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NWIRP CALVERTON
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CORRECTIVE MEASURES STUDY ADDENDUM SOUTHERN AREA GROUNDWATER
PLUME NWIRP CALVERTON NY
08/01/2011
TETRA TECH NUS

Corrective Measures Study (CMS) Addendum

Southern Area Groundwater Plume

Naval Weapons Industrial Reserve Plant Calverton, New York



Mid-Atlantic Division Naval Facilities Engineering Command

**Contract Number N62470-08-D-1001
Contract Task Order WE08**

August 2011



**TABLE 1
AREA-SPECIFIC ALTERNATIVE EVALUATION AND RECOMMENDED REMEDY
SOUTHERN AREA GROUNDWATER CMS ADDENDUM
NWIRP CALVERTON, NEW YORK
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Area	Alternative	CMS Alternative Reference	Time to Implement	Estimated Duration	Initial Contaminant Treatment Rate	Mass of Contaminant Treated	Cost	Human Health Effects	Ecological Effects	Decision Matrix
Source Area	1. No Action	1	0 Year	NA	NA	NA	\$0	Unacceptable risk from potential future consumption of contaminated groundwater.	No ecological receptor exposure.	None
	2. LUCs and Monitoring ¹	3 and 7	1 Year	2 to 8 years	NA	NA	PV: \$245k Capital: \$91k OMM: Yr1-Yr4: \$26k/yr to \$51k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	Evaluate contaminant trends over 2 years. Establish trigger values in a Remedial Design based on evidence of continuing release of VOCs in the source area to groundwater (e.g., VOC mass flux from Source Area should decrease by 30 percent or more per year). If the Source Area continues to release VOCs to groundwater, evaluate the use of air sparging as an optimization step relative to the continued operation of the Fence Line Treatment System or to otherwise accelerate the cleanup of the Source Area (property transfer). Discontinue monitoring when cleanup goals are achieved.
	3. Air Sparging, LUCs, and Monitoring ²	4	2 Years	2 to 8 years	11 pounds per year	21 pounds ³	PV: \$2,024k Capital: \$133k OMM: Yr1, Yr2, and Yr5-Yr8: \$32k/yr to \$130k/yr; Yr3-Yr4: \$234k/yr to \$1,320k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	If needed, based on the Source Area and Fence Line Area groundwater monitoring data, establish an area for treatment (e.g., VOCs greater than 5, 50, or 500 µg/L) and establish a treatment goal (e.g., shutdown when VOC concentrations are reduced by 90 percent or more or MCLs are achieved). The treatment area may extend into the northern portion of the Fence Line Area. Discontinue monitoring when cleanup goals are achieved.
	4. Anaerobic Biodegradation, LUCs, and Monitoring	5 and 6	2 Years	2 to 8 years	5 to 10 pounds per year	21 pounds ³	PV: \$1,388k Capital: \$133k OMM: Yr 1, Yr2, and Yr4-Yr8: \$35k/yr to \$234k/yr; Yr3: 887k.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	None
Fence Line Area	1. No Action	1	0 Years	NA	NA	NA	\$0	Unacceptable risk from potential future consumption of contaminated groundwater.	No ecological receptor exposure.	None
	2. LUCs and Monitoring	3 and 7	1 Year	2 to 8 years	NA	NA	PV: \$249k Capital: \$75k OMM: Yr 1-Yr4: 31k/yr to \$55k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	None
	3. Anaerobic Biodegradation, LUCs, and Monitoring ²	5 and 6	2 Years	2 to 6 years	47 pounds per year	95 pounds ³	PV: \$1,960k Capital: \$114k OMM: Yr1, Yr2, and Yr4 to Yr8: 37k to 152k; Yr3: 1,459k.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	None
	4. Extraction, Treatment, and Discharge, LUCs, and Monitoring ¹	7	1 Year	2 to 8 years	35 pounds per year	95 pounds ³	PV: \$3,056k Capital: \$1,445k OMM: Yr1-Yr5: \$276k/yr to \$579k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	Evaluate contaminant trends and hydraulic capture over 2 to 4 years. Evaluate the effectiveness of plume containment, and if necessary, modify groundwater extraction and discharge to optimize performance. Establish shutdown criteria in Remedial Design (e.g., when average and maximum VOCs in Fence Line Wells are less than 10 µg/L and 50 µg/L, respectively). Discontinue monitoring when cleanup goals are achieved.

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Area	Alternative	CMS Alternative Reference	Time to Implement	Estimated Duration	Initial Contaminant Treatment Rate	Mass of Contaminant Treated	Cost	Human Health Effects	Ecological Effects	Decision Matrix
Offsite Southern Area , (VOCs greater than 500 µg/L)	1. No Action	1	0 Years	NA	NA	NA	\$0	Unacceptable risk from potential future consumption of contaminated groundwater.	No ecological receptor exposure.	None
	2. LUCs and Monitoring ¹	3, 4, and 7	1 Year	4 to 10 Years	NA	NA	PV: \$169k Capital: \$24k OMM: Yr1-Yr8: \$17k/yr to \$35k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	Based on calculated flows in this area, evaluate contaminant trends over 2 to 4 years and establish trigger values in a Remedial Design. The trigger values would evaluate the migration of VOCs into and out of this area and within the area. If VOCs are continuing to migrate into the area, the effectiveness of Fence Line Treatment System would be evaluated. If more VOCs are present in this area than anticipated or VOCs are leaving this area at a significantly higher rate than under current conditions that could adversely affect ecological receptors in the Peconic River, then conduct increased monitoring throughout the plume to better define the migration and potential impacts. Also re-evaluate the need for Anaerobic Biodegradation in this area and/or Air Sparging at the Peconic River. Discontinue monitoring when cleanup goals are achieved.
	3. Anaerobic Biodegradation, LUCs, and Monitoring ²	5 and 6	4 Years	4 to 8 Years	75 pounds per year	153 pounds	PV: \$1,874k Capital: \$61k OMM: Yr1-Yr4, and Yr6-Yr8: \$22k/yr to \$89k/yr; Yr5: \$1,612k.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	If needed, based on an evaluation of upgradient and downgradient groundwater monitoring data and potential impacts to the Peconic River, establish an area for treatment (e.g., VOCs greater than 50 or 500 µg/L) and establish a treatment goal (e.g., shutdown when VOC concentrations are reduced by 90 percent or more or MCLs are achieved). Establish shutdown criteria in Remedial Design (e.g., when average and maximum VOCs in the area are less than 10 µg/L and 50 µg/L, respectively). Discontinue monitoring when cleanup goals are achieved.
Offsite Southern Area , (VOCs less than 500 µg/L)	1. No Action	1	0 Year	NA	NA	NA	\$0	Unacceptable risk from potential future consumption of contaminated groundwater.	No ecological receptor exposure.	None
	2. LUCs and Monitoring ¹	3, 4, 5, 6 and 7	2 Years	6 to 14 Years	NA	NA	PV: \$801k Capital: \$91k OMM: Yr1-Yr10: \$62k/yr to \$ 90k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	No ecological receptor exposure.	Based on calculated flows in this area, evaluate contaminant trends over 4 to 8 years and establish trigger values in a Remedial Design. The trigger values would evaluate the migration of VOCs into and out of this area and within the area. If more VOCs are present in this area than anticipated or VOCs are leaving this area at a significantly higher rate than under current conditions that could adversely affect ecological receptors in the Peconic River, then conduct increased monitoring throughout the plume to better define migration and potential impacts. Also re-evaluate the need for Anaerobic Biodegradation in the Offsite High Concentration Area and/or Air Sparging at the Peconic River. Discontinue monitoring when cleanup goals are achieved.

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AREA-SPECIFIC ALTERNATIVE EVALUATION AND RECOMMENDED REMEDY
SOUTHERN AREA GROUNDWATER CMS ADDENDUM
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Area	Alternative	CMS Alternative Reference	Time to Implement	Estimated Duration	Initial Contaminant Treatment Rate	Mass of Contaminant Treated	Cost	Human Health Effects	Ecological Effects	Decision Matrix
Peconic River Area	1. No Action	1	0 Year	NA	NA	NA	\$0	Unacceptable risk from potential future consumption of contaminated groundwater.	Potential for excessive exposure to macro-invertebrates.	None
	2. LUCs and Monitoring ¹	3,5,and 6	2 Years	8 to 36 Years	NA	NA	PV: \$386k Capital: \$34k OMM: Yr1-Yr17: \$22k/yr to \$31k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	Potential for excessive exposure to macro-invertebrates.	Based on calculated flows in this area, evaluate contaminant trends over 4 to 16 years and establish trigger values in a Remedial Design. The trigger values would evaluate the migration of VOCs into and out of this area and within the area. If more VOCs are present in this area than anticipated or VOCs are leaving this area at a significantly higher rate than under current condition that could adversely affect ecological receptors in the Peconic River, then conduct increased monitoring throughout the plume to better define migration and potential impacts. Concurrently, re-evaluate the need for Air Sparging at the Peconic River. Discontinue monitoring when cleanup goals are achieved.
	3. Air Sparging, LUCs, and Monitoring ²	4 and 6	3 Years	12 to 36 Years	5.2 pounds per year	Up to 275 pounds	PV: \$6,292k Capital: \$34k OMM: Yr1-Yr4: \$24k/yr to \$92k/yr; Yr5: \$2,440k; Yr6-Yr20: \$260k/yr to \$270k/yr; Yr21-Yr24: \$29k/yr to \$271k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	Reduces or eliminates potential for excessive exposure to macro-invertebrates.	If needed, based on an evaluation of upgradient groundwater and surface water monitoring data and potential impacts to the Peconic River, establish an area for treatment (e.g., VOCs greater than 5 or 50 µg/L) and establish a treatment goal (e.g., shutdown when VOC concentrations are reduced by 90 percent or more or MCLs are achieved). Establish shutdown criteria in Remedial Design, (e.g. when average and maximum VOCs in the area are less than 10 µg/L and 50 µg/L , respectively). Discontinue monitoring when cleanup goals are achieved.
	4. Extraction, Treatment, and Discharge, LUCs, and Monitoring.	7	3 Years	12 to 36 Years	5.2 pounds per year	Up to 275 pounds	PV: \$17,774k Capital: \$34k OMM: Yr1-Yr4: \$24k/yr to \$92k/yr; Yr5: \$5,421k; Yr6-Yr20: \$1,017k/yr to \$1,027k/yr; Yr21-Yr24: \$26k/yr to \$130k/yr.	LUCs and monitoring used to prevent potable use of groundwater until cleanup levels are achieved.	Reduces or eliminates potential for excessive exposure to macro-invertebrates. Potential for localized short-term dewatering of wetlands.	None

