8.0 SUMMARY OF PROJECT COSTS

Consent Decree EPA ID	Capital Construction Activities [1]	Total Cost
1	**Site Preparation and Cleanup**	
1.a.	Close Firepond	$11,549.52
1.b.	Spoils Pile Consolidation	$10,419.05
1.c.	Drum/Waste Removal in On-Site Containment Area	$1,063,993.06
1.d.	PCB Soil Excavation from Wetland	$398,380.63
1.e	General Groundwater Remediation	$842,334.92
1.e.1.	ORC Treatment of Groundwater in North Area	$3,607.17
1.e.2.	ORC Treatment of Groundwater in South Area	$281,109.40
1.e.3.	Chemical Oxidation in South Area	$1,627,617.73
1.e.4.	Lower Aquifer Investigation	$287,463.75
2	**In-Situ Soil Vapor Extraction (ISVE)**	
2.a.	ISVE Installation - Off-Site Containment Area	$1,134,707.43
2.b.	ISVE Installation - Kapica Pazmey Area	$398,083.00
2.c.1	O&M of Off-Site ISVE System for 1st 12 months	$420,350.30
2.c.2	O&M of Kapica Area ISVE System for 1st 12 months	$127,482.72
2.d.	ISVE Installation - Still Bottoms Pond Area	$1,601,975.90
2.e.	O&M of Still Bottoms Pond System for 1st 12 months	$630,769.16
3 & 4	**De-Watering/Barrier Wall**	
3.a.	Groundwater Treatment Plant Upgrade	$2,569,382.67
3.b.1.	Barrier Wall Extraction System Upgrades Off-Site	$436,047.98
3.b.2.	Barrier Wall Extraction System Upgrades On-Site	$200,869.78
3.b.3.	De-Watering Groundwater Treatment System	$2,205,239.41
3.c.	De-Watering Groundwater Treatment System	$30,942.29
4.a.	Barrier Wall Between On-Site and Off-Site Areas	$268,299.04
5	**Cap/Cover**	
5.a.	Temporary Off-Site Area	$396,163.96
5.b.	Final Off-Site Area	$1,197,139.67
5.c.	Temporary On-Site Area	$487,160.98
5.d.	Final On-Site Area	$830,939.89
	Capital Cost Subtotals:	$17,462,029.41
6.b. & B.9	**Project Management Activities**	$913,719.50
	Management Subtotals:	$913,719.50
	Operation & Maintenance Costs [2]	
B.1,2,3,4	PGCS Groundwater Treatment System	$634,996.23
B.1	O&M of the PGCS Groundwater Treatment System	$112,637.75
B.2 and B.3	O&M of Off-Site ISVE System for first 12 months: Chemicals/Parts/Services	$15,048.88
B.2, B.3 & B.4	O&M of Off-Site ISVE System for first 12 months: Chemicals/Parts/Services	$276,076.06
B.5.	Cover Inspections & Maintenance	$12,157.65
B.7.	Groundwater, Air Quality, Wetland Area Monitoring	$614,357.06
B.8.	Residential Well Sampling	$53,153.88
B.6,7,8	Groundwater, Air Quality, Wetland Area Monitoring	$0.00
B.1,2,3,3	O&M Reporting	$2,212.85
B.1,2,3,4	Treatment System Monitoring	$134,554.69
B.1,2,3,4, 7	O&M for PGCS GWTP, Groundwater Monitoring	$17,145.11
	O&M Subtotals:	$1,872,340.16

Notes: [1]Costs for Capitol Construction Activities are current as of September 1, 2005.
[2]Operating and maintenance costs are current as of September 1, 2005. Fill costs are not represented here. O&M is anticipated to continue for many years.

