

**Document Control No. 4400-24-ACYT**

**Revision 2**

**FIVE-YEAR REVIEW  
FINAL REPORT**

**TRIANA/TENNESSEE RIVER SITE  
TRIANA, MADISON COUNTY, ALABAMA**

**Work Assignment No. 24-4S32**

**June 1993**

**REGION IV**

**U.S. EPA CONTRACT NO. 68-W9-0057**

**Roy F. Weston, Inc.  
1880-H Beaver Ridge Circle  
Norcross, Georgia 30071**

**WESTON W.O. No. 04400-024-091-0061-00**

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FINAL REPORT**

**REVISION 2**


**TRIANA/TENNESSEE RIVER SITE  
TRIANA, MADISON COUNTY, ALABAMA**

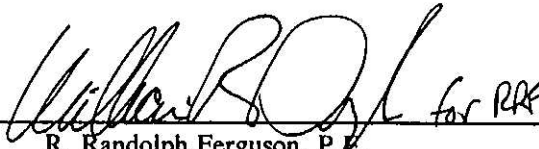
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## LIST OF ACRONYMS

ADEM	Alabama Department of Environmental Management
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
COE	U.S. Army Corps of Engineers
DA	Department of the Army
DDT	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-chlorophonyl) ethane), and DDE (1,1-dichloro-2,2-bis (p-chlorophenyl) ethylene), and the isomers thereof.
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FDA	U.S. Food and Drug Administration
FWS	U.S. Fish and Wildlife Service
HSB	Huntsville Spring Branch
HSBM	Huntsville Spring Branch Milepost
IC	Indian Creek
LRA	Lower Reach A
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollution Discharge Elimination System
O&M	Operation & Maintenance
ROD	Record of Decision
RP	Review Panel
RSA	Redstone Arsenal
SARA	Superfund Amendments and Reauthorization Act
TVA	Tennessee Valley Authority
URA	Upper Reach A
WWR	Wheeler Wildlife Refuge

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## **SECTION 1**

### **BACKGROUND**

#### **1.1 INTRODUCTION**

The Triana/Tennessee River Superfund (Triana) Site resulted from the discharge of wastewater from a DDT manufacturing plant into tributaries of the Tennessee River from 1947 to 1970. In 1980, the U.S. Environmental Protection Agency (EPA) and State of Alabama filed complaints against Olin Corporation (Olin) alleging imminent and substantial endangerment to human health and the environment from DDT contamination in waters of the United States. To resolve the contamination problem, the State of Alabama, United States, and Olin entered into a Consent Decree on May 31, 1983. The Consent Decree provided for a Review Panel (RP) responsible for technical overview of Olin's remedial action proposals. This RP has issued Decision Documents equivalent to the Record of Decision (ROD).

Remedial actions consisted of diverting stream flow around the contaminated portions of the tributaries, excavating new channels, excavating portions of the contaminated sediments, and burying portions of the contaminated sediments in place. These remedial actions began on April 1, 1986 and were completed on October 14, 1987. A complete description of these remedial actions is presented in Section 1.4 of this report. The Consent Decree further specified that Olin shall attain a performance standard of 5 ppm DDT in fillets of certain fish species within 10 years after the completion of remedial actions. Operation and maintenance (O&M) activities are ongoing which include the annual fish and surface water collections. The EPA issued an Interim Close-Out Report for the site on December 18, 1991.

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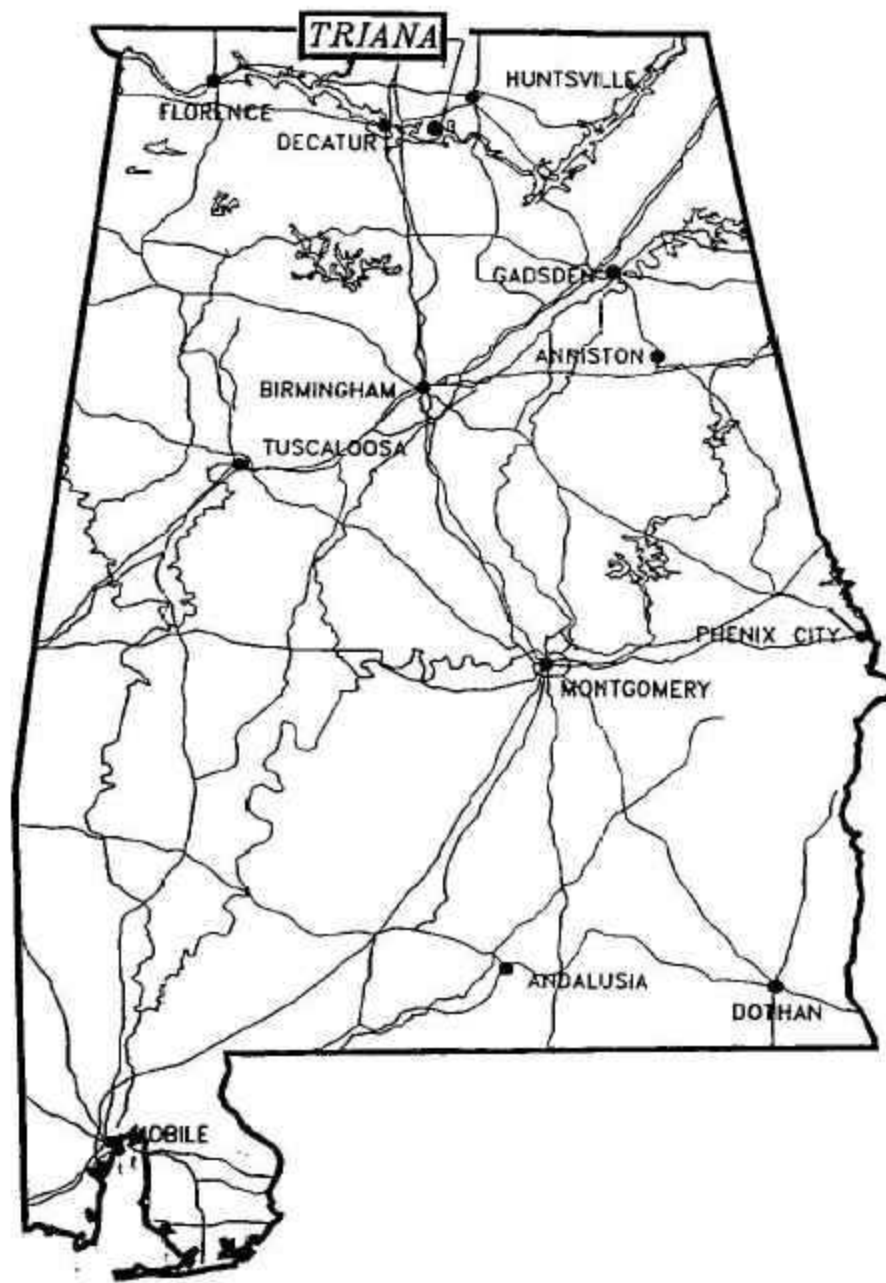
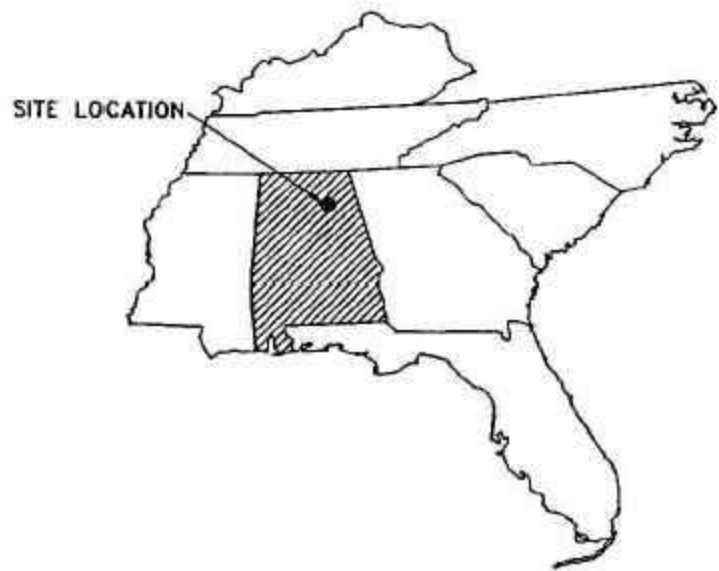
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The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 Section 121(c) and Section 300.430(f) (4) (ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), requires a statutory five-year review of certain sites to evaluate the effectiveness of the remedial actions. This review is to be conducted no less often than each five years after the initiation of the remedial action or until contamination levels allow for unlimited use and unrestricted exposure. The Triana site is being remediated pursuant to a pre-SARA Consent Decree and the five-year review is not a statutory requirement; however, as a matter of policy, EPA determined that a review was appropriate for this site.

## **1.2 SITE LOCATION AND DESCRIPTION**

The Triana Site is located in the northern section of Alabama approximately 5 miles southwest of Huntsville, Alabama (See Figure 1). The site consists of an 11-mile stretch of two tributaries, the Huntsville Spring Branch (HSB) and Indian Creek (IC). The HSB flows south-southwest and joins IC which then carries the flow of both streams and empties into the Tennessee River near the town of Triana, Alabama (See Figure 2). These two tributaries lie almost entirely within the confines of the Wheeler Wildlife Refuge (WWR) and the Redstone Arsenal (RSA).

From 1947 to 1970, a DDT manufacturing plant operated within the RSA and discharged wastewater into the HSB-IC system. The Olin Corporation operated this facility during most of the operating period under a lease from the U.S. Army. Fish in the vicinity became heavily contaminated with DDT from the estimated 408.8 tons of contaminated stream sediments. The majority of these sediments were located between mileposts 5.4 and 3.5 in the HSB.



