GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	***JAMES RIVER***	***ProjectID:*** 03-03
Last Updated:	08/11/98	

City:	Hopewell (source location)
County:	Prince George
State:	VA
Country:	USA
Bodies of Water:	James River; Chesapeake Bay
US EPA Region:	III
Status (Active, Complete, or Monitoring Only):	Complete
Date On NPL:	N/A
ROD/ESD Date:	N/A
Operable Unit:	N/A
Areas of Concern (length or acres):	81-mile estuary; 0.6 to seven miles in width.
Other Characteristics of Water Body:	James River estuary extending 81 miles, from 7 miles above the contaminant source to the Chesapeake Bay; avg. depth 19 feet; width from 0.6 to 7 miles; organic-rich silty clay sediments.
Contaminants of Concern:	Kepone (a chlorinated pesticide)
Source of Contamination:	Pesticide factory in Hopewell, VA (1968-1975); entry into the river was by the municipal sewage system, surface runoff from the factory site, and solid waste dumping into a small tributary/marsh.
Contaminated Area Physical Characteristics:	All major components of the estuary (81 miles) contaminated including sediments, water column, biota, small mammals. Distribution of kepone in sediment not controlled by point source, but by estuary hydrodynamics (circulation, reflux action). Highest concentrations occur in a near field zone close to the source (0-10 miles)(12 ppm max) and at the freshwater/saltwater interface zone called the "turbidity maximum zone," 9-31 miles from source. Average main channel concentrations are 20-193 ppb Kepone.
Type of Regulatory Action:	Mitigation Feasibility Study (EPA).
Overall Status Summary:	Natural recovery (slow burial by natural sedimentation). The remedy was to allow slow burial of river sediments by natural sedimentation; allow natural recovery of fish and biota (crab/oyster Kepone levels dropped from 0.8 to 0.1-0.2 ppm from 1976-85); and allow maintenance dredging of the main channel (a six-year moratorium on maintenance dredging was lifted in 1982), with disposal of dredge spoils on the flanks of the river bottom adjacent to the dredged channel. The commercial fishing ban was lifted in 1988; only a subsistence fish eating advisory remains in place.

Remedial Action Planned:	☑
Risk Assessment:	☐
Remedial Action Implemented:	☑
Status of Dredging	☐
PRPs:	☑
Contacts:	☐

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	***JAMES RIVER***	***ProjectID:*** 03-03
Last Updated:	08/11/98	
References:	☑	
Modeling:	☑	
Fishing Advisory:	☑	
Key Conditions:	extended (> 1 mile) river, hydrodynamic modeling, natural recovery	

REMEDIAL ACTION PLANNED

Project Name	***JAMES RIVER***	***ProjectID:*** 03-03
Last Updated:	08/11/98	

Target Sediment Cleanup Standards (TSCS): None

How TSCS Established: N/A

Target Bank and Floodplain Cleanup Levels (if applicable): N/A

Other Target: None

Environmental Sample Data References:

- ***Sediment:***
- ***Water:***
- ***Fish:***

Estimated Target Volume: 221 million cubic yards (69 miles to 38 cm depth)

Planned Disposal Method:

Estimated Calendar Time to Implement Remedy: N/A

Estimated Time to Implement Remedy: N/A

Estimated Cost to Implement Remedy: N/A

Stated Remedial Action Objectives (and Source): N/A

Measures of Success to be Used: Fish and crab Kepone levels: fish action level (0.3 ppm) and blue crab action level (0.4 ppm).

Planned Monitoring and Restoration: Ongoing studies (refer to references)

Agency Position on Sediment Removal (and Source): Source: Reference
Remedial techniques investigated in 1978 included stabilization (molten sulfur), dredging, and retrievable sorbents. Lowest cost, $3 billion. Cost, plus biological impact, dictated "leave alone" approach. Dredging of 69 miles to 38 cm depth (221 million cubic yards), with use of contiguous disposal sites, estimated at $1 billion. Dredging of hot spots not viable due to the widely dispersed low levels of Kepone, i.e., no hot spot candidates.

- In 1980, there was no plan to clean the James.

State officials decided dredging would do more harm than good by stirring up the Kepone. Also, disposal of the Kepone-laden sludge scooped from the river would have been a problem. (Source: Reference D-25).

