

**Notes and Calculations**  
**Delphi - Moraine**

**Negotiate CMP, Environmental Covenant**

**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>Negotiations with Regulators</u>					
Complete 3 one day meetings to negotiate CMP	2009	\$50,000	LS	1	\$50,000
Finalize CMP					
Completion of Statement of Basis	2010	\$40,000	LS	1	\$40,000
Response to comments received during public comment period					
Environmental Covenant/land use restrictions	2010	\$35,000	LS	1	\$35,000
Continued work on Environmental Covenant/land use restrictions and negotiations	2011	\$20,000	LS	1	\$20,000
Total Estimate					\$145,000

Annual Cost Breakdown	
2009	\$50,000
2010	\$75,000
2011	\$20,000
Total	\$145,000

**Notes and Calculations**  
**Delphi - Moraine**

**Pre-Design Investigation, CMP Design, System Installation**

**Moraine Subsurface/Delineation (Transect) Investigation**  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
Work Plan	2009	\$20,000	LS	1	\$20,000
Drilling	2010	\$6,000	Day	50	\$300,000
Additional drilling to collect GW samples (3 rigs)	2010	\$4,500	Day	25	\$112,500
Utility clearing	2010	\$3,500	Day	10	\$35,000
On-site laboratory	2010	\$3,000	Day	15	\$45,000
Laboratory Samples (VOCs) - Confirmation	2010	\$120	Sample	60	\$7,200
Rotosonic Drilling	2010	\$6,000	Day	25	\$150,000
Oversite of Drilling (including expenses)	2010	\$1,300	Day	85	\$110,500
Oversite of Drilling (including expenses) - for GW samp	2010	\$1,300	Day	25	\$32,500
Waste Management	2010	\$200	Drum	60	\$12,000
Technical (TKI) assistance	2010	\$20,000	LS	1	\$20,000
Surveying	2010	\$10,000	LS	1	\$10,000
Office field support	2010	\$10,000.00	LS	1	\$10,000
Summary Report	2010	\$15,000.00	LS	1	\$15,000
Project Management/Coordination	2010	\$60,000.00	LS	1	\$60,000
Contingency	2010	10.00%	%	1	\$93,970
Total Estimate					\$1,033,670

**Assumptions:**

- 1) Drill 4 transects in Upper aquifer; each transect = 2,000 feet (approximate extent of plume)
- 2) Borings will be spaced 100 feet apart, 25% additional borings to delineate between 100 foot spacings.
- 3) one sample per boring will be submitted per laboratory analysis to confirm real-time data.
- 4) one lower aquifer transect will be installed to a depth from below RCT to 120 feet bls.
- 5) assume 2 shallow; one deep boring per day
- 6) Temporary casing used for sonic work (below RCT).
- 7) Utility Clearing 10 points per day
- 8) On-site laboratory can process between 50-80 samples per day.
- 9) Laboratory confirmation samples (assume 10%)

**Annual Cost Breakdown**

2009	\$20,000
2010	\$1,013,670
Total	\$1,033,670

**Secondary Source (Box Sewer, Fill Area, West Tank Farm, Delphi Oil House) Investigations**  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
Work Plan	2009	\$10,000	LS	1	\$10,000
Rotosonic Drilling	2010	\$6,000	Day	24	\$144,000
Utility clearing	2010	\$3,500	Day	3	\$10,500
Oversite of Drilling (including expenses)	2010	\$1,300	Day	27	\$35,100
Waste Management	2010	\$200	Drum	20	\$4,000
Laboratory Samples (VOCs)	2010	\$120	Sample	56	\$6,720
Office field support	2010	\$10,000.00	LS	1	\$10,000
Surveying	2010	\$2,000.00	LS	1	\$2,000
Summary Report	2010	\$10,000.00	LS	1	\$10,000
Project Management/Coordination	2010	\$10,000.00	LS	1	\$10,000
Contingency	2010	5.00%	%	1	\$12,116
Total Estimate					\$254,436

**Assumptions:**

- 1) assume 4 borings per each location in upper aquifer (total depth = 60 feet)
- 2) one deep boring at each location; temp cased at RCT (total depth 120 feet)
- 3) Vertical aquifer profiling every 10 feet after water (~30), 3 samples shallow, 5 additional deep.
- 4) Utility Clearing 10 points per day

**Annual Cost Breakdown**

2009	\$10,000
2010	\$244,436
Total	\$254,436

**Perimeter Boring and Monitor Well Installation**  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
Work Plan	2009	\$10,000	LS	1	\$10,000
Rotosonic Drilling	2010	\$6,000	Day	25	\$150,000
Utility clearing	2010	\$3,500	Day	3	\$10,500
Oversite of Drilling (including expenses)	2010	\$1,300	Day	20	\$26,000
Waste Management	2010	\$200	Drum	30	\$6,000
Laboratory Samples (VOCs)	2010	\$120	Sample	60	\$7,200
Well installation (upper) - materials	2010	\$2,000	Well	8	\$16,000
Well installation (lower) - materials	2010	\$3,000	Well	4	\$12,000
Surveying	2010	\$2,000.00	LS	1	\$2,000
Office field support	2010	\$10,000.00	LS	1	\$10,000
Summary Report	2010	\$15,000.00	LS	1	\$15,000
Project Management/Coordination	2010	\$10,000.00	LS	1	\$10,000
Contingency	2010	5.00%	%	1	\$13,735
Total Estimate					\$288,435