9.0 OBSERVATIONS AND LESSONS LEARNED

The intent of this section of the report is to highlight successes and challenges encountered in the implementation of the RA. Feedback was sought from all parties (EPA, IDEM, Black & Veatch, PRP Group Members, and MWH team members). The items listed below were provided by the project team members:

- Execution of the construction of the RA components utilizing a Design-Build approach allowed flexibility in completing the work and in application of creative approaches to even the most routine tasks.
- Open lines of communication through consistent updates and regular meetings (weekly during construction activities), was vital.
- Utilization of qualified, local subcontractors provided flexibility during implementation of the various components of the RA.
- Maintenance activities associated with the thermal oxidizers have been challenging. The extreme contaminant loading into the oxidizers and associated scrubbers has consistently degraded various mechanical components (pH and conductivity probes, pumps, etc.). The vapor stream has also been observed to damage the steel structure of the scrubbers despite utilization of highly resilient alloys.
- MWH consistently performs routine maintenance activities and repairs to ensure that oxidizers and scrubbers continue to operate and meet their performance criteria.
- Continuous evaluations into health and safety protocol and procedures were vital for the Site's successful history of operations.
- The project team consistently communicated progress of the construction activities through regular one-page Field Updates. Paper copies of each of 24 Updates were sent out to approximately 300 people who had requested them during the Public Meeting.
- Site tours to local groups including the Boy Scouts, the Griffith Fire Department, and church groups have been made available. Throughout the project, concerns that affect the community have been addressed. For example, in response to concerns raised by neighboring residents, MWH constructed a noise abatement structure over the GWTP's aeration blower.
- Consistent enforcement of health and safety rules for all aspects of the construction was crucial to ensure the safety of the all team members. The result was over 3,000 consecutive days with no lost time due to a health and safety incident. In response to one incident involving an MWH employee, project activities were immediately ceased to allow the team members to attend an incident debriefing and analysis. This session emphasized that the Site is more dynamic than it appears and that complacency in executing regular tasks presents definite risks to the safety of personnel.
- Members of the ACS Technical Committee were included in planning and review. This led to significant progress with respect to the technical aspects of the project and promoted better interaction with the Agencies.
- Re-evaluation of the feasibility of the proposed remedy resulting in the implementation of interim remedial actions has been critical to delivering a remedial design and construction ahead of schedule and well below original cost estimates.

10.0 CONTACT INFORMATION

The PRP's used the following contractor for the RA:

Peter Vagt, Ph.D., CPG - Project Manager
Joseph D. Adams, Jr., P.E. - Project Coordinator
Todd Lewis - Construction Manager
Lee Orosz - Site Supervisor
Chris Daly - Engineering Manager
MWH
175 West Jackson Blvd., Suite 1900
Chicago, Illinois, 60604
312-831-3000

The U.S. EPA used the following contractor for oversight of the RA activities:

Larry Campbell
Chad Gailey
Leigh Peters
Margaret Clark
Black & Veatch
101 N. Wacker Drive, Suite 1100
Chicago, Illinois, 60606
312- 346-3775

The Chairperson of the PRP Group is:

Barbara Magel
Karaganis White & Magel, Ltd.
414 North Orleans Street, Suite 810
Chicago, Illinois, 60610
847-559-1177

The Remedial Project Managers for the EPA were:

Kevin Adler (c. 1999-Present)
Sheri Bianchin (c. 1995-1999)
Region V, Mail Code SR-6J
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
312-886-7078

The Project Managers for IDEM were:

Prabhakar Kasarabada (c. 2002-present)
Sean Grady (c. 2000-2002)
OLQ/Federal Programs Section
IDEM/IGCN Room #1101
100 North Senate Avenue
Indianapolis, Indiana 46204-2241
317-234-0352

11.0 REFERENCES

The detailed Administrative Record, including the documents referenced here, can be examined at the following locations:

Griffith Public Library
940 North Broad Street
Griffith, IN 46319
219-838-2825

Griffith Town Hall
111 North Broad Street
Griffith, IN 46319
219-924-7500

Record of Decision (ROD), U.S. Environmental Protection Agency, September 1992.

Consent Decree, U.S. Environmental Protection Agency, January 2001.

Petition for ROD Amendment, Montgomery Watson, July 1994.