- Dredging demonstration project conducted in 1981-82 by the Corps. References I-2 and M-14. Did maintenance dredging with conventional cutterhead and with modified dustpan fitted to

cutter suction dredge. Kepone levels in sediment were about 45 ppb at this test location. Neither Kepone nor turbidity increased substantially above background in water column around dredge head with either method. Short term elevated levels of Kepone occurred at disposal sites (adjacent to channel). Overall objectives and results are not clearly stated. A 1994 analysis by Dr. John Herbich indicated that the cutterhead resuspended sediment plume (at two times background TSS) affected 80% of the water column at least 1000 feet in both the ebb and flood directions. The modified dustpan dredgehead experienced repeated clogging.

- Effects of subsequent navigational dredging have been monitored. Dredging seems to retard the decrease of concentrations in sediment and biota in the vicinity, then natural recovery picks up again a year of so later.

REMEDIAL ACTION IMPLEMENTED

Project Name:	***JAMES RIVER***	***ProjectID:*** 03-03
Last Updated:	08/11/98	

Physical Target:	Sediments in 81 miles of the James River
Goals:	Reduction of fish/crab levels and elimination of all advisories
Primary Contractor:	N/A
Other Contractors:	N/A
Generic Remediation Method:	Natural recovery
Equipment:	N/A
Material Handling:	
Volume Removed:	None (natural recovery)
Calendar Time:	
Time To Implement:	On-going
Total Cost:	N/A
Dredging Cost:	N/A
Disposal of Sediment:	N/A
Volume of Water:	N/A
Method of Water Treatment:	
Water Discharge Limit:	
Air Monitoring During Remediation:	
Water Monitoring During Remediation:	
Outcome:	Natural burial under clean sediments is continuing to decrease the availability of the Kepone. The commercial fishing ban was lifted in 1988; only a subsistence fish eating advisory remains in place. A major concern voiced regarding this natural recovery process is in regard to the potential for a major hurricane (none has occurred since the 1950s) to disturb bottom sediments.
Restoration and Post-Monitoring:	Ongoing studies (refer to references)
Site-Specific Difficulties:	All major components of the estuary (74 miles) contaminated with low to trace levels of Kepone including sediments, water column, biota, and small mammals; difficulty in establishing meaningful fish/oyster/crab action levels due to the somewhat obscure and unique characteristics of the contaminant.
Monitoring Data References:	

Project Name: ***JAMES RIVER*** ***ProjectID:*** 03-03

Last Updated: 08/11/98

- ***Sediment*** References M-11, M-12, M-13, M-16, M-56
- ***Water:*** References M-16, M-56
- ***Fish:*** References M-1, M-3, M-4, M-5, M-7, M-8, M-9, M-10

POTENTIALLY RESPONSIBLE PARTIES

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

PRP Name: **PRP INFORMATION NOT RELEASED** ***PRPID:***

Street Address:

City:

State:

KEY CONTACTS

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Last Name: **KEY CONTACT INFORMATION NOT RELEASED** ***Contact ID:***

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # : ***Other Phone #:***

Fax # :

Email Address:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: B ***ReferenceID:*** 26

Title: ***Output Generated from Compact Cambridge Search: ASFA 1982 - Sep 1991 Search Strategy: KEPONE [TI, AB, DE, CL] and "JAMES RIVER" [TI, AB, DE, CL]***

Location: AEM

Category: Miscellaneous

Prepared by/Author: VIMS Library (College of Williams and Mary)

Preparer/Author Address: Gloucester Point, VA

Prepared For: AEM, Inc.

Date Published: April 4, 1992

Key Words and Phrases:

Reference Type: B ***ReferenceID:*** 27

Title: ***Chesapeake Bay Bibliography Search Results***

Location: AEM

Category: Miscellaneous

Prepared by/Author: VIMS Library (College of Williams and Mary)

Preparer/Author Address: Gloucester Point, VA

Prepared For: AEM, Inc.

