President, Environmental Affairs
Olin Chemicals
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.

APPENDIX C

REVIEW PANEL OPERATING PROCEDURES



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

FEB - 7 1984

MEMORANDUM:

Subject: Memorandum of Agreement - Operating Procedures

To: Review Panel Members
(List attached)

Enclosed for your records is a copy of the Memorandum of Agreement, Review Panel Operating Procedures, signed by all members. Your comments, suggestions and cooperation in reaching agreement on this document are appreciated.


HOWARD D. ZELLER
Chairman

Enclosure

ADDRESSEES:

Mr. Howard D. **Zeller**
Assistant Administrator
for Policy & Management
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dr. Edward S. Bender
U.S. Environmental Protection
Agency
401 M Street, S. W. EN-338
Washington, D. C. 20460

Mr. Bruce A. Brye
Environmental Engineer
Tennessee Valley Authority
Room 248
401 Building
Chattanooga, Tennessee 37401

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

Colonel Dahl J. Cento
Deputy Post Commander
DRSMI-XK, Bldg. 112
Redstone Arsenal, Alabama 35898

Mr. James W. Warr
Interim Deputy **Director**
Alabama Department of Environmental
Management
State Capitol
Montgomery, Alabama 36130

Honorable Clyde Foster
Mayor Town of Triana
640 Sixth Street
Triana, Alabama 35758

Verrill M. Norwood
Director, Environmental Affairs
Olin Chemicals Group
P. O. Box 248
Charleston, Tennessee 37310

MEMORANDUM OF AGREEMENT

Review Panel Operating Procedures

The Consent Decree filed in U.S. v. Olin Corporation, CIV80-PT5300-NE, U.S. District Court, Northern District of Alabama, on May 31, 1983, called for the establishment of a Review Panel consisting of members from EPA (Chairperson), Tennessee Valley Authority, Fish and Wildlife Service, U.S. Army, Alabama Department of Environmental Management and non-voting participants from the Town of Triana and Olin Corporation. The Review Panel is responsible for establishing the procedural guidelines to be followed in conducting its activities and responsibilities.

The provisions and operating procedures contained in this Memorandum of Agreement are intended solely for the guidance of the Review Panel members and participants. It is not intended to and may not be relied upon to create a right or benefit, substantive or procedural, enforceable at law or in equity by any person.

By signature affixed to this Memorandum of Agreement, the Review Panel adopts the following guidelines and procedures for the conduct of the Review Panel activities and responsibilities. This Memorandum of Agreement may be modified, supplemented or changed by majority vote of the Review Panel.

I. General

1. The Chairperson of the Review Panel will be the United States Program Coordinator and, as such, will be the focal point of communications between the United States and Olin to carry out the terms and conditions of the Consent Decree.

2. Each entity appointing a member or participant to the Review Panel shall be responsible for its own expenses in connection with its respective member's service on the Review Panel.

3. The EPA will provide legal counsel to the Review Panel. However, all members have the opportunity to utilize their own agency legal counsel. The Department of Justice will represent the United States in all matters relating to compliance with the Consent Decree provisions and Review Panel decisions.

4. Freedom of Information Act requests directed to the Review Panel or its member agencies will be responded to by one of the following methods:

- a. Except as noted in c below, the Chairperson (EPA) will respond to FOIA requests lodged with the EPA or requests for documents held within the official files of the Review Panel, complying with FOIA and agency regulations and guidelines. The Chairperson will furnish a copy of such FOIA requests and a listing of the documents released to each of the Review Panel members. In addition, the Chairperson will coordinate FOIA requests requiring a joint response from Review Panel member agencies.
- b. Except as noted in c below Review Panel member agencies will respond to FOIA requests lodged with the individual agency complying with FOIA and agency regulations and guidelines. Any FOIA response given by a Review Panel member agency will be coordinated with the Chairperson. A copy of the request and a listing of the documents will be submitted for inclusion in the Official File of the Review Panel.
- c. The Chairperson, or his designated representative, and agencies will refer to the individual voting members for processing any record which contains information supplied by one or more voting members and to which the supplying voting member has objected to release. Objections to public release of a document will be clearly noted in the cover letter and on the first page of such documents.

5. The Review Panel may, as needed, appoint committees or task groups from its own members or member agencies to perform specified tasks, including but not limited to, providing information, consultation or assistance to the Review Panel. The Review Panel may obtain the services of non Review Panel technical experts within or outside a member Agency to performs tasks in a specialized area and report to the Review Panel.

6. The Chairperson, as Program Coordinator, will be the focal point of communications between the United States and Olin Corporation. However, to facilitate the operation of the Review Panel, members of the Review Panel may communicate directly with the Olin Corporation Program Coordinator, on matters not privileged or exempt from disclosure as necessary, provided a copy of all such communications are

sent to the Official Review Panel File maintained by the Chairperson. Copies of all documents exchanged by the Chairperson, Review Panel members and Olin will be provided to all members of the Review Panel.

7. The Chairperson will be the spokesperson for public statements and news releases regarding the activities and deliberations of the Review Panel. Statements and news releases prepared in advance of release will be coordinated and reviewed by the Review Panel, to the extent possible. If advance coordination and review of statements and news releases are not obtained, all members of the Review Panel will be informed of the release at the earliest possible time.

8. The Review Panel recognizes that Review Panel represented agencies may have knowledge, experience, expertise and capabilities that would be useful to the conduct of studies pursuant to the Joint Technical Proposal to Implement Remedial Activities by Olin Corporation. However, in order to avoid situations in which an organizational conflict of interest or the appearance of an organizational conflict of interest could arise, the Review Panel will follow the following guidelines:

- a. Prior to the initiation by Olin of any studies, projects or proposals which involve the provision of services or products by a Review Panel-represented agency, Olin will present to the Review Panel sufficient information regarding the proposed scope of work, the factors suggesting or requiring such involvement and other information desired by the Review Panel, to enable the Review Panel to evaluate the project, the necessity of Government involvement and options thereto, and to explore any potential organizational conflict, of interest.
- b. A member of the Review Panel who represents an agency that may be involved with Olin in such a proposal may elect not to participate in any discussions and decisions on such projects.
- c. The following factors, among others that may become known at a future time, will be considered by the Review Panel in its evaluation of Olin's proposed projects with member agencies. If a member agency has:

- (1) a unique capability; or

- (2) expertise in an area necessary to an Olin study; or
- (3) knowledge and experience that are necessary to an Olin study; or
- (4) facilities that are in close proximity to the study area and necessary to an Olin study; or
- (5) a combination of any of the above factors that will allow for rapid completion of projects necessary to comply with Olin's schedule.

d. The Review Panel will evaluate the nature of the project, particularly the results expected to be derived from the project. The Review Panel is the entity responsible, under the terms of the Consent Decree, for the ultimate decision on the remedial measures to be implemented by Olin Corporation. Therefore, projects with member agencies which call for answers, conclusions or recommendations which properly fall within the responsibility and authority of Olin Corporation and the Review Panel, may present the potential for compromise or the appearance of compromise of the integrity of a Review Panel member. The Review Panel will avoid situations which may bias or appear to bias the decision-making ability of its members.

e. The Review Panel will fully evaluate the proposal, considering relevant factors. If the Review Panel determines, in its view, that a significant actual or apparent organizational conflict of interest exists, the Review Panel will initiate appropriate action to expeditiously resolve the matter.

9. Visits to the Redstone Arsenal for the purpose of Review Panel or other DDT-related matters should be coordinated through the Redstone Arsenal Environmental Office. The address, point of contact and telephone number are:

Commander
U.S. Army Elissile Command
ATTM: **DRSMI-KLC** (Mr. **Schroder**/Mr. Hagler)
Redstone Arsenal, Alabama 35898

'Mr. Norris W. (Bill) **Schroder**; Mr. Ronald Hagler; 205/876-6122 or FTS 876-6122, or Autovon 746-6122. Advance notice should be furnished in writing, giving name, social security number, dates of attendance, security classification, organization and telephone number.

II. Meetings - Decision

1. The Review Panel may hold meetings, both **regular** and special, at any location of its member agencies, and at any other appropriate site. Regular meetings shall be held semi-annually and special meetings shall be held as appropriate. Regular meetings shall be **scheduled** by the Chairperson with at least 30 days notice to all members and non-voting participants. Members may request the Chairperson to schedule special meetings, provided at least five work days notice is given to all other members and non-voting participants. Notice of meetings may be by mail or telephone communication. At the discretion of the Review Panel, meetings or portions of meetings may be deliberative sessions of the Review Panel and may be limited to attendance of: members. Appropriate news releases regarding scheduled meetings of the Review Panel will be sent to area media in advance of meetings.

2. At least ten days prior to each regular meeting, an agenda will be provided to each representative at the meeting. The Chairperson will provide for the attendance of a recording secretary at Review Panel meetings. Following each regular meeting a Record of Summary of the Review Panel Meeting will be prepared and distributed within ten working days by the Chairperson to each member and non-voting participant. The record will bear in the margin a designation made by the Chairperson of those matters which are subject to a claim of privilege or exemption **from** release by member agencies, If no response is received by the Chairperson within ten days, the Record or Summary will be deemed final.

3. Each agency providing a member to the Review Panel shall have one vote. The decisions of the Review Panel will be by majority vote. If requested, a minority report will be recognized and included in the record of the vote.

4. The Review Panel recognizes that situations may arise which could result in the possibility of a deadlocked vote. These situations included, but are not limited to:

- a. Absence of a member representative at Review Panel meetings;
- b. Abstention of a member during votes;
- c. Failure of an agency to promptly reappoint a representative to the Review Panel.