*SITE LOCATION MAP  
TRIANA/TENNESSEE RIVER  
SUPERFUND SITE*

*TRIANA, MADISON COUNTY, ALABAMA*

**FIGURE 1**



# Triana/Tennessee River Site Huntsville Spring Branch-Indian Creek System

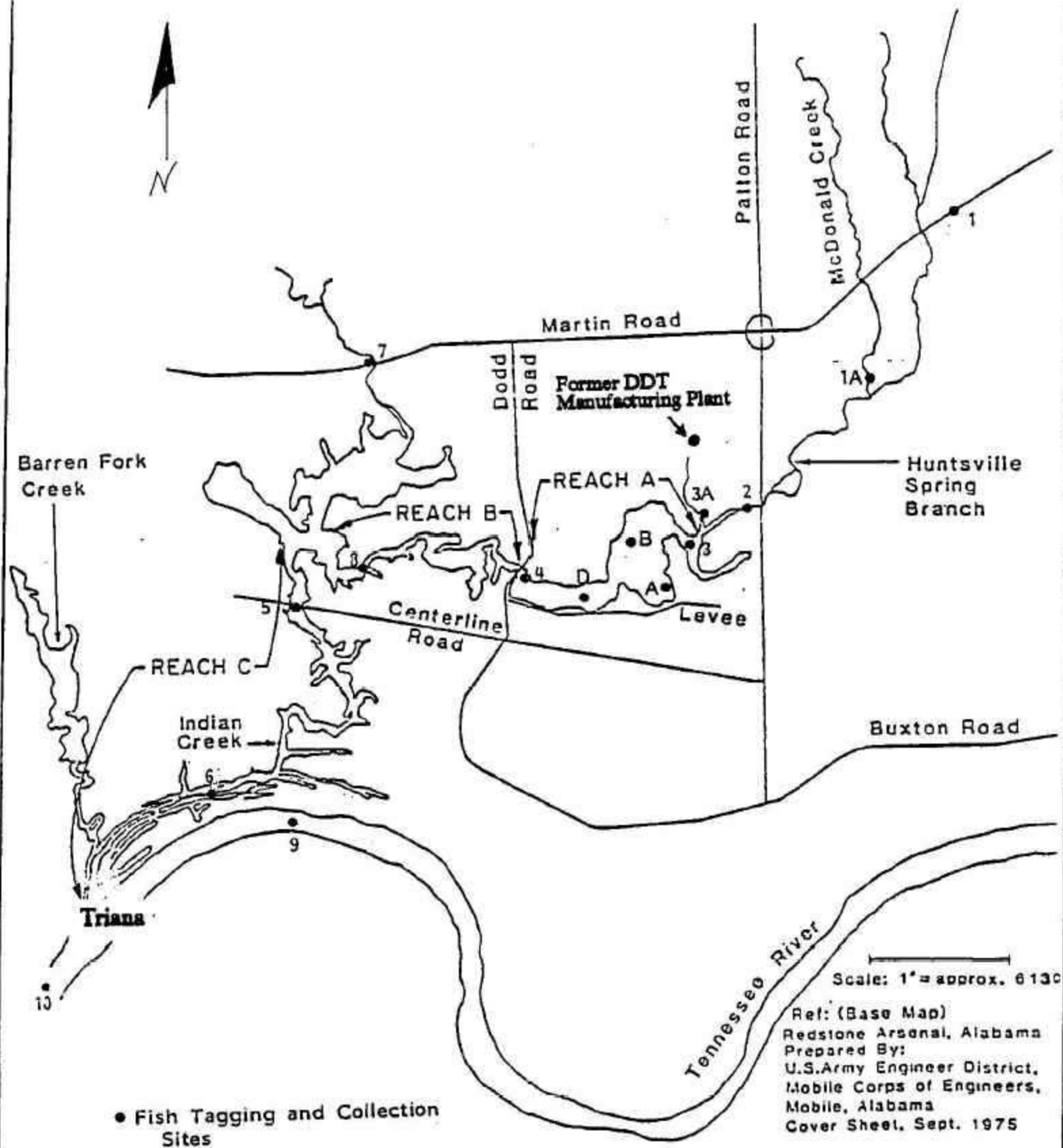


FIGURE 2

### **1.3 HISTORY**

Judicial actions commenced in 1980 when the U.S. EPA and State of Alabama filed complaints against Olin. The complaints alleged that DDT discharged from the manufacturing plant had created an imminent and substantial endangerment to human health and the environment.

On May 31, 1983, the Northern District of Alabama of the United States District Court entered, as part of an overall order settling litigation between the U.S., the State of Alabama, and four sets of private parties against Olin, a Consent Decree to develop and implement a remedial action for DDT contamination in the HSB-IC System. The Consent Decree requires Olin to develop and implement a remedial plan to meet a performance standard of 5 ppm of DDT in fillets of channel catfish, largemouth bass, and smallmouth buffalo. This action level was established by the Food and Drug Administration (FDA, 1981).

The Consent Decree also provided for a Review Panel (RP) responsible for technical overview and approval, disapproval or modification of Olin's proposals to achieve the requirements of the Consent Decree. The RP consists of members from the U.S. EPA, Tennessee Valley Authority (TVA), U.S. Fish and Wildlife Service (FWS), Department of the Army (DA), the State of Alabama Department of Environmental Management (ADEM), and nonvoting participants from the town of Triana, Alabama, and Olin. This RP was established in June 1983.

Olin submitted its proposed remedial plan on June 1, 1984 and the RP held a public meeting on July 14, 1984 in Triana for information and solicitation of comments on the proposal. On August 31, 1984 the RP issued its first Decision Document which accepted Olin's proposed

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remediation plan with modifications. The RP continues to issue Decision Documents for documentation of its decisions related to the project.

Olin then proceeded with a series of permitting requirements including an Environmental Impact Statement (EIS) developed by the Nashville District Corps of Engineers with assistance from the EPA, TVA, and FSW. The necessary permits were issued on April 1, 1986. Additional licenses were required from the RSA to perform activities within the Arsenal boundaries.

The Consent Decree identified the following three phases for the project: 1) construction of the remedial action; 2) long-term monitoring to demonstrate attainment and continued attainment of the performance standard; and 3) operations and maintenance of the remedy for an additional seven years of continued compliance.

The O&M being performed currently includes annual fish and surface water collections. In April 1990, following a review of Olin's monitoring report, and pursuant to the terms of the Consent Decree, the RP determined that "far-field" groundwater monitoring would be discontinued based on results of 3 years of monitoring which showed no significant DDT contamination in the public water supplies. A further recommendation from Olin was approved by the RP which declared that monitoring of the 37 "near-field" wells would be discontinued in years 4 and 8, but to resume for year 10 or during the year following attainment of compliance with the performance standard.

## **1.4 REMEDIAL OBJECTIVES**

Remedial actions were designed and performed in three separate segments of the Huntsville Branch Indian-Creek System (HSB-IC) System. These segments were designated as:

Reach A - HSB mileposts 5.4 to 2.4  
Reach B - HSB mileposts 2.4 to 0.0  
Reach C - IC mileposts 5.6 to 0.0

See Figure 2 for locations of these segments of the HSB-IC system.

Reach A was further subdivided into two separate parts, Upper Reach A (URA) and Lower Reach A (LRA). URA is defined as the area between HSB milepost 5.4 and 4.0 while LRA is defined as the area between HSB milepost 4.0 to 2.4.

URA remedial actions commenced on April 1, 1986. The following description of activities on both the URA and IRA is taken from the EPA "Interim Close Out Report".

The approved remedial action in URA included bypassing and burying in-place the most heavily contaminated channel area (HSBM 5.4 to 4.0), rerouting Huntsville Spring Branch, cutting a new channel to the large embayment area, filling the channel after isolation with layers of soils, stone and geotextile fabric, and construction of blocking dams plus several rainfall runoff diversion ditches. The URA isolated 308 out of 317.9 tons of DDT-contaminated sediments (96.89 %) estimated to occur in that area. The remedial action consisted of a new wastewater diversion ditch; a northern diversion ditch; access roads and stream crossings; north and south

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staging areas for construction activities; excavation of the 1,640-foot salient cut and the 3,250-foot Oxbow cut; three diversion structures and diversion levee; the blocking off, dewatering and filling of the HSB channel from HSBM 5.5 to HSBM 4.0, including the West portion of the loop and the small embayment at HSBM 4.2 to isolate the DDT; covering the dewatered channel with geotextile fabric and 9 inches of crushed rock; the addition of soil and topsoil; and revegetation.

The approved remedial action in LRA included bypassing and burying in-place 71 of the 75.6 tons of DDT estimated to occur in that area, which is entirely within the boundaries of RSA and WWR. The remedial action consisted of constructing four diversion structures; excavating a new channel between HSB mileposts 3.4 and 2.4; filling three areas; constructing a diversion ditch around the fill areas; and excavating portions of the sediments from the channel. The construction area was entirely within the safety fan of one of the missile test ranges at RSA and within the normal fluctuation zone of Wheeler Reservoir. Therefore, construction was closely coordinated with operations of both the test range and the reservoir. Because of activities at the test range, much of the construction work was performed at night under lights. Completion of remedial action in both URA and IRA, effectively isolated in-place approximately 93% of the DDT in the HSB-IC system.

On October 14, 1987, the Review Panel Chairman transmitted his concurrence with the Inspection Committee's certification that the remedial project was complete.

## **1.5 ARARS REVIEW**

The Superfund Amendments and Reauthorization Act of 1986 and the NCP, revised March 8, 1990 (40CFR 300), provides that the development and evaluation of remedial actions under

CERCLA must include a comparison of alternative site responses to applicable or relevant and appropriate federal and state environmental and public health requirements (ARARS).

The following environmental protection statutes and regulations were considered during the development of the remedial design. This list was obtained from the EIS Report prepared by the Army Corps of Engineers (Nashville District).

- National Environmental Policy Act (NEPA)
- Rivers and Harbors Act of 1899
- Clean Water Act
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- Solid Waste Disposal Act as Amended by the Resources Conservation and Recovery Act (RCRA)
- Endangered Species Act
- Fish and Wildlife Coordination Act
- Wild and Scenic Rivers Act
- Tennessee Valley Authority Act of 1933
- Executive Order No. 11988, 24 May 1977, Floodplain Management
- Executive Order no. 11990, 24 May 1977, Protection of Wetlands
- Occupational Safety and Health Act (29 CFR 1990 et seq.)
- National Historic Preservation Act of 1966
- Alabama Air Pollution Control Act
- Alabama Water Pollution Control Act
- Alabama Hazardous Waste Act

During a review of these ARARs, WESTON did not identify any changes in the standards above. The most evident ARAR not included in the above list is the chemical specific requirement outlining the action levels which was established in the Consent Decree. In this situation, the action level has taken the form of DDT contaminant levels in certain fish species.