**Assumptions:**

- 1) Assume 1 boring every two days
- 2) VAS sampling every 10 feet to 80 feet bls (temporary casing through RCT)
- 3) Depth to water = 20 feet

**Annual Cost Breakdown**

2009	\$10,000
2010	\$278,435
Total	\$288,435

Notes and Calculations  
Delphi - Moraine

Pre-Design Investigation, CMP Design, System Installation  
IRZ Design and System Install  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>Upper Aquifer Reactive Zone Corrective Measures</b>					
<i>RZ-4 West Relocation</i>					
Work Plan	2010	\$10,000	LS	1	\$10,000
Mobilization	2010	\$10,000	LS	1	\$10,000
Shallow injection well installation	2010	\$5,000	Wells	10	\$50,000
Deep injection well installation	2010	\$8,000	Wells	10	\$80,000
Performance monitor well installation	2010	\$5,000	Wells	4	\$20,000
Field oversight	2010	\$1,300	days	15	\$19,500
Project Management	2010	\$10,000	LS	1	\$10,000
Contingency	2010	20.00%	%	1	\$39,900
<i>RZ-2 Installation</i>					
Work Plan	2011	\$10,000	LS	1	\$10,000
Mobilization	2011	\$10,000	LS	1	\$10,000
Shallow injection well installation	2011	\$5,000	Wells	10	\$50,000
Deep injection well installation	2011	\$8,000	Wells	10	\$80,000
Performance monitor well installation	2011	\$5,000	Wells	4	\$20,000
Field oversight	2011	\$1,300	days	15	\$19,500
Project Management	2011	\$10,033	LS	1	\$10,033
<i>Semi-Automation of IRZs</i>					
RZ-2 semi-automated system installation	2011	\$75,000	LS	1	\$75,000
RZ-3 and RZ-4 semi-automated system installation	2011	\$100,000	LS	1	\$100,000
Field oversight	2011	\$1,300	days	16	\$20,800
Engineering	2011	\$10,000	LS	1	\$10,000
Project Management	2011	\$10,000	LS	1	\$10,000
Contingency	2011	20.00%	%	1	\$130,947
Total Estimate					\$785,680

Annual Cost Breakdown	
2010	\$239,400
2011	\$546,280
Total	\$785,680

Pump-and-Treat System Upgrade  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>TW-2 Upgrades</b>					
New Air Stripper Blower	2011	\$103,000	LS	1	\$103,000
Centrifugal Pump	2011	\$3,000	LS	1	\$3,000
Electrical Upgrade	2011	\$10,000	LS	1	\$10,000
Control Panel	2011	\$5,000	LS	1	\$5,000
Telemetry	2011	\$5,000	LS	1	\$5,000
Pre-treatment chemical dosage system	2011	\$10,000	LS	1	\$10,000
General Mechanical	2011	\$10,000	LS	1	\$10,000
Total Estimate					\$146,000

Annual Cost Breakdown	
2011	\$146,000
Total	\$146,000

Downgradient Lower Aquifer Corrective Measures  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>DN-13</b>					
New Pump for well	2011	\$20,000	LS	1	\$20,000
<b>DN-11</b>					
Reconditioning well; installing new pump	2011	\$25,000	LS	1	\$25,000
Pumping well trenching and underground piping	2011	\$10,000	LS	1	\$10,000
Soil and Water disposal (IDW)	2011	\$5,000	LS	1	\$5,000
Incidental Costs (Electrical/mechanical)	2011	\$25,000	LS	1	\$25,000
Field Oversight, Engineering, and Project Management	2011	\$50,000	LS	1	\$50,000
Modeling	2011	\$20,000	LS	1	\$20,000
Contingency	2011	10.00%	%	1	\$15,500
Total Estimate					\$170,500

Assumptions:  
DN-11 will not require ex-situ treatment (similar to DN-13)