ROD Amendment, U.S. Environmental Protection Agency, July 1999.

Explanation of Significant Differences. U.S. Environmental Protection Agency, September 2004.

Preliminary Close-out Report, U.S. Environmental Protection Agency, September 2004.

Remedial Investigation Report (RI), Warzyn Inc., June 1991.

Final Report Feasibility Study (FS), Warzyn, Inc., June 1992.

Management and Temporary Storage of Construction Derived Soils, Montgomery Watson, November 1996.

Operations & Maintenance Plan/Contingency Plan, Montgomery Watson, July 1997.

Buried Drum Removal Plan, Montgomery Watson, January 1999.

Field Sampling Plan (FSP), Montgomery Watson, April 1999.

PCB-Impacted Soil Excavation Work Plan, Montgomery Watson, April 1999.

Construction Quality Assurance Plan (CQAP), Montgomery Watson, June 1999.

Performance Standard Verification Plan (PSVP), Montgomery Watson, June 1999.

Site Safety Plan (SSP), Montgomery Watson, June 1999.

Final Remedial Design Report, Final Remedy, Montgomery Watson, August 1999.

Close Out Procedures for National Priorities List Sites, Office of Emergency and Remedial Response, U.S.EPA 540-R-98-016, 3 January 2000.

Quality Assurance Protection Plan (QAPP), MWH, November 2001.

Separation Barrier Wall Installation Construction Completion Report, MWH, March 2002.

Revised Long-Term Groundwater Monitoring Plan, MWH, September 2002.

Final PCB-impacted Soil Excavation In the Wetland Area Construction Completion Report, MWH, November 2002.

Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, U.S. EPA Draft Guidance, November 2002.

Final Off-Site Area Interim Engineered Cover Construction Completion Report including Spoils Pile Consolidation, MWH, February 2003.

Final Barrier Wall Extraction System Off-Site Area Upgrades Construction Completion Report, MWH, March 2003.

Final Buried Drum Removal in On-Site Containment Area Construction Completion Report. MWH, March 2003.

Off-Site Containment Area and Kapica-Pazmey Area In-Situ Soil Vapor Extraction Systems Construction Completion Report, MWH, March 2004.

*Still Bottoms Pond Area Interim Engineered Cover Construction Completion Repor*t, including Fire Pond Closure, MWH, March 2004.

Off-Site Area Final Engineered Cover Construction Completion Report, MWH, June 2004.

Still Bottoms Pond Area In-Situ Soil Vapor Extraction System Construction Completion Report, MWH, June 2004.

Superfund Preliminary Close-out Report American Chemical Service, Inc. Site, U.S. EPA, September 2004.

Still Bottoms Pond Area Final Engineered Cover Construction Completion Report, MWH, January 2005.

Operation & Maintenance Manual, ISVE Systems, MWH, March 2005.

Health and Safety Field Manual, MWH, June 2005.

Table 1

Groundwater Treatment System Effluent Discharge Limits

Quality Parameter	Effluent Standard (Limit)
General Water Quality Parameters	
pH	6 - 9 S.U.
BOD-5	30 mg/L
TSS	30 mg/L
Inorganics	
Arsenic	50 µg/L
Beryllium	NE
Cadmium	4.1 µg/L
Manganese	NE
Mercury	0.02 µg/L (w/DL = 0.64)
Selenium	8.2 µg/L
Thallium	NE
Zinc	411 µg/L
Volatile Organics	
Acetone	6,800 µg/L
Benzene	5 µg/L
2-Butanone	210 µg/L
Chloromethane	NE
1,4 – Dichlorobenzene	NE
1,1 – Dichloroethane	NE
1,2 – Dichloroethene – cis	70 µg/L
Ethylbenzene	34 µg/L
Methylene chloride	5 µg/L
Tetrachloroethene	5 µg/L
Trichloroethene	5 µg/L
Vinyl chloride	2 µg/L
4 – Methyl - 2 – pentanone	15 µg/L
Semi-Volatile Organics	
bis(2 – Chloroethyl) ether	9.6 µg/L
bis(2 – Ethylhexyl) phthalate	6 µg/L
Isophorone	50 µg/L
4 – Methylphenol	34 µg/L
Pentachlorophenol	1 µg/L
PCBs	
PCBs	0.00056 µg/L (w/DL = 0.1 to 0.9)