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This level of 5 ppm was established by the U.S. Food & Drug Administration and currently remains as the performance standard.

## **SECTION 2**

### **SITE CONDITIONS**

#### **2.1 SUMMARY OF SITE RECONNAISSANCE**

On September 1, 1992 WESTON representative Ralph P. McKeen met Olin representatives Keith Roberts and Robert Cheek in Huntsville, Alabama to perform a site reconnaissance. The purpose of this site visit was to evaluate components of the remediation with respect to the Consent Decree and Decision Documents.

The site tour began with a visit to Olin's field office trailer located within the RSA and adjacent to the Tennessee River. WESTON viewed site photographs to become oriented with the area while Olin notified RSA Officials of our intent to walk through the DDT Remediation Area. Coordination with the Redstone Arsenal was necessary due to the proximity to one of the missile test ranges.

The following is a summary of WESTON's observations made during the site tour with references to photographs which are included as Appendix A of this report. Upon clearance to the remediation area, we first observed the area where the old DDT manufacturing plant once operated. No structures remain and the area has been fenced to restrict access. This area is maintained by the Arsenal. Groundwater monitoring well RS-30 was located and noted to be one of the wells which will be sampled during the follow-up sampling trip. We then drove along the drainage ditch that once carried DDT wastewaters to the HSB. Sediment control structures have been installed in the ditch by RSA (Photograph #1). This drainage ditch, although cleaned during the remediation effort, appears stabilized to the point that any residual



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DDT contamination will not be carried through to the HSB. The RSA monitors surface water runoff between dam #3 and #4 as required by the NPDES permit.

We then entered the DDT Remediation area through the northern staging area (Photograph #2). Access was restricted and warning signs posted. Progressing to the first section of the project was Diversion #1 where the HSB was diverted and a section of the new channel constructed (Photographs #3 & 5). The focus of the inspection at this location was to identify signs of erosion or abnormal flooding activities. The diversion structure consisting of sheet piling and rip-rap appeared solid with no signs of erosion. The new channel was also appeared to be functioning well. The first section of filled channel (Photograph #5) was heavily vegetated. No trees were observed growing within the filled channel.

The "Embayment Area" was the next inspection point during the tour. The water level in this area was extremely low, which is a function of TVA flood control structures in the Tennessee River. The low level had exposed debris washed down from the City of Huntsville (Photograph #6). Waterfowl were observed in this area. We then continued along the filled channel on the access road and observed the northern diversion ditch (Photograph #9) which collects storm water runoff from areas north of the channel. This ditch is functioning as intended with no signs of erosion or deterioration. Olin pointed out that underdrains have been constructed within the ditch as a "beaver proof" measure. Beaver activity was observed during the site tour but did not appear to be adversely affecting the drainage pattern and structures.

To better observe the fill areas within Lower Reach A, we then proceeded to the observation post. Photographs 10, 11, and 12 are taken from this vantage point. This view again showed that the diversion and filled channels continued to perform as originally intended.

The last section of the site inspection was along the Lower Reach A (Photograph #13). Once again, this channel appeared intact with no sign of erosion. The final stop was at Dodd Road Bridge marking the end of the remediation activities. We then drove to Triana to observe the confluence of the Indian Creek into the Tennessee River. A wire rope is present across the HSB channel at the RSA boundary preventing access onto the Arsenal via boat.

## **2.2 SUMMARY OF INTERVIEWS**

Following the site reconnaissance, WESTON proceeded to contact key individuals involved with the project and solicit input for the Five-Year Review Report. The initial contact was made with Mr. Clyde Foster, former Mayor of the Town of Triana. Mr. Foster was mayor during the project implementation and continues to serve as a non-voting participant on the RP as Triana's representative. Mr. Foster was very complimentary of all parties involved with the project and noted cooperation as the most significant factor leading to the success of the project. He termed the RP as a "blue ribbon panel" that instilled a positive attitude to the public and provided a high level of comfort to the local citizens in town meetings. These town meetings continue to be held periodically to discuss O&M and any new site issues. Mr. Foster also praised the Technical Committee of the Review Panel for presenting the technical aspects of the project in a manner that the public could comprehend.

WESTON also visited with Mr. H. Tucker Stone, Manager of the Wheeler Wildlife Refuge, in Decatur, Alabama. The remediation area extends onto a portion of the Refuge as well as the Redstone Arsenal. Mr. Stone stated that they monitor the Refuge regularly and have expanded the studies beyond fish to include black birds, wood ducks, and snapping turtles. He also added that wading birds have increased in the remediated area but would not commit to a direct correlation with the remediation efforts. Mr. Stone then directed any further questions to the

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FWS Enhancement Office. The Enhancement Office is the section of the FWS that serves as the representative on the RP. WESTON contacted Dr. Charles Facemire who is the RP member for the FWS located in Atlanta, Georgia. Dr. Facemire responded that the FWS agreed that DDT, DDE, and DDD levels in sediment and tissues seem to be on the decline as a result of remediation efforts. However, he stated that the FWS is not sure that current levels are not impacting wildlife populations. Recent data from other areas within the Service's Southeast Region indicate that exposure to relatively low levels of DDT metabolites have caused aberrant development of the reproductive tract in alligator and turtle populations. Similar effects have been seen in birds, fish and marine mammals in other parts of the world. The FWS hopes that this type of injury is not occurring in wildlife populations inhabiting Wheeler National Wildlife Refuge; however, it is uncertain at this time. Finally, Dr. Facemire stated that the FWS intends to conduct the studies necessary to detect if this problem is present.

On September 2, 1992, WESTON's R. McKeen visited with Mr. Bill Schroder, Environmental Quality Coordinator for the RSA. Mr. Schroder is pleased with the remedial actions and continues to be satisfied with the performance. He has observed no signs of erosion or deterioration of any of the structures. Mr. Schroder does have concerns about the vegetative cover in that he feels it should be mowed regularly. According to Mr. Schroder, if the cover is allowed to grow uncontrolled, small trees (particularly locust) will become established and eventually take over the filled channel areas. WESTON obtained a copy of a vegetation assessment of the remediation area prepared by Alabama Agricultural and Mechanical University (A&M). The overall recommendation based on the evaluation was to restore the remediation area to natural vegetation cover similar to that existing on surrounding undisturbed lands. A further assessment was performed on the impact of trees uprooted and blown over by wind. The recommendation followed that no action was deemed necessary to prevent trees from growing due to the low likelihood of any problems being created by blow-downs.

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Mr. John Williford, Alabama Department of Environmental Management (ADEM), was contacted for input from the State's perspective. Mr. Williford stated that ADEM was satisfied with the remedial actions and is encouraged with the sampling data results showing a decrease in the levels of DDT. He believes that the remedy remains protective and will continue to monitor the sampling activities of Olin. ADEM also performs a formal annual inspection of the site for signs of visual deterioration or erosion of any structures. Mr. James Warr, Deputy Director, ADEM, has been involved with this effort and was contacted for an update on the most recent inspection. Mr. Warr informed us that the inspection is performed by the Inspection Committee designated by the Review Panel and that he currently chairs that committee. The inspection consists of visual observations to determine structural integrity of the various components. The most recent inspection has revealed that the overall remedy remains in good condition and functioning as intended.

Mr. William James, U.S. Army Corps of Engineers (COE), was contacted by telephone on December 22, 1992 for comment. Mr. James has been involved with this project for over eight years. He said that the Corps became involved in the project to enforce applicable regulations and to review and issue COE permits. As a regulator, Mr. James felt that the COE has maintained an objectiveness during the remediation effort as well as the subsequent inspections. Mr. James is a member of the Inspection Committee. His comments regarding the most recent inspection (July 15, 1992) were favorable. The COE is satisfied with regulatory requirements and has no concerns regarding the post-construction phases of the project.

A relevant issue worth noting was the decision by an Alabama State Health Officer to issue a health advisory in late 1992 for consumption of fish on the Tennessee River in the area of the IC/HSB confluence.

WESTON also contacted a representative from the Tennessee Valley Authority (TVA). Mr. Bruce A. Brye, who served as Chairman of the Review Panel Inspection Committee, has retired. Mr. Robert Pryor is now TVA's representative on the RP but stated that Mr. Brye has been retained as a consultant to maintain continuity with respect to past activities. Mr. Brye was involved with the project from the beginning and was involved with the development of all the Decision Documents issued by the RP. His comments on the current status were favorable in that he is impressed with the integrity of structures noting that the site has undergone at least two "headwater" floods without damage. A "headwater" flood is created by surface stormwater runoff within the project area's watershed and would create the most severe erosion conditions. Mr. Pryor added in closing that contamination conditions have been reduced and the control structures continue to fulfill their intended function.