Annual Cost Breakdown	
2011	\$170,500
Total	\$170,500

Notes and Calculations  
Delphi - Moraine

Pre-Design Investigation, CMP Design, System Installation  
Lower Aquifer Pump-and-Treat Corrective Measures  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>GM-68D/GM-75D</u>					
Pumping Test	2011	\$20,000	LS	1	\$20,000
Modelling	2011	\$28,250	LS	1	\$28,250
Pumping Well Installation	2011	\$90,000	LS	1	\$90,000
Pumping Well Trenching and Underground Piping	2011	\$55,000	LS	1	\$55,000
Pump-and-Treat Equipment and Installation	2011	\$140,000	LS	1	\$140,000
Pump-and-Treat System Startup	2011	\$50,000	LS	1	\$50,000
IDW	2011	\$25,000	LS	1	\$25,000
Utilities, Electrical, Mechanical	2011	\$60,000	LS	1	\$60,000
<i>Indirect Costs</i>					
Engineering Design	2011	\$50,000	LS	1	\$50,000
Construction Oversight	2011	\$50,000	LS	1	\$50,000
Project Management	2011	\$40,000	LS	1	\$40,000
Permitting	2011	\$25,000	LS	1	\$25,000
Health and Safety (Electrical)	2011	\$20,000	LS	1	\$20,000
Contingency	2011	20.00%	%	1	\$130,650
Total Estimate					\$783,900

Annual Cost Breakdown	
2011	\$783,900
Total	\$783,900

Annual Grand Total	
2009	\$40,000
2010	\$1,775,941
2011	\$1,646,680
Total	\$3,462,621

**Notes and Calculations**  
**Delphi - Moraine**

**OMM IRZ Barriers and Pump and Treat Systems**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>2009</u>					
IRZ-1, IRZ-3E/W, and IRZ-4 Operation	2009	\$100,000	LS	1	\$100,000
DN-13	2009	\$20,500	LS	1	\$20,500
TW-2	2009	\$76,750	LS	1	\$76,750
<u>2010</u>					
IRZ-1, IRZ-3E/W, and IRZ-4 Operation	2010	\$150,000	LS	1	\$150,000
DN-13	2010	\$41,000	LS	1	\$41,000
TW-2	2010	\$153,500	LS	1	\$153,500
<u>2011</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2011	\$250,000	LS	1	\$250,000
DN-13	2011	\$41,000	LS	1	\$41,000
DN-11	2011	\$41,000	LS	1	\$41,000
TW-2	2011	\$153,500	LS	1	\$153,500
GM-68D/GM-75D	2011	\$97,000	LS	1	\$97,000
<u>2012</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2012	\$250,000	LS	1	\$250,000
DN-13	2012	\$41,000	LS	1	\$41,000
DN-11	2012	\$41,000	LS	1	\$41,000
TW-2	2012	\$153,500	LS	1	\$153,500
GM-68D/GM-75D	2012	\$97,000	LS	1	\$97,000
<u>2013</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2013	\$250,000	LS	1	\$250,000
DN-13	2013	\$41,000	LS	1	\$41,000
DN-11	2013	\$41,000	LS	1	\$41,000
TW-2	2013	\$153,500	LS	1	\$153,500
GM-68D/GM-75D	2013	\$97,000	LS	1	\$97,000
<u>2014</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2014	\$250,000	LS	1	\$250,000
DN-13	2014	\$41,000	LS	1	\$41,000
DN-11	2014	\$41,000	LS	1	\$41,000
TW-2	2014	\$153,500	LS	1	\$153,500
GM-68D/GM-75D	2014	\$97,000	LS	1	\$97,000
<u>2015</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2015	\$250,000	LS	1	\$250,000
DN-13	2015	\$41,000	LS	1	\$41,000
DN-11	2015	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2015	\$97,000	LS	1	\$97,000
<u>2016</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2016	\$250,000	LS	1	\$250,000
DN-13	2016	\$41,000	LS	1	\$41,000
DN-11	2016	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2016	\$97,000	LS	1	\$97,000
<u>2017</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2017	\$250,000	LS	1	\$250,000
DN-13	2017	\$41,000	LS	1	\$41,000
DN-11	2017	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2017	\$97,000	LS	1	\$97,000
<u>2018</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2018	\$250,000	LS	1	\$250,000
DN-13	2018	\$41,000	LS	1	\$41,000
DN-11	2018	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2018	\$97,000	LS	1	\$97,000
<u>2019</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2019	\$250,000	LS	1	\$250,000
DN-13	2019	\$41,000	LS	1	\$41,000
DN-11	2019	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2019	\$97,000	LS	1	\$97,000
Remediation Cost Estimate Backup	2019	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2019	\$97,000	LS	1	\$97,000