To resolve the possibility of deadlocked votes on decisions, the following procedures will be followed:

- a. Member agencies may designate an alternate to its Review Panel representative and ensure, to the extent possible, representation of its agency at all meetings;
- b. Member agencies may cast a proxy vote or absentee vote on issues by advising the Chairperson in writing of its intention to do so at least three days prior to the vote on the issue. The agency's proxy or absentee vote must be received by the Chairperson by the date of the vote.
- c. In the event of absence or abstention of a member agency and if a proxy or absentee vote has not been cast by the agency, the Review Panel Chairperson will cast the deciding vote if the issue presented for decision is a routine matter before the Review Panel. Routine matters before the Review Panel are decisions other than matters relating to the conduct of monitoring studies, technical proposals, substitute fish species, remedial measures, schedules for implementation of measures and monitoring, modifications of schedules or remedial measures, interim goal

progress, determination of "Delaying Events," attainment, continued showing of attainment, termination of the Consent Decree, conflict of interest matters, and any other matters determined by the Review Panel to be major items.

- d. In the event of failure of an agency to promptly reappoint a representative to the Review Panel, the Review Panel, through the Chairperson, will request such reappointment. If the lack of the reappointment endangers the ability of the Review Panel to proceed in a timely manner on major decisions, the Review Panel may deliberate and determine by unanimous decision whether a vote on the matter should proceed with a tie breaking vote. The tie breaking method shall be determined by the Review Panel. Simultaneously with these deliberations, the Review Panel, through the Chairperson, will request the Department of Justice to petition the senior active judge, U.S. District Court, Northern District of Alabama, for resolution of the matter.

5. On matters presented to the Review Panel for decision, sufficient time, not to exceed thirty days unless a longer time is agreed upon by the Review Panel, shall be provided for each member to obtain policy guidance and/or approval from his/her agency.

6. Over the course of time, issues not requiring a meeting of the Review Panel may arise. In that event, communication by correspondence, telephone, or other means, may be utilized by members to present such issues to all members and to solicit comments. Any action required or permitted to be taken at any meeting of the Review Panel may be taken without a meeting if a consent in writing, **setting** forth the action taken, shall be signed by all members of the Review Panel entitled to vote with respect to the subject matter and the writing or the writings are filed with the Record of the Review Panel maintained by the Chairperson. Such consent shall have the same-force and effect as all other decisions of the Review Panel.

III. Financial Information

1. Each entity providing representation to the Review Panel is responsible for the costs of its member's representation.

2. The Consent Decree, Paragraph 42, provides that Olin shall bear the reasonable expenses incurred by the United States for contracts to monitor Olin's activities, including data collection and analysis, in connection with the Consent Decree. From the effective date of the Consent Decree and until Olin demonstrates continued attainment of the performance standard, Olin shall bear, without its prior approval, such expenses in an amount not to exceed \$10,000 per year. Upon request of Olin, the U.S. shall provide a brief description of the work to be performed under contracts entered into pursuant to carrying out these activities and substantiation of expenses. The United States may not carry over unused sums in any subsequent year. Olin shall reimburse such expense in excess of \$10,000 per calendar year only if it has given prior approval to such expenditures.

3. The Review Panel, by majority vote, will determine the appropriate expenditure of the \$10,000 per year and any other funds requested of Olin. Procedures for procurement of contractors and fiscal administration will be developed by the Chairperson and Olin Corporation and provided to the Review Panel.

IV. Reports

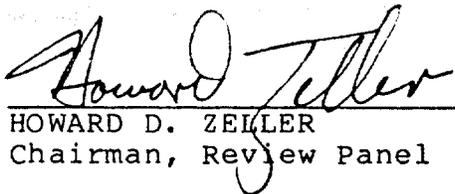
1. The Review Panel will determine the reporting format and due dates for all reporting to be accomplished by Olin Corporation. The Review Panel has adopted the reporting format in use by Olin Corporation on June 14, 1983. Quarterly reporting, with the first report to be submitted by Olin on September 1, 1983, has been adopted by the Review Panel.

2. Olin Corporation will submit copies of all data and reports directly to the Review Panel representatives in the following quantities:

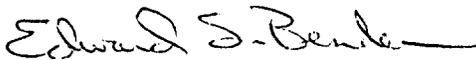
EPA - 6
TVA - 8
F&W - 7
RSA - 5
ADEM - 3
Mayor Foster - 2

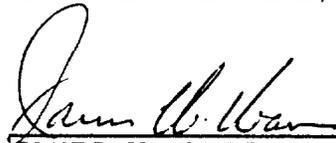
3. The Consent Decree, in Paragraphs 32-34, provides procedures for the determination of whether delays or prevention of performance of obligations under the Consent Decree may be classified as "Delaying Events" and therefore excusable. The Review Panel Chairperson will receive any notification of such Delaying Event, along with all required documentation to fully describe the actual or anticipated event. Following the criteria outlined in the Consent Decree, the Review Panel will determine whether the time for Olin's performance should be extended. The Review Panel will document its decisions and provide all necessary information to the Department of Justice (DOJ) for the appropriate filing with the Court. The Review Panel will also assist the DOJ in determinations regarding stipulated penalties, as outlined in Paragraphs 35 through 40 of the Consent Decree.

This Memorandum of Agreement, constituting the Review Panel Operating Procedures, is hereby accepted and adopted by the representatives of the Review Panel member agencies and non-voting participants as shown by the signatures affixed hereto.


HOWARD D. ZELLER
Chairman, Review Panel


COLONEL DAHL J. CENTO
Redstone Arsenal, Alabama

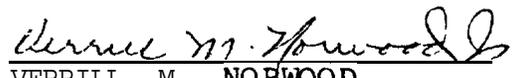

DR. EDWARD S. BENDER
EPA - Washington, D. C.


JAMES W. WARR
Alabama Department of
Environmental Management


BRUCE A. BRYE
Tennessee Valley Authority


MAYOR CLYDE FOSTER
Town of Triana, Alabama


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


VERRILL M. NORWOOD
Olin Corporation

DATED: JAN 26 1984

APPENDIX D

CHRONOLOGY OF SIGNIFICANT MILESTONES

CHRONOLOGY OF SIGNIFICANT MILESTONES

May 31, 1983 Consent Decree approved by Court.

June 14, 1983 Review Panel established; first meeting held.

January 26, 1984 Review Panel Operating Procedures finalized and adopted.

June 1, 1984 Olin's Remedial Action Plan submitted to Review Panel.

July 14, 1984 Public hearing held at Triana, Alabama, to receive public comments on Olin's Proposed Remedial Action Plan.

August 31, 1984 Review Panel Decision Document issued; approving Olin's remedial action plan, with modifications.

January 2, 1985 Nashville COE initiated scoping request to the public for an EIS on the permit action.

February 5, 1985 Olin submitted draft permit applications to Review Panel and Permitting Agencies.

July 1, 1985 Olin submitted final engineering drawings and specifications, and environmental analysis report.

July 1, 1985 Olin submitted Section 10/404 and Section 26a permit applications to Nashville COE and TVA, respectively; submitted formal request for right-of-way permit to FWS.

July 1, 1985 Olin submitted Report on Field and Laboratory Investigations of the Huntsville Spring Branch-Indian Creek (HSB-IC) System.

July 17, 1985 Nashville COE issued notice of the availability of the draft EIS for the Section 10/404, 26a, and right-of-way permitting actions.

CHRONOLOGY OF SIGNIFICANT MILESTONES (Continued)

August 1, 1985 Olin submitted remedial action alternatives report for Lower Reach A.

August 1, 1985 Olin submitted interim goals report.

December 2, 1985 U.S. Army issued license to Olin for remedial action construction activities on Redstone Arsenal property.

January 15, 1986 Olin submitted revised section 10/404/26a and right of way permit applications and detailed engineering plans to Review Panel, Nashville COE, TVA, and FWS.

January 28, 1986 FWS issued limited authorization for the initiation of site preparation and mobilization activities within the boundaries of the Wheeler National Wildlife Refuge.

February 21, 1986 Final EIS issued by Nashville COE.

March 1, 1986 Olin submitted the following 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 environmental impact statement.

March 25, 1986 Alabama Department of Environmental Management issued section 401 certification for the remedial action.

March 31, 1986 Permits issued to Olin for remedial action
Section 10/404 - Nashville COE
Section 26a - TVA

April 1, 1986 Right-of-Way Permit issued by FWS.

CHRONOLOGY OF SIGNIFICANT MILESTONES (Continued)

- April 1, 1986** **Initiation of construction of
remedial action in Upper Reach A.**
- April 23, 1986** **Official groundbreaking ceremony for
remedial action construction
activities in Upper Reach A.**

APPENDIX E

REVIEW PANEL DECISION DOCUMENT

August 31, 1984

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.

11. 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 flaw 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 Peaches 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:

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1. As additional information becomes available or the state-of-the-art advances, further remedial actions and monitoring in one or more Peaches 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 Peach A*
August 1, 1985	Submission of interim goals and basis
September 1, 1986	Submission of studies further identifying the extent of DDT in Peaches 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. Coals 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 oh 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-r is inconsistent with the Coals 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 sane 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 **implemen-**
tation. 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 BSB-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

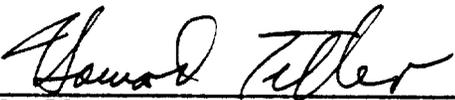
The comments received from the public relative to the Olin Corporation remedial plan have been considered and, are summarized and responded to in Appendix 4.

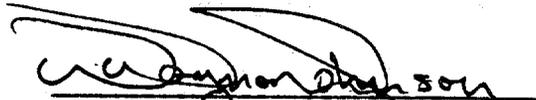
IV. Conclusion

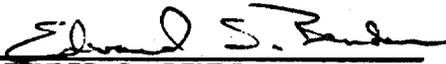
This Decision Document comprises the decision and Appendices 1-6, which are attached hereto and are incorporated herein,

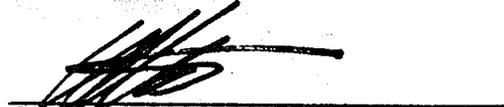
This Decision is accepted and adopted by the representatives of the Review Panel member agencies and concurred in by the nonvoting participants as shown by the signatures affixed hereto.