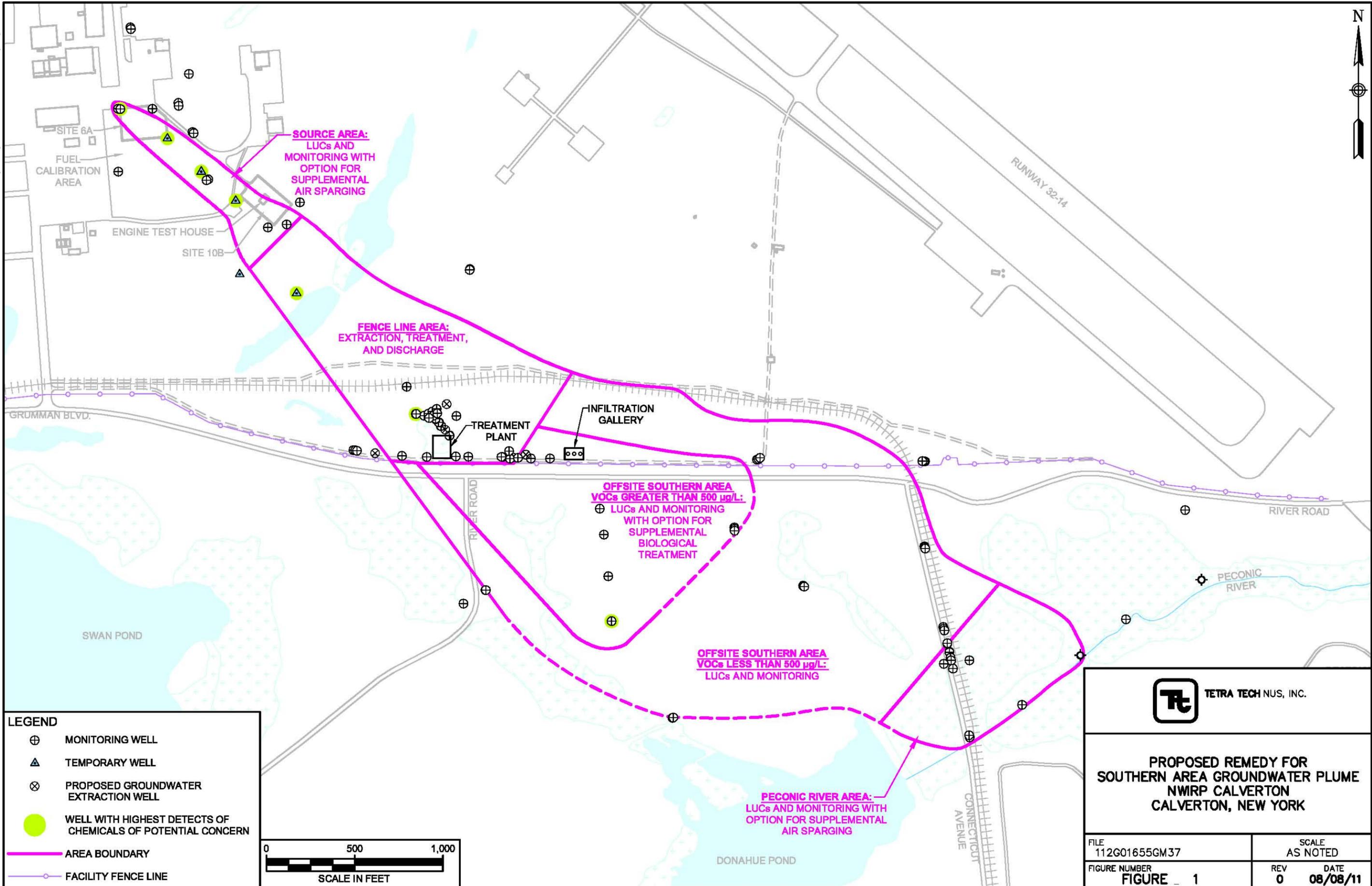
Notes:

1 Yellow- shaded alternatives are the Navy-recommended alternative for the corresponding area.

2 Pale yellow-shaded areas are contingency remedies to be implemented based on monitoring data and optimization.

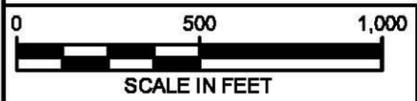
3. Total mass is based on the currently estimated quantity of VOCs present in the source area, higher quantities may be present.

O&M – operation and maintenance µg/L – micrograms per liter VOC – volatile organic compound PV – present value OMM – Operation, Maintenance, and Monitoring k - \$1,000s yr – year.



LEGEND

- ⊕ MONITORING WELL
- ▲ TEMPORARY WELL
- ⊗ PROPOSED GROUNDWATER EXTRACTION WELL
- WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
- AREA BOUNDARY
- - - FACILITY FENCE LINE



 TETRA TECH NUS, INC.	
PROPOSED REMEDY FOR SOUTHERN AREA GROUNDWATER PLUME NWRP CALVERTON CALVERTON, NEW YORK	
FILE 112G01655GM37	SCALE AS NOTED
FIGURE NUMBER FIGURE 1	REV DATE 0 08/08/11

APPENDIX A
COST ESTIMATES

**APPENDIX A - Area 1: Source Area
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY ADDENDUM
NWIRP CALVERTON, NEW YORK**

Alternative	Alternative 2 LUCs and Monitoring			Alternative 3 Air Sparge, LUCs, and Monitoring			Alternative 4 Anaerobic Biodegradation, LUCs, and Monitoring		
Alternative Evaluation Timeframe	4 years			8 years			8 years		
	-30%	Estimate	+50%	-30%	Estimate	+50%	-30%	Estimate	+50%
Total Implementation Costs	\$64,000	\$91,000	\$137,000	\$93,000	\$133,000	\$199,000	\$93,000	\$133,000	\$199,000
Present Value of Future Costs	\$108,000	\$154,000	\$231,000	\$1,324,000	\$1,891,000	\$2,837,000	\$879,000	\$1,255,000	\$1,883,000
Grand Total Present Value	\$172,000	\$245,000	\$368,000	\$1,417,000	\$2,024,000	\$3,036,000	\$972,000	\$1,388,000	\$2,082,000

Notes:

- Alternative 1 - No Action has no cost (\$0).

- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-cl.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Area	1. Source Area					
Alternative	2 - LUCs & Monitoring		3 - Air Sparge, LUCs, & Monitoring		4. Biodegradation, LUCs, & Monitoring	
Duration	4 years (geo mean of 2-8yr range)		8 years (prescribed timeframe/steps)		8 years (prescribed timeframe/steps)	
TOTAL Present Value	\$245,414		\$2,023,774		\$1,387,812	
Implementation	\$91,272	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells	\$132,606	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells	\$132,606	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells
Future Total PV	\$154,142		\$1,891,169		\$1,255,207	
Year						
1	\$1,650 \$24,727	LUC Inspection 9-month LTM	\$1,650 \$129,396	LUC Inspection Quarterly LTM (total)	\$1,650 \$129,396	LUC Inspection Quarterly LTM (total)
2	\$1,650 \$24,727	LUC Inspection 18-month LTM	\$1,650 \$32,349	LUC Inspection Annual LTM	\$1,650 \$32,349	LUC Inspection Annual LTM
3	\$1,650 \$49,454	LUC Inspection 27- & 36-month LTM	\$1,650 \$50,552 \$909,407 \$202,623 \$156,179	LUC Inspection New performance well install & sample Air Sparge Install & Startup Air Sparge O&M Quarterly LTM (total)	\$1,650 \$63,162 \$647,883 \$174,756	LUC Inspection New performance well install & sample Injection Well Install & Injection Quarterly LTM (total)
4	\$1,650 \$24,977 \$24,727	LUC Inspection Well Abandonment Annual LTM	\$1,650 \$202,623 \$30,322	LUC Inspection Air Sparge O&M Annual LTM	\$1,650 \$33,720	LUC Inspection Annual LTM
5			\$1,650 \$3,450 \$5,738 \$30,322	LUC Inspection 5YR Well Maintenance Annual LTM	\$1,650 \$3,450 \$5,738 \$33,720	LUC Inspection 5YR Well Maintenance Annual LTM
6			\$1,650 \$30,322	LUC Inspection Annual LTM	\$1,650 \$33,720	LUC Inspection Annual LTM
7			\$1,650 \$30,322	LUC Inspection Annual LTM	\$1,650 \$33,720	LUC Inspection Annual LTM
8			\$1,650 \$64,306 \$34,463 \$30,322	LUC Inspection Well Abandonment Demo/Abandon Air Sparge system Annual LTM	\$1,650 \$38,865 \$33,720	LUC Inspection Well Abandonment Annual LTM

Table A-1.1
Area 1: Source Area
Cost Estimate for Alternative 1 - No Action
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

No Action
Cost = \$0

Table A-1.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 1: Source Area
Southern Area Feasibility Study Addendum
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Assumptions:

LUC RD prepared by contractor. RAOs met before 5 years; therefore, no 5YR or well maintenance needed. Annual LUC inspections performed by contractor.

Baseline sampling of 12 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 4 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).

MNA performance monitoring of 10 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annual event during final Year 4.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$7,500	\$7,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (12 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,572	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$480	
Lab & Data Validation	1	each	\$7,147	\$7,147	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New Well Installation (4 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$500	\$500	

Table A-1.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 1: Source Area
Southern Area Feasibility Study Addendum
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Labor, ODCs, and Travel	1.0	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$2,000	\$2,000	
<i>Subtotal</i>				\$16,325	
<i>Contingency</i>	25%			\$4,081	
<i>Project Management</i>	10%			\$1,633	
<i>G&A</i>	10%			\$1,633	
<i>Fee</i>	8%			\$1,306	
<i>Subtotal</i>				\$24,977	
Well Abandonment Future Annual Cost at Year 4				\$24,977	
<i>Present Value (0.2%) of Future Cost of Well Abandonment</i>	4	year	0.2%	\$24,581	
Performance Groundwater Monitoring (16 wells) Months 9, 18, 27, and 36					
Labor, ODCs, travel	1.6	week	\$9,525	\$15,240	Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event. 9, 18, 27, and 36 month events. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.6	week	\$1,000	\$1,600	
Lab & Data Validation	4	each	\$6,247	\$24,989	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$66,829	
<i>Contingency</i>	20%			\$13,366	
<i>Project Management</i>	10%			\$6,683	
<i>G&A</i>	10%			\$6,683	
<i>Fee</i>	8%			\$5,346	
<i>Subtotal</i>				\$98,907	
Future Monitoring Annual Cost during each of Years 1 and 2			\$24,727		(Total / 4). 1 event each of years 1 and 2
Future Monitoring Annual Cost at Year 3			\$49,454		(Total / 2). 2 events in year 3
Total Future Monitoring Cost Years 1-3				\$98,907	
<i>Present Value (0.2%) of Future Cost of Groundwater Sampling Years 1-3</i>	3	year	0.2%	\$98,464	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).

Table A-1.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Year 4 (annual)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	0.4	week	\$9,525	\$3,810	
Equipment & Expendables	0.4	week	\$1,000	\$400	
Lab & Data Validation	1	each	\$6,247	\$6,247	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$16,707	
<i>Contingency</i>	20%			\$3,341	
<i>Project Management</i>	10%			\$1,671	
<i>G&A</i>	10%			\$1,671	
<i>Fee</i>	8%			\$1,337	
<i>Subtotal</i>				\$24,727	
Monitoring Total Future Cost (Year 4)				\$24,727	
<i>Present Value</i> <small>(0.2%)</small> <i>of Future Cost of Groundwater Sampling Year 4</i>	4	year	0.2%	\$24,530	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$154,142	Y2011 PV calculated for 4-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 3 - LUCs and Monitoring					
			-30%	+50%	
	\$245,414		\$171,790	\$368,121	

Table A-1.2(b) - Lab Backup for Alternative 2 - LUCs and Monitoring
Area 1: Source Area
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 12 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	12	2	3	1	3	2	2					25	25	\$111.71	\$2,792.75	\$2,792.75	
Methane, Ethane, & Ethene by RSK-175	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide by USEPA 376.1	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity by USEPA 310.1	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC by SW-846 9060 Quadruplicate analysis	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,146.56
Additional Baseline -- Assume 4 new wells																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$95.00	\$950.00	\$950.00	
Methane, Ethane, Ethene	GW	4	0	0	0	0	1	1					6	6	\$101.09	\$606.54	\$606.54	
Nitrate, Nitrite, Sulfate	GW	4	0	0	0	0	1	1					6	6	\$48.82	\$292.92	\$292.92	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$21.91	\$131.46	\$131.46	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.18	\$79.08	\$79.08	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$128.57	\$771.42	\$771.42	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	
Dissolved Arsenic, Iron, and Manganese	GW	4	1	0	0	0	1	1					7	7	\$28.08	\$196.56	\$196.56	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$4,129.93
																TOTAL IMPLEMENTATION LAB COST		\$11,276.49
Performance Monitoring																		
Months 9, 18, 27, and 36 -- Assume 10 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, and Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$6,247.29
																Total for 9,18,27&36 months		\$24,989.18
Year 4 -- Assume 10 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, and Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$6,247.29
																Total for 4		\$6,247.29
																TOTAL FUTURE LAB COST		\$31,236.47

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 12 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 4 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitor 10 wells for 2 yrs, quarterly during Year 1 and once during Year 2.