**Notes and Calculations**  
**Delphi - Moraine**

**OMM IRZ Barriers and Pump and Treat Systems**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>2020</u>					
IRZ-1, IRZ-2, IRZ-3E/W, and IRZ-4E/W Operation	2020	\$250,000	LS	1	\$250,000
DN-13	2020	\$41,000	LS	1	\$41,000
DN-11	2020	\$41,000	LS	1	\$41,000
GM-68D/GM-75D	2020	\$97,000	LS	1	\$97,000
<u>2021</u>					
DN-13	2021	\$41,000	LS	1	\$41,000
DN-11	2021	\$41,000	LS	1	\$41,000
<u>2022</u>					
DN-13	2022	\$41,000	LS	1	\$41,000
DN-11	2022	\$41,000	LS	1	\$41,000
<u>2023</u>					
DN-13	2023	\$41,000	LS	1	\$41,000
DN-11	2023	\$41,000	LS	1	\$41,000
<u>2024</u>					
DN-13	2024	\$41,000	LS	1	\$41,000
DN-11	2024	\$41,000	LS	1	\$41,000
<u>2025</u>					
DN-13	2025	\$41,000	LS	1	\$41,000
DN-11	2025	\$41,000	LS	1	\$41,000
<u>2026</u>					
DN-13	2025	\$41,000	LS	1	\$41,000
DN-11	2026	\$41,000	LS	1	\$41,000
<u>2027</u>					
DN-13	2026	\$41,000	LS	1	\$41,000
DN-11	2027	\$41,000	LS	1	\$41,000
<u>2028</u>					
DN-13	2027	\$41,000	LS	1	\$41,000
DN-11	2028	\$41,000	LS	1	\$41,000
<u>2029</u>					
DN-13	2028	\$41,000	LS	1	\$41,000
DN-11	2028	\$41,000	LS	1	\$41,000
<u>2028</u>					
DN-13	2029	\$41,000	LS	1	\$41,000
DN-11	2029	\$41,000	LS	1	\$41,000
<u>2029</u>					
DN-13	2030	\$41,000	LS	1	\$41,000
DN-11	2030	\$41,000	LS	1	\$41,000
<u>2030</u>					
DN-13	2031	\$41,000	LS	1	\$41,000
DN-11	2031	\$41,000	LS	1	\$41,000
<u>2031</u>					
DN-13	2032	\$41,000	LS	1	\$41,000
DN-11	2032	\$41,000	LS	1	\$41,000
<u>2032</u>					
DN-13	2033	\$41,000	LS	1	\$41,000
DN-11	2033	\$41,000	LS	1	\$41,000
<u>2033</u>					
DN-13	2034	\$41,000	LS	1	\$41,000
DN-11	2034	\$41,000	LS	1	\$41,000
<u>2034</u>					
DN-13	2034	\$41,000	LS	1	\$41,000
DN-11	2035	\$41,000	LS	1	\$41,000
<u>2035</u>					
DN-13	2035	\$41,000	LS	1	\$41,000
DN-1 Remediation Cost Estimate Backup	2036	\$41,000	LS	1	\$41,000

**Notes and Calculations**  
**Delphi - Moraine**

**OMM IRZ Barriers and Pump and Treat Systems**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>2036</u>					
DN-13	2036	\$41,000	LS	1	\$41,000
DN-11	2037	\$41,000	LS	1	\$41,000
<u>2037</u>					
DN-13	2037	\$41,000	LS	1	\$41,000
DN-11	2037	\$41,000	LS	1	\$41,000
<u>2038</u>					
DN-13	2038	\$41,000	LS	1	\$41,000
DN-11	2038	\$41,000	LS	1	\$41,000

**Assumptions:**

DN-11 will not require ex-situ treatment (similar to DN-13)

Annual Cost Breakdown	
2009	\$197,250
2010	\$344,500
2011	\$582,500
2012	\$582,500
2013	\$582,500
2014	\$582,500
2015	\$429,000
2016	\$429,000
2017	\$429,000
2018	\$429,000
2019	\$429,000
2020	\$429,000
2021	\$82,000
2022	\$82,000
2023	\$82,000
2024	\$82,000
2025	\$82,000
2026	\$82,000
2027	\$82,000
2028	\$82,000
2029	\$82,000
2030	\$82,000
2031	\$82,000
2032	\$82,000
2033	\$82,000
2034	\$82,000
2035	\$82,000
2036	\$82,000
2037	\$82,000
2038	\$82,000
<b>Total</b>	<b>\$6,921,750</b>