MEMBERS

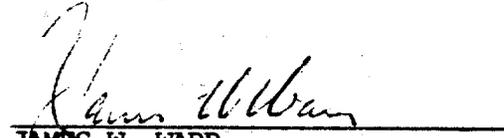

HOWARD D. ZELLER
Chairman, Review Panel


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


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

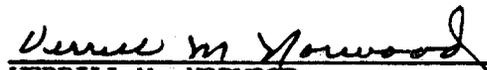

COLONEL DAHL J. CENTO
U. S. Army, Redstone Arsenal


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

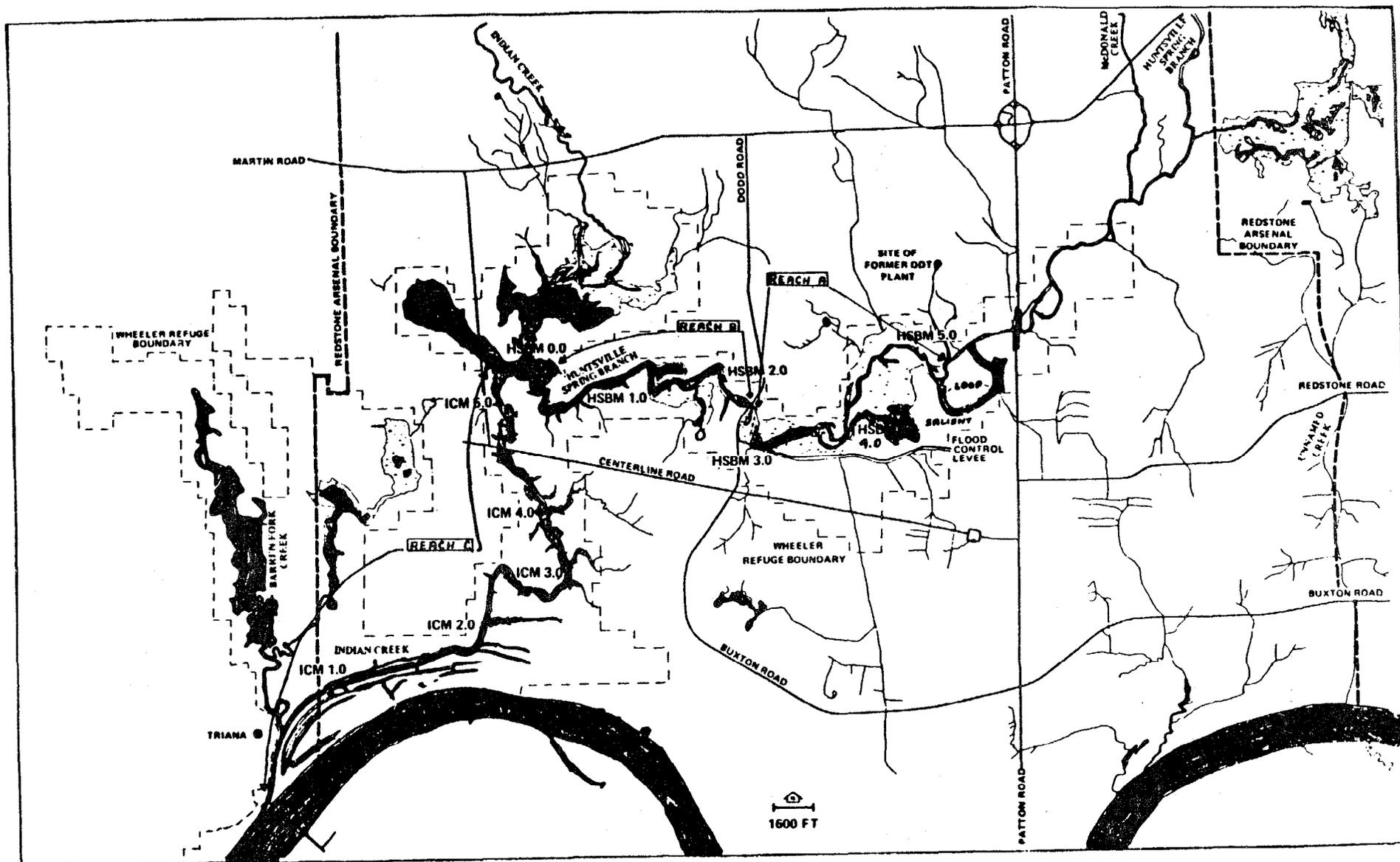


FIGURE 1.

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

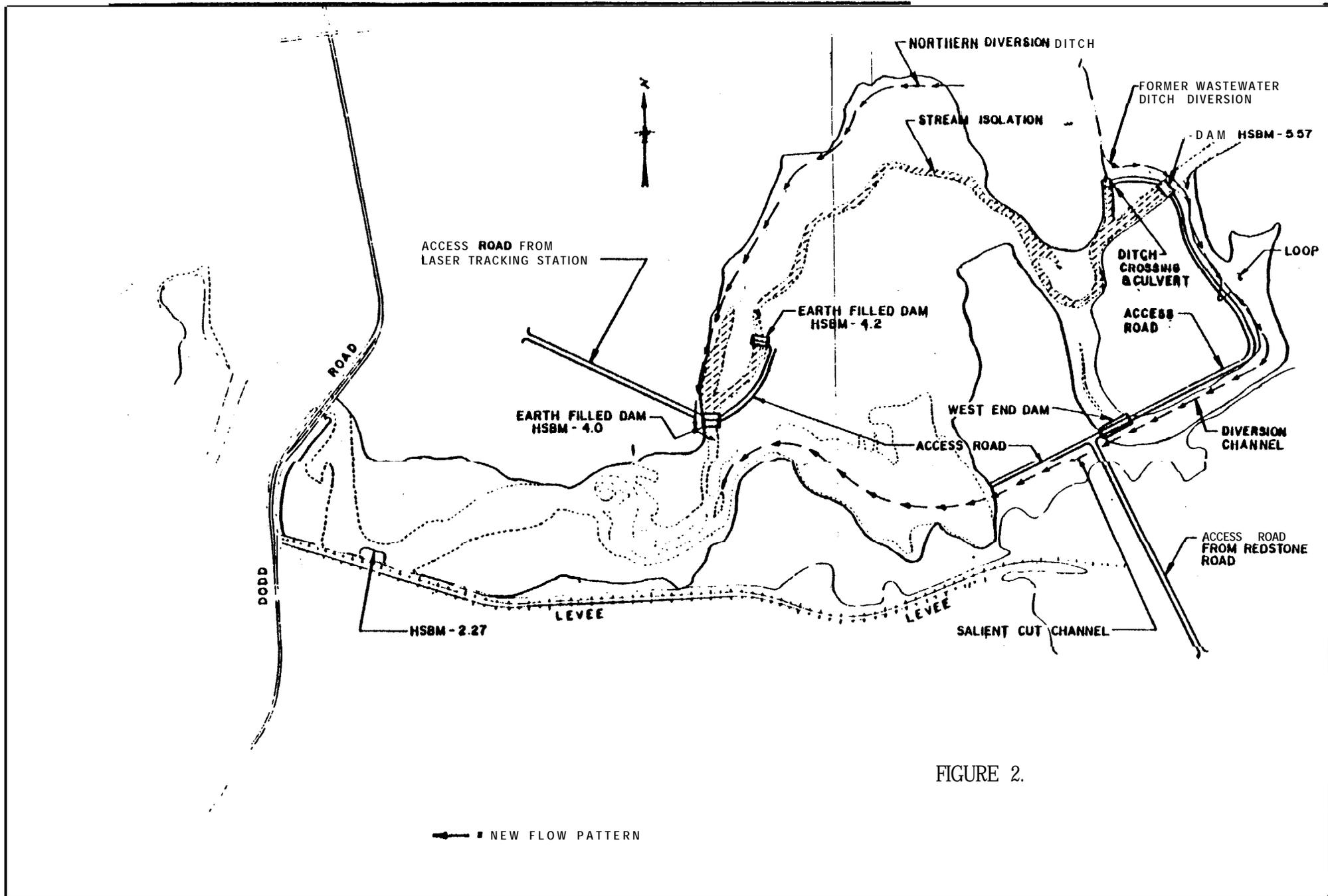


FIGURE 2.

Clin 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 $4\frac{1}{2}$ tons are in the 0-3 inch depth fraction. Thus, about $4\frac{1}{2}$ 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 i,t 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:

0 Site surveys	November - December 1984
o Preliminary Engineering	January - March 1985
0 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
0 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

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 dam 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 Chatmeland **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 m-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 contaminated 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 dam 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** cutback 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, cut-of-basin diversion and removal of contaminated sediments, cut-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.

Cut-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 8.0** would be hydraulically dredged under near-zero flcm 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.

at-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 or 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 **DM1** 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.

I,

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** amsequences of dredging, theeffectonlocalroads 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.

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.

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 F

FUTURE KEY DATES

FUTURE KEY DATES

August 1986	Oral presentation of Olin's plan for Lower Reach A.
October 1986	Submission of Olin's plan for Lower Reach A.
July-December 1986	Review Panel decision on: <ol style="list-style-type: none">1. interim goals for DDT levels in water and fish2. Substitute fish species3. Long-term monitoring programs.4. Baseline data report for DDT in water and fish
October 1986- June 1987	Review Panel decision on Olin plan for Lower Reach A.
August 1987	Completion of construction for Remedial Action in Upper Reach A.
February 1990	Olin submittal of monitoring results for first two years following completion of remedial action in Upper Reach A.
Future Dates (to be determined)	Within ten years from the date of completion of construction and implementation of the initial remedial action, Olin shall attain the performance standard. Attainment of the performance standard in each reach and for each performance standard fish species will be determined by the Review Panel following the review of the results of each annual monitoring period.

REPLY TO ENVIRONMENTAL PROTECTION AGENCY (S.N. MOORE)

- 9 | the adequacy of the soil material and depth to support
 | the selected vegetation in the cover should be addressed.
 | The soil moisture, root depth, fertilizing, and seeding
 | requirements should also be evaluated.
- 10 | The method utilized in stabilizing the soil until
 | vegetation is established should be included in the
 | technical specifications. The use of a geotextile
 | for both immediate and long term stabilization may be
 | appropriate and, therefore, should be considered.