Date Published: April 4, 1992

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 288

Title: ***Virginia Paid by Allied Chemical in "Partial Settlement" on Kepone***

Location: AEM

Category: Site Update

Prepared by/Author: John Frye

Preparer/Author Address:

Prepared For: National Fisherman, vol. 58, no. 11, p. 15-A

Date Published: March 1978

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: C ***ReferenceID:*** 337

Title: ***Effects of Accumulated Dietary Kepone on Spot (Leiostomus Xanthurus)***

Location: AEM

Category: Site Update

Prepared by/Author: Linda L. Stehlik and John V. Merriner

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Aquatic Toxicology, 3 (1983) 345-358

Date Published: 1983

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 420

Title: ***Evaluation of Elutriate Test Parameters for an Organic Hydrophobic Pollutant, Kepone***

Location: AEM

Category: Site Update

Prepared by/Author: David R. Burris and Robert J. Huggett

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Environmental Pollution, (Series B) 8 (1984) 63-69

Date Published: 1984

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 421

Title: ***Effects of Ingestion of Kepone-Contaminated Food by Juvenile Blue Crabs (Callinectes Sapidus Rathbun)***

Location: AEM

Category: Site Update

Prepared by/Author: D.J. Fisher, M.E. Bender and M.H. Roberts, Jr.

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Aquatic Toxicology, 4 (1983) 219-234

Date Published: 1983

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: C ***ReferenceID:*** 424

Title: ***Depuration of Kepone by Atlantic Croaker in a Laboratory Study***

Location: AEM

Category: Site Update

Prepared by/Author: Robert T. Doyle, J.V. Merriner and M.E. Bender

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Unknown

Date Published: 1977 circa

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 470

Title: ***Egg Extrusion as a Kepone-Clearance Route in the Blue Crab, Callinectes sapidus***

Location: AEM

Category: Site Update

Prepared by/Author: Morris H. Roberts, Jr. and A. Thomas Leggett, Jr.

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Estuaries, Vol. 3, No. 3, p. 192-199

Date Published: September 1980

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 471

Title: ***The Importance of Natural Variabilities in the Total Analytical Scheme***

Location: AEM

Category: Site Update

Prepared by/Author: R.J. Huggett

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Biomedical Mass Spectrometry, Vol. 8, No. 9

Date Published: 1981

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: C ***ReferenceID:*** 472

Title: ***Kepone Distribution in Selected Tissues of Blue Crabs, Callinectes sapidus, Collected from the James River and Lower Chesapeake Bay***

Location: AEM

Category: Site Update

Prepared by/Author: Morris H. Roberts, Jr.

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Estuaries, Vol. 4, No. 4, p. 313-320

Date Published: December 1981

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 473

Title: ***Kepone Concentration in Juvenile Anadromous Fishes***

Location: AEM

Category: Site Update

Prepared by/Author: Joseph G. Loesch, Robert J. Huggett and Eric J. Foell

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Estuaries, Vol. 5, No. 3, p. 175-181

Date Published: September 1982

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 474

Title: ***Uptake of Kepone from sediment suspensions and subsequent loss by the oyster Crassostrea virginica***

Location: AEM

Category: Site Update

Prepared by/Author: R. Morales-Alamo and D.S. Haven

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Marine Biology, 74, 187-201 (1983)

Date Published: 1983

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: C ***ReferenceID:*** 475

Title: ***Kepone in the James River***

Location: AEM

Category: Site Update

Prepared by/Author: Robert J. Huggett and Michael E. Bender

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Environmental Science & Technology, 1980, Vol. 14, pp 918-922

Date Published: August 1980

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 476

Title: ***Sedimentologic Fate and Cycling of Kepone in an Estuarine System: Example from the James River Estuary***

Location: AEM

Category: Site Update

Prepared by/Author: Maynard M. Nichols

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: The Science of the Total Environment, 97/98 (1990) 407-440

Date Published: 1990

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 477

Title: ***Tracing Kepone Contamination in James Estuary Sediments***

Location: AEM

Category: Site Update

Prepared by/Author: (1) Maynard M. Nichols and (2) Norman H. Cutshall

Preparer/Author Address: (1) VIMS and
(2) Oak Ridge National Laboratory

Prepared For: Rapp. P.-v. Reun. Cons. Int. Explor. Mer, 174 : 102-110. 1981

Date Published: 1981

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: C ***ReferenceID:*** 478

Title: ***The Suspended Sediment-Water Partitioning Coefficient for Kepone in the James River, Virginia***

Location: AEM

Category: Site Update

Prepared by/Author: Charles J. Strobel, Robert E. Croonenberghs and Robert J. Huggett

Preparer/Author Address: VIMS, College of William and Mary

Prepared For: Environmental Pollution, (Series B) 2 (1981) 367-372

Date Published: 1981

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 1057

Title: ***Around the States: Virginia - James River***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Hazardous Waste/Superfund Week

Date Published: December 8, 2003

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 1108

Title: ***Around the States: Virginia***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Hazardous Waste/Superfund Week