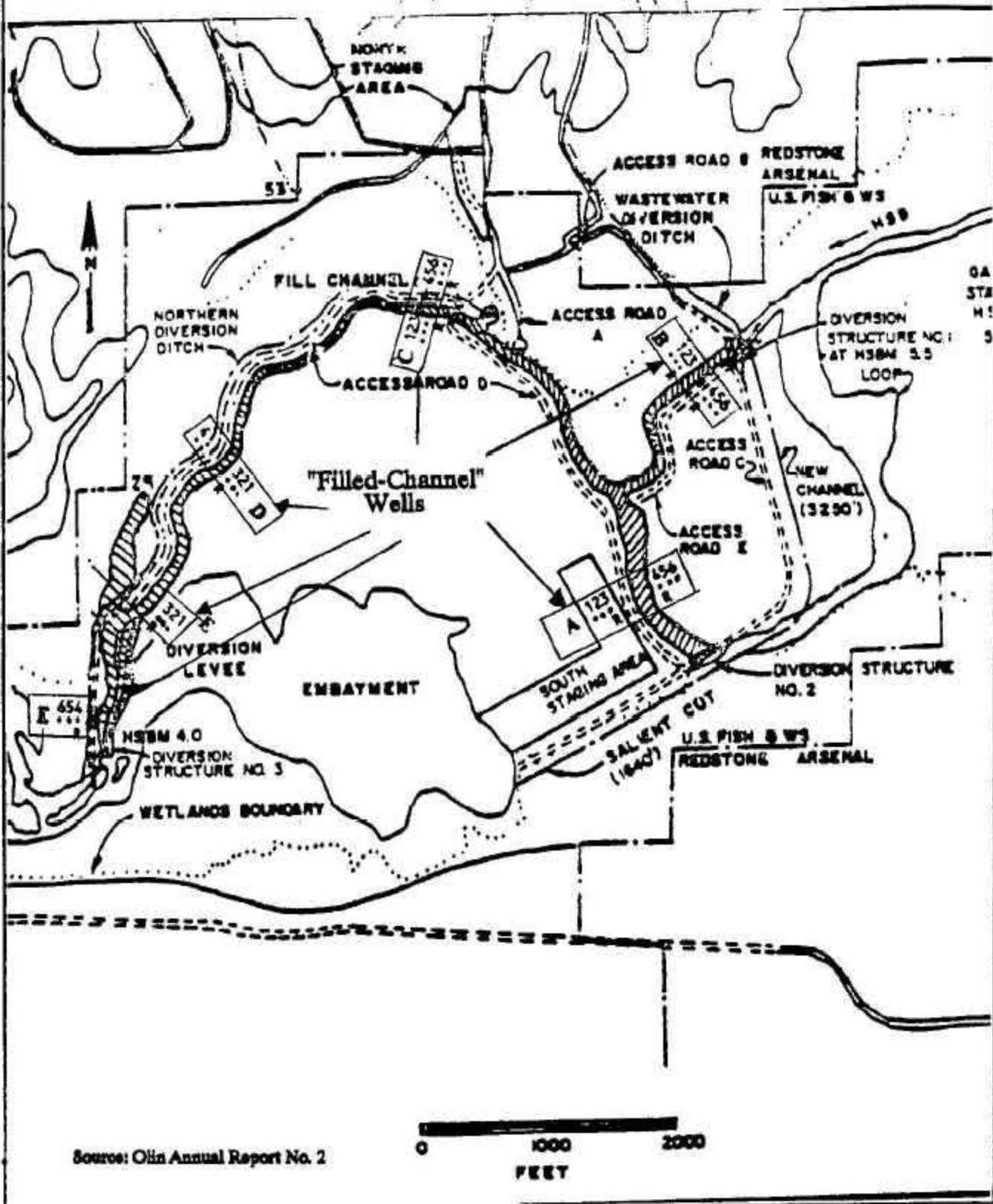
Ms. Anne L. Asbell, EPA Office of Regional Council, is the current Chairperson of the Review Panel. Ms. Asbell has been pleased with the spirit of cooperation between the RP, the town of Triana, and the Olin Corporation. She was particularly complimentary of the progress made in reducing the DDT contamination at the site and with Olin's efforts during post-remediation monitoring.

### **2.3 SUMMARY OF SITE SAMPLING TRIP**

WESTON obtained samples from 12 transect wells along the filled channel areas (Figure 3). These sampling activities were performed from September 29, 1992 through October 1, 1992. Olin provided the manpower and equipment necessary to purge the wells while WESTON collected one-gallon samples for analysis. Olin obtained split samples for analysis through their laboratory. WESTON submitted the samples to the Ecology and Environment, Inc. laboratory

# Triana/Tennessee River Site "Filled-Channel" Wells Location Map

● RS30  
(Approximate Location)



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in Cheektowaga, New York for analysis under the EPA Contract Laboratory Program. Twelve (12) wells were sampled and submitted for analysis. One blank and one spike was also submitted as a quality assurance measure. The following table lists the samples and the associated laboratory test results. A complete copy of the test results is included as Appendix B.

The wells sampled for this five-year review represented a random selection of those which had revealed total DDT concentrations in the past sampling efforts. For comparison, the last column of the table shows data from WESTON's samples collected in September of 1992, Olin's comparison data, and data from samples collected in August of 1989. The 1992 data of the samples split by WESTON and Olin are comparable with the exception of RS30. Olin's laboratory revealed a concentration of 3.37 ug/l while the EPA Contract Laboratory revealed non-detectable levels. WESTON's average total DDT concentration for the 11 transect wells was 0.27 ug/l while Olin's was 0.11 ug/l. Olin's 1989 average concentration for these same wells was 0.08 ug/l.

## **2.4 AREAS OF NON-COMPLIANCE**

WESTON did not observe any areas of non-compliance with respect to the Consent Decree or Decision Documents. The remediation area appears to be functioning as intended and Olin continues to perform O&M as instructed by the Consent Decree. In Section 2.1 of this report, several concerns were noted from those who were interviewed. These concerns have merit and should be discussed at the next Review Panel meeting. Specifically, the high growth of weeds on the filled channel make it difficult to visually survey the area from the access road. While the vegetative growth is not a compliance issue, it makes it difficult to identify any small trees beginning to grow. A special condition in the FWS right-of-way easement specifies that no trees larger than 3 inches in diameter shall exist on the filled-channel areas even though the Alabama

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### Monitoring Well Analytical Summary

Well No.	Water Depth (ft. bgs)	Water Level (ft. bgs)	Total DDT Residues (ug/l)		
			OLIN 1989	OLIN 1993	WESTON 1992
B1	12.5	7.87	0.02U	0.02U	0.16J
B3	12.3	4.13	0.02U	0.89	0.60J
B3R	17.0	2.23	0.31	0.02U	0.17J
B4	12.2	4.38	0.02U	0.02U	0.60UJ
C3	13.1	2.48	0.02U	0.18	0.72J
C4	17.3	2.40	0.14	0.02U	0.86J
C5	15.4	1.28	0.19	0.19	0.31J
D4	20.3	0.85	0.14	0.02U	0.19J
E3	29.9	3.95	0.02U	0.02U	0.60U
E4	12.6	8.61	0.09	0.02U	0.60U
E4R	19.2	9.52	0.02U	0.02U	0.60U
RS30	36.0	13.22	0.91	3.37	0.60U

J = Estimated Value

U = Material was analyzed for but not detected. The number is the minimum quantitation limit.



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A&M study concluded that trees would not create a problem. The inspection performed by WESTON did not reveal any trees of this size and therefore, is not a compliance issue at this time.

## **SECTION 3**

### **RECOMMENDATIONS**

#### **3.1 TECHNOLOGY RECOMMENDATIONS**

It appears that Olin has continued a conscientious attitude in performing O&M activities at the site. Olin maintains a work trailer at the site and has personnel at the site for monitoring and sampling on a regular basis. They should, however, monitor closely the growth on the filled channel areas so that trees do not get started. The Review Panel continues to play an active role with competent Technical and Inspection Committees to evaluate the current situation.

#### **3.2 REQUIREMENTS FOR RECOMMENDATION IMPLEMENTATION**

Based on the results of the groundwater samples collected as part of this review, no significant DDT levels were observed in the "filled channel" wells. Accordingly, the decision of the RP in the Decision Document No. 8 should continue unchanged. Sampling of these wells is not necessary until year ten or during the year following the initial demonstration of attainment as specified in the Consent Decree. Since Olin data on RS30 indicated a relatively high level of DDT, it is recommended that this well and the remaining Redstone Arsenal wells be sampled in year 10.

#### **3.3 STATEMENT ON PROTECTIVENESS**

Based upon the site visit and sampling results, the remedial actions certainly appear to be performing well. All diversion, drainage, and filled structures appear sound with no signs of physical deterioration. The hazardous substances remain controlled with the cover materials.

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Overall, the average level of DDT in each fish species has declined compared to pre-remediation levels. The 1991 data on fish were considered invalid because it did not meet the project's Quality Assurance Standards. These data will not be used to evaluate progress to the performance standard. The 1992 data were not available at the time of this report writing.

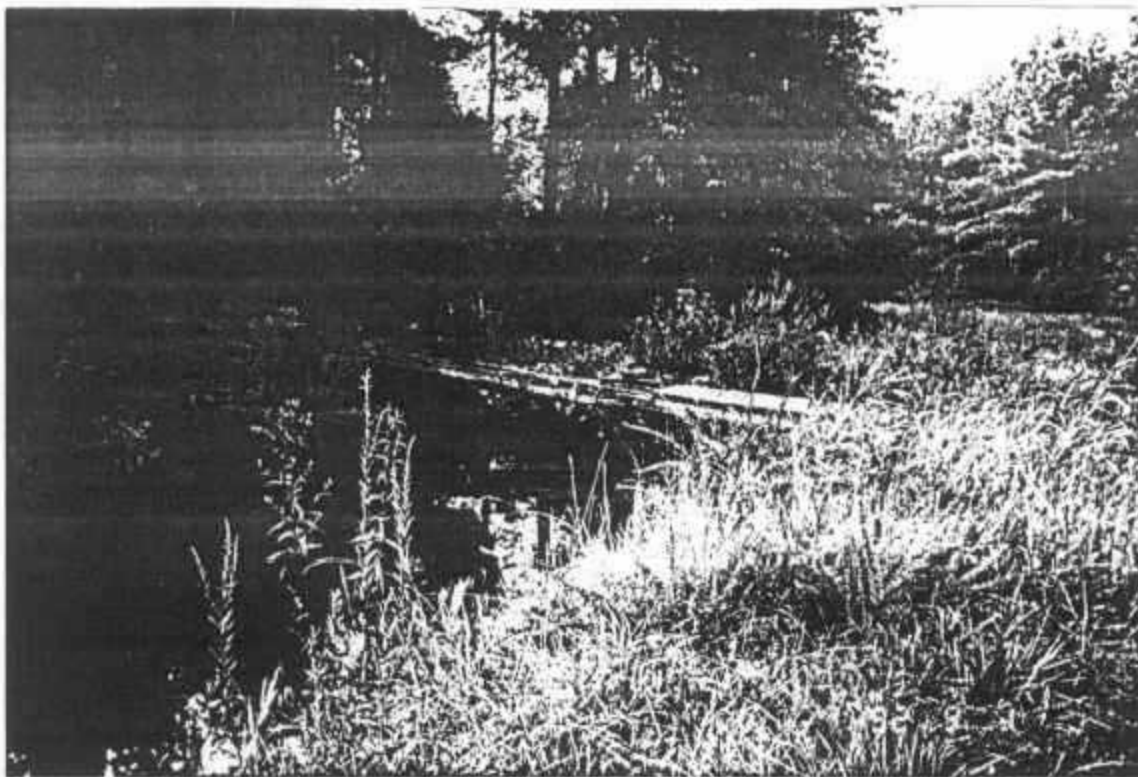
### **3.4 NEXT REVIEW**

WESTON suggests a similar format and level of effort during the next review. The review is to be done within 5 years of approval of this five-year review report by the EPA, Region IV, Waste Management Division Director. The individuals selected to interview for input may change, but input from those involved with the project is necessary. Sampling may or may not be required, based on the most recent O&M data at that time. The most important aspect will be the visual inspection to assess the structural integrity of the system. A review of the sediment profiles will also provide valuable information on stability and long-term integrity (Decision Document number 9).