Section 2E Part 3.1(A)(L) of the specification indicates that temporary water control measures may be required to deal with water emanating from HSB. The following points require additional clarification.

- 11 | • The temporary water control measures should not
 | result in the spread of contaminated constituents.
- 12 | • How adequate dewatering will be achieved should be
 | discussed.
- 13 | • Provisions should be established to identify and
 | divert existing springs discharging into the filled
 | sections of HSB. In the event that the major streams
 | are not diverted, it should be documented that the
 | springs will not adversely impact the long term
 | stability of the cover.

- 14 | We suggest a modification to the present clearing plan.
 | That is, instead of removing and burning the vegetation
 | it should be incorporated into the subsoil to minimize
 | surface erosion and improve soil texture/structure. This
 | would eliminate the need to secure a state permit and
 | approval from Redstone Arsenal to burn the vegetation. If
 | the vegetation is removed, measures should be established
 | to ensure that DDT contaminated soils are not removed with
 | the root mass or that suitable collection and disposal of
 | contaminated soil is achieved. Also, note that the proposed
 | clear cutting of canopy vegetation has the potential to
 | introduce additional contaminated material into the channel
 | unless appropriate erosion control measures are taken.

- 15 | Provision for maintaining the integrity and effectiveness
 | of the final cover must be established to meet RCRA
 | technical post-closure requirements. These provisions
 | would include maintenance of access to the cover. The
 | post-closure requirements also require continuing appropri-
 | ate public access restrictions.

Comment No.	Response
9	An approved revegetation plan will be required of Olin as a permit condition.
10	Same response as 9.
11	This will be addressed through a special condition.
12	See response to Item 4.
1 3	See response to item 11.
14	Appropriate soil erosion and DDT containment measures will be implemented and proper permits will be obtained.
15	See response to item 11.

REPLY TO ENVIRONMENTAL PROTECTION AGENCY (S.N. MOORE)

Comment No.	Response
16	See response to item 11.
17	See response to item 11.
18	See response to item 11.
19	See response to item 11.
20	see response to item 11.
21	See response to item 11.
22	See response to item 11.
23	See response to item 11.
24	Appendix E has been updated.

16 the existing hydrogeological data should be evaluated in the Final EIS. Additional studies of the localized hydrogeology may be necessary to establish the ground water monitoring system. The ground water monitoring program should include, but not be limited to the following:

- 17 • A ground water monitoring system designed to monitor the filled channel. The system should monitor both the regolith and upper limestone formation.
- 18 • The design of the monitoring system should consider the possible effects diversion of the channel will have on ground water flow in the area of the filled channel.
- 19 • The monitoring system should include one or more wells installed hydraulically upgradient of the channel and a sufficient number of downgradient wells located close to the area of isolation. The system should be designed to detect any release from the channel as soon as possible.
- 20 • At a minimum, the monitoring system should be sampled semiannually.
- 21 • Both filtered and unfiltered ground water samples should be analyzed.
- 22 • Additional ground water monitoring wells south of the project area are also recommended, although not mandated by RCRA for the detection monitoring system.
- 23 • The potential impacts of solvents, acids, or other hazardous constituents which may be present in the ground water plume or runoff from the upgradient Redstone Arsenal Sanitary Landfill should be considered. The monitoring program should include provisions to detect these constituents.

24 The EIS (Appendix E, page 48), does not reflect the latest EPA water criteria for DDT. The October 1980 values are 0.001 ug/l as a 24-hour average (water column) and are not to exceed concentrations of 1.1 ug/l. (See - "Ambient Water Quality Criteria for DDT", U.S. EPA, Office of Regulation Standards, Document Number EPA 440/5-80-038, October 1980). Based on these criteria, there are current violations which should be acknowledged in the Final EIS.

REPLY TO ENVIRONMENTAL PROTECTION AGENCY (S.N. MOORE)

25 Although we have no objections to the proposed remedial action, the post monitoring program should include testing for DDT in the water column. If the DDT level exceeds EPA's criteria, then further remedial actions may be warranted (see previous remarks). Further, monitoring for the EPA DDT criteria should also occur during the clean-up action.

Comment No.

Response

25

Post-construction monitoring will be in accordance with a long-term monitoring plan approved by the Review Panel. Monitoring for compliance with state conditions will occur during construction.

REPLY TO K.O. DONOHUE

Comment No.

Response

1

No response necessary.

9-1-85

Please DO NOT buy DDT on
the Wheeler Wildlife Refuge as per
Olin Card plan for the contamination
of Huntley's Spring Branch

Thank you.

J. O'Donohue

Box 572
Enterprise, AL 36021

REPLY TO WILMA GARNE

Montsueen Ala
July 22 1985

I notice you request
I am written to let you know I feel
about it I really feel that you want some
any body any thing because late something
the game come down from that situation
place that just it should be just it
people from out of unit state sign up
some people ~~from~~ come back here in
this town has been away for 10-20 year
said they was gain get money because
they water here here long ago it was
big so there some people line in there
didn't sign up you all need another sign
you people who live in that in the
acceptation to fill out for the money to

Mrs Wilma ~~Garne~~ GARNE
607 East Brook St
Montsueen Ala 35811

Comment No.

Response

1 There is currently no governmental program to compensate persons who have allegedly been adversely affected by DDT in HSB-IC.

H-47

REPLY TO FRANCIS MICHAEL HINDS

FRANCIS MICHAEL HINDS
4232A MYRTLEWOOD DRIVE, HUNTSVILLE, ALABAMA 351395 205/837-8984

29 August 1985

Mr. Ray Hedrick
U.S. Army Engineer District, Nashville
P.O. Box 1070
Nashville, Tennessee 37202
Subject: DEIS Reply - Olin's Remedial Action Plan - Bypass and Bury DDT

Dear Mr. Hedrick:

Burial defeats the short term 10 to 20 year isolation afforded by the bypass and will effectuate DM-R particulate transport at a minimum rate of from 2.68 feet per year ('/yr) to 1676'/yr. Maximum particulate transport could well exceed 200 '/yr.

Neither physical nor chemical factors influencing subsurface migration have been qualified or presented to identify areas and mechanisms by which an accurate pin-point estimate of particulate transport within the groundwater flow system could be made. The plan as proposed merely facilitates metering DDT-R back into the environment following a time frame of from 18 to 24 months (period allowed for breakthrough of the Natural, reaction mechanism laden, Restoration sediment-to-stream bed boundary-layer-zone and the stream bed clay-lens, if not disturbed during construction.). In essence the plan as being implemented is applicably practicing the crudest form of empirical research and will not isolate DDT from people and the environment.

In our meeting of 19 March 85 I made the remark that, "Olin's plan was very well prepared and written for presentation to Civil and Environmental Engineers but a good Geochemist, or someone highly versed in the chemistry and physics of colloidal clay subsurface geostructures could tear it apart". It is requested that someone so disciplined from the USGS and/or Bureau of Mines be requested to comment on the Remedial Action Plan and DEIS prior to release of the finalized EIS or issuance of any permit. It is also requested that a copy of this communication be forwarded with these requests-for-comment.

ASSISTING NATURE:

Natural Restoration is far greater than has been acknowledged. Although the WAR report states, "A full range of alternatives for mitigation of this problem was investigated. All can be compared with the Natural Restoration....." no supportive data was presented to qualify this activity for comparison. Personal interviews with former employees of the manufacturers, disclosed that over 13,900 tons of DDT waste was effluented from startup in 1947 through shutdown in 1970. Half of this amount when added to the abundant area usage of the insecticide through the early 70's would tax the validity of, not only the distribution data, but also the half-life data outlined in the DEIS unless we face the facts. The truth of the matter is that anomalies of Natural Restoration far outweigh known factors, are the key to effective dissolution of the contaminant and are prevalent in the Wheeler Refuge etc. This disclosure alone qualifies research as a truly viable alternative.

A second statement - DEIS 2.2.3.7 In Place Physical Chemical Degradation - qualifies only selective specific scientific disciplines discussing specific unit objectives (i.e. a Bio- discussing Biodegradability et al.). Consideration of the fact that reaction mechanisms facilitating Natural Restoration are combined actively within proximate space time frames would qualify the statement

Comment No.	Response
1	No support for this comment is offered.
2	Coverage of hydrogeological impacts will be strengthened in the FEIS. The COE does not guarantee the success of Olin's or any applicant's proposal but must determine whether it is contrary to the public interest.
3	The USGS reviewed and commented on the DEIS. Their comments are incorporated in the Department of Interior response. The DEIS and comments including this letter were forwarded to Dr. Phillip Lamoreaux and he was tasked with providing a more detailed evaluation of hydrologic issues.
4	The selection of a remedial action is outside the scope of a permit review which is the focus of this EIS.
5	See previous comments. We are unaware of established findings that have been ignored.

REPLY TO FRANCIS MICHAEL HINDS

deceptive and misleading thereby qualifying research as a viable alternative. Hydrology problems, currently understood to be creating dilemma as to how to go about cleaning up the HSB-Indian Creek lower reaches, would in all probability prove an asset for successful in-situ dissolution of the DDT-R contaminant.

The role of Natural Restoration reaction mechanisms as they relate to this DDT problem, and the national toxic waste problem as a whole, is an example of how established findings are ignored because they cannot be reconciled with conventional concepts and, that the act of ignoring creates the most persistent barrier towards truly solving the problem.

SOCIO-ECONOMIC:

Successfully assisting nature in its Natural Restoration processes, as related to the DDT-R problem being discussed, would alleviate one of the major segments of our national toxic waste threat. It would also substantiate the generation of a new industrial venture with unlimited earning potential and the means of creating an unlimited number of new job opportunities.

CONCLUSION:

The permit should be denied - or

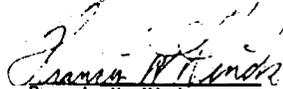
The Bypass - affording a viable short term isolation - segment should be accepted.

The Burial segment denied with recommendations to immediately initiate a 3 year research effort (or less, should development occur sooner.) for the development of at least one viable in-situ DM-R destruction method using the contaminated HSB channel and the West Loop as the laboratory and/or the control site. Chemical, Electro-, Bio- et al. programs to start immediately.