Install Source Area air sparge system in Year 3 and run for 2 years. Any add'l performance monitoring well installations and sampling (beyond 16 wells) is covered by contingencies.

Assume installation of 4 add'l new monitoring wells for performance monitoring. Sample these for additional baseline data (COCs and geochem/biodeg analyses). Sample these quarterly during Year 3 and annually for Years 6-8.

Source Area Air Sparge System contains 48 vertical air sparge wells at 4 locations (2 curtains of 7 wells, 2 curtains of 10 wells, 2 curtains of 10 wells, and 2 curtains of 7 wells); all screened 45-50 ft bgs (0.010-slot); spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC).

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, sparge operation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$32,500	\$32,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (12 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,572	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$480	
Lab & Data Validation	1	each	\$7,147	\$7,147	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New Well Installation (4 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (4 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$160	
Lab & Data Validation	1	each	\$4,130	\$4,130	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$86,670	
<i>Contingency</i>	25%			\$21,668	
<i>Project Management</i>	10%			\$8,667	
<i>G&A</i>	10%			\$8,667	
<i>Fee</i>	8%			\$6,934	
Total Implementation Cost				\$132,606	
FUTURE COSTS (8 years)					
LUCs (Years 1-8)					
Annual Inspections and reporting (1 per year)	8	year	\$1,500	\$12,000	
<i>Subtotal</i>			\$1,500	\$12,000	
<i>Project Management</i>	10%		\$150	\$1,200	
<i>Subtotal</i>			\$1,650	\$13,200	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$13,200	
<i>Present Value</i> (0.97%) <i>of Future Cost of LUCs</i>	8	year	0.97%	\$12,642	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$2,500	\$2,500	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$2,500	
<i>Contingency</i>	10%		\$250	\$250	
<i>Project Management</i>	10%		\$250	\$250	
<i>G&A</i>	10%		\$250	\$250	
<i>Fee</i>	8%		\$200	\$200	
<i>Subtotal</i>			\$3,450	\$3,450	
5YR Total Annual Cost at Year 5			\$3,450		
5YR Total Future Cost				\$3,450	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of 5YRs</i>	5	year	0.97%	\$3,287	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$3,750	\$3,750	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$3,750	
<i>Contingency</i>	25%		\$938	\$938	
<i>Project Management</i>	10%		\$375	\$375	
<i>G&A</i>	10%		\$375	\$375	
<i>Fee</i>	8%		\$300	\$300	
<i>Subtotal</i>			\$5,738	\$5,738	
Well Maintenance Future Annual Cost at Year 5			\$5,738		
Well Maintenance Total Future Cost				\$5,738	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Maintenance</i>	5	year	0.97%	\$5,467	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 8)					
Abandon wells when RAOs are achieved. Driller sub.	68	well	\$300	\$20,400	Abandon all monitoring wells and air sparge wells.
Labor, ODCs, and Travel	2.0	week	\$9,525	\$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW disposal	1	each	\$4,000	\$4,000	minimal IDW generated.

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Subtotal</i>				\$43,450	
<i>Contingency</i>	20%			\$8,690	
<i>Project Management</i>	10%			\$4,345	
<i>G&A</i>	10%			\$4,345	
<i>Fee</i>	8%			\$3,476	
<i>Well Abandonment Subtotal in Year 8</i>				\$64,306	
<i>Present Value ^(0.97%)</i> <i>of Future Cost of Well Abandonment</i>	8	year	0.97%	\$59,527	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
New Sparge Performance Well Installation (4 new wells) (Year 3)					assume 4 wells screened at 40-50 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	\$1,250	\$1,250	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$21,658	
<i>Contingency</i>	20%			\$4,332	
<i>Project Management</i>	10%			\$2,166	
<i>G&A</i>	10%			\$2,166	
<i>Fee</i>	8%			\$1,733	
<i>Subtotal Sparge Performance Well Installation during Year 3</i>				\$32,054	
<i>Present Value ^(0.97%)</i> <i>of Future Well Installation Year 3</i>	3	year	0.97%	\$31,139	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Sparge Performance Wells (4 wells)					

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$160	
Lab & Data Validation	1	each	\$4,565	\$4,565	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$12,499	
<i>Contingency</i>	20%			\$2,500	
<i>Project Management</i>	10%			\$1,250	
<i>G&A</i>	10%			\$1,250	
<i>Fee</i>	8%			\$1,000	
<i>Subtotal Sample New Sparge Performance Wells Year 3</i>				\$18,498	
<i>Present Value ^(0.97%) of Future Well Sample Year 3</i>	3	year	0.97%	\$17,970	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
SOURCE AREA - Vertical Air Sparge System Installation & Startup (Year 3)					
Office Trailer, Storage Trailer, & Site Utilities	6	month	\$610	\$3,657	48 vertical wells screened 45-50 ft bgs
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	\$10,000	\$10,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	8.3	week	\$9,525	\$79,248	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	8.3	week	\$200	\$1,664	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	2,400	feet	\$32	\$76,800	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	48	each	\$120	\$5,760	includes miscellaneous vaults and accesses.
Travel	8.3	week	\$3,000	\$24,960	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	8.3	week	1,375	\$11,440	
Water usage (hydrant permit fee)	41.6	day	\$50	\$2,080	
Water IDW Transport & Disposal	7,200	gallon	\$2	\$14,400	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	1.55	each	\$2,000	\$3,103	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	2	each	\$132	\$264	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	400	sq ft	\$200	\$80,000	20 ft x 20 ft building.

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Electricity Conveyance & Hookup	1	each	\$50,000	\$50,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary switch. Navy provides all else.
Conveyance Piping Materials					
4-inch HDPE (to system area)	400	feet	\$3.50	\$1,400	
2-inch HDPE (to curtains)	600	feet	\$3.20	\$1,920	
2-inch HDPE (along curtains)	800	feet	\$3.20	\$2,560	
Trenching & Installation	3.6	week	\$10,025	\$36,090	1,800 ft. 100 ft/day. 2 persons. Includes equipment.
Ball valve (per 5 Air Sparge wells)	10	each	\$30	\$300	
Misc Piping, Fittings, Materials	1	each	\$15,000	\$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	\$36,449	\$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	\$1,500	\$1,500	
Switchgear	1	each	\$2,600	\$2,600	
Instrumentation	1	each	\$15,000	\$15,000	
Telemetry System	1	each	\$3,000	\$3,000	
Post-Construction Site Survey	1	LS	\$4,500	\$4,500	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	\$9,525	\$38,100	2 people.
Startup Equipment Rental	4	week	\$300	\$1,200	
Construction Report	1	each	\$15,000	\$15,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$538,111	
<i>Contingency</i>	25%			\$134,528	
<i>Project Management</i>	10%			\$53,811	
<i>Remedial Design</i>	6%			\$32,287	
<i>Construction Oversight</i>	10%			\$53,811	
<i>G&A</i>	10%			\$53,811	
<i>Fee</i>	8%			\$43,049	
Total Air Sparge Installation & Startup in Year 3				\$909,407	
<i>Present Value</i> <small>(0.97%)</small>	3	year	0.97%	\$883,449	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
<i>of Future Cost of Air Sparge Installation & Startup during Year 3</i>					
SOURCE AREA Air Sparge System O&M (Years 3 and 4)					Assume as optimization, start sparging at Year 3 and run for 2 yrs through Year 4.
Weekly System Checks	104	events	\$850	\$88,400	labor and travel
Monthly O&M	24	events	\$950	\$22,800	labor and travel
Quarterly "Heavy" Maintenance	8	events	\$1,600	\$12,800	labor and travel

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Telemetry System	2	year	\$1,200	\$2,400	
O&M Supplies	2	year	\$2,000	\$4,000	
Electrical usage (4 years)	638,078	kW-hr	\$0.21	\$133,996	Power for 2 years continual operation. Power cost assumes \$0.21/kW-hr. 60 HP compressor at 460 V & 72 A. 60 HP dryer at 220 V & 15 A.
<i>Subtotal</i>				\$264,396	
<i>Contingency</i>	25%			\$66,099	
<i>Project Management</i>	10%			\$26,440	
<i>G&A</i>	10%			\$26,440	
<i>Fee</i>	8%			\$21,152	
<i>Air Sparge O&M Years 3-4 Subtotal</i>				\$404,527	
<i>Air Sparge O&M Subtotal per year for Years 3 & 4</i>			\$202,263		(Years 2-3 Subtotal / 2)
<i>Present Value (0.97%) of Future Cost of Air Sparge O&M Years 3-4</i>	4	year	0.97%	\$391,092	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Demo/Abandonment of Source Area Air Sparge System (Year 8)					Wait to abandon air sparge system until end of Year 8 when other well abandonments occur. Air sparge well abandonment accounted for above with monitoring well abandonment.
Abandon Air Sparge systems when RAOs are achieved. Demo sub.	1	each	\$8,000	\$8,000	Demo and abandon Source Area Air Sparge buildings. Demo and abandon trenched conveyance piping.
Labor, ODCs, and Travel	1	week	\$9,525	\$9,525	
IDW disposal	1	each	\$5,000	\$5,000	
<i>Subtotal</i>				\$22,525	
<i>Contingency</i>	25%			\$5,631	
<i>Project Management</i>	10%			\$2,253	
<i>G&A</i>	10%			\$2,253	
<i>Fee</i>	8%			\$1,802	
<i>Subtotal</i>				\$34,463	
<i>Present Value (0.97%) of Future Cost of System Abandonment</i>	8	year	0.97%	\$31,902	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (10 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	3.2	week	\$9,525	\$30,480	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Equipment & Expendables	3.2	week	\$1,000	\$3,200	
Lab & Data Validation	4	each	\$7,187	\$28,750	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$87,430	
<i>Contingency</i>	20%			\$17,486	
<i>Project Management</i>	10%			\$8,743	
<i>G&A</i>	10%			\$8,743	
<i>Fee</i>	8%			\$6,994	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$129,396	
<i>Total per year during each of Year 1</i>			\$129,396		(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>			\$32,349		(Year 1 Subtotal / 4)
<i>Present Value _(0.97%)</i> <i>of Future Cost of Groundwater Sampling Year 1</i>	1	year	0.97%	\$128,153	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (10 wells)					
Year 2 (Annual Event)					
Labor, ODCs, travel	0.8	week	\$9,525	\$7,620	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.8	week	\$1,000	\$800	
Lab & Data Validation	1	each	\$7,187	\$7,187	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$21,857	
<i>Contingency</i>	20%			\$4,371	
<i>Project Management</i>	10%			\$2,186	
<i>G&A</i>	10%			\$2,186	
<i>Fee</i>	8%			\$1,749	
<i>Total Future Groundwater Sampling Cost Year 2</i>				\$32,349	
<i>Total per year during each of Year 2</i>			\$32,349		(Year 2 Subtotal / 1)
<i>Present Value _(0.97%)</i> <i>of Future Cost of Groundwater Sampling Year 2</i>	2	year	0.97%	\$31,730	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (14 wells)					
Year 3 (Quarterly events)					
Labor, ODCs, travel	4.5	week	\$9,525	\$42,672	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Equipment & Expendables	4.5	week	\$1,000	\$4,480	
Lab & Data Validation	4	each	\$8,344	\$33,374	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$105,526	
<i>Contingency</i>	20%			\$21,105	
<i>Project Management</i>	10%			\$10,553	
<i>G&A</i>	10%			\$10,553	
<i>Fee</i>	8%			\$8,442	
<i>Total Future Groundwater Sampling Cost Year 3</i>				\$156,179	
<i>Total per year during each of Year 3</i>			\$156,179		(Year 3 Subtotal / 1)
<i>Total per quarterly event</i>			\$39,045		(Year 3 Subtotal / 4)
<i>Present Value ^(0.97%)</i>	3	year	0.97%	\$151,721	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
<i>of Future Cost of Groundwater Sampling Year 3</i>					
Years 4-8 (annual) (14 wells)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	2.8	week	\$9,525	\$26,670	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	2.8	week	\$1,000	\$2,800	
Lab & Data Validation	5	each	\$8,344	\$41,718	See lab & DV backup sheets
Report	5	each	\$6,250	\$31,250	
<i>Subtotal</i>				\$102,438	
<i>Contingency</i>	20%			\$20,488	
<i>Project Management</i>	10%			\$10,244	
<i>G&A</i>	10%			\$10,244	
<i>Fee</i>	8%			\$8,195	
<i>Total Future Groundwater Sampling Cost Years 4-8</i>				\$151,608	
<i>Total per year during each of Years 4-8</i>			\$30,322		(Total / 5)
<i>Present Value ^(0.97%)</i>	8		0.97%	\$143,090	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
<i>of Future Cost of Groundwater Sampling Years 4-8</i>					
Total Present Value of All Future Costs				\$1,891,169	Y2011 PV calculated for 8-yr-future-cost using Real Discount Rates detailed above per OMB (2010).