Notes:
NE = No effluent limit established.
DL = Detection limit
S.U. = Standard pH units
mg/L = micrograms per Liter

Table 2
Closure Activities for Site Capital Tasks

Consent Decree EPA ID	Task Description	Construction Completion Year	Construction Completion Report (CCR) or Closure Activity
Capital Construction Activities			
1	**Site Preparation and Cleanup**		
1.a.	Close Firepond	2003	*Final PCB-Impacted Soil Excavation in the Wetland Area Construction Completion Report* (MWH, November 2002) and *Still Bottoms Pond Area Interim Engineered Cover Construction Completion Report Including Fire Pond Closure* (MWH, March 2003)
1.b.	Spoils Pile Consolidation	2001	*Final Off-Site Area Interim Engineered Cover Construction Completion Report Including Spoils Pile Consolidation* (MWH, February 2003)
1.c.	Drum/Waste Removal in On-Site Containment Area	2002	*Final Buried Drum Removal in the On-Site Containment Area Construction Completion Report* (MWH, March 2003)
1.d.	PCB Soil Excavation from Wetland	2001	*Final PCB-Impacted Soil Excavation in the Wetland Area Construction Completion Report* (MWH, November 2002)
1.e	General Groundwater Remediation		
1.e.1.	ORC Treatment of Groundwater in North Area	NA	A pilot study was conducted in the North Area in 1999 to evaluate the effectiveness of ORC treatment of groundwater in the North Area. The results of the pilot study are detailed in Agency-approved *ORC Pilot Study Report, Summary of the Oxygen Release Compound Pilot Study in the North Area (Montgomery Watson, November 2000)*
1.e.2.	ORC Treatment of Groundwater in South Area	2004	A pilot study was conducted in the South Area in 2001 to evaluate the effectiveness of ORC treatment of groundwater in the South Area. The results of the pilot study are detailed in *Final Phase 3 Investigation Report, South Area ORC Pilot Study* (MWH, April 2004)
2	**In-Situ Soil Vapor Extraction (ISVE)**		
2.a.	ISVE Installation - Off-Site Containment Area	2002	*Off-Site Containment Area and Kapica-Pazmey Area In-Situ Soil Vapor Extraction Systems Construction Completion Report* (MWH. March 2004)
2.b.	ISVE Installation - Kapica Pazmey Area	2002	*Off-Site Containment Area and Kapica-Pazmey Area In-Situ Soil Vapor Extraction Systems Construction Completion Report* (MWH. March 2004)
2.c.1.	O&M of Off-Site ISVE System for 1st 12 months	2003	Duration-based operating event. Therefore, no completion documentation is required.
2.c.2.	O&M of K-P Area ISVE System for 1st 12 months	2003	Duration-based operating event. Therefore, no completion documentation is required.
2.d.	ISVE Installation - Still Bottoms Pond Area	2003	*Still Bottoms Pond Area In-Situ Soil Vapor Extraction System Construction Completion Report* (MWH, June 2004)
2.e.	O&M of Still Bottoms Pond System for 1st 12 months	2004	Duration-based operating event. Therefore, no completion documentation is required.
3 & 4	**De-Watering/Barrier Wall**		
3.a.	Groundwater Treatment Plant Upgrade	2000	*Operation & Maintenance Manual Groundwater Treatment Plant* (MWH, July 2002)
3.b.1.	Barrier Wall Extraction System Upgrades Off-Site	2001	*Final Barrier Wall Extraction System, Off-Site Area Upgrades Construction Completion Report* (MWH, March 2003)
3.b.2.	Barrier Wall Extraction System Upgrades On-Site	2003	*Still Bottoms Pond Area In-Situ Soil Vapor Extraction System Construction Completion Report* (MWH, June 2004) and *Still Bottoms Pond Area Interim Engineered Cover Construction Completion Report Including Fire Pond Closure* (MWH, March 2003)
3.c.	De-Watering Groundwater Treatment System	NA	This item is not included in Appendix G of the Consent Decree as a required capital construction item. This item was added as an accounting method to track contingency costs associated with task-specific dewatering needs.
4.a.	Barrier Wall Between On-Site and Off-Site Areas	2001	*Separation Barrier Wall Construction Completion Report* (MWH, March 2002)
5	**Cap/Cover**		
5.a.	Temporary Off-Site Area	2001	*Final Off-Site Area Interim Engineered Cover Construction Completion Report Including Spoils Pile Consolidation* (MWH, February 2003)
5.b.	Final Off-Site Area	2003	*Off-Site Area Final Engineered Cover Construction Completion Report* (MWH, June 2004)
5.c.	Temporary On-Site Area	2003	*Still Bottoms Pond Area Interim Engineered Cover Construction Completion Report Including Fire Pond Closure* (MWH, March 2003)
5.d.	Final On-Site Area	2004	*Still Bottoms Pond Area Final Engineered Cover Construction Completion Report* (MWH, January 2005)