**Notes and Calculations**  
**Delphi - Moraine**

**OMM Lagoons, Landfills, Groundwater Monitoring, and Reporting**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>2009</b>					
Lagoon monitoring/maintenance	2009	\$15,000	LS	1	\$15,000
Groundwater Monitoring/Reporting	2009	\$75,000	LS	1	\$75,000
<b>2010</b>					
Lagoon monitoring/maintenance	2010	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2010	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2010	\$75,000	LS	1	\$75,000
<b>2011</b>					
Lagoon monitoring/maintenance	2011	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2011	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2011	\$75,000	LS	1	\$75,000
<b>2012</b>					
Lagoon monitoring/maintenance	2012	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2012	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2012	\$75,000	LS	1	\$75,000
<b>2013</b>					
Lagoon monitoring/maintenance	2013	\$20,000	LS	1	\$20,000
Landfill monitoring/maintenance	2013	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2013	\$75,000	LS	1	\$75,000
<b>2014</b>					
Lagoon monitoring/maintenance	2014	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2014	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2014	\$75,000	LS	1	\$75,000
<b>2015</b>					
Lagoon monitoring/maintenance	2015	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2015	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2015	\$75,000	LS	1	\$75,000
<b>2016</b>					
Lagoon monitoring/maintenance	2016	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2016	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2016	\$75,000	LS	1	\$75,000
<b>2017</b>					
Lagoon monitoring/maintenance	2017	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2017	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2017	\$75,000	LS	1	\$75,000
<b>2018</b>					
Lagoon monitoring/maintenance	2018	\$20,000	LS	1	\$20,000
Landfill monitoring/maintenance	2018	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2018	\$75,000	LS	1	\$75,000
<b>2019</b>					
Lagoon monitoring/maintenance	2019	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2019	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2019	\$75,000	LS	1	\$75,000
<b>2020</b>					
Lagoon monitoring/maintenance	2020	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2020	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2020	\$75,000	LS	1	\$75,000
<b>2021</b>					
Lagoon monitoring/maintenance	2021	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2021	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2021	\$75,000	LS	1	\$75,000
<b>2022</b>					
Lagoon monitoring/maintenance	2022	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2022	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2022	\$75,000	LS	1	\$75,000
<b>2023</b>					
Lagoon monitoring/maintenance	2023	\$20,000	LS	1	\$20,000
Landfill monitoring/maintenance	2023	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2023	\$75,000	LS	1	\$75,000
Groundwater Monitoring/Reporting Backup	2023	\$75,000	LS	1	\$75,000



**Notes and Calculations**  
**Delphi - Moraine**

**OMM Lagoons, Landfills, Groundwater Monitoring, and Reporting**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>2024</u>					
Lagoon monitoring/maintenance	2024	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2024	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2024	\$75,000	LS	1	\$75,000
<u>2025</u>					
Lagoon monitoring/maintenance	2025	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2025	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2025	\$75,000	LS	1	\$75,000
<u>2026</u>					
Lagoon monitoring/maintenance	2026	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2026	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2026	\$75,000	LS	1	\$75,000
<u>2027</u>					
Lagoon monitoring/maintenance	2027	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2027	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2027	\$75,000	LS	1	\$75,000
<u>2028</u>					
Lagoon monitoring/maintenance	2028	\$20,000	LS	1	\$20,000
Landfill monitoring/maintenance	2028	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2028	\$75,000	LS	1	\$75,000
<u>2029</u>					
Lagoon monitoring/maintenance	2029	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2029	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2029	\$75,000	LS	1	\$75,000
<u>2030</u>					
Lagoon monitoring/maintenance	2030	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2030	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2030	\$75,000	LS	1	\$75,000
<u>2031</u>					
Lagoon monitoring/maintenance	2031	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2031	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2031	\$75,000	LS	1	\$75,000
<u>2032</u>					
Lagoon monitoring/maintenance	2032	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2032	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2032	\$75,000	LS	1	\$75,000
<u>2033</u>					
Lagoon monitoring/maintenance	2033	\$15,000	LS	1	\$20,000
Landfill monitoring/maintenance	2033	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2033	\$75,000	LS	1	\$75,000
<u>2034</u>					
Lagoon monitoring/maintenance	2034	\$20,000	LS	1	\$15,000
Landfill monitoring/maintenance	2034	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2034	\$75,000	LS	1	\$75,000
<u>2035</u>					
Lagoon monitoring/maintenance	2035	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2035	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2035	\$75,000	LS	1	\$75,000
<u>2036</u>					
Lagoon monitoring/maintenance	2036	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2036	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2036	\$75,000	LS	1	\$75,000

**Notes and Calculations**  
**Delphi - Moraine**

**OMM Lagoons, Landfills, Groundwater Monitoring, and Reporting**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>2037</b>					
Lagoon monitoring/maintenance	2037	\$15,000	LS	1	\$15,000
Landfill monitoring/maintenance	2037	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2037	\$75,000	LS	1	\$75,000
<b>2038</b>					
Lagoon monitoring/maintenance	2038	\$15,000	LS	1	\$20,000
Landfill monitoring/maintenance	2038	\$10,000	LS	1	\$10,000
Groundwater Monitoring/Reporting	2038	\$75,000	LS	1	\$75,000

Annual Cost Breakdown	
2009	\$90,000
2010	\$100,000
2011	\$100,000
2012	\$100,000
2013	\$105,000
2014	\$100,000
2015	\$100,000
2016	\$100,000
2017	\$100,000
2018	\$105,000
2019	\$100,000
2020	\$100,000
2021	\$100,000
2022	\$100,000
2023	\$105,000
2024	\$100,000
2025	\$100,000
2026	\$100,000
2027	\$100,000
2028	\$105,000
2029	\$100,000
2030	\$100,000
2031	\$100,000
2032	\$100,000
2033	\$105,000
2034	\$100,000
2035	\$100,000
2036	\$100,000
2037	\$100,000
2038	\$105,000
<b>Total</b>	<b>\$3,020,000</b>