Other research - such as closed system incineration processes (plasma-arc, micro-wave plasma, induction furnace, centorr furnace et al.), closed system portable or fixed location chemical or electrochemical processing facilities (electro phase separation, packed porous carbon electrode et al.), and of handling methods (treasure hunting or oceanographic mining techniques et al.) that qualify minimal if any turbulence could be included as feasibility or, if applicable, field pilot studies.

If I can be of any assistance please feel free to contact me at your own convenience.

Sincerely,


Francis M. Hinds

cc: Sen. H. Heflin
Sen. J. Denton
Rep. R. Flippo
Review Panel
Media

Comment No.	Response
6	No response necessary.
7	These views have been made a part of the record.

67-H

REPLY TO LLOYD R. ROBINSON

3229 Wisteria Drive
Birmingham, Alabama 35216

August 18, 1985

District Engineer
U. S. Army Engineer District, Nashville
P. O. Box 1070
Nashville, Tennessee 37202

Subject: Draft Environmental Impact Statement for Regulatory Actions
Associated with the Olin Corporation Remedial Action Plan
to Isolate DDT from People and the Environment in the
Huntsville Spring Branch - Indian Creek System,
Wheeler Reservoir, Alabama (Madison County)

Dear Sir:

On February 21, 1985, I wrote to Dr. J. H. Sullivan, Jr., P.E.,
Vice President, Water and Air Research, Inc., concerning the initial Draft
EIS for the subject Regulatory Actions. The two items which I mentioned
in that letter have been addressed in the subject Draft EIS; however, I
feel that the Draft EIS still does not adequately address these and other
extremely important environmental issues.

1 section 1.2.7.2. Groundwater states that "Groundwater resources
should not be adversely impacted during implementation of the proposed
remedial actions..... With regard to long-term groundwater degradation,
monitoring data from wells on RSA in the vicinity of DDT cleanup and disposal
operations do not indicate that DDT is migrating downward to aquifers from
those highly-contaminated areas....." Section 6.2.6.2. Groundwater states
that "...Analysis of groundwater levels in the vicinity of HSB indicates
that HSB is a zone of groundwater discharge....." These statements are
mutually contradictory. If groundwater flow has historically been toward
the existing drainage channels, significant downward migration of DDT would
not be anticipated because flow patterns would induce lateral and not down-
ward movement. Thus elimination of the existing drainage path would change
groundwater flow patterns and contamination of groundwater resources would
be more likely than with even the present condition of the area.

2 Increased flushing action into surface watercourses is even a
significant possibility through increased discharge of groundwater through
the contaminated soils and onto the surface. Section 4.2.6.2. Groundwater
indicates this real possibility as follows: "The layers of crushed stone
proposed to be placed in each segment of the filled HSB channel have the
potential for creating localized flow paths and collection areas for shallow
groundwater. Groundwater collecting in these areas would lie directly above
the geotextile fabric, presumably in contact with underlying contaminated
sediments. This water would probably move at a very slow rate upward and
eventually discharge to nearby surface waters."

Comment No.

Response

- 1 More detailed information relative to groundwater will be included in the FEIS.
- 2 Since the contaminated channel will be completely covered with soil, the only pathway for potentially contaminated subsurface water to reach the surface will be by seepage through the soil cover. Because (1) the anticipated rate of seepage is low and (2) the likelihood that any DDT would be adsorbed by the soil cover, any threat to surface water contamination by this route is believed to be minimal.

REPLY TO LLOYD R., ROBINSON

District Engineer
U. S. Army Engineer District, Nashville

August 18, 1985

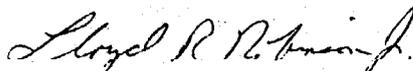
Page 2

3 The only indirect mention of the point of possible future flooding is 8s is indicated in the Summary under UNRESOLVED ISSUES. Item 1. Indicates that "In order to fully assess post-project drainage, an acceptable grading/drainage plan would be required." Item 2. Indicates that "Until detailed plans and specifications are available for the channel filling operations and final site closure, long-term integrity cannot be fully addressed." This seems to indicate that no assurance can be given that the plan presented in the Draft EIS offers a permanent solution to the isolation of DDT from people and the environment. This lack of assurance is also indicated in the Study under AREAS OF CONTROVERSY where the Review Panel indicated that Olin must perform 8 further study in Reaches B and C which may lead to 8 requirement for further actions in those reaches.

4 While it is now Federal policy to require double liners for Protected Landfills, the subject plan offers not even 8 single liner to totally isolate the DDT from People and the Environment in the Huntsville Spooling Branch - Indian Creek System, Wheeler Reservoir, Alabama (Madison County). Under Section 2.2.3. ALTERNATIVES DETERMINED TO BE INADEQUATE OR INAPPROPRIATE the rejection of other alternatives considered frequently contained the terms: "Data did not exist which defined the long-term stability..."; "...no data were available to evaluate short- or long-term effectiveness."; and "The closed disposal site would require long-term maintenance." These and other reasons given all sound like reasons to reject the alternative chosen. It would appear that the selection of the chosen alternative was based on cost above all.

5 For the above reasons and because effective and permanent clean-up methods are available, I strongly recommend that the plan presented in the subject Draft EIS be rejected.

Yours truly,


Lloyd R. Robinson, Jr., Ph.D., P. E.

cc: Senator Howell T. Heflin
Senator Jeremiah Denton

Comment No.

Response

3 The concerns raised by this comment are addressed more fully in the FEIS.

Regarding Dr. Robinson's latter area of concern, it is not the COE's responsibility within the context of 8 permit review to guarantee the success of any applicant's proposal, but to determine whether the work is contrary to the public interest. The Review Panel accepted Olin's Remedial Action Plan, as modified, as an appropriate action toward achieving the required performance standard. If, during or following implementation of the remedy, the Review Panel determines that further actions are necessary to achieve the 5 ppm performance standard, the Review Panel may require such further actions. The Consent Decree mandates that the performance standard of 5 ppa DDT in specified fish species be achieved by Olin, consistent with the Goals and Objectives of the Consent Decree. The purpose of the studies to be performed in Reaches B and C is to further identify the extent of contamination in those reaches. This situation along with the lack of detail during early planning when the DEIS was written is responsible for the points raised in support of the perception that the remedial plan is not 8 solution.

4 Dr. Robinson's comments also mention the policy on liners. The Hazardous and Solid Waste Amendments of 1984 require additional technical measures such as double liners and leachate collection systems are prospective and apply to new landfills or lateral expansions of existing landfills. These requirements are not retroactive and do not apply to existing landfills nor to the remedial action presented in the DEIS. The applicable technical requirements of the RCRA regulations are being applied to the remedial action.

5 This view has been made 8 part of the record.

APPENDIX I
BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT OF IMPACTS
UPON ENDANGERED **SPECIES** BY
OLIN CHEMICAL CORPORATION
REMEDIAL ACTION PLAN TO **ISOLATE**
DDT FROM PEOPLE AND **THE ENVIRONMENT** IN
HUNTSVILLE SPRING **BRANCH-INDIAN CREEK SYSTEM,**
WHEELER RESERVOIR, **ALABAMA**

Prepared for:

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, **CORPS OF ENGINEERS**
Nashville, Tennessee

Prepared by:

WATER AND AIR RESEARCH, INC.
Gainesville, Florida

October 1985

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I. Purpose. . Olin Chemical Corporation has applied for a Tennessee Valley Authority 26A Permit, a U.S. Fish and Wildlife Service (USFWS) Refuge Use Permit, and a U.S. Army Corps of Engineers (Nashville District) dredge and fill permit in Huntsville Spring Branch. The Corps is exerting its jurisdiction in this permitting action under the authority of Section 10 of the River and Harbor Act of 1899 (30 stat. 1151 j 33 U.S.C. 403) and Section 404 of the Clean Water Act. A Draft Environmental Impact Statement for Regulatory Actions Associated with the Olin Corporation Remedial Action Plan to Isolate DDT from People and the Environment in Huntsville Spring Branch-Indian Creek System, Wheeler Reservoir, Alabama has been prepared in accordance with Section 102 (2)(c) of the National Environmental Policy Act of 1969 (Public Law 91-190); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the **National Environ-**mental Policy Act, 29 November 1978; and Corps of Engineers Regulation 200-2-2, 25 August 1980, Environmental Quality, Policy and Procedures for Implementing **NEPA**.

In accordance **with** routine procedures for implementing Section 7c of the Endangered Species Act, the Jackson, Mississippi Endangered Species Field Office was contacted by letter concerning the permit 'action. The Service's reply advised that a biological assessment (BA) must be prepared to determine the effects on three federally-listed endangered species: the gray bay (Myotis grisescens), the bald eagle (Haliaeetus leucocephalus), and the American alligator (Alligator mississippiensis). The Alabama cave shrimp (Palaemonias alabamae) was identified as a candidate species. **BA** coverage of candidate species is not mandatory but agencies are asked to be sensitive toward these species during project planning. The Indiana bat (Myotis sodalis) was added to the assessment by the Corps in anticipation of possible questions raised by the work's location in its range. Copies of these letters are attached (Exhibits A, B, and C).

In compliance with Section 7 of the Endangered Species Act as amended, the following is the biological assessment of the remedial action plan upon the five mentioned species. The permit area is wholly within the Wheeler National Wildlife Refuge (**WNWR**), a large part of which is also within the Redstone Arsenal (RSA).

II. Affected Environment. A comprehensive description of the affected environment appears on pages 3-1 through 3-69 of the Draft EIS (WAR 1985).

III. Assessment Methodology. A thorough assessment of existing habitat conditions was made during the EIS process. The assessment evaluated the types, extent, and ecological "health" of the habitats available to the endangered species of concern. To a limited **extent** it also evaluated the likelihood of endangered species utilizing these habitats. These data were the basis for determining the need for this biological assessment. As a result, the five species above were extracted from the total of 68 species reported in the EIS as possibly occurring in the project area.

The following information for each of the five species was then sought in the published literature and in personal communications with recognized experts that were thought to have unpublished data.