Date Published: June 7, 2004

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: D ***ReferenceID:*** 25

Title: ***Kepone, enigma of the James: A special report on an enduring legacy***

Location: AEM

Category: Site Update

Prepared by/Author: Bruce Ebert, Bruce Reid and George Stukenbroeker

Preparer/Author Address: Staff writers, Newport News, VA

Prepared For: Newport News (VA) Daily Press and The Newport News (VA) Times-Herald

Date Published: July 1985

Key Words and Phrases:

Reference Type: F ***ReferenceID:*** 1

Title: ***Handbook of Environmental Data on Organic Chemicals - Second Edition (excerpt re Kepone)***

Location: AEM

Category: Site Update

Prepared by/Author: Karel Verschueren, Environmental Advisor

Preparer/Author Address: Heidemij/Adviesbureau and Department of Public Health and Tropical Hygiene, Agricultural University of Wageningen, Netherlands

Prepared For:

Date Published: 1983

Key Words and Phrases:

Reference Type: L ***ReferenceID:*** 123

Title: ***Contaminated Sediment Projects in the U.S. Using Monitored Natural Recovery***

Location: AEM

Category: Capping/Placement

Prepared by/Author: AEM, Inc.

Preparer/Author Address:

Prepared For: Distribution

Date Published: September 25, 2001

Key Words and Phrases:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

ReferenceID: 10

Reference Type:	M
Title:	***Kepone Residues in Chesapeake Bay Biota***
Location:	AEM
Category:	Site Update
Prepared by/Author:	M.E. Bender., R.J. Huggett and W.J. Hargis, Jr.
Preparer/Author Address:	VIMS, College of William and Mary
Prepared For:	Manuscript
Date Published:	September 1977
Key Words and Phrases:	

ReferenceID: 56

Reference Type:	M
Title:	***Kepone and the James River***
Location:	AEM
Category:	Site Update
Prepared by/Author:	Robert J. Huggett
Preparer/Author Address:	VIMS, College of William and Mary
Prepared For:	Contaminated Marine Sediments, Case Studies
Date Published:	1989
Key Words and Phrases:	

ReferenceID: 87

Reference Type:	M
Title:	***Demonstration of Advanced Dredging Technology Dredging Contaminated Material (Kepone) - James River, VA***
Location:	AEM
Category:	Dredging: Remedial (Contaminated Sediments)
Prepared by/Author:	D.L. Haller
Preparer/Author Address:	U.S. Army Corps of Engineers Norfolk District Norfolk, VA 23510
Prepared For:	
Date Published:	February 1981
Key Words and Phrases:	

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Reference Type: M ***ReferenceID:*** 89

Title: ***James River Dredging Demonstration in Sediments Contaminated with Kepone***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Richard L. Klein

Preparer/Author Address: U.S. Army Corps of Engineers
Norfolk District

Prepared For:

Date Published: 1982

Key Words and Phrases:

Reference Type: N ***ReferenceID:*** 1

Title: ***Conversation between MKH and Dr. Khizar Wasti, VA DEQ re Fishing Ban***

Location: AEM

Category: Phone Memos (Site Updates)

Prepared by/Author: Mark Hammaker

Preparer/Author Address: AEM, Inc.
Malvern, PA 19355

Prepared For:

Date Published: April 15, 1998

Key Words and Phrases:

MODELING

Project Name: ***JAMES RIVER*** ***ProjectID:*** 03-03

Last Updated: 08/11/98

Modeling Performed: Two dimensional numerical models for fate and transport of suspended sediment and kepone.

Modeling Objectives:

Modeling Description: Based on the concept of density-driven estuarine circulation, a number of two-dimensional numerical models have been developed to quantify the transport and deposition of suspended sediment in the James (Officer and Nichols, 1980), and to quantify the dissolved and particulate Kepone distributions (O'Connor and Farley, 1980; O'Connor et al., 1983).

Company Performing Modeling:

Modeling Status:

Modeling Summary:

Project Name ***JAMES RIVER*** ***ProjectID:*** 03-03

Advisory:	James River	***AdvisoryID:***	123
Extent:	From fall line at Richmond to Hampton-Norfolk Bridge Tunnel, including tributaries (113 miles)		
Pollutant:	kepone		
Species:	all fish		
Population:	RGP		
Population Definition:	Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.		
Advisory Type:	River	***Advisory Number:***	858
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Khizar Wasti	***Contact Number:***	804-786-1763