**Notes and Calculations**  
**Delphi - Moraine**

**Landfill L1**

**Moraine Landfill L1 Investigation**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
Geotechnical Drilling (5 borings)	2010	\$5,000	Day	2	\$10,000
Geotechnical Analytical Data	2010	\$10,000	LS	1	\$10,000
Rotosonic Drilling (50 borings to approx. 30 feet)	2010	\$6,000	Day	15	\$90,000
HAS Monitoring	2010	\$1,300	Day	15	\$19,500
Oversite of Drilling (including expenses)	2010	\$1,300	Day	18	\$23,400
Waste Management	2010	\$200	Drum	100	\$20,000
Analytical Samples - VOCs (3 per boring)	2010	\$110.00	Sample	150	\$16,500
Office field support	2010	\$10,000.00	LS	1	\$10,000
Work Plan and Summary Report	2010	\$30,000.00	LS	1	\$30,000
Surveying	2010	\$5,000.00	LS	1	\$5,000
Project Management	2010	\$20,000.00	LS	1	\$20,000
Contingency	2010	10%	%	1	\$25,440
<b>Total Estimate</b>					<b>\$279,840</b>

Assumptions:

- 1) Second person required for Health and Safety monitoring; drilling in a landfill.
- 2) Waste is assumed to be non-hazardous.

**Moraine Landfill L1 Cap**  
**Engineer's Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
Mobilization/Demobilization	2011	\$150,000	LS	1	\$150,000
Clearing and Grubbing	2011	\$2,500	AC	8.3	\$20,750
Subgrade Preparation	2011	\$2,500	AC	8.3	\$20,750
Compacted Grading soils (Assumed average 4-feet of thickness)	2011	\$15.00	CY	53,563	\$803,440
Gas Venting Geocomposite	2011	\$0.50	SF	361,548	\$180,774
GCL	2011	\$0.75	SF	361,548	\$271,161
Geomembrane	2011	\$0.40	SF	361,548	\$144,619
Geocomposite	2011	\$0.50	SF	361,548	\$180,774
2-ft cover soils	2011	\$12.00	CY	26,781	\$321,376
6-in Topsoil	2011	\$15.00	CY	6,695	\$100,430
Seed/Fertilize/Mulch	2011	\$3,000	AC	8.3	\$24,900
Perimeter Ditch	2011	\$50.00	LF	2,600	\$130,000
Gas Vents	2011	\$1,000	EA	8	\$8,000
Erosion/Sediment Controls	2011	\$10,000	EA	1	\$10,000
Decon/Haz Mat	2011	\$25,000	EA	1	\$25,000
Misc - Site Controls, Site Clean-up, etc.	2011	\$25,000	EA	1	\$25,000
Engineering and CQA	2011				\$400,000
<b>Total Engineer's Estimate</b>					<b>\$2,816,974</b>

8.3 acres

**Notes and Calculations**  
**Delphi - Moraine**

**Source Treatment for Oil House (AOI-7) and Sump**

**AOI-7 Source Area Treatment**  
**SVE and ERD Install**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>SVE install</b>					
Additional Investigation	2010	\$6,500	LS	1	\$6,500
Pilot test	2010	\$55,000	LS	1	\$55,000
Drilling wells	2010	\$100	foot	900	\$90,000
waste management	2010	\$125	drum	60	\$7,500
trenching/piping	2010	\$60,000	LS	1	\$60,000
Building	2010	\$40,000	LS	1	\$40,000
SVE equipment	2010	\$30,000	LS	1	\$30,000
Air Treatment equipment (catox and scrubber)	2010	\$250,000	LS	1	\$250,000
Manifold, valves, controls, electrical	2010	\$60,000	LS	1	\$60,000
Electrical/Mechanical install	2010	\$125	hours	320	\$40,000
Electrical Drop	2010	\$15,000	LS	1	\$15,000
Project Management and Oversight	2010	\$130,000	LS	1	\$130,000
Contingency	2010	20%	%	1	\$156,800
<b>ERD install</b>					
Additional Investigation	2010	\$6,500	LS	1	\$6,500
Drilling wells and well construction	2010	\$120	feet	1600	\$192,000
waste management	2010	\$125	drum	70	\$8,750
Building	2010	\$10,000	LS	1	\$10,000
equipment - pump, mixer	2010	\$30,000	LS	1	\$30,000
manifold, valves, instruments, controls, electrical	2010	\$65,000	LS	1	\$65,000
trenching/piping	2010	\$80,000	LS	1	\$80,000
Chemical storage tank	2010	\$20,000	LS	1	\$20,000
Electrical drop	2010	\$15,000	LS	1	\$15,000
mechanical/electrical install	2010	\$85	hours	300	\$25,500
Project Management and Oversight	2010	\$150,000	LS	1	\$150,000
Contingency	2010	20%	%	1	\$120,550
<b>Total Estimate</b>					<b>\$1,664,100</b>