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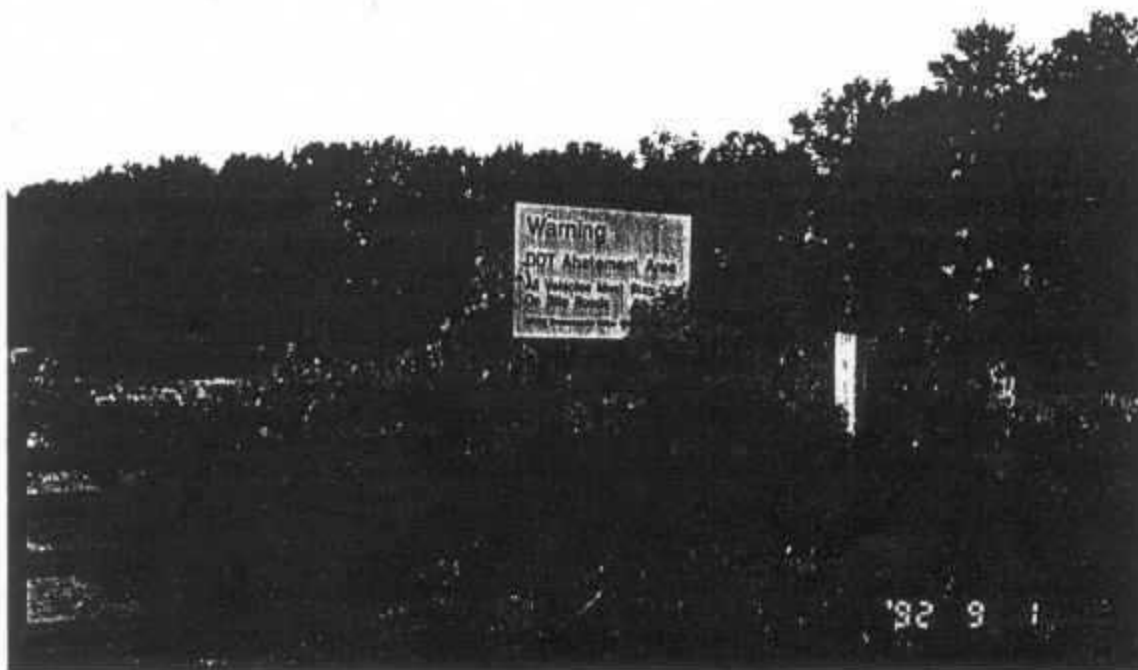
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**APPENDIX A**  
**PHOTOGRAPHIC DOCUMENTATION**

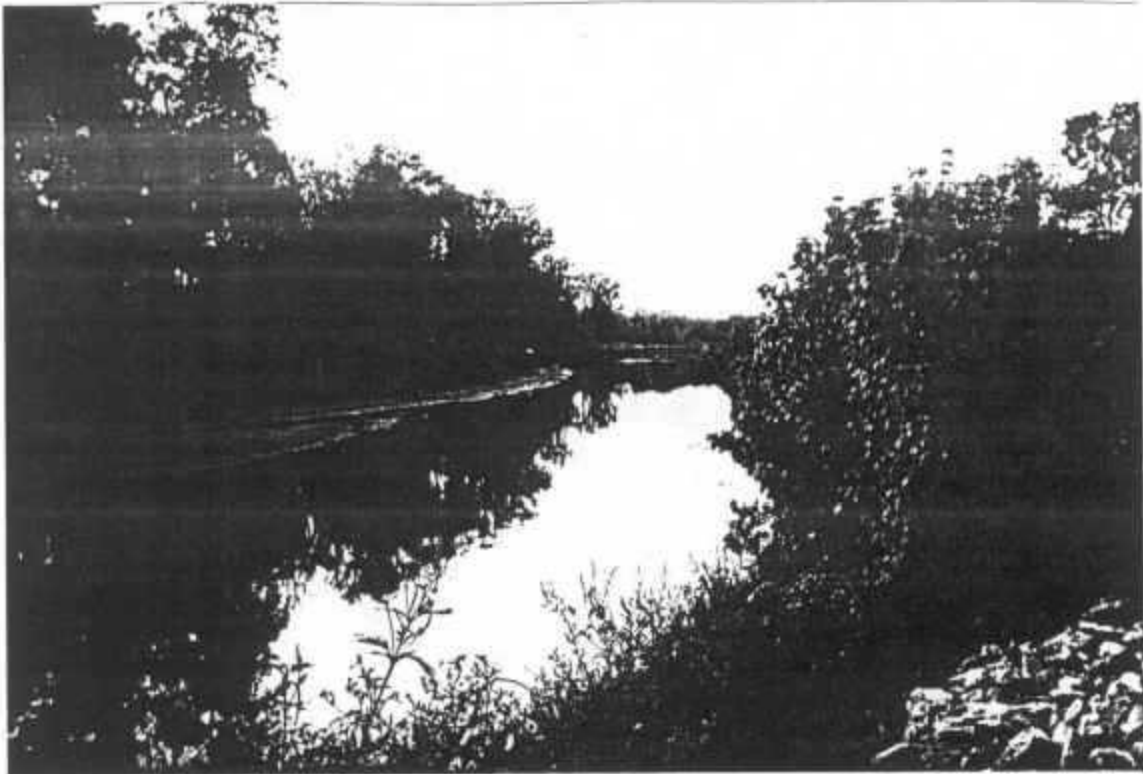


Photograph No. 1                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: Ditch leading from former DDT plant. Note the first sediment control structure installed in the ditch.

---



Photograph No. 2                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: Entrance leading into the DDT Abatement Area. Gate is locked restricting access.



Photograph No. 3                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: First part of new channel which was constructed.  
Huntsville-Spring Branch (HSB) diverted here.

---



Photograph No. 4                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: The first section of the old HSB channel which was  
filled.

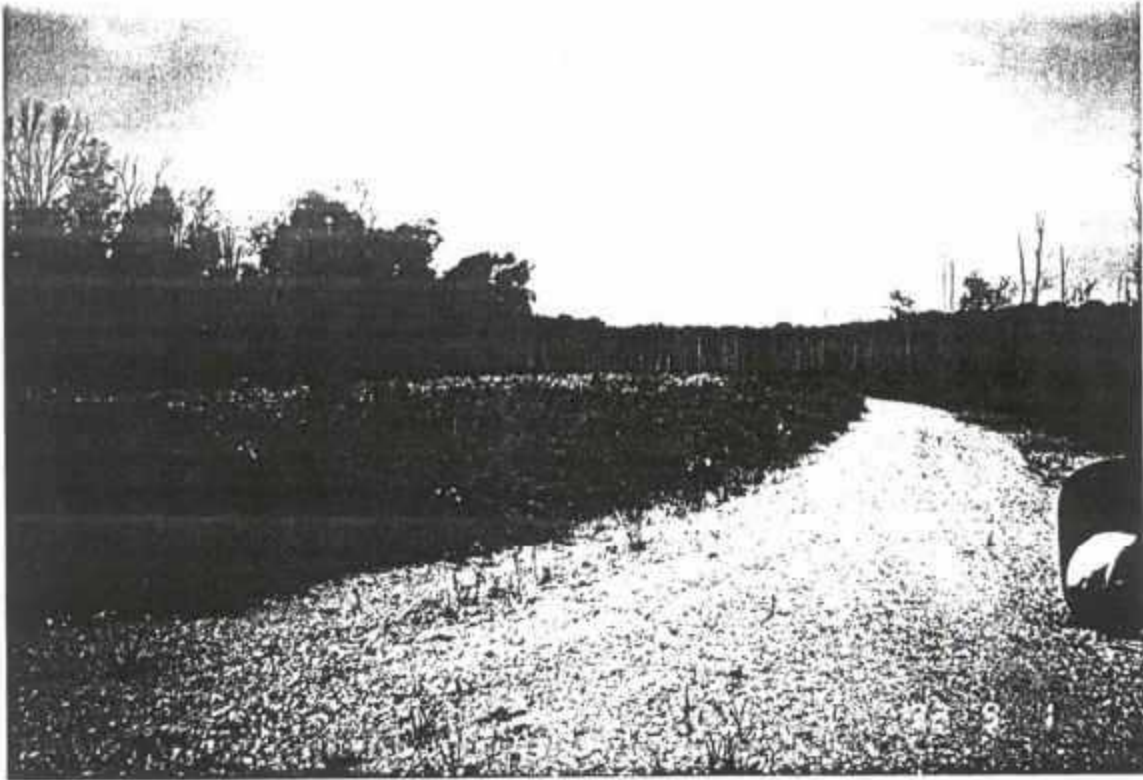


Photograph No. 5                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of Diversion Structure No.1 of the HSB showing  
rip-rap and sheet piling.