1. Historical geographical range;
2. Historical use of the project area;
3. Population size, especially within the project area;
4. Food and feeding requirements;
5. Cover and nesting requirements;
6. Susceptibility to DDTR; and
7. Reintroduction requirements.

IV. Biological Assessment.

Alabama Cave Shrimp (Palaemonais alabamae)--The Alabama cave shrimp is known only from Shelta Cave and Bobcat Cave (Bouchard 1976; personal

communication on April 10, 1985 with Dr. R. Bouchard, **Wildwood** Crest, New Jersey). Shelta Cave is within the city limits of Huntsville, Alabama. Bobcat Cave is within RSA, approximately **3** miles north of the confluence of Indian Creek (IC) and Huntsville Spring Branch (HSB). Shelta Cave is well upstream of the project area. Although groundwater is a possible route for impacting the Alabama cave shrimp in Bobcat Cave, the probability of this occurring is remote since the contaminated area is within a groundwater discharge **area**. This aquatic crustacean is an obligate cavernicole (specifically, a "troglobite") requiring a cave environment for all phases of its life cycle. It is not even remotely likely to occur within the surface waters of the project area, and would therefore be unaffected by the proposed actions.

American Alligator (Alligator **mississippiensis**)--Northern Alabama is outside of the historical range of the alligator (Mount 1976). Cold weather is believed to be the major limiting factor. There were a few alligators in the WNWR in 1939, but these individuals were believed to be escaped or released pets (Personal communication on May 8, 1985 with **T. Atkeson**, Director, WNWR, Decatur, Alabama). The USFWS released 52 alligators in WNWR in 1979, and it is believed that pet alligators have also been released there on occasion by the public (Personal communication on May 8, 1985 **with T. Atkeson**, Director, WNWR, Decatur, Alabama). During the course of field studies several military and civilian personnel reported to project investigators that alligators continue to be occasionally spotted within RSA. Olin work crews have reported seeing alligators in the vicinity of HSB Mile 2.0, and an alligator was spotted outside the work area by USFWS personnel during a helicopter flight. Recent population counts have not been conducted; therefore the status of the alligator on **WNWR** is unknown.

Within its historic range the alligator was ubiquitous in aquatic and wetland habitats, from lakes and wetlands to streams and, rarely, brackish water habitats. Young alligators feed on insects, mollusks,

and crustaceans, whereas adults will take fish (especially **mudfish**, Amia calva, and gar, Lepisosteus spp.), turtles, snakes, birds, mammals, and crustaceans (**Fogarty** 1978). Nests are mounds built of mud and vegetation, and are located within or beside aquatic habitats and wetlands. There is no shortage of these foraging and nesting habitats for alligators within the project area. Alligators construct dens, or "gator holes" where they spend much of their time, even hibernating there. Gator holes may be underground tunnels leading away from the edge of a stream or lake, or may resemble small ponds within marshes. Alligators also construct an underground passage leading off from the edge of the hole to an enlarged cave a short distance away (**Fogarty** 1978). Gator holes constructed within marshes are relatively conspicuous to researchers. **Fogarty** (1978) reports the home ranges of alligators studied in a Louisiana marsh were 6.4 to 41.0 acres for females and 452 to 12,560 acres for males. Alligators are easily "shined" with a strong spotlight at night, making **it** relatively easy to monitor the project site for alligators.

There is very little data concerning DDTR body burdens in alligators (Personal communications on August 1, 1985 with Dr. R. Labisky, professor of Wildlife Management, University of Florida, Gainesville, Florida; and A. Woodward, research biologist, Wildlife Research Lab, Florida Game and Fresh Water Fish Commission, Gainesville, Florida). There is no information **on acute** or chronic toxicity to this species. Specifically, data on DDTR levels in WNR alligators is not available. Labisky (Personal communication on August 1, 1985) sampled adult alligators in Florida and found DDE levels of approximately 0.1 to 6.5 ppm in fat. The highest values were found in alligators from ponds in orange groves which formerly received DDT applications. Samples from the surrounding environment (sediments, water, food organisms) were not analyzed, however, so an assessment of the alligator's susceptibility to DDTR is not possible at this time.

n

Alligators could be impacted by remedial actions through either increased DDT uptake and/or physical harm from construction equipment. Increased DDT uptake could occur when the HSB channel is filled by consumption of contaminated fish, turtles, and other vertebrates. This is unlikely to occur in the presence of human or near operating construction machinery during daylight hours because alligators are relatively shy and are largely **nocturnal**. At night, however, and in the presence of a **serendipitous** food supply, they may become emboldened enough to approach heavy machinery and could then sustain physical injuries.

The alligator's secretive, nocturnal, scavenging nature indicates that all alligators in the project area will be in jeopardy during remedial activities and therefore should be removed prior to construction. Their territorial habit (**Fogarty** 1978) and (suspected) low density within the **project** area suggests that other alligators would not **neces-**sarily move into the area subsequent to removal of presently established individuals, at least not right away. The relative ease with which alligators can be located and trapped implies that translocation would not be prohibitively expensive. Removal of alligator from marginal, contaminated habitat is considered a positive impact on the alligators involved. Removal of alligator should be done by or in close cooperation with the USFWS and the Game and Fish Division of the Alabama Department of Conservation and Natural Resources. All captured alligators should be returned to habitat where they will have a chance to survive and reproduce in a more suitable environment than that of northern Alabama. If this cannot be accommodated, alligators could be held in captivity until construction has ceased, or else released far enough away that they are unlikely to return to the site. Otherwise, alligators, being territorial, are likely to return to the contaminated area when released.

Even if all the DDT is removed from the system, the ability of the alligators to survive the winters of north Alabama is believed to be

marginal. However, all the DDTR will not be removed by the proposed remedial actions, and alligators are known to take up DDTR (although at unknown rates and with unknown susceptibility). There is no evidence that the introduced alligators have ever reproduced in WNWR, and, without reproduction, reintroduction will fail. Their unsuccessful reproduction in the area could be at least partially due to DDTR contamination. The project area is therefore considered to have very low value for the restoration or conservation of the American alligator.

Gray Bat (*Myotis grisescens*)--This species is known to occur in several caves near the project site. Hibernacula currently exist in Fern Cave, and **Hambrick** Cave is an important summer roost. Fern Cave is located approximately 22 miles east-southeast of the project area. **Hambrick** Cave also lies approximately 20 to 22 miles from the remedial action site. A maternity colony of at least 34,900 individuals exists in Cave Springs Cave approximately 8 to 10 miles from RSA. Gray **bats** are believed to forage a maximum distance of approximately 12 miles from maternity colonies (Personal communication on May 9, 1985 with Dr. **M. Tuttle**, Milwaukee Museum), which indicates **potential jeopardy** only to the Cave Springs Cave population.

Construction per se will not impact the gray bat because they do not live within or immediately adjacent to the construction area, nor will prime foraging habitat be disrupted or eliminated.

The gray bat forages over water for insects, and if activities increase DDT concentrations in aquatic insects, DDT levels in bats could increase. Emerging aquatic insects thus present a potential route of DDT contamination. Observations (Personal communications on May 9, 1985 with Dr. M. Tuttle) of the species' feeding habits suggest that adult **mayflies** (Ephemeroptera) are a highly preferred food item. Gray bats often travel long distances in order to secure a suitable source of mayflies. Once a productive source is located, feeding territories

are established and defended. Gray bats are not known to forage, however, in areas such as HSB where midges are abundant and **mayfly** populations are depauperate or completely lacking (Personal **communications** on **May 9, 1985 with Dr. M. Tuttle**).

Except for low densities of Caenis sp. and Hexagenia sp. at the mouth of IC, **mayflies** were not found within the project area's aquatic ecosystem during a 1979 survey (WAR 1980). A more recent study in 1984 indicates that **mayfly** populations consisting of Caenis sp., Stenonema sp., and Hexagenia sp. occur along lower HSB below the proposed remedial action site (Bayne et al. 1984). These latter populations are a potential source of contamination to gray bats in the **area**. However, the greatest threat to the bats would be **mayfly** populations in the areas where dredging and construction would take place (HSB Mile 4.0 to HSB Mile 5.6). In 1979 and 1984, **mayflies** were apparently absent along this stretch of HSB. Benthic macroinvertebrates in the portion of the HSB channel proposed for permanent filling have not been recently documented, however. If **mayfly** populations currently exist in the latter area, they are probably not abundant due to poor water quality.

Most **mayfly** species, including those mentioned here, exhibit peak emergence during the spring and summer. This is especially true of Hexagenia sp., the largest of the **mayfly** species present (Berner 1957; **McCafferty 1975**), which attains peak emergence levels within the project area from the second week in June to the end of July (Personal communication on September 23, 1985 with Dr. **K. Tennessen**, Tennessee Valley Authority).

Table 1 presents unpublished data collected (Unpublished data provided on May 3, 1985 by T. Talley, Field Supervisor, USFWS, Cookeville, Tennessee) in 1976 regarding **the ratio** of DDD to DDE in gray bat guano from various locations along the Tennessee River. DDD and DDE are metabolites of DDT under anaerobic and aerobic conditions, **respect-**ively. Agricultural use of DDT results primarily in the DDE

Table 1. DDD/DDE Ratios in Gray Bat Guano from Selected Locations in North Alabama

Ratios	Gray Bat Colony Location
0.00	Tennessee River upstream of Triana, Alabama
0.05	Tennessee River upstream of Triana, Alabama
0.32	Cave Springs Cave , Wheeler NWR, Alabama
0.29	Indian Cave, near Elkmont, Alabama
0.14	Cave near Florence, Alabama
0.12	Cave near Georgetown, Alabama

Source: Unpublished data provided on May 3, 1985 by **T.** Talley, Field Supervisor; U.S. Fish and Wildlife Service, Cookeville, Tennessee.

metabolite, whereas underwater accumulations of DDT result primarily in the DDD metabolite (Personal communication on May 8, 1985 with Dr. D. Clark, Section Leader, Population Ecology Section, USFWS, Laurel, Maryland). Samples of gray bats (and their guano) that have been feeding on insects contaminated by DDTR in HSB should therefore produce relatively high DDD:DDE ratios, and that these ratios should decrease with distance from the site of contamination. This has in fact been observed. The highest ratios are found in bat guano samples taken near the contaminated project site.