**Sump Area Investigation**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
Work Plan	2010	\$20,000	LS	1	\$20,000
Rotosonic Drilling	2010	\$6,000	Day	10	\$60,000
Utility clearing	2010	\$3,500	Day	2	\$7,000
Oversite of Drilling (including expenses)	2010	\$1,300	Day	12	\$15,600
Well installation	2010	\$5,000	well	5	\$25,000
Waste Management	2010	\$200	Drum	15	\$3,000
Laboratory Samples (VOCs)	2010	\$110	Sample	40	\$4,400
Office field support	2010	\$10,000.00	LS	1	\$10,000
Surveying	2010	\$2,000.00	LS	1	\$2,000
Summary Report	2010	\$10,000.00	LS	1	\$10,000
Project Management/Coordination	2010	\$10,000.00	LS	1	\$10,000
Contingency	2010	20.00%	%	1	\$33,400
<b>Total Estimate</b>					<b>\$200,400</b>

Assumptions:

- 1) assume 2 borings per day in upper aquifer (total depth = 60 feet) - 20 borings
- 2) Vertical aquifer profiling every 10 feet after water (~30)
- 3) Utility Clearing 10 points per day

Notes and Calculations  
Delphi - Moraine

Source Treatment for Oil House (AOI-7) and Sump  
Sump Source Area Treatment  
SVE and ERD install  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>SVE install</b>					
Additional Investigation	2011	\$6,500	LS	1	\$6,500
Pilot test	2011	\$55,000	LS	1	\$55,000
Drilling wells	2011	\$100	foot	900	\$90,000
waste management	2011	\$125	drum	55	\$6,875
trenching/piping	2011	\$60,000	LS	1	\$60,000
Building	2011	\$40,000	LS	1	\$40,000
SVE equipment	2011	\$30,000	LS	1	\$30,000
Air Treatment equipment (catox and scrubber)	2011	\$250,000	LS	1	\$250,000
Manifold, valves, controls, electrical	2011	\$60,000	LS	1	\$60,000
Electrical/Mechanical install	2011	\$125	hours	310	\$38,750
Electrical Drop	2011	\$15,000	LS	1	\$15,000
Project Management and Oversight	2011	\$130,000	LS	1	\$130,000
Contingency	2011	30	%	1	\$234,638
<b>ERD install</b>					
Additional Investigation	2011	\$6,500	LS	1	\$6,500
Drilling wells and well construction	2011	\$120	feet	1600	\$192,000
waste management	2011	\$125	drum	55	\$6,875
Building	2011	\$10,000	LS	1	\$10,000
equipment - pump, mixer	2011	\$30,000	LS	1	\$30,000
manifold, valves, instruments, controls, electrical	2011	\$65,000	LS	1	\$65,000
trenching/piping	2011	\$80,000	LS	1	\$80,000
Chemical storage tank	2011	\$20,000	LS	1	\$20,000
Electrical drop	2011	\$15,000	LS	1	\$15,000
mechanical/electrical install	2011	\$85	hours	300	\$25,500
Project Management and Oversight	2011	\$150,000	LS	1	\$150,000
Contingency	2011	30	%	1	\$180,263
Total Estimate					\$1,797,900

AOI 7 and Sump Area O&M  
Cost Estimate

Item	Year	Unit Rate	Unit	Quantity	Cost
<b>AOI 7</b>					
<b>SVE</b>					
Electrical Usage	2011	\$0.11	KW - hour	160000	17,600
Gas Usage	2011	\$1.20	therm	50000	60,000
Labor (16 hours per month)	2011	\$100	hour	189	18,943
Equipment replacement/repair	2011	\$30,000	LS	1	30,000
Catalyst replacement (every other year)	2011	\$50,000	LS	0.5	25,000
Maintenance	2011	\$25,000.00	LS	1	25,000
Data Management (5 hours per month)	2011	\$100.00	hour	60	6,042
System Report	2011	\$10,000.00	LS	1	10,000
Injection substrate into SVE wells	2011	\$50,000.00	LS	1	50,000
Project Management	2011	\$50,000.00	LS	1	50,000
Contingency	2011	20	%	1	48,517
<b>ERD</b>					
System Labor/Maintenance (40 hours per month)	2011	\$100.00	hour	480	48,000
Molasses	2011	\$5,000.00	month	12	60,000
Data Management/Data Evaluation (10 hours per month)	2011	\$100.00	hour	120	12,000
System reporting	2011	\$10,000.00	LS	1	10,000
Project Management	2011	\$40,000.00	LS	1	40,000
Contingency	2011	20	%	1	34,000
<b>Sump</b>					
<b>SVE</b>					
Electrical Usage	2012	\$0.11	KW - hour	160000	17,600
Gas Usage	2012	\$1.20	therm	50000	60,000
Labor (16 hours per month)	2012	\$100	hour	190	19,000
Equipment replacement/repair	2012	\$30,000	LS	1	30,000
Catalyst replacement (every other year)	2012	\$50,000	LS	0.5	25,000
Maintenance	2012	\$25,000.00	LS	1	25,000
Data Management (5 hours per month)	2012	\$100.00	hour	59	5,900
System Report	2012	\$10,000.00	LS	1	10,000
Injection substrate into SVE wells	2012	\$30,000.00	LS	1	30,000
Project Management	2012	\$40,000.00	LS	1	40,000
Contingency	2012	20	%	1	44,500
<b>ERD</b>					
System Labor/Maintenance (40 hours per month)	2012	\$100.00	hour	480	48,000
Molasses	2012	\$5,000.00	month	12	60,000
Data Management/Data Evaluation (10 hours per month)	2012	\$100.00	hour	120	12,000
System reporting	2012	\$10,000.00	LS	1	10,000
Project Management	2012	\$30,000.00	LS	1	30,000
Contingency	2012	20	%	1	32,000