Photograph No. 6                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of the Embayment Area. Water level is low  
exposing debris washed down the HSB from city of Huntsville.



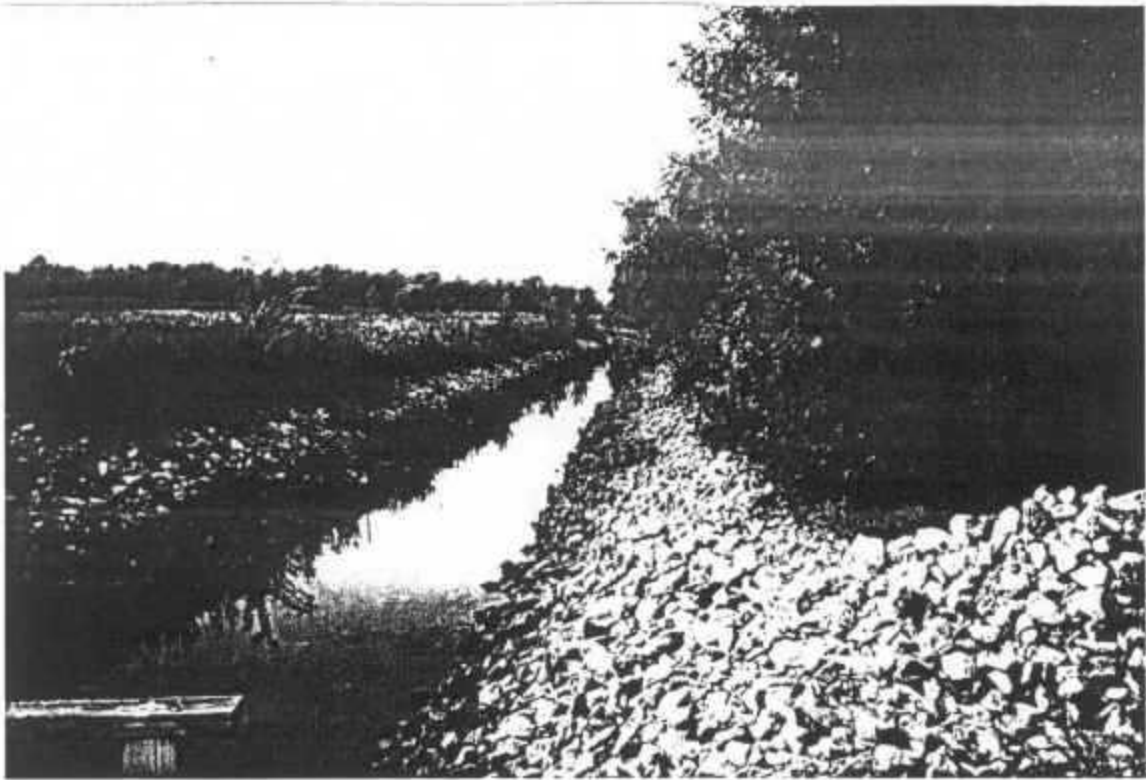


Photograph No. 7                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View the filled channel at Mile 4.8. Access road  
parallels the channel. Note vegetative cover on filled channel.

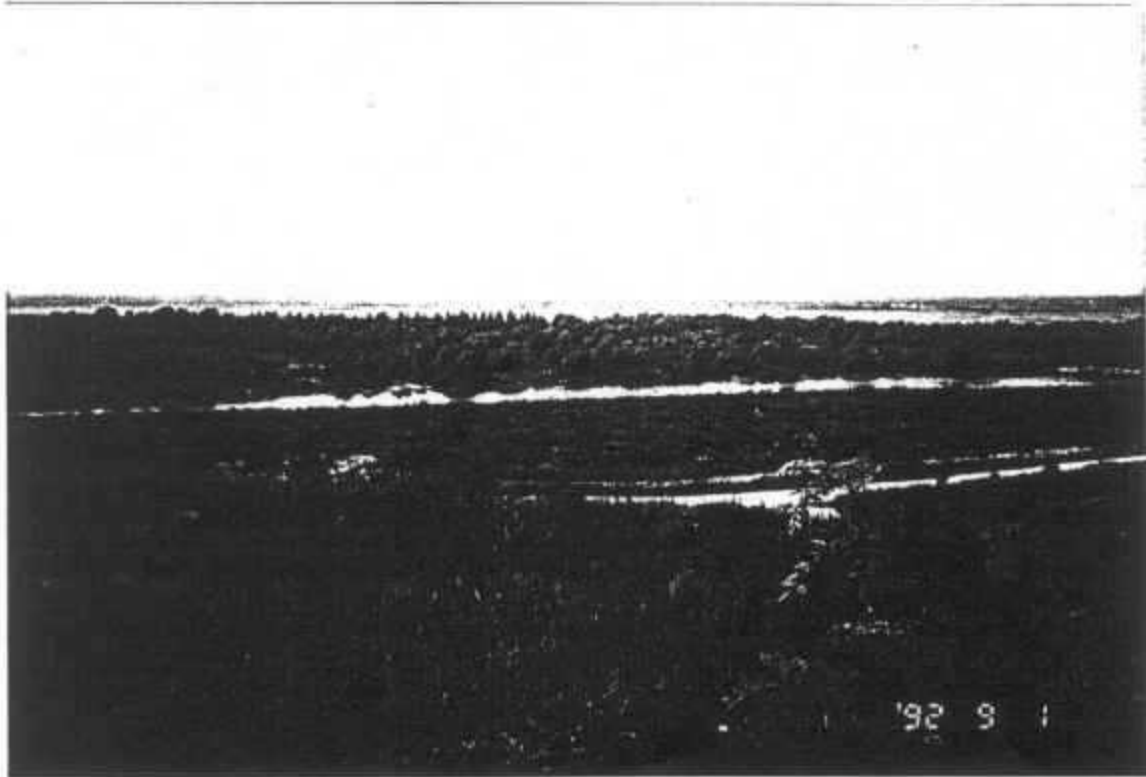


Photograph No. 8                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: Monitoring Well D4 marked with white flag and  
nearly covered with surface water.

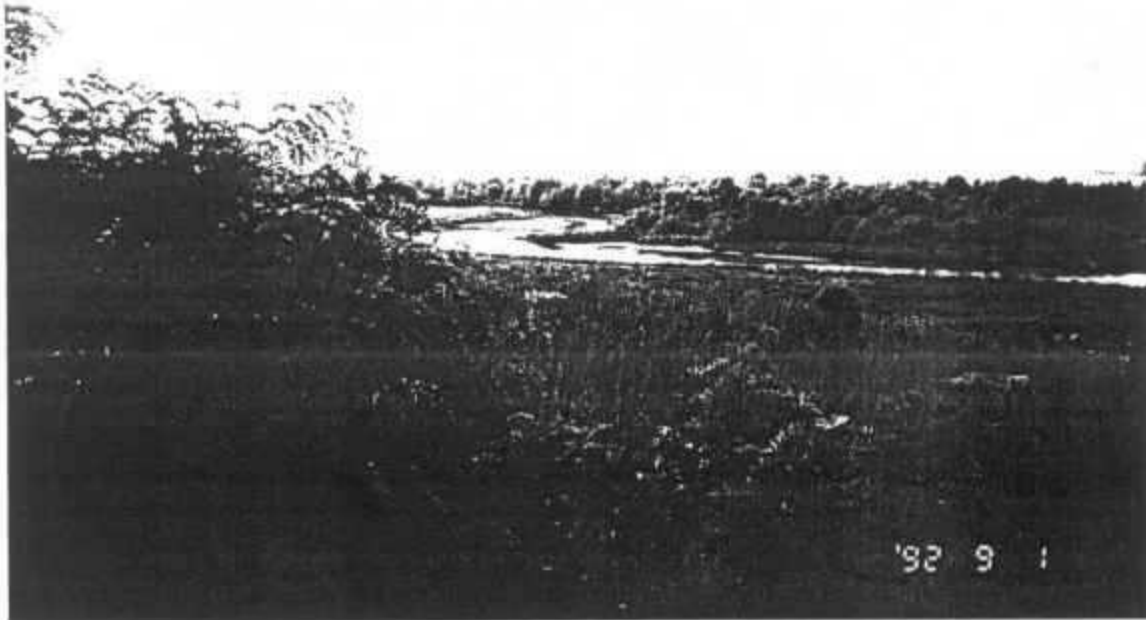




Photograph No. 9                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: Northern Diversion Ditch which collects storm water runoff from northern areas.