Table A-1.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
TOTAL PV Cost of Alternative 4 - Air Sparge, LUCs, and Monitoring					
			-30%	+50%	
		\$2,023,774	\$1,416,642	\$3,035,662	

Table A-1.3(b) - Lab Backup for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 1: Source Area
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 12 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	12	2	3	1	3	2	2					25	25	\$111.71	\$2,792.75	\$2,792.75	
Methane, Ethane, & Ethene by RSK-175	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide by USEPA 376.1	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity by USEPA 310.1	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC by SW-846 9060 Quadruplicate analysis	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,146.56
Additional Baseline -- Assume 4 new wells																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$95.00	\$950.00	\$950.00	
Methane, Ethane, & Ethene	GW	4	0	0	0	0	1	1					6	6	\$101.09	\$606.54	\$606.54	
Nitrate, Nitrite, & Sulfate	GW	4	0	0	0	0	1	1					6	6	\$48.82	\$292.92	\$292.92	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$21.91	\$131.46	\$131.46	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.18	\$79.08	\$79.08	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$128.57	\$771.42	\$771.42	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	
Dissolved Arsenic, Iron, & Manganese	GW	4	1	0	0	0	1	1					7	7	\$28.08	\$196.56	\$196.56	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$4,129.93
																	TOTAL IMPLEMENTATION LAB COST	\$11,276.49
LTM & Performance Monitoring																		
Year 1 - Quarterly Sampling Events - Assume 16 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,187.40
																	Total for Year 1	\$28,749.59
Year 2 - Annual Event - Assume 10 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Iron and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,187.40
																	Total for Year 2	\$7,187.40
Year 3 - New Baseline (4 wells)																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$111.71	\$1,117.10	\$1,117.10	
Methane, Ethane, & Ethene	GW	4	0	0	0	0	1	1					6	6	\$105.18	\$631.08	\$631.08	
Nitrate, Nitrite, & Sulfate	GW	4	0	0	0	0	1	1					6	6	\$50.87	\$305.22	\$305.22	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$35.12	\$210.72	\$210.72	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.73	\$82.38	\$82.38	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$134.90	\$809.40	\$809.40	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	

Table A-1.3(b) - Lab Backup for Alternative 3 - Air Sparge, LUCs, and Monitoring
 Area 1: Source Area
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Dissolved Arsenic, Iron, & Manganese	GW	4	1	0	0	0	1	1					7	7	\$35.73	\$250.11	\$250.11	
IDW - Purged groundwater and decon water & soil cuttings of new wells																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$4,564.66
																Total for Year 3		\$4,564.66
Year 3 - Quarterly Sampling Events - Assume 14 wells																		
Groundwater wells																		
TCL VOCs	GW	14	2	3	1	3	2	2					27	27	\$111.71	\$3,016.17	\$3,016.17	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,343.60
																Total for Year 3		\$33,374.38
Years 4-8 - Annual Event - Assume 14 wells																		
Groundwater wells																		
TCL VOCs	GW	14	2	3	1	3	2	2					27	27	\$111.71	\$3,016.17	\$3,016.17	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,343.60
																Total for Years 4-8		\$41,717.98
																TOTAL FUTURE LAB COST		\$115,594.00

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 12 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 4 new monitoring wells (varying depths). Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitor 10 wells for 2 yrs, quarterly during Year 1 and once during Year 2. Install 4 add'l wells for injection performance monitoring in Year 3. Baseline sample. Then sample 14 wells quarterly during Year 3, followed by annual sampling of 14 wells Years 4-8.

Install permanent injection wells in Year 3. Assume 22 injection wells (varying depths) spaced 25-ft on center. 15-ft radius of injection. 4-inch diameter. 20-ft 0.010-slot continuous wrap screens.

2,630 pounds of 60% emulsified vegetable oil injected per well. EOS® 598B42 product assumed. Saturation dosage based on 0.0015 lbs EOS® per lb soil in treatment area. Mobile porosity at 15%. Total oil concentrate and mixture/chase water injected per well = 15,862 gallons. See Dosage calculation sheet.

Estimated Time to Complete Year 3 injection event (22 wells) = 14 days (4-well injection manifold; 15 gpm; 7 hrs injection/day).

Assume no re-injection. No bioaugmentation necessary. No pH buffering required.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$32,500	\$32,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (12 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,572	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$480	
Lab & Data Validation	1	each	\$7,147	\$7,147	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New Well Installation (4 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (4 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment	0.2	week	\$1,000	\$160	
Lab & Data Validation	1	each	\$4,130	\$4,130	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$86,670	
<i>Contingency</i>	25%			\$21,668	
<i>Project Management</i>	10%			\$8,667	
<i>G&A</i>	10%			\$8,667	
<i>Fee</i>	8%			\$6,934	
Total Implementation Cost				\$132,606	
FUTURE COSTS (8 years)					
LUCs (Years 1-8)					
Annual Inspections and reporting (1 per year)	8	year	\$1,500	\$12,000	
<i>Subtotal</i>			\$1,500	\$12,000	
<i>Project Management</i>	10%		\$150	\$1,200	
<i>Subtotal</i>			\$1,650	\$13,200	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$13,200	

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of LUCs</i>	8	year	0.97%	\$12,642	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$2,500	\$2,500	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$2,500	
<i>Contingency</i>	10%		\$250	\$250	
<i>Project Management</i>	10%		\$250	\$250	
<i>G&A</i>	10%		\$250	\$250	
<i>Fee</i>	8%		\$200	\$200	
<i>Subtotal</i>			\$3,450	\$3,450	
5YR Total Annual Cost at Year 5			\$3,450		
5YR Total Future Cost				\$3,450	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of 5YRs</i>	5	year	0.97%	\$3,287	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$3,750	\$3,750	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$3,750	
<i>Contingency</i>	25%		\$938	\$938	
<i>Project Management</i>	10%		\$375	\$375	
<i>G&A</i>	10%		\$375	\$375	
<i>Fee</i>	8%		\$300	\$300	
<i>Subtotal</i>			\$5,738	\$5,738	
Well Maintenance Future Annual Cost at Year 5			\$5,738		
Well Maintenance Total Future Cost				\$5,738	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Maintenance</i>	5	year	0.97%	\$5,467	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
Well Abandonment (Year 8)					
Abandon wells when RAOs are achieved. Driller sub.	42	well	\$300	\$12,600	Abandon monitoring wells and injection wells.

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Labor, ODCs, and Travel	1	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$4,000	\$4,000	
<i>Subtotal</i>				\$26,125	
<i>Contingency</i>	20%			\$5,225	
<i>Project Management</i>	10%			\$2,613	
<i>G&A</i>	10%			\$2,613	
<i>Fee</i>	8%			\$2,090	
<i>Subtotal</i>				\$38,665	
Well Abandonment Future Annual Cost at Year 8				\$38,665	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Abandonment</i>	8	year	0.97%	\$35,791	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
New Injection Performance Well Installation (6 new wells) (Year 3)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.0	week	\$9,525	\$9,906	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.0	week	\$200	\$208	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	6	each	\$325	\$1,950	
Travel	1.0	week	\$3,000	\$3,120	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.0	week	1,375	\$1,430	
Water usage (hydrant permit fee)	5.2	day	\$50	\$260	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	900	gallon	\$2	\$1,800	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$27,883	
<i>Contingency</i>	20%			\$5,577	
<i>Project Management</i>	10%			\$2,788	
<i>G&A</i>	10%			\$2,788	
<i>Fee</i>	8%			\$2,231	
<i>Subtotal Injection Performance Well Installation during Year 3</i>				\$41,266	

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> ^(0.97%) <i>of Future Well Installation Year 3</i>	3	year	0.97%	\$40,088	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Injection Performance Wells (6 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$2,286	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$240	
Lab & Data Validation	1	each	\$6,019	\$6,019	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$14,795	
<i>Contingency</i>	20%			\$2,959	
<i>Project Management</i>	10%			\$1,479	
<i>G&A</i>	10%			\$1,479	
<i>Fee</i>	8%			\$1,184	
<i>Subtotal Sample New Injection Performance Wells Year 3</i>				\$21,896	
<i>Present Value</i> ^(0.97%) <i>of Future Well Sample Year 3</i>	3	year	0.97%	\$21,271	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Biobarrier Well Installation and Injection					
Office Trailer, Storage Trailer, & Site Utilities	4	month	\$610	\$2,222	
Well Installation (22 wells)					Barrier 1 - 6 wells screened at 15-35 ft bgs & 5 wells at 25-45 ft bgs. Barrier 2 - 6 wells at 15-35 ft bgs & 5 wells at 25-45 ft bgs.
Mobilization	1	each	\$10,000	\$10,000	Includes sub mob/demob, utility location, construction of staging area, and clearing.
Labor	3.8	week	\$9,525	\$36,322	Install 22 wells listed above. Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	3.8	week	\$200	\$763	
Drilling Subcontractor / well installation					Includes mob, materials, labor, travel
Well installation - HSA drilling & 4-inch PVC install	870	feet	\$38	\$33,060	Labor and materials. 6.25-inch ID HSA.
4-inch, 20-ft PVC 0.010-slot continuous-wrap screens	22	each	\$990	\$21,780	
Well Completion with bollards	22	each	\$325	\$7,150	
Travel	3.8	week	\$2,000	\$7,627	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	3.8	week	1,375	\$5,243	