October 30, 2009

Notes and Calculations  
Delphi - Moraine

Source Treatment for Oil House (AOI-7) and Sump

AOI-7					
SVE	2012	\$341,000.00	LS	1	341,000
IRZ	2012	\$204,000.00	LS	1	204,000
AOI-7					
SVE	2013	\$341,000.00	LS	1	341,000
IRZ	2013	\$204,000.00	LS	1	204,000
Sump Area					
SVE	2013	\$295,000.00	LS	1	295,000
IRZ	2013	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2014	\$204,000.00	LS	1	204,000
Sump Area					
SVE	2014	\$295,000.00	LS	1	295,000
IRZ	2014	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2015	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2015	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2016	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2016	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2017	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2017	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2018	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2018	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2019	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2019	\$204,000.00	LS	1	204,000
AOI-7					
IRZ	2020	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2020	\$204,000.00	LS	1	204,000
Sump Area					
IRZ	2021	\$204,000.00	LS	1	204,000

Annual Cost Breakdown	
2010	\$1,864,500
2011	\$2,343,001
2012	\$1,044,000
2013	\$1,044,000
2014	\$703,000
2015	\$408,000
2016	\$408,000
2017	\$408,000
2018	\$408,000
2019	\$408,000
2020	\$408,000
2021	\$204,000
Total	\$9,650,501

**Notes and Calculations**  
**Delphi - Moraine**

**Vapor Intrusion Investigation**

**Vapor Intrusion On-site and Off-site Investigation**  
**Cost Estimate**

Item	Year	Unit Rate	Unit	Quantity	Cost
<u>On-site investigation</u>					
geoprobe drilling	2011	\$1,700	day	3	\$5,100
Utility clearing	2011	\$3,500	day	1	\$3,500
Permanent point installation	2011	\$1,000	LS	10	\$10,000
Oversite of installation	2011	\$1,300	day	4	\$5,200
Summa Sampling (10 points - each month)	2011	\$600	sample	120	\$72,000
Monthly sampling	2011	\$1,300	month	12	\$15,600
Data Management and review	2011	\$20,000	LS	1	\$20,000
Modelling	2011	\$10,000	LS	1	\$10,000
Work plan	2011	\$20,000	LS	1	\$20,000
Office Support	2011	\$10,000	LS	1	\$10,000
Project Management	2011	\$20,000	LS	1	\$20,000
Contingency	2011	20	%	1	\$38,280
<u>Off-site Investigation</u>					
Workplan and Community Relations Plan	2010	\$50,000	LS	1	\$50,000
Area Southwest of MLC Property investigation					
Obtain permission per residential property	2010	\$1,500	resident	75	\$112,500
Install sub-slab sampling point	2010	\$500	resident	75	\$37,500
Subslab samples (3)	2010	\$2,520	resident	75	\$189,000
Ambient air samples (2)	2010	\$1,680	resident	75	\$126,000
Field sampling	2010	\$2,000	resident	75	\$150,000
Data analysis	2010	\$500	resident	75	\$37,500
Risk Assessment/Risk communication	2010	\$500	resident	75	\$37,500
Project Management	2010	\$1,500	resident	75	\$112,500
Contingency	2010	20	%	1	\$170,500
<b>Total Estimate</b>					<b>\$1,252,680</b>

**Assumptions:**

- 1) Only the area south of Hoylake and west of Dryden Road
- 2) 75 residents in neighborhood
- 3) no residential mitigation costs included
- 4) no industrial buildings investigation/mitigation costed

Annual Cost Breakdown	
2010	\$1,023,000
2011	\$229,680
<b>Total</b>	<b>\$1,252,680</b>

**Additional Costs:**

Mitigation Costs per resident

\$15,000 see below for cost details

**Mitigation Cost include:**

Subspace or Crawlspace depressurization and Sealing, capital cost of design and installation.	\$6,000
Annual cost of system maintenance and monitoring of function (8 years)	\$4,800
Energy Consumption (8 years)	\$2,700
Project Management, coordination (8 years)	\$1,500
<b>Total (8 years)</b>	<b>\$15,000</b>