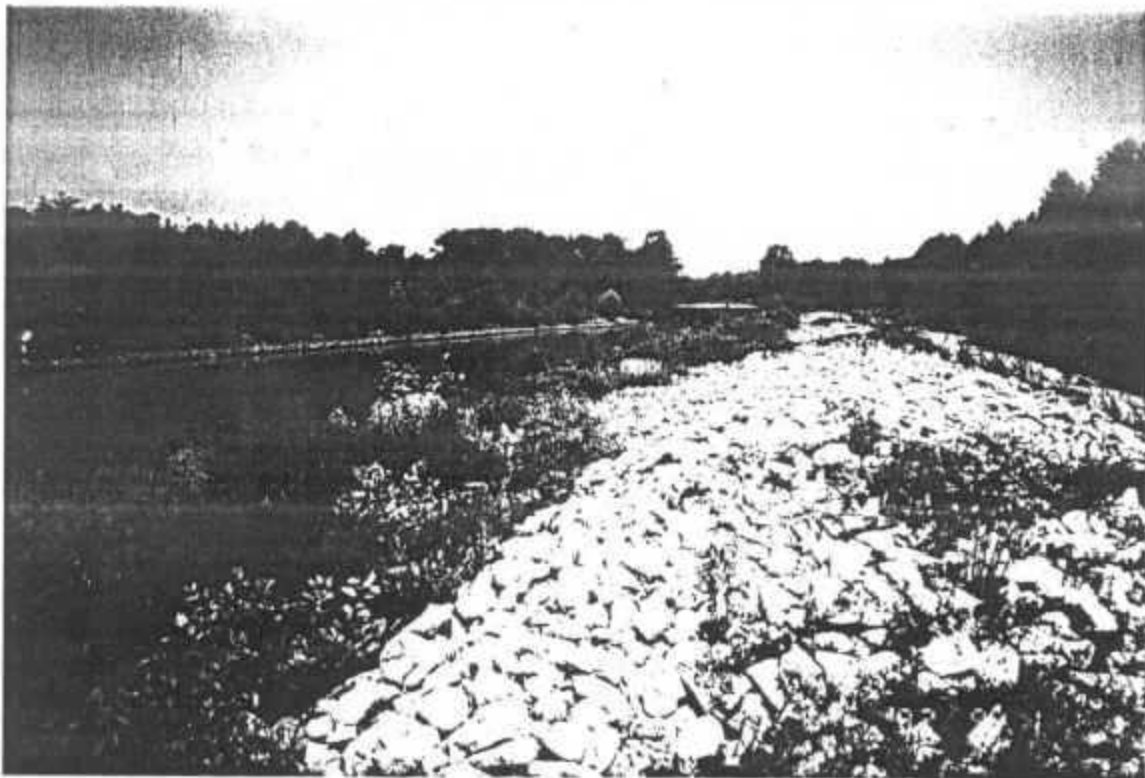
Photograph No. 10                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of the Fill Area 1 in Lower Reach A. Redstone Arsenal Test Range No. 1 in background.



Photograph No. 11                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of Lower Reach A overlooking Fill Area 1 as  
seen from observation point.



Photograph No. 12                      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of Fill Area 1 and Fill Area 2 in Lower Reach  
A as seen from the observation point.



Photograph No. 13      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of Lower Reach A channel looking towards Dodd Road Bridge.



Photograph No. 14      Date: September 1, 1992  
Location: Triana/Tennessee River, Triana, Alabama  
Description: View of Fill Area 3 as seen from access road near Dodd Road Bridge. Levee and pumping station in background.

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## **APPENDIX B**

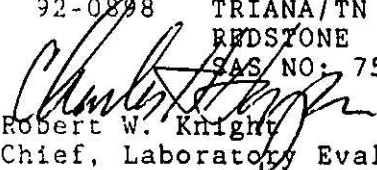
### **ANALYTICAL RESULTS**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region IV  
Environmental Services Division  
College Station Road, Athens, Ga. 30613

\*\*\*\*\*MEMORANDUM\*\*\*\*\*

DATE: 11/14/92

SUBJECT: Results of Specified Analysis;  
92-0898 TRIANA/TN RIVER  
REDSTONE AL  
SAS NO: 7546D

FROM:  Robert W. Knight  
Chief, Laboratory Evaluation/Quality Assurance Section

TO: CONLEY PHIFER

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

ORGANIC DATA QUALIFIER REPORT

Case Number                      Project Number              92-0898    SAS Number    7546D  
 Site ID.    Triana/TN River, Redstone, AL.

<u>Affected Samples</u>	<u>Compound or Fraction</u>	<u>Flag Used</u>	<u>Reason</u>
<u>Pesticides</u>			
72293,72296,72303	2,4'-DDD	J	<quantitation limit
72293,72295,72297	4,4'-DDD	J	<quantitation limit
72293	4,4'-DDT	J	<quantitation limit
72294	4,4'-DDE	N	difference between columns
72294	4,4'-DDT	N	difference between columns
72294	4,4'-DDE	J	<quantitation limit
72298	4,4'-DDD	N	difference between columns
72298-72299	all pesticides	J	exceeded holding time for extraction
72293-72299,72303	total DDT residues	J	<quantitation limit

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

*****
** PROJECT NO. 92-0898 SAMPLE NO. 72294 SAMPLE TYPE: GROUNDWA PROG ELEM: SSF COLLECTED BY: J BOAKES **
** SOURCE: TRIANA/TN RIVER CITY: REDSTONE ST: AL **
** STATION ID: B3 COLLECTION START: 09/29/92 1005 STOP: 00/00/00 **
** CASE NO: 0 SAS NO.: 7546D D. NO.: 1084 MD NO: **
*****
  
```

RESULTS	UNITS	PARAMETER
0.17	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.21	UG/L	4,4'-DDD ( P,P'-DDD )
0.059JN	UG/L	4,4'-DDE ( P,P'-DDE )
0.16N	UG/L	4,4'-DDT ( P,P'-DDT )
0.60J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES \*\*\*

- \*A-AVERAGE VALUE \*NA-NOT ANALYZED \*NAI-INTERFERENCES \*J-ESTIMATED VALUE \*N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
- \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
- \*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

*****
** PROJECT NO. 92-0898    SAMPLE NO. 72293    SAMPLE TYPE: GROUNDWA    PROG ELEM: SSF    COLLECTED BY: J BOAKES    **
** SOURCE: TRIANA/TN RIVER    CITY: REDSTONE    ST: AL    **
** STATION ID: B3R    COLLECTION START: 09/29/92    1300    STOP: 00/00/00    **
** CASE NO: 0    SAS NO.: 7546D    D. NO.: 1083    MD NO:    **
*****
    
```

RESULTS	UNITS	PARAMETER
0.041J	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.079J	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.048J	UG/L	4,4'-DDT ( P,P'-DDT )
0.17J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES \*\*\*

- \*A-AVERAGE VALUE \*NA-NOT ANALYZED \*NAI-INTERFERENCES \*J-ESTIMATED VALUE \*N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
- \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

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*****
** PROJECT NO. 92-0898      SAMPLE NO. 72295      SAMPLE TYPE: GROUNDWA      PROG ELEM: SSF      COLLECTED BY: J BOAKES      **
** SOURCE: TRIANA/TN RIVER      CITY: REDSTONE      ST: AL      **
** STATION ID: C3      COLLECTION START: 09/29/92      1335      STOP: 00/00/00      **
** CASE NO: 0      SAS NO.: 7546D      D. NO.: 1085      MD NO:      **
*****
    
```

RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.072J	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.072J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES \*\*\*

- \*A-AVERAGE VALUE \*NA-NOT ANALYZED \*NAI-INTERFERENCES \*J-ESTIMATED VALUE \*N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
- \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
- \*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

\*\*\*\*\*  
\*\* PROJECT NO. 92-0898      SAMPLE NO. 72296      SAMPLE TYPE: GROUNDWA      PROG ELEM: SSF      COLLECTED BY: J BOAKES      \*\*  
\*\* SOURCE: TRIANA/TN RIVER      CITY: REDSTONE      ST: AL      \*\*  
\*\* STATION ID: D4      COLLECTION START: 09/29/92      1552      STOP: 00/00/00      \*\*  
\*\* CASE NO: 0      SAS NO.: 7546D      D. NO.: 1086      MD NO:      \*\*  
\*\*\*\*\*

RESULTS	UNITS	PARAMETER
0.056J	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.13J	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10J	UG/L	4,4'-DDT ( P,P'-DDT )
0.19J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES \*\*\*

\*A-AVERAGE VALUE \*NA-NOT ANALYZED \*NAI-INTERFERENCES \*J-ESTIMATED VALUE \*N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
\*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

****
** PROJECT NO. 92-0898      SAMPLE NO. 72297      SAMPLE TYPE: GROUNDWA      PROG ELEM: SSF      COLLECTED BY: J BOAKES      **
** SOURCE: TRIANA/TN RIVER      CITY: REDSTONE      ST: AL      **
** STATION ID: C4      COLLECTION START: 09/29/92      1410      STOP: 00/00/00      **
** CASE NO: 0      SAS NO.: 7546D      D. NO.: 1087      MD NO:      **
****
  
```

RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.086J	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.086J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES \*\*\*

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

\*\*\*\*\*  
\*\* PROJECT NO. 92-0898    SAMPLE NO. 72298    SAMPLE TYPE: GROUNDWA    PROG ELEM: SSF    COLLECTED BY: J BOAKES    \*\*  
\*\* SOURCE: TRIANA/TN RIVER    CITY: REDSTONE    ST: AL    \*\*  
\*\* STATION ID: C5    COLLECTION START: 09/29/92    1445    STOP: 00/00/00    \*\*  
\*\* CASE NO: 0    SAS NO.: 7546D    D. NO.: 1088    MD NO:    \*\*  
\*\*\*\*\*

RESULTS	UNITS	PARAMETER
0.11J	UG/L	2,4' -DDD ( O,P' -DDD )
0.10UJ	UG/L	2,4' -DDE ( O,P' -DDE )
0.10UJ	UG/L	2,4' -DDT ( O,P' -DDT )
0.20NJ	UG/L	4,4' -DDD ( P,P' -DDD )
0.10UJ	UG/L	4,4' -DDE ( P,P' -DDE )
0.10UJ	UG/L	4,4' -DDT ( P,P' -DDT )
0.31J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\*REMARKS\*\*\*  
EXCESSIVE HOLDING TIME

\*\*\*REMARKS\*\*\*

\*\*\* FOOTNOTES \*\*\*  
\*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
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\*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

*****
** PROJECT NO. 92-0898   SAMPLE NO. 72299   SAMPLE TYPE: GROUNDWA   PROG ELEM: SSF   COLLECTED BY: J BOAKES   **
** SOURCE: TRIANA/TN RIVER   CITY: REDSTONE   ST: AL   **
** STATION ID: B4   COLLECTION START: 09/29/92   0933   STOP: 00/00/00   **
** CASE NO: 0   SAS NO.: 7546D   D. NO.: 1089   MD NO:   **
*****
    