Absolute levels of DDTR in gray bat carcasses are also high in bats from the WNWR area relative to samples collected more distantly from HSB. Nine bats collected from Cave Springs Cave averaged 37 ppm DDE, 17 ppm DDD, and 0.34 ppm DDT (Personal communication with D. Clark on May 8, 1985). These data sets indicate that gray bats from the Cave Springs Cave maternity colony may be feeding either within the project area or downstre'am within the contaminated area. However, the bat and bat guano data are 9 years old and may no longer represent current conditions.

Benthic macroinvertebrate sampling in HSB indicates a low likelihood for Olin's remedial actions to adversely impact gray bats. On the other hand, USFWS data **from gray** bat carcasses and guano indicate that DDT originating from Olin's RSA plant is or has been contaminating gray bats on WNWR. Until this question has been resolved, it would appear prudent to monitor the project site for gray bat activity prior to and during the filling of HSB at the time periods when gray bats would be foraging there. The monitoring plan should be developed in cooperation with USFWS and the Game and Fish Division of the Alabama Department of Conservation and Natural Resources. If gray bats are observed within the project area, construction activities therein should be postponed until autumn or winter (ideally November through February) when **mayfly** emergences have diminished **and** the gray bats **are** in hibernation.

Indiana Bat (*Myotis sodalis*)--Although WNWR is within the known geographical range for this species, Indiana bats occur only rarely in the RSA area (Personal communication on **May 9, 1985** with **Dr. M. Tuttle**). Indiana bats generally roost under loose slabs of bark on trees. They have been observed within WNWR in summer and still 'numbers are suspected to hibernate in Fern and Blowing Wind (Sauta) Caves (Personal **communication** **May 8, 1985** with **T. Atkeson**). Fern Cave lies approximately 22 miles east-southeast of the project area. Blowing Wind Cave lies in excess of 35 miles from the project area. Humphrey et al. (1977) found that an Indiana bat population of Webster, Indiana foraged a maximum distance of approximately 0.5 miles **from their summer** roost. It is therefore unlikely that Indiana bats utilizing these caves during warm months would be affected by the project. In spring, when hibernating colonies disband to form smaller maternity **colonies** there is a much greater danger of contamination. Data to confirm or deny DDTR contamination in Indiana bats was not located during this assessment.

Like the gray bat, this species is potentially susceptible to contamination via insectivorous feeding habits. Foraging primarily takes place at treetop level, ranging from 2 to **30** meters (Humphrey et al. 1977). Humphrey et al. (1977) also noted that the Indiana bat does not forage over streams where riparian vegetation **is** absent. The proposed clearing of riparian vegetation along the western loop and HSB may at least temporarily discourage the Indiana bat from foraging in these areas. This represents a positive potential impact on the Indiana bat. Otherwise, there appear to be no adverse impacts to the Indiana bat as a result of Olin's remedial actions.

Bald Eagle (*Haliaeetus leucocephalus*)--The bald eagle formerly resided and bred in Alabama along the Gulf Coast and in the Tennessee River Valley. Winter-visiting eagles also occurred **in** the Valley (Imhoff 1976). The last active eagle **nest** in WNWR was observed **in** 1949. Throughout the **1950s**, **10** to 12 eagles **utilized the refuge**

regularly during winter. Presently, only a few transient individuals visit the refuge in winter and early spring. There **is** some speculation that these individuals are following waterfowl migrations (Personal communication on May 8, 1985 with **T. Atkeson**), although there are no data available to support this (Personal communication on May 13, 1985 with **S. Atkins**, Biologist, Division of Services and **Field Operations**, Tennessee Valley Authority, Muscle Shoals, Alabama).

Atkins (Personal communications on May 13, 1984) reported on the recent use by bald eagles of two reservoirs (Normandy and Pickwick) downstream of Wheeler Reservoir. Last year, bald eagles paired, went through courtship, built nests, and then left the area of these two **reservoirs**. During January 1985, 29 eagles were sighted on Pickwick Reservoir, but no young were reared in subsequent months. The reasons, for their reproductive failure on these reservoirs **is** unknown.

Bald eagles live near and forage in and over rivers and lakes. **They** feed primarily on fish, especially catfish (Imhoff 1976), frequently by stealing them from other piscivorous birds such as osprey. Eagles also eat carrion, rodents and other mammals, snakes, waterfowl, and shore-birds. These food habits make them especially susceptible to contamination by DDT and other toxicants in the nation's waterways. Indeed, DDT and other chlorinated hydrocarbon pesticides are blamed for the drastic population decline of bald eagles in the United States.

Eagles could undergo DDT contamination during remedial actions primarily through the consumption of dead or dying fish that have been contaminated. **Consumption** of waterfowl is another suspected route of contamination. However, their near absence in the project area during the summer season indicates that eagles are very unlikely to be impacted by consumption of contaminated food organisms at that time. They might be more exposed during winter when they are more abundant on **WNWR**, but this is not of great concern since eagles will **avoid** the remedial action site during construction due to visual and **audial**

disturbances. Bald eagles are already recolonizing the Tennessee River Valley, including **WNWR**, through natural processes. Their numbers are slowly increasing (Personal communication on May 8, 1985 and May 13, 1985 with **T. Atkeson and S. Atkins**, respectively), although the reason(s) for their unsuccessful reproduction attempts are unclear. It **may**, therefore, be unnecessary or even undesirable to attempt artificial reintroduction of the bald eagle into the region at this time.

The applicant and USFWS should establish a plan to prevent contamination of eagles. The plan might include such measures as:

1. Monitoring the project area during construction for eagle activity;
2. Removal of contaminated fish and other aquatic vertebrates; and
3. Driving eagles from the project area.

Assuming a very low population of eagles in the project area, and establishment of a plan to prevent contamination of eagles during construction activities, Olin's remedial action plan should have no adverse effect on bald eagles.

Revegetation of the Contaminated Area

In its present condition the project area constitutes attractive wildlife habitat but has a high potential for contaminating fish and wildlife that use it. Activities which result in discouraging use of the contaminated area in favor of uncontaminated habitat would thus be of positive impact. This logic suggests that plants used to revegetate construction areas be unattractive to wildlife; The plant species to be used should be chosen in cooperation with the **USFWS** and the Game and Fish Division of the Alabama Department of Conservation and Natural Resources.

V. Conclusions. The Alabama cave shrimp does not occur in or downstream of waters of the project area. The Indiana bat is uncommon to

rare in the region, and probably does not use the project area to any significant degree. The bald eagle and the gray bat are **known** to utilize the project area at least occasionally, but monitoring activities and special permit actions should eliminate potential adverse impacts. An introduced population of the American alligator occurs in the project area; these alligators will be removed to more suitable habitat prior to remedial construction activities. Therefore, Olin Chemical Corporation's remedial action plan is not expected to result in significant adverse impacts to the gray bat, Indiana bat, bald eagle, American alligator, or Alabama cave shrimp.

Removal of the majority of the DDTR from the **aquatic** ecosystem represents a significant environmental improvement over present conditions-

References

- Bayne, D.R., E.C. Webber, and W.C. Sesock. 1984. Benthic **Macroin-**vertebrate Communities of Huntsville Spring Branch and Indian Creek, Madison County, Alabama, 1983-1984. Unpublished Report, Department of Fisheries and Allied Aquacultures, Auburn University, Alabama. 48 pp.
- Berner, L. 1957. A **Mayfly** Gynandromorph. Proceedings of the Entomological Society of Washington **59:167-169**.
- Bouchard, R.W. 1976. Crayfishes and Shrimps. In: Endangered and Threatened Plants and Animals of Alabama, **pp. 13-20**, H. Boschung, Editor. Alabama Museum of Natural History Bulletin 2.
- Pogarty, M.J. 1978. American Alligator. In: Rare and Endangered Biota of Florida: Volume Three, Amphibians and Reptiles, R.W. **McDiarmid**, Editor. 74 pages.
- Humphrey, S.R., A.R. Richter, and J.B. Cope. 1977. Summer Habitat and Ecology of the Endangered Indiana Bat, **Myotis sodalis**. Journal of Mammology **58(3):334-346**.
- Imhoff, T.A. 1976. Alabama Birds. University Alabama Press, University, Alabama, 445 pages.
- McCafferty**, W.P. 1975. The Burrowing **Mayflies** (Ephemeroptera: **Ephemeroidea**) of the United States. Transactions of the American Entomological Society **101:447-504**.
- Mount, R.H. 1976. Amphibians and Reptiles. In: Endangered and Threatened Plants and Animals **of Alabama**, **pp. 66-79**, H. Boschung, Editor. Alabama Museum of Natural History Bulletin 2.
- U.S. Fish and Wildlife Service. 1984. Unpublished data. Patuxent Wildlife Research Center.
- Water and Air Research, Inc. (WAR). 1980. Engineering and Environmental Study of DDT Contamination of Huntsville Spring Branch, Indian Creek, and Adjacent Lands and Waters, Wheeler Reservoir, Alabama. Prepared for the U.S. Army Corps of Engineers, Mobile District, Contract No. **DACW01-79-C09224** (3 volumes).
- Water and Air Research, Inc. (WAR). 1985. Draft Environmental Impact Statement for Regulatory Actions Associated with the Olin Corporation Remedial Action Plan to Isolate DDT from People and the Environment in the Huntsville Spring Branch-Indian Creek System, Wheeler Reservoir, Alabama. Prepared for the U.S. Army Corps of Engineers, Nashville District, Contract No. **DACW62-85-C-0035**.