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
Southern Area Feasibility Study Addendum
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water usage (hydrant permit fee)	19.1	day	\$50	\$953	
Survey	1	each	\$3,000	\$3,000	
Water IDW Transport & Disposal	11,000	gallon	\$2	\$22,000	Assume 500 gallons per 4-inch well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	1.06	each	\$2,000	\$2,127	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	2	each	\$132	\$264	1 per 20 cy.
Injection (22 wells)					
Labor, ODCs, Travel	2.8	week	\$14,450	\$40,020	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at \$200/day. 2 rental trucks at \$65/day each.
Equipment	2.8	week	\$700	\$1,939	Trailer, generator, expendables
Injection parts and equipment	1	each	\$10,000	\$10,000	
Emulsified Oil material and delivery	139	drum	\$1,106	\$153,790	EOS® 598B42 brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	13.8	day	\$50	\$692	
Drum disposal	139	drum	\$40	\$5,560	
Construction Report	1	each	\$30,000	\$30,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$394,627	
<i>Contingency</i>	25%			\$98,657	
<i>Project Management</i>	10%			\$39,463	
<i>Remedial Design</i>	6%			\$23,678	
<i>Construction Oversight</i>	10%			\$39,463	
<i>G&A</i>	10%			\$39,463	
<i>Fee</i>	8%			\$31,570	
Total Year 3 Injection				\$666,920	
<i>Present Value (0.97%) of Future Cost of Injection during Year 3</i>	3	year	0.97%	\$647,883	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (10 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	3.2	week	\$9,525	\$30,480	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	3.2	week	\$1,000	\$3,200	
Lab & Data Validation	4	each	\$7,187	\$28,750	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$87,430	
<i>Contingency</i>	20%			\$17,486	

Table A-1.4(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 1: Source Area
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NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Project Management</i>	10%			\$8,743	
<i>G&A</i>	10%			\$8,743	
<i>Fee</i>	8%			\$6,994	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$129,396	
<i>Total per year during each of Year 1</i>			\$129,396		(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>			\$32,349		(Year 1 Subtotal / 4)
<i>Present Value _(0.97%)</i> <i>of Future Cost of Groundwater Sampling Year 1</i>	1	year	0.97%	\$128,153	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (10 wells)					
Year 2 (Annual Event)					
Labor, ODCs, travel	0.8	week	\$9,525	\$7,620	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.8	week	\$1,000	\$800	
Lab & Data Validation	1	each	\$7,187	\$7,187	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$21,857	
<i>Contingency</i>	20%			\$4,371	
<i>Project Management</i>	10%			\$2,186	
<i>G&A</i>	10%			\$2,186	
<i>Fee</i>	8%			\$1,749	
<i>Total Future Groundwater Sampling Cost Year 2</i>				\$32,349	
<i>Total per year during each of Year 2</i>			\$32,349		(Year 2 Subtotal / 1)
<i>Present Value _(0.97%)</i> <i>of Future Cost of Groundwater Sampling Year 2</i>	2	year	0.97%	\$31,730	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (16 wells)					
Year 3 (Quarterly events)					
Labor, ODCs, travel	5.1	week	\$9,525	\$48,768	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	5.1	week	\$1,000	\$5,120	
Lab & Data Validation	4	each	\$9,798	\$39,190	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$118,078	
<i>Contingency</i>	20%			\$23,616	

Table A-1.4(b) - Lab Backup for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
 Area 1: Source Area
 Southern Area Feasibility Study Addendum
 NWIRP Calverton, New York
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 12 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	12	2	3	1	3	2	2					25	25	\$111.71	\$2,792.75	\$2,792.75	
Methane, Ethane, & Ethene by RSK-175	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide by USEPA 376.1	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity by USEPA 310.1	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC by SW-846 9060 Quadruplicate analysis	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,146.56
Additional Baseline -- Assume 4 new wells																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$95.00	\$950.00	\$950.00	
Methane, Ethane, & Ethene	GW	4	0	0	0	0	1	1					6	6	\$101.09	\$606.54	\$606.54	
Nitrate, Nitrite, & Sulfate	GW	4	0	0	0	0	1	1					6	6	\$48.82	\$292.92	\$292.92	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$21.91	\$131.46	\$131.46	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.18	\$79.08	\$79.08	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$128.57	\$771.42	\$771.42	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	
Dissolved Arsenic, Iron, & Manganese	GW	4	1	0	0	0	1	1					7	7	\$28.08	\$196.56	\$196.56	
IDW - (1) Soil cuttings from new well installations;																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$4,129.93
																	TOTAL IMPLEMENTATION LAB COST	\$11,276.49
Performance Monitoring																		
Year 1 - Quarterly Sampling Events - Assume 10 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,187.40
																	Total for Year 1	\$28,749.59
Year 2 - Annual Event - Assume 10 wells																		
Groundwater wells																		
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78	
Methane, Ethane, Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Iron and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,187.40
																	Total for Year 2	\$7,187.40
Year 3 - New Baseline (6 wells)																		
Groundwater wells																		
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94	
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	
IDW - Purged groundwater and decon water & soil cuttings of new wells																		

Table A-1.4(b) - Lab Backup for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
 Area 1: Source Area
 Southern Area Feasibility Study Addendum
 NWIRP Calverton, New York
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00
Subtotal +15% for Data Validation																\$6,018.63	
Total for Year 3																\$6,018.63	
Year 3 - Quarterly Sampling Events - Assume 16 wells																	
Groundwater wells																	
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$9,797.56	
Total for Year 3																\$39,190.25	
Years 4-8 - Annual Event - Assume 16 wells																	
Groundwater wells																	
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$9,797.56	
Total for Years 4-8																\$48,987.82	
TOTAL FUTURE LAB COST																\$130,133.68	

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

**APPENDIX A - Area 2: Fenceline
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY ADDENDUM
NWIRP CALVERTON, NEW YORK**

Alternative	Alternative 2 LUCs and Monitoring			Alternative 3 Anaerobic Biodegradation, LUCs, and Monitoring			Alternative 4 Extraction, Treatment, & Discharge, LUCs, and Monitoring		
	4 years			8 years			8 years		
Alternative Evaluation Timeframe	-30%	Estimate	+50%	-30%	Estimate	+50%	-30%	Estimate	+50%
Total Implementation Costs	\$53,000	\$75,000	\$113,000	\$80,000	\$114,000	\$171,000	\$1,011,000	\$1,445,000	\$2,167,000
Present Value of Future Costs	\$122,000	\$174,000	\$261,000	\$1,293,000	\$1,846,000	\$2,770,000	\$1,128,000	\$1,611,000	\$2,416,000
Grand Total Present Value	\$175,000	\$249,000	\$374,000	\$1,373,000	\$1,960,000	\$2,941,000	\$2,139,000	\$3,056,000	\$4,583,000

Notes:

- Alternative 1 - No Action has no cost (\$0).

- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-cl.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Area	2. Fenceline					
Alternative	2 - LUCs & Monitoring		3. Biodegradation, LUCs, & Monitoring		4. Extraction, Treatment, Disposal, LUCs, & Monitoring	
Duration	4 years (geo mean of 2-8yr timeframe)		8 years (prescribed timeframe/steps)		8 years (prescribed timeframe/steps)	
TOTAL Present Value	\$249,252		\$1,960,338		\$3,055,650	
Implementation	\$75,204	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells	\$113,844	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells	\$1,444,692	LUC Implementation UFP-SAP Baseline Sampling & New LTM Wells Install & Startup Extraction System
Future Total PV	\$174,049		\$1,846,494		\$1,610,959	
Year						
1	\$1,650 \$29,508	LUC Inspection 9-month LTM event	\$1,650 \$150,434	LUC Inspection Quarterly LTM (total)	\$1,650 \$243,163 \$118,004	LUC Inspection Extraction System O&M Quarterly LTM (total)
2	\$1,650 \$29,508	LUC Inspection 18-month LTM event	\$1,650 \$33,870	LUC Inspection Annual LTM	\$1,650 \$243,163 \$31,135	LUC Inspection Extraction System O&M Annual LTM
3	\$1,650 \$59,017	LUC Inspection 27- & 36-month LTM events	\$1,650 \$63,162 \$1,212,365 \$182,846	LUC Inspection New Performance Wells Install & Baseline Sample Install Injection Wells & Inject Quarterly LTM (total)	\$1,650 \$243,163 \$31,135	LUC Inspection Extraction System O&M Annual LTM
4	\$1,650 \$24,518 \$29,508	LUC Inspection Well Abandonment Annual LTM event	\$1,650 \$35,742	LUC Inspection Annual LTM	\$1,650 \$243,163 \$31,135	LUC Inspection Extraction System O&M Annual LTM
5			\$1,650 \$3,450 \$5,738 \$35,742	LUC Inspection 5YR Well Maintenance Annual LTM	\$1,650 \$3,450 \$5,738 \$243,163 \$31,135	LUC Inspection 5YR Well Maintenance Extraction System O&M (Shut down end Year 5) Annual LTM
6			\$1,650 \$35,742	LUC Inspection Annual LTM	\$1,650 \$31,135	LUC Inspection Annual LTM
7			\$1,650 \$35,742	LUC Inspection Annual LTM	\$1,650 \$31,135	LUC Inspection Annual LTM
8			\$1,650 \$62,086 \$35,742	LUC Inspection Well Abandonment Annual LTM	\$1,650 \$27,731 \$62,750	LUC Inspection Well Abandonment Demo/Abandon Extraction System

Table A-2.1
Area 2: Fenceline
Cost Estimate for Alternative 1 - No Action
Southern Area Feasibility Study Addendum
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No Action
Cost = \$0

Table A-2.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Assumptions:

LUC RD prepared by contractor. RAOs met before 5 years; therefore, no 5YR or well maintenance needed. Annual LUC inspections performed by contractor.

Baseline sampling of 13 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 2 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).

MNA performance monitoring of 13 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annual event during final Year 4.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$7,500	\$7,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (13 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,953	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$520	
Lab & Data Validation	1	each	\$7,745	\$7,745	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New Well Installation (2 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 2 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.3	week	\$9,525	\$3,302	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.3	week	\$200	\$69	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	100	feet	\$36	\$3,600	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	2	each	\$325	\$650	
Travel	0.3	week	\$3,000	\$1,040	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.3	week	1,375	\$477	
Water usage (hydrant permit fee)	1.7	day	\$50	\$87	
Survey	1	each	\$500	\$500	

Table A-2.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water IDW Transport & Disposal	300	gallon	\$2	\$600	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.06	each	\$2,000	\$129	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (2 wells)					
Labor, ODCs, travel	0.1	week	\$9,525	\$762	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.1	week	\$1,000	\$80	
Lab & Data Validation	1	each	\$3,049	\$3,049	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$50,813	
<i>Contingency</i>	20%			\$10,163	
<i>Project Management</i>	10%			\$5,081	
<i>G&A</i>	10%			\$5,081	
<i>Fee</i>	8%			\$4,065	
Total Implementation Cost				\$75,204	
FUTURE COSTS (4 years)					
LUCs (Years 1-4)					
Annual Inspections and reporting (1 per year)	4	year	\$1,500	\$6,000	
<i>Subtotal</i>			\$1,500	\$6,000	
<i>Project Management</i>	10%		\$150	\$600	
<i>Subtotal</i>			\$1,650	\$6,600	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$6,600	
<i>Present Value</i> <small>(0.2%) of Future Cost of LUCs</small>	4	year	0.20%	\$6,567	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 4)					
Abandon wells when RAOs are achieved. Driller sub.	15	well	\$300	\$4,500	

Table A-2.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Labor, ODCs, and Travel	1.0	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$2,000	\$2,000	
<i>Subtotal</i>				\$16,025	
<i>Contingency</i>	25%			\$4,006	
<i>Project Management</i>	10%			\$1,603	
<i>G&A</i>	10%			\$1,603	
<i>Fee</i>	8%			\$1,282	
<i>Subtotal</i>				\$24,518	
Well Abandonment Future Annual Cost at Year 4				\$24,518	
<i>Present Value</i> (0.97%) <i>of Future Cost of Well Abandonment</i>	4	year	0.97%	\$23,590	
Performance Groundwater Monitoring (13 wells)					
Months 9, 18, 27, and 36					
Labor, ODCs, travel	2.1	week	\$9,525	\$19,812	Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event.
Equipment & Expendables	2.1	week	\$1,000	\$2,080	9, 18, 27, and 36 month events. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Lab & Data Validation	4	each	\$8,215	\$32,861	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$79,753	
<i>Contingency</i>	20%			\$15,951	
<i>Project Management</i>	10%			\$7,975	
<i>G&A</i>	10%			\$7,975	
<i>Fee</i>	8%			\$6,380	
<i>Subtotal</i>				\$118,034	
Future Monitoring Annual Cost during each of Years 1 and 2			\$29,508		(Total / 4). 1 event each of years 1 and 2
Future Monitoring Annual Cost at Year 3			\$59,017		(Total / 2). 2 events in year 3
Total Future Monitoring Cost Years 1-3				\$118,034	
<i>Present Value</i> (0.97%) <i>of Future Cost of Groundwater Sampling Years 1-3</i>	3	year	0.97%	\$115,501	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).