Notes:

1. This list contains only the capital tasks identified in the Consent Decree and subsequently the only tasks that need to be completed for total construction completion of the Final Remedy.

Table 3

Completion of Punch List Items

Task ID	Punch List Item [1]	Completion Summary
1.e General Groundwater Remediation	1. Complete restoration of the property at 1002 Reder Road as part of Phase 1 Chemical Oxidation Application.	Restoration at 1002 Reder Road was completed in October 2004. Restoration consisted of smoothing ruts and torn-up areas, seeding areas with grass. Similar restoration activities were performed following subequent injection events.
	2. Complete chemical oxidation injection at the remaining 65 points of the Phase 1 Application.	The Phase 1 chemical oxidation application was completed on September 25, 2004.
	3. Demobilize equipment from Phase 1 Chemical Oxidation Application.	The chemical oxidation injection equipment was demobilized from the site on September 25, 2004.
	4. Complete indoor air intrusion follow-up work at the residence at 1002 Reder Road.	Soil vapor sampling was conducted in August 2004 and documented in a February 7, 2005 letter report. A Soil Vapor Mitigation System was installed at the residence in February 2005. Indoor air sampling was conducted in June 2005. Sampling results show that no further action is required.
5.d Final On-Site Cover	1. Dress up the edges of the cover with aggregate to assist in directing stormwater to the catch basins and protect the edges of the cover.	INDOT Aggregate #53 was placed along the cover in selected areas on October 8, 2004.
	2. Place regular asphalt around select catch basins around the perimeter of the cover to assist in directing stormwater to the catch basins.	Asphalt was placed around the selected catch basins on October 8, 2004.
	3. Install an asphalt curb along certain locations at the south perimeter of the cover to assist in directing stormwater to the catch basins	The curb was installed at selected locations on October 8, 2004.
	4. Evaluate if additional work needs to be completed to address the areas where stormwater ponds on the cover.	Due to the relatively small and shallow nature of the ponding areas and the potential for damaging the newly installed cover to repair them, no action is recommended.
	5. Expand the fencing to include more ISVE wells.	The fencing on the east side of the truck road was completed in March 2005.
	6. Mark the allowed truck route on the cover.	The extents of the truck route were painted on the asphalt on October 21, 2004.

Note:

[1] Punch list items identified by the EPA and IDEM during the Pre-Final Inspection on September 23, 2004.