ORNED-P

Mr. Dennis Jordan, Field Supervisor
U.S. Fish and Wildlife Service
300 Woodrow Wilson Avenue, Suite 316
Jackson, Mississippi 39213

Dear Mr. Jordan:

Mr. Ray Hedrick of my staff contacted, you by phone on February 28, 1985, concerning Olin Chemical Company's remedial action plan to isolate DDT present in Huntsville Spring Branch adjacent to Redstone Arsenal, Alabama. As Mr. Hedrick mentioned, the Nashville District has initiated preparation of an Environmental Impact Statement (EIS) for a Department of the Army Permit Review of the initial work under the remedial action plan. The Fish and Wildlife Service (FWS), Tennessee Valley Authority (TVA), and Environmental Protection Agency (EPA) are cooperating agencies for the EIS and the document will also cover the FWS Refuge Use Permit action and the TVA 26A Permit action. The EIS will be tiered in recognition that additional remedial action will be necessary between Huntsville Spring Branch (HSB) miles 2.4 and 4.0 and may be necessary in other areas. However, the initial permit action will pertain to HSB miles 4.0 to 5.57. A summary of the proposed initial action is enclosed for your information.

On behalf of all the agencies involved in preparing the EIS, I am requesting a list of federally-listed species which could potentially be affected by the action and advice on compliance with Section 7 of the Endangered Species Act. The proposed action is surrounded by sensitive and complex issues, the solution of which is complicated by the court-established schedule. Thus, I feel that an unusual degree of patience and innovative thinking will be required of all involved to assure that the Section 7 process is completed in the smoothest and most time-efficient manner.

Mr. Ray Hedrick (FWS 852-5026) will be my point of contact. Please contact him directly at any time that the process can be expedited or simplified by doing so. Thanks for your

Hedrick/wsd/5026

T: 04 Mar 85

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cooperat ion. I Look forward to working: with you on this
proposal.

Sincerely,

E. C. Moore
Chief, Engineering Division

Copy **Furnished:**

John Thurman, TVA
Lee Barclay, FWS
Bob Howard, EPA

CATHEY/ED-P
NEFF/ED-P
BENNETT/ED-P
JAMES/OP-F
HUDDLESTON/OP-F
MILLER/OC
CONNOR/ED
MOORE/ED



United States Department of the Interior

FISH AND WILDLIFE SERVICE
JACKSON MALL OFFICE CENTER
300 WOODROW WILSON AVENUE, SUITE 316
JACKSON, MISSISSIPPI 39213

March 26, 1985

IN REPLY REFER TO:
Log No. 4-3-85-340

Mr. E. C. Moore
U.S. Army, Corps of Engineers
Post Office Box 1070
Nashville, Tennessee 37202

Dear Mr. Moore:

This responds to your letter of March 6, 1985, concerning the Olin Chemical Company's remedial action plan to isolate DDT present in Huntsville Spring Branch adjacent to Redstone Arsenal, Alabama, and an Environmental Impact Statement (EIS) for a Department of the Army Permit Review of the initial work under the remedial action plan. We have reviewed the information you enclosed relative to the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Our records indicate that the bald eagle (Haliaeetus leucocephalus), the gray bat (Myotis grisescens), and the American alligator (Alligator mississippiensis) are federally listed endangered species which may occur in the project area. The bald eagle is known to winter along the Tennessee River adjacent to the project area. The gray bat has a maternity colony in Cave Springs Cave, Morgan County. They may also occur in Talucah Cave, Morgan County (see attached maps). These same bats feed upon flying aquatic insects over water and are likely to hunt over the Tennessee River adjacent to the project area and over Indian Creek and Huntsville Spring Branch within the project area. The endangered American alligator may occur in small numbers in the vicinity of the project, as this project site is located on the periphery of the species' range. There are no threatened species or critical habitats in the vicinity of the project. There are no proposed species in the vicinity of the project area. The Alabama cave shrimp (Palaemonias alabamiae) is a candidate species located in Bobcat Cave on the Redstone Arsenal.

As this project is a major Federal action significantly affecting the quality of the human environment (i.e., one requiring an environmental impact statement), Section 7(c) of the Endangered Species Act, as amended requires that you prepare a biological assessment to determine the effect of the project on listed and proposed species. The biological assessment shall be completed within 180 days after the date on which initiated and

before any physical modification of the environment is begun. If the biological assessment is not begun within 90 days, you should verify the species list informally (via phone) prior to initiation of your assessment. When conducting a biological assessment, you shall, at a minimum

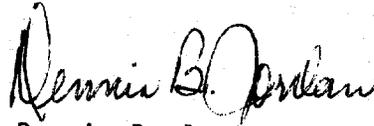
1. conduct a scientifically sound on-site inspection of the area affected by the action, which must include a detailed survey of the area to determine if listed or proposed species are present or occur seasonally and whether suitable habitat exists within the area for either expanding the existing population or potential reintroduction of populations;
2. interview recognized experts on the species at issue, including those within the Fish & Wildlife Service, the National Marine Fisheries Service, state conservation agencies, universities, and others who may have data not yet found in scientific literature;
3. review literature and other scientific data to determine the species distribution, habitat needs, and other biological requirements;
4. analyze the effects of the action on individuals and populations' of each species and its habitat, including cumulative effects of the action;
5. analyze alternative sections that may provide conservation measures;
6. conduct any studies necessary to fulfill the requirements of (1) through (5) above;
7. review any other relevant information.

If you determine that the proposed action may affect any of the listed species or critical habitats, you must request in writing formal consultation pursuant to Section 7(a) from our office. Section 7 requirements also apply to proposed species and proposed critical habitat.

If you require further information regarding this project, please contact our office, telephone 601/960-4900.

We appreciate your participation in the efforts to enhance the existence of endangered species.

Sincerely yours,



Dennis B. Jordan
Field Supervisor
Endangered Species Field Office

Attachments

cc: **Division of Game and Fish, Montgomery, AL**
Wheeler NWR
Cookeville ES



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

IN REPLY REFER TO

NOV 22 1985

ORNED-P

Mr. Dennis B. Jordan, Field Supervisor
Endangered Species Field Office
U.S. Fish and Wildlife Service
300 Woodrow Wilson Avenue, Suite 316
Jackson, Mississippi 39213

Dear Mr. Jordan:

Please refer to Log No. 4-3-85-340, concerning the Department of the Army Permit review of initial work under Olin Corporation's remedial action plan to isolate DDT present in Huntsville Spring Branch on Wheeler National Wildlife Refuge adjacent to Redstone Arsenal, Alabama. I am pleased to submit herewith a biological assessment of effects on listed and proposed species. Two other agencies, the Fish and Wildlife Service and Tennessee Valley Authority, also have permit actions associated with this work and may apply the biological assessment in their reviews. Subject to imposition of appropriate special permit conditions, I have concluded that there would be no effect on listed or proposed species if the work is permitted.

Your letter of March 26, 1985, identified three **listed** species, the American bald eagle (*Haliaeetus leucocephalus*), the gray bat (*Myotis grisescens*), and the American alligator (*Alligator mississippiensis*), and one candidate species, the Alabama cave shrimp (*Palaemonias alabamae*) as potentially occurring in the vicinity of the proposed work. Since the proposed work area is within the range of the Indiana bat (*Myotis sodalis*) we considered it in addition to the four previously mentioned species in the **biological** assessment. The biological assessment found no potential for the proposed work to affect the Indiana bat or the Alabama cave shrimp. It is also unlikely the other three species would be affected but special permit conditions are necessary to assure that they are not impacted. For the alligator, I propose that the applicant be required to conduct a preconstruction survey of his work area and, in cooperation with appropriate authorities, relocate any individuals found to uncontaminated suitable habitat. For the bald eagle, I propose that the applicant, in cooperation with appropriate authorities, develop a plan for recognizing and discouraging dangerous levels of bald eagle use in his work area. Finally, for the gray bat, I propose the applicant monitor his work area for **feeding** gray bats during the months of peak **mayfly**

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emergence and, if feeding use becomes significant, cease any operations deemed through consultation with appropriate authorities to substantially elevate contamination levels. With the above measures as special conditions to the permit (if issued) there would be no impact on these species.

To promote your understanding of the applicant's plan, I have enclosed a copy of the Regulatory Draft Environmental Impact Statement (EIS) and descriptions of two design options which will be included in the Final EIS. Other portions of the Draft EIS are incorporated into the biological assessment by reference and the biological assessment will appear as an appendix to the Final EIS.

Your cooperation is greatly appreciated and I look forward to hearing from you. Should you have any questions, please contact Mr. Ray Hedrick at FTS 852-5026.

Sincerely,

E. C. Moore
Chief, Engineering Division

Enclosures



United States Department of the Interior

FISH AND WILDLIFE SERVICE

JACKSON MALL OFFICE CENTER
300 WOODROW WILSON AVENUE, SUITE 316
JACKSON, MISSISSIPPI 39213

January 15, 1986

Mr. E. C. Moore
Chief, Engineering Division
Nashville District, Corps of Engineers
Post Office Box 1070
Nashville, Tennessee 37202-1070

Dear Mr. Moore:

This refers to your letter of November 22, 1985, which provided the biological assessment of impacts upon endangered species by Olin Chemical Corporation remedial action plan to isolate DDT from people and the environment in Huntsville Spring Branch - Indian Creek System, Wheeler Reservoir, Alabama (log number 4-3-85-340). We concur with your determination that the endangered species identified in our letter of March 26, 1985, as potentially occurring in the vicinity of the proposed work (the bald eagle, the gray bat, the American alligator) plus the Indiana bat will not be affected by the project if the following special conditions are included in the project's Department of the Army permit.

1. Removal and disposal of contaminated fish (suggested mechanism of contamination in bald eagles) from the bypassed HSB channel,
2. Scheduling of construction activities in highly contaminated areas to coincide with periods of low aquatic insect emergence (suggested mechanism of contamination in bats),
3. Discouraging use of highly contaminated areas by eagles or waterfowl during construction, and
4. Relocation of alligators, if encountered.

We also agree that the proposed work will not impact the Alabama cave shrimp. It has been a pleasure working with you on this matter.

Sincerely yours,

Dennis B. Jordan
Field Supervisor
Endangered Species Field Office

cc: AL Dept. Conservation & Natural Resources, Montgomery, AL
FWS, ES, Cookeville (ATTN: Lee Barclay)