Table A-2.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Year 4 (annual) (13 wells)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	0.5	week	\$9,525	\$4,953	
Equipment & Expendables	0.5	week	\$1,000	\$520	
Lab & Data Validation	1	each	\$8,215	\$8,215	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$19,938	
<i>Contingency</i>	20%			\$3,988	
<i>Project Management</i>	10%			\$1,994	
<i>G&A</i>	10%			\$1,994	
<i>Fee</i>	8%			\$1,595	
<i>Subtotal</i>				\$29,508	
Monitoring Total Future Cost (Year 4)				\$29,508	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Groundwater Sampling Year 4</i>	4	year	0.97%	\$28,391	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$174,049	Y2011 PV calculated for 4-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 3 - LUCs and Monitoring			-30%	+50%	
	\$249,252		\$174,477	\$373,879	

Table A-2.2(b) - Lab Backup for Alternative 2 - LUCs and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 13 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, & Ethene by RSK-175	GW	7	0	0	0	0	1	1					9	9	\$105.18	\$946.62	\$946.62	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	7	0	0	0	0	1	1					9	9	\$50.87	\$457.83	\$457.83	
Sulfide by USEPA 376.1	GW	7	0	0	0	0	1	1					9	9	\$35.12	\$316.08	\$316.08	
Alkalinity by USEPA 310.1	GW	7	0	0	0	0	1	1					9	9	\$13.73	\$123.57	\$123.57	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	7	0	0	0	0	1	1					9	9	\$134.90	\$1,214.10	\$1,214.10	
TOC by SW-846 9060 Quadruplicate analysis	GW	7	0	0	0	0	1	1					9	9	\$33.21	\$298.89	\$298.89	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	7	1	0	0	0	1	1					10	10	\$35.73	\$357.30	\$357.30	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,745.08
Additional Baseline -- Assume 2 new wells																		
Groundwater wells																		
TCL VOCs	GW	2	1	1	1	1	1	1					8	8	\$95.00	\$760.00	\$760.00	
Methane, Ethane, Ethene	GW	2	0	0	0	0	1	1					4	4	\$101.09	\$404.36	\$404.36	
Nitrate, Nitrite, Sulfate	GW	2	0	0	0	0	1	1					4	4	\$48.82	\$195.28	\$195.28	
Sulfide	GW	2	0	0	0	0	1	1					4	4	\$21.91	\$87.64	\$87.64	
Alkalinity	GW	2	0	0	0	0	1	1					4	4	\$13.18	\$52.72	\$52.72	
VFAs	GW	2	0	0	0	0	1	1					4	4	\$128.57	\$514.28	\$514.28	
TOC	GW	2	0	0	0	0	1	1					4	4	\$33.21	\$132.84	\$132.84	
Dissolved Arsenic, Iron, and Manganese	GW	2	1	0	0	0	1	1					5	5	\$28.08	\$140.40	\$140.40	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$3,049.25
																TOTAL IMPLEMENTATION LAB COST		\$10,794.33
Performance Monitoring																		
Months 9, 18, 27, and 36 -- Assume 13 wells																		
Groundwater wells																		
TCL VOCs	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,215.13
																Total for 9,18,27&36 months		\$32,860.51
Years 4 through 8 -- Assume 13 wells																		
Groundwater wells																		
TCL VOCs	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,215.13
																Total for 4-8		\$41,075.64
																TOTAL FUTURE LAB COST		\$73,936.16
Full QA/QC for COCs only. Also, duplicates for metals.		MS/MSDs are billable			Standard turnaround time													

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 13 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 2 new monitoring wells (varying depths). Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitor 10 wells for 2 yrs, quarterly during Year 1 and once during Year 2. Install 6 add'l wells for injection performance monitoring in Year 3. Baseline sample. Then sample 19 wells quarterly during Year 3, followed by annual sampling of 19 wells Years 4-8.

Permanent injection wells. Assume 42 injection wells (varying depths) spaced 25-ft on center. 15-ft radius of injection. 4-inch diameter. 20-ft 0.010-slot continuous wrap screens.

2,630 pounds of 60% emulsified vegetable oil injected per well. EOS® 598B42 product assumed. Saturation dosage based on 0.0015 lbs EOS® per lb soil in treatment area. Mobile porosity at 15%. Total oil concentrate and mixture/chase water injected per well = 15,862 gallons. See Dosage calculation sheet.

Estimated Time to Complete Year 3 injection event (42 wells) = 27 days (4-well injection manifold; 15 gpm; 7 hrs injection/day).

Assume no re-injection. No bioaugmentation necessary. No pH buffering required.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$32,500	\$32,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (13 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,953	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$520	
Lab & Data Validation	1	each	\$6,736	\$6,736	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New Well Installation (2 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 2 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.3	week	\$9,525	\$3,302	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment	0.3	week	\$200	\$69	
Drilling Subcontractor / well installation					

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well installation - HSA drilling & 2-inch PVC install	100	feet	\$36	\$3,600	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	2	each	\$325	\$650	
Travel	0.3	week	\$3,000	\$1,040	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.3	week	1,375	\$477	
Water usage (hydrant permit fee)	1.7	day	\$50	\$87	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	300	gallon	\$2	\$600	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.06	each	\$2,000	\$129	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (2 wells)					
Labor, ODCs, travel	0.1	week	\$9,525	\$762	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment	0.1	week	\$1,000	\$80	
Lab & Data Validation	1	each	\$2,653	\$2,653	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$74,408	
<i>Contingency</i>	25%			\$18,602	
<i>Project Management</i>	10%			\$7,441	
<i>G&A</i>	10%			\$7,441	
<i>Fee</i>	8%			\$5,953	
Total Implementation Cost				\$113,844	
FUTURE COSTS (8 years)					
LUCs (Years 1-8)					
Annual Inspections and reporting (1 per year)	8	year	\$1,500	\$12,000	
<i>Subtotal</i>			\$1,500	\$12,000	
<i>Project Management</i>	10%		\$150	\$1,200	
<i>Subtotal</i>			\$1,650	\$13,200	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$13,200	

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of LUCs</i>	8	year	0.97%	\$12,642	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$2,500	\$2,500	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$2,500	
<i>Contingency</i>	10%		\$250	\$250	
<i>Project Management</i>	10%		\$250	\$250	
<i>G&A</i>	10%		\$250	\$250	
<i>Fee</i>	8%		\$200	\$200	
<i>Subtotal</i>			\$3,450	\$3,450	
5YR Total Annual Cost at Year 5			\$3,450		
5YR Total Future Cost				\$3,450	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of 5YRs</i>	5	year	0.97%	\$3,287	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$3,750	\$3,750	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$3,750	
<i>Contingency</i>	25%		\$938	\$938	
<i>Project Management</i>	10%		\$375	\$375	
<i>G&A</i>	10%		\$375	\$375	
<i>Fee</i>	8%		\$300	\$300	
<i>Subtotal</i>			\$5,738	\$5,738	
Well Maintenance Future Annual Cost at Year 5			\$5,738		
Well Maintenance Total Future Cost				\$5,738	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Maintenance</i>	5	year	0.97%	\$5,467	<i>Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).</i>
Well Abandonment (Year 8)					
Abandon wells when RAOs are achieved. Driller sub.	63	well	\$300	\$18,900	Abandon monitoring wells and injection wells.

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 2: Fenceline
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Labor, ODCs, and Travel	2	week	\$9,525	\$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$4,000	\$4,000	
<i>Subtotal</i>				\$41,950	
<i>Contingency</i>	20%			\$8,390	
<i>Project Management</i>	10%			\$4,195	
<i>G&A</i>	10%			\$4,195	
<i>Fee</i>	8%			\$3,356	
<i>Subtotal</i>				\$62,086	
Well Abandonment Future Annual Cost at Year 4				\$62,086	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Abandonment</i>	8	year	0.97%	\$57,472	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
New Injection Performance Well Installation (6 new wells) (Year 3)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.0	week	\$9,525	\$9,906	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.0	week	\$200	\$208	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	6	each	\$325	\$1,950	
Travel	1.0	week	\$3,000	\$3,120	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.0	week	1,375	\$1,430	
Water usage (hydrant permit fee)	5.2	day	\$50	\$260	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	900	gallon	\$2	\$1,800	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$27,883	
<i>Contingency</i>	20%			\$5,577	
<i>Project Management</i>	10%			\$2,788	
<i>G&A</i>	10%			\$2,788	
<i>Fee</i>	8%			\$2,231	
<i>Subtotal Injection Performance Well Installation during Year 3</i>				\$41,266	

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> ^(0.97%) <i>of Future Well Installation Year 3</i>	3	year	0.97%	\$40,088	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Injection Performance Wells (6 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$2,286	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$240	
Lab & Data Validation	1	each	\$6,019	\$6,019	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$14,795	
<i>Contingency</i>	20%			\$2,959	
<i>Project Management</i>	10%			\$1,479	
<i>G&A</i>	10%			\$1,479	
<i>Fee</i>	8%			\$1,184	
<i>Subtotal Sample New Injection Performance Wells Year 3</i>				\$21,896	
<i>Present Value</i> ^(0.97%) <i>of Future Well Sample Year 3</i>	3	year	0.97%	\$21,271	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Biobarrier Well Installation and Injection					
Office Trailer, Storage Trailer, & Site Utilities	5	month	\$610	\$3,134	
Well Installation (42 wells)					Barrier 1 - 9 wells at 20-40 ft bgs & 8 wells at 30-50 ft bgs. Barrier 2 - 13 wells at 25-45 ft bgs & 12 wells at 35-55 ft bgs.
Mobilization	1	each	\$10,000	\$10,000	Includes sub mob/demob, utility location, construction of staging area, and clearing.
Labor	7.3	week	\$9,525	\$69,342	Install 42 wells listed above. Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	7.3	week	\$200	\$1,456	
Drilling Subcontractor / well installation					Includes mob, materials, labor, travel
Well installation - HSA drilling & 4-inch PVC install	2,005	feet	\$38	\$76,190	Labor and materials. 6.25-inch ID HSA.
4-inch, 20-ft PVC 0.010-slot continuous-wrap screens	42	each	\$990	\$41,580	
Well Completion with bollards	42	each	\$325	\$13,650	
Travel	7.3	week	\$2,000	\$14,560	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	7.3	week	1,375	\$10,010	
Water usage (hydrant permit fee)	36.4	day	\$50	\$1,820	