```

RESULTS	UNITS	PARAMETER
0.10UJ	UG/L	2,4'-DDD ( O,P'-DDD )
0.10UJ	UG/L	2,4'-DDE ( O,P'-DDE )
0.10UJ	UG/L	2,4'-DDT ( O,P'-DDT )
0.10UJ	UG/L	4,4'-DDD ( P,P'-DDD )
0.10UJ	UG/L	4,4'-DDE ( P,P'-DDE )
0.10UJ	UG/L	4,4'-DDT ( P,P'-DDT )
0.60UJ	UG/L	TOTAL DDT RESIDUES (TDDTR)

\*\*\* REMARKS\*\*\*  
EXCESSIVE HOLDING TIME

\*\*\*REMARKS\*\*\*

\*\*\* FOOTNOTES\*\*\*  
 \*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
 \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
 \*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

*****
** PROJECT NO. 92-0898   SAMPLE NO. 72300   SAMPLE TYPE: GROUNDWA   PROG ELEM: SSF   COLLECTED BY: J BOAKES   **
** SOURCE: TRIANA/TN RIVER   CITY: REDSTONE   ST: AL   **
** STATION ID: RS30   COLLECTION START: 09/30/92   1545   STOP: 00/00/00   **
** CASE NO: 0   SAS NO.: 7546D   D. NO.: 1090   MD NO:   **
*****
    
```

RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.10U	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.60U	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES\*\*\*

\*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
 \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

```

*****
** PROJECT NO. 92-0898   SAMPLE NO. 72301   SAMPLE TYPE: GROUNDWA   PROG ELEM: SSF   COLLECTED BY: J BOAKES   **
** SOURCE: TRIANA/TN RIVER   CITY: REDSTONE   ST: AL   **
** STATION ID: E4R   COLLECTION START: 09/30/92   1340   STOP: 00/00/00   **
** CASE NO: 0   SAS NO.: 7546D   D. NO.: 1091   MD NO:   **
*****

```

RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.10U	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.60U	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES\*\*\*

\*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
 \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
 \*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

\*\*\*\*\*  
\*\* PROJECT NO. 92-0898    SAMPLE NO. 72302    SAMPLE TYPE: GROUNDWA    PROG ELEM: SSF    COLLECTED BY: J BOAKES    \*\*  
\*\* SOURCE: TRIANA/TN RIVER    CITY: REDSTONE    ST: AL    \*\*  
\*\* STATION ID: E3/E3A    COLLECTION START: 09/30/92    1435    STOP: 00/00/00    \*\*  
\*\* CASE NO: 0    SAS NO.: 7546D    D. NO.: 1093    MD NO:    \*\*  
\*\*\*\*\*

RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.10U	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.60U	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES\*\*\*

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\*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
\*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.



SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

\*\*\*\*\*  
\*\* PROJECT NO. 92-0898    SAMPLE NO. 72303    SAMPLE TYPE: GROUNDWA    PROG ELEM: SSF    COLLECTED BY: J BOAKES    \*\*  
\*\* SOURCE: TRIANA/TN RIVER    CITY: REDSTONE    ST: AL    \*\*  
\*\* STATION ID: B1    COLLECTION START: 09/30/92    1005    STOP: 00/00/00    \*\*  
\*\* CASE NO: 0    SAS NO.: 7546D    D. NO.: 1094    MD NO:    \*\*  
\*\*\*\*\*

RESULTS	UNITS	PARAMETER
0.048J	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.11	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.16J	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES\*\*\*

\*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
\*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
\*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM  
EPA-REGION IV ESD, ATHENS, GA.

11/13/92

SPECIFIED ANALYSIS DATA REPORT

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** PROJECT NO. 92-0898   SAMPLE NO. 72304   SAMPLE TYPE: GROUNDWA   PROG ELEM: SSF   COLLECTED BY: J BOAKES   **
** SOURCE: TRIANA/TN RIVER   CITY: REDSTONE   ST: AL   **
** STATION ID: E4   COLLECTION START: 09/30/92   1330   STOP: 00/00/00   **
** CASE NO: 0   SAS NO.: 7546D   D. NO.: 1095   MD NO:   **
*****
    
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RESULTS	UNITS	PARAMETER
0.10U	UG/L	2,4'-DDD ( O,P'-DDD )
0.10U	UG/L	2,4'-DDE ( O,P'-DDE )
0.10U	UG/L	2,4'-DDT ( O,P'-DDT )
0.10U	UG/L	4,4'-DDD ( P,P'-DDD )
0.10U	UG/L	4,4'-DDE ( P,P'-DDE )
0.10U	UG/L	4,4'-DDT ( P,P'-DDT )
0.60U	UG/L	TOTAL DDT RESIDUES ( TDDTR )

\*\*\* FOOTNOTES\*\*\*

\*A-AVERAGE VALUE    \*NA-NOT ANALYZED    \*NAI-INTERFERENCES    \*J-ESTIMATED VALUE    \* N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL  
 \*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN    \*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN  
 \*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUATITATION LIMIT.

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Analytical Report

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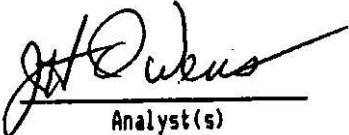
Sample	SDate	Sample Amount	Final Volume	ug/L OP-DDE	ug/L PP-DDE	ug/L OP-DDD	ug/L PP-DDD	ug/L OP-DDT	ug/L PP-DDT	Total DDTs	Aldrin % RECOVERY
STD	921007	1000	10	0.64	0.64	0.66	1.29	0.62	0.65	4.50	105
REF	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.74	0.74	111
3LK	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	104
B	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96
31	920929	1010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	101
33	920929	1000	10	0.00	0.12	0.16	0.39	0.00	0.00	0.67	105
JUP1 B3	920929	1000	10	0.00	0.18	0.17	0.52	0.00	0.10	0.97	117
JUP2 B3	920929	1000	10	0.00	0.17	0.16	0.48	0.00	0.00	0.81	112
3PK B3	920929	1000	10	0.71	0.00	0.92	1.06	0.83	0.81	5.93	104
34	920929	1005	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99
33R	920929	1010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103
33	920929	1000	10	0.00	0.00	0.00	0.18	0.00	0.00	0.18	102
34	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	101
35	920929	1000	10	0.00	0.00	0.00	0.19	0.00	0.00	0.19	86
34	920929	1005	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102
STD	921007	1000	10	0.65	0.66	0.67	1.33	0.63	0.65	4.59	107
REF	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.76	0.76	116
3LK	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106
31-F	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98
33-F	920929	1005	10	0.00	0.14	0.13	0.51	0.00	0.00	0.78	107
JUP B3-F	920929	1000	10	0.00	0.14	0.14	0.55	0.00	0.00	0.83	117
34-F	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	107
33R-F	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97
33-F	920929	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106
34-F	920929	1010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97
35-F	920929	1010	10	0.00	0.00	0.00	0.14	0.00	0.00	0.14	110
34-F	920929	1010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109
STD	921007	1000	10	0.66	0.67	0.68	1.34	0.64	0.65	4.64	108
REF	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.77	0.77	114
3LK	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	104
E3	920930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94
JUP E3	020930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96
3PK E3	920930	1000	10	0.67	0.65	0.77	1.46	0.86	0.78	5.19	98
E4	920930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
E4R	920930	1010	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
RS30	920930	1005	10	0.00	0.00	2.07	1.38	0.10	0.27	3.82	100
JUP RS30	920930	1000	10	0.00	0.00	1.67	1.10	0.00	0.15	2.92	100
FB	920930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102
STD	921007	1000	10	0.66	0.68	0.68	1.36	0.65	0.68	4.71	105

Olin Chemicals  
 Charleston, TN  
 Analytical Report

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Sample	SDate	Sample Amount	Final Volume	ug/L OP-DDE	ug/L PP-DDE	ug/L OP-DDD	ug/L PP-DDD	ug/L OP-DDT	ug/L PP-DDT	Total DDTRS	Aldrin % Recovery
REF	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.79	0.79	114
BLK	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	104
E3-F	920930	1005	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91
DUP E3F	920930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106
SPK E3-F	920930	1005	10	0.70	0.67	0.82	1.50	0.82	0.75	5.26	100
E4-F	920930	1005	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105
E4R-F	920930	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109
RS30-F	920930	1005	10	0.00	0.00	0.74	1.11	0.00	0.00	1.85	115
DUP RS30-F	920930	1005	10	0.00	0.00	0.69	1.10	0.00	0.00	1.79	99
STD	921007	1000	10	0.66	0.68	0.68	1.34	0.64	0.67	4.67	107
REF	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.77	0.77	117
BLK	921007	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	104
SPK DIH20	921007	1000	10	0.67	0.62	0.73	1.36	0.81	0.74	4.93	107
STD	921008	1000	10	0.64	0.65	0.68	1.30	0.63	0.64	4.54	104
REF	921008	1000	10	0.00	0.00	0.00	0.00	0.00	0.74	0.74	112
BLK	921008	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103
HSB2.4	920928	41.2	1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99
HSB3.9	920928	45.8	1000	0.00	0.05	0.14	0.25	0.00	0.00	0.44	99
HSB2.4	921001	38.2	1000	0.00	0.00	0.00	0.18	0.00	0.00	0.18	98
DUP2.4	921001	35.4	1000	0.00	0.00	0.00	0.19	0.00	0.00	0.19	91
SPK2.4	921001	1010	10	0.67	0.67	0.85	1.61	0.82	0.75	5.37	94
HSB3.9	921001	47.8	1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95
HSB2.4	921002	39.2	1000	0.00	0.00	0.12	0.22	0.00	0.00	0.34	97
HSB3.9	921002	24.4	1000	0.00	0.00	0.00	0.11	0.00	0.00	0.11	91
STD	921008	1000	10	0.65	0.67	0.68	1.34	0.64	0.68	4.66	103
REF	921008	1000	10	0.00	0.00	0.00	0.00	0.00	0.78	0.78	107
BLK	921008	1000	10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99
SPK DIH20	921008	1000	10	0.67	0.64	0.73	1.39	0.84	0.77	5.04	103

All Samples Were Analyzed : OCT 8, 1992  
 GC Injection Size : 5 uL  
 Samples 1 thru 13 were extracted : 921005  
 Samples 14 thru 41 were extracted : 921006  
 Samples 42 thru 54 were extracted : 921007  
 Samples 55 thru 65 were extracted : 921008

  
 Analyst(s)