Appendix A
Acronyms and Abbreviations

ACS	American Chemical Service
amsl	Above Mean Sea Level
AS	Air Sparge
BOD	Biological Oxygen Demand
BWES	Barrier Wall Extraction System
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cfm	Cubic feet per minute
cm/s	Centimeters per second
CQAP	Construction Quality Assurance Plan
DL	Detection Limit
DPE	Dual Phase Extraction
ESD	Explanation of Significant Differences
FML	Flexible Membrane Liner
FS	Feasibility Study
FSP	Field Sampling Plan
GWTP	Groundwater Treatment Plant
HDPE	High Density Polyethylene
IDEM	Indiana Department of Environmental Management
IAC	Indiana Administrative Code
IDW	Investigation Derived Wastes
ISCO	In-Situ Chemical Oxidation
ISVE	In-Situ Soil Vapor Extraction
K-P Area	Kapica-Pazmey Area
lb/day	Pounds per day
LTTT	Low Temperature Thermal Treatment
MATCON	Modified Asphalt Technology for Waste Containment
mg/kg	Milligrams per kilogram
MNA	Monitored Natural Attenuation
MWH	Montgomery Watson Harza (formerly Warzyn and Montgomery Watson)
NAPL	Non-Aqueous Phase Liquid
NPL	National Priorities List
O & M	Operations and Maintenance
OFCA	Off-Site Containment Area
ONCA	On-Site Containment Area
ORC	Oxygen Reduction Compound
OSHA	Occupational Safety and Health Administration

Appendix A (continued)

Acronyms and Abbreviations

PCBs	Polychlorinated Biphenyls
PCOR	Preliminary Close-out Report
PGCS	Perimeter Groundwater Containment System
ppm	Parts per million
PRP	Potentially Responsible Parties
PSVP	Performance Standard Verification Plan
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SBPA	Still Bottoms Pond Area
SOW	Statement of Work
SSP	Site Safety Plan
SVOC	Semi-Volatile Organic Compounds
TCL/TAL	Target Compound List/Target Analyte List
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
µg	Micrograms
µg/L	Micrograms per liter
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

Appendix B
Remedial Construction Timeline

Consent Decree	Task Description Capital Construction Activities	1996				1997				1998				1999				2000				2001				2002				2003				2004				2005			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Interim Remedial Actions																																								
	Construct PGCS																																								
	Construct Barrier Wall																																								
	Construct BWES																																								
	GWTP Construction																																								
1	**Site Preparation and Cleanup**																																								
1.a.	Close Firepond																																								
1.b.	Spoils Pile Consolidation																																								
1.c.	Drum/Waste Removal in On-Site Containment Area																																								
1.d.	PCB Soil Excavation from Wetland																																								
1.e	General Groundwater Remediation																																								
1.e.1.	ORC Treatment of Groundwater in North Area																																								
1.e.2.	ORC Treatment of Groundwater in South Area																																								
2	**In-Situ Soil Vapor Extraction (ISVE)**																																								
2.a.	ISVE Installation - Off-Site Containment Area																																								
2.b.	ISVE Installation - Kapica Pazmey Area																																								
2.c.1.	O&M of Off-Site ISVE System for 1st 12 months																																								
2.c.2.	O&M of Kapica Area ISVE System for 1st 12 months																																								
2.d.	ISVE Installation - Still Bottoms Pond Area																																								
2.e.	O&M of Still Bottoms Pond System for 1st 12 months																																								
3 & 4	**De-Watering/Barrier Wall**																																								
3.a.	Groundwater Treatment Plant Upgrade																																								
3.b.1.	Barrier Wall Extraction System Upgrades Off-Site																																								
3.b.2.	Barrier Wall Extraction System Upgrades On-Site																																								
4.a.	Barrier Wall Between On-Site and Off-Site Areas																																								
5	**Cap/Cover**																																								
5.a.	Temporary Off-Site Area																																								
5.b.	Final Off-Site Area																																								
5.c.	Temporary On-Site Area																																								
5.d.	Final On-Site Area																																								
	Operation & Maintenance																																								
B.1,2,3,4	PGCS Groundwater Treatment System																																								
B.1,2,3,4	ISVE System Monitoring																																								
B.6.	Monitored Natural Attenuation																																								