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Survey	1	each	\$3,000	\$3,000	
Water IDW Transport & Disposal	21,000	gallon	\$2	\$42,000	Assume 500 gallons per 4-inch well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	2.45	each	\$2,000	\$4,901	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	3	each	\$132	\$396	1 per 20 cy.
Injection (42 wells)					
Labor, ODCs, Travel	5.3	week	\$14,450	\$76,402	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at \$200/day. 2 rental trucks at \$65/day each.
Equipment	5.3	week	\$700	\$3,701	Trailer, generator, expendables
Injection parts and equipment	1	each	\$10,000	\$10,000	
Emulsified Oil material and delivery	265	drum	\$1,106	\$293,196	EOS® 598B42 brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	26.4	day	\$50	\$1,322	
Drum disposal	265	drum	\$40	\$10,600	
Construction Report	1	each	\$30,000	\$30,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$717,376	
<i>Contingency</i>	25%			\$179,344	
<i>Project Management</i>	10%			\$71,738	
<i>Remedial Design</i>	6%			\$43,043	
<i>Construction Oversight</i>	10%			\$71,738	
<i>G&A</i>	10%			\$71,738	
<i>Fee</i>	8%			\$57,390	
Total Year 3 Injection				\$1,212,365	
<i>Present Value (0.97%) of Future Cost of Injection during Year 3</i>	3	year	0.97%	\$1,177,759	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (13 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	4.2	week	\$9,525	\$39,624	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	4.2	week	\$1,000	\$4,160	
Lab & Data Validation	4	each	\$8,215	\$32,861	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$101,645	
<i>Contingency</i>	20%			\$20,329	
<i>Project Management</i>	10%			\$10,164	

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
G&A	10%			\$10,164	
Fee	8%			\$8,132	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$150,434	
<i>Total per year during each of Year 1</i>				\$150,434	(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>				\$37,608	(Year 1 Subtotal / 4)
<i>Present Value ^(0.97%)</i>					
<i>of Future Cost of Groundwater Sampling Year 1</i>				\$148,989	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (10 wells)					
Year 2 (Annual Event)					
Labor, ODCs, travel	0.8	week	\$9,525	\$7,620	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.8	week	\$1,000	\$800	
Lab & Data Validation	1	each	\$8,215	\$8,215	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$22,885	
<i>Contingency</i>				\$4,577	
<i>Project Management</i>				\$2,289	
<i>G&A</i>				\$2,289	
<i>Fee</i>				\$1,831	
<i>Total Future Groundwater Sampling Cost Year 2</i>				\$33,870	
<i>Total per year during each of Year 2</i>				\$33,870	(Year 2 Subtotal / 1)
<i>Present Value ^(0.97%)</i>					
<i>of Future Cost of Groundwater Sampling Year 2</i>				\$33,222	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (19 wells)					
Year 3 (Quarterly events)					
Labor, ODCs, travel	5.1	week	\$9,525	\$48,768	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	5.1	week	\$1,000	\$5,120	
Lab & Data Validation	4	each	\$11,164	\$44,657	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$123,545	
<i>Contingency</i>				\$24,709	
<i>Project Management</i>				\$12,354	

Table A-2.3(a) - Cost Estimate for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
G&A	10%			\$12,354	
Fee	8%			\$9,884	
<i>Total Future Groundwater Sampling Cost Year 3</i>				\$182,846	
<i>Total per year during each of Year 3</i>			\$182,846		(Year 3 Subtotal / 1)
<i>Total per quarterly event</i>			\$45,712		(Year 3 Subtotal / 4)
<i>Present Value (0.97%) of Future Cost of Groundwater Sampling Year 3</i>	3	year	0.97%	\$177,627	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 4-8 (annual) (16 wells)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	3.2	week	\$9,525	\$30,480	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	3.2	week	\$1,000	\$3,200	
Lab & Data Validation	5	each	\$11,164	\$55,821	See lab & DV backup sheets
Report	5	each	\$6,250	\$31,250	
<i>Subtotal</i>				\$120,751	
<i>Contingency</i>	20%			\$24,150	
<i>Project Management</i>	10%			\$12,075	
<i>G&A</i>	10%			\$12,075	
<i>Fee</i>	8%			\$9,660	
<i>Total Future Groundwater Sampling Cost Years 4-8</i>				\$178,711	
<i>Total per year during each of Years 4-8</i>			\$35,742		(Total / 5)
<i>Present Value (0.97%) of Future Cost of Groundwater Sampling Years 4-8</i>	8		0.97%	\$168,670	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$1,846,494	Y2011 PV calculated for 8-yr-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 5 - Anaerobic Biodegradation, LUCs, and Monitoring			-30%	+50%	
	\$1,960,338		\$1,372,236	\$2,940,507	

Table A-2.3(b) - Lab Backup for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 13 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, & Ethene by RSK-175	GW	7	0	0	0	0	1	1					9	9	\$105.18	\$946.62	\$946.62	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	7	0	0	0	0	1	1					9	9	\$50.87	\$457.83	\$457.83	
Sulfide by USEPA 376.1	GW	7	0	0	0	0	1	1					9	9	\$35.12	\$316.08	\$316.08	
Alkalinity by USEPA 310.1	GW	7	0	0	0	0	1	1					9	9	\$13.73	\$123.57	\$123.57	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	7	0	0	0	0	1	1					9	9	\$134.90	\$1,214.10	\$1,214.10	
TOC by SW-846 9060 Quadruplicate analysis	GW	7	0	0	0	0	1	1					9	9	\$33.21	\$298.89	\$298.89	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	7	1	0	0	0	1	1					10	10	\$35.73	\$357.30	\$357.30	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$6,736.00
Additional Baseline -- Assume 2 new wells																		
Groundwater wells																		
TCL VOCs	GW	2	1	1	1	1	1	1					8	8	\$95.00	\$760.00	\$760.00	
Methane, Ethane, & Ethene	GW	2	0	0	0	0	1	1					4	4	\$101.09	\$404.36	\$404.36	
Nitrate, Nitrite, & Sulfate	GW	2	0	0	0	0	1	1					4	4	\$48.82	\$195.28	\$195.28	
Sulfide	GW	2	0	0	0	0	1	1					4	4	\$21.91	\$87.64	\$87.64	
Alkalinity	GW	2	0	0	0	0	1	1					4	4	\$13.18	\$52.72	\$52.72	
VFAs	GW	2	0	0	0	0	1	1					4	4	\$128.57	\$514.28	\$514.28	
TOC	GW	2	0	0	0	0	1	1					4	4	\$33.21	\$132.84	\$132.84	
Dissolved Arsenic, Iron, & Manganese	GW	2	1	0	0	0	1	1					5	5	\$28.08	\$140.40	\$140.40	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$2,652.67
																TOTAL IMPLEMENTATION LAB COST		\$9,388.67
Performance Monitoring																		
Year 1 - Quarterly Sampling Events - Assume 13 wells																		
Groundwater wells																		
TCL VOCs	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,215.13
																Total for Year 1		\$32,860.51
Year 2 - Annual Event - Assume 13 wells																		
Groundwater wells																		
TCL VOCs	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Iron and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,215.13
																Total for Year 2		\$8,215.13
Year 3 - New Baseline (6 wells)																		
Groundwater wells																		
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94	
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44	
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96	
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96	
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84	
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20	
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68	
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57	

Table A-2.3(b) - Lab Backup for Alternative 3 - Anaerobic Biodegradation, LUCs, and Monitoring
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
IDW - Purged groundwater and decon water & soil cuttings of new wells																	
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00
																Subtotal +15% for Data Validation	\$6,018.63
																Total for Year 3	\$6,018.63
Year 3 - Quarterly Sampling Events - Assume 19 wells																	
Groundwater wells																	
TCL VOCs	GW	19	2	4	1	4	2	2					34	34	\$111.71	\$3,798.14	\$3,798.14
Methane, Ethane, & Ethene	GW	12	0	0	0	0	1	1					14	14	\$105.18	\$1,472.52	\$1,472.52
Nitrate, Nitrite, & Sulfate	GW	12	0	0	0	0	1	1					14	14	\$50.87	\$712.18	\$712.18
Sulfide	GW	12	0	0	0	0	1	1					14	14	\$35.12	\$491.68	\$491.68
Alkalinity	GW	12	0	0	0	0	1	1					14	14	\$13.73	\$192.22	\$192.22
VFAs	GW	12	0	0	0	0	1	1					14	14	\$134.90	\$1,888.60	\$1,888.60
TOC	GW	12	0	0	0	0	1	1					14	14	\$33.21	\$464.94	\$464.94
Dissolved Arsenic, Iron, & Manganese	GW	12	2	0	0	0	1	1					16	16	\$35.73	\$571.68	\$571.68
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
																Subtotal +15% for Data Validation	\$11,164.15
																Total for Year 3	\$44,656.62
Years 4-8 - Annual Event - Assume 19 wells																	
Groundwater wells																	
TCL VOCs	GW	19	2	4	1	4	2	2					34	34	\$111.71	\$3,798.14	\$3,798.14
Methane, Ethane, & Ethene	GW	12	0	0	0	0	1	1					14	14	\$105.18	\$1,472.52	\$1,472.52
Nitrate, Nitrite, & Sulfate	GW	12	0	0	0	0	1	1					14	14	\$50.87	\$712.18	\$712.18
Sulfide	GW	12	0	0	0	0	1	1					14	14	\$35.12	\$491.68	\$491.68
Alkalinity	GW	12	0	0	0	0	1	1					14	14	\$13.73	\$192.22	\$192.22
VFAs	GW	12	0	0	0	0	1	1					14	14	\$134.90	\$1,888.60	\$1,888.60
TOC	GW	12	0	0	0	0	1	1					14	14	\$33.21	\$464.94	\$464.94
Dissolved Arsenic, Iron, & Manganese	GW	12	2	0	0	0	1	1					16	16	\$35.73	\$571.68	\$571.68
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
																Subtotal +15% for Data Validation	\$11,164.15
																Total for Years 4-8	\$55,820.77
																TOTAL FUTURE LAB COST	\$147,571.66

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 13 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 4 new monitoring wells (2 LTM & 2 performance for extraction system). Sample these for additional baseline data (COCs and geochem/biodeg analyses).

Performance monitoring: 15 wells. Quarterly during Year 1, and then annually through Year 8.

Extraction well at Fenceline Area, only, Years 0-5. One 4-inch steel extraction well screened 25-45 ft bgs. Extraction at 100 gpm. Four 4-inch steel injection wells screened 30-50 ft bgs for discharge.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$32,500	\$32,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (13 existing Wells)					
Labor, ODCs, travel	0.5	week	\$9,525	\$4,953	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.5	week	\$1,000	\$520	
Lab & Data Validation	1	each	\$6,736	\$6,736	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
New LTM & Extraction Performance Well Installation (4 new wells)					
Mobilization & Site Setup	1	each	\$1,250	\$1,250	assume 4 wells screened at 40-50 ft bgs. 2-inch PVC. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 2: Fenceline
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water usage (hydrant permit fee)	4	day	\$50	\$200	
Survey	1	each	\$500	\$500	
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (4 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$160	
Lab & Data Validation	1	each	\$3,592	\$3,592	
Report	1	each	\$6,250	\$6,250	
Extraction, Treatment, & Discharge/Injection System Installation & Startup					
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	\$5,000	\$5,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	3.0	week	\$7,500	\$22,500	Assume install 1 extraction & 4 injection wells. 3 days per well. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people.
Equipment & Expendables	3.0	week	\$200	\$600	
Drilling Subcontractor / well installation					
12-inch Mud Rotary drilling	245	feet	\$48	\$11,760	Labor & materials. 12-inch mud rotary drilling.
8-inch carbon steel riser installed	145	feet	\$48	\$6,960	
8-inch stainless steel 10-ft screen	10	each	\$1,650	\$16,500	
Well Completion pads with bollards	5	each	\$575	\$2,875	
Travel	3.0	week	\$3,000	\$9,000	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	3.0	week	1,375	\$4,125	
Water usage (hydrant permit fee)	15.0	day	\$50	\$750	
Water IDW Transport & Disposal	5,000	gallon	\$2	\$10,000	Assume 1000 gallons per well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	1	each	\$2,000	\$2,000	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	1	each	\$132	\$132	1 per 20 cy.
Submersible Centrifugal Pump & Installation	1	ea	\$5,000	\$5,000	100 gpm, 50 ft head, 5-hp
Equipment Delivery	1	each	\$500	\$500	
Extraction System Equipment & Setup					
Mobilization and Site Setup	1	each	\$30,000	\$30,000	Includes sub mob/demob, utility location, and clearing.
System Storage/Operations Building	1,200	sq ft	\$200	\$240,000	40 ft x 30 ft building.

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 2: Fenceline
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Subtotal</i>			\$1,650	\$13,200	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$13,200	
<i>Present Value</i> (0.97%) <i>of Future Cost of LUCs</i>	8	year	0.97%	\$12,642	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$2,500	\$2,500	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$2,500	
<i>Contingency</i>	10%		\$250	\$250	
<i>Project Management</i>	10%		\$250	\$250	
<i>G&A</i>	10%		\$250	\$250	
<i>Fee</i>	8%		\$200	\$200	
<i>Subtotal</i>			\$3,450	\$3,450	
5YR Total Annual Cost at Year 5			\$3,450		
5YR Total Future Cost				\$3,450	
<i>Present Value</i> (0.97%) <i>of Future Cost of 5YRs</i>	5	year	0.97%	\$3,287	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$3,750	\$3,750	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$3,750	
<i>Contingency</i>	25%		\$938	\$938	
<i>Project Management</i>	10%		\$375	\$375	
<i>G&A</i>	10%		\$375	\$375	
<i>Fee</i>	8%		\$300	\$300	
<i>Subtotal</i>			\$5,738	\$5,738	
Well Maintenance Future Annual Cost at Year 5			\$5,738		
Well Maintenance Total Future Cost				\$5,738	

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Maintenance</i>	5	year	0.97%	\$5,467	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 8)					
Abandon wells when RAOs are achieved. Driller sub.	22	well	\$300	\$6,600	
Labor, ODCs, and Travel	1.0	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$2,000	\$2,000	
<i>Subtotal</i>				\$18,125	
<i>Contingency</i>	25%			\$4,531	
<i>Project Management</i>	10%			\$1,813	
<i>G&A</i>	10%			\$1,813	
<i>Fee</i>	8%			\$1,450	
<i>Subtotal</i>				\$27,731	
Well Abandonment Future Annual Cost at Year 8				\$27,731	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Well Abandonment</i>	8	year	0.97%	\$25,670	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Extraction System O&M (Years 1-5)					
Electrical usage	456,834	kW-hr	\$0.21	\$95,935	Power for 5 years continual operation. Power cost assumes \$0.21/kW-hr. 5-hp extraction pump; 3-hp horizontal-centrifugal pump; 30 hp blower; 1 hp for air feed system.
Maintenance	5	each	\$37,446	\$187,228	5% of installation cost
Polyphosphate	10	drum	\$1,000	\$10,000	2 drums/yr
Influent & Exfluent Sampling					Quarterly during Month 1. Then monthly through Year 8. VOCs only. 30% QA/QC
Labor, ODCs, & Travel	63	day	\$800	\$50,400	
Equipment & Expendables	63	day	\$100	\$6,300	
VOC Samples (1 extraction wells and 1 effluent)	199	sample	\$112	\$22,288	
Sludge Handling					
Disposal	10	ton	\$200	\$2,000	Assume 2 ton/yr
Labor, ODCs, & Travel	260	week	\$925	\$240,500	8 hrs per wk
O&M Report	60	each	\$3,000	\$180,000	quarterly
<i>Subtotal</i>				\$794,651	

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 2: Fenceline
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Contingency</i>	25%			\$198,663	
<i>Project Management</i>	10%			\$79,465	
<i>G&A</i>	10%			\$79,465	
<i>Fee</i>	8%			\$63,572	
<i>Extraction System O&M Year 1-5 Subtotal</i>				\$1,215,816	
<i>O&M per year</i>			\$243,163		(Years 1-5 Subtotal / 5)
<i>Present Value _(0.97%)</i> <i>of Future Cost of Extraction&Treatment O&M Years 1-5</i>	5	year	0.97%	\$1,181,221	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Demo/Abandonment of Extraction System (Year 8)					
Abandon Extraction system when RAOs are achieved. Demo sub.	1	each	\$25,000	\$25,000	Wait to abandon until end of Year 8 when other well abandonments occur. Demo and abandon extraction & treatment system building. Demo and abandon trenched conveyance and discharge piping. Extraction & injection/infiltration well abandonment accounted for above with monitoring well abandonment.
Labor, ODCs, and Travel	2.0	week	\$9,525	\$19,050	
IDW disposal	1	each	\$10,000	\$10,000	
<i>Subtotal</i>				\$54,050	
<i>Contingency</i>	20%			\$3,625	
<i>Project Management</i>	10%			\$1,813	
<i>G&A</i>	10%			\$1,813	
<i>Fee</i>	8%			\$1,450	
<i>Subtotal</i>				\$62,750	
<i>Present Value _(0.97%)</i> <i>of Future Cost of Well Abandonment</i>	8	year	0.97%	\$58,086	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (15 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	2.4	week	\$9,525	\$22,860	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	2.4	week	\$1,000	\$2,400	
Lab & Data Validation	4	each	\$7,368	\$29,473	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$79,733	
<i>Contingency</i>	20%			\$15,947	
<i>Project Management</i>	10%			\$7,973	

Table A-2.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 2: Fenceline
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
G&A	10%			\$7,973	
Fee	8%			\$6,379	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$118,004	
<i>Total per quarterly event</i>			\$29,501		(Year 1 Subtotal / 4)
<i>Present Value (0.97%) of Future Cost of Groundwater Sampling Year 1</i>	1	year	0.97%	\$116,871	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 2-8 (annual) (15 wells)					
Labor, ODCs, travel	4.2	week	\$9,525	\$40,005	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	4.2	week	\$1,000	\$4,200	
Lab & Data Validation	7	each	\$8,472	\$59,304	See lab & DV backup sheets
Report	7	each	\$6,250	\$43,750	
<i>Subtotal</i>				\$147,259	
<i>Contingency</i>	20%			\$29,452	
<i>Project Management</i>	10%			\$14,726	
<i>G&A</i>	10%			\$14,726	
<i>Fee</i>	8%			\$11,781	
<i>Total Future Groundwater Sampling Cost Years 2-8</i>				\$217,944	
<i>Total per year</i>			\$31,135		(Total Future Yrs 2-8 / 7)
<i>Present Value (0.97%) of Future Cost of Groundwater Sampling Years 2-8</i>	8	year	0.97%	\$207,713	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$1,610,959	Y2011 PV calculated for 8-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 8(a) - Extraction, Treatment, Discharge, LUCs, and Monitoring			-30%	+50%	
	\$3,055,650		\$2,138,955	\$4,583,476	

Table A-2.4(b) - Lab Backup for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 2: Fenceline
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 13 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	13	2	3	1	3	2	2					26	26	\$111.71	\$2,904.46	\$2,904.46	
Methane, Ethane, & Ethene by RSK-175	GW	7	0	0	0	0	1	1					9	9	\$105.18	\$946.62	\$946.62	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	7	0	0	0	0	1	1					9	9	\$50.87	\$457.83	\$457.83	
Sulfide by USEPA 376.1	GW	7	0	0	0	0	1	1					9	9	\$35.12	\$316.08	\$316.08	
Alkalinity by USEPA 310.1	GW	7	0	0	0	0	1	1					9	9	\$13.73	\$123.57	\$123.57	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	7	0	0	0	0	1	1					9	9	\$134.90	\$1,214.10	\$1,214.10	
TOC by SW-846 9060 Quadruplicate analysis	GW	7	0	0	0	0	1	1					9	9	\$33.21	\$298.89	\$298.89	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	7	1	0	0	0	1	1					10	10	\$35.73	\$357.30	\$357.30	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$6,736.00
Additional Baseline -- Assume 4 new wells																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$95.00	\$950.00	\$950.00	
Methane, Ethane, & Ethene	GW	4	0	0	0	0	1	1					6	6	\$101.09	\$606.54	\$606.54	
Nitrate, Nitrite, & Sulfate	GW	4	0	0	0	0	1	1					6	6	\$48.82	\$292.92	\$292.92	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$21.91	\$131.46	\$131.46	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.18	\$79.08	\$79.08	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$128.57	\$771.42	\$771.42	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	
Dissolved Arsenic, Iron, & Manganese	GW	4	1	0	0	0	1	1					7	7	\$28.08	\$196.56	\$196.56	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal +15% for Data Validation		\$3,592.39
																TOTAL IMPLEMENTATION LAB COST		\$10,328.39
Performance Monitoring																		
Year 1 - Quarterly Sampling Events - Assume 15 wells																		
Groundwater wells																		
TCL VOCs	GW	15	2	3	1	3	2	2					28	28	\$111.71	\$3,127.88	\$3,127.88	
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$7,368.16
																Total for Year 1		\$29,472.64
Years 2-8 (annual) - Assume 15 wells																		
Groundwater wells																		
TCL VOCs	GW	15	2	3	1	3	2	2					28	28	\$111.71	\$3,127.88	\$3,127.88	
Methane, Ethane, Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80	
Nitrate, Nitrite, Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70	
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20	
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30	
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00	
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10	
Dissolved Iron and Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal +15% for Data Validation		\$8,472.06
																Total for Years 2-8		\$59,304.43
																TOTAL FUTURE LAB COST		\$88,777.07

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

**APPENDIX A - Area 3: Offsite VOCs > 500 ug/L
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY ADDENDUM
NWIRP CALVERTON, NEW YORK**

Alternative	Alternative 2 LUCs and Monitoring			Alternative 3 Anaerobic Biodegradation, LUCs, and Monitoring		
	7 years			8 years		
Alternative Evaluation Timeframe	-30%	Estimate	+50%	-30%	Estimate	+50%
Total Implementation Costs	\$17,000	\$24,000	\$36,000	\$43,000	\$61,000	\$91,000
Present Value of Future Costs	\$101,000	\$145,000	\$217,000	\$1,269,000	\$1,813,000	\$2,719,000
Grand Total Present Value	\$118,000	\$169,000	\$253,000	\$1,312,000	\$1,874,000	\$2,810,000

Notes:

- Alternative 1 - No Action has no cost (\$0).

- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.
- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Area	3. Offsite VOCs > 500 ug/L			
Alternative	2 - LUCs & Monitoring		3. Biodegradation, LUCs, & Monitoring	
Duration	7 years (geo mean of 4-10yr timeframe)		8 years (prescribed timeframe/steps)	
TOTAL Present Value	\$168,868		\$1,873,587	
Implementation	\$23,879	LUC Implementation UFP-SAP Baseline Sampling existing wells	\$60,879	LUC Implementation UFP-SAP Baseline Sampling existing wells
Future Total PV	\$144,989		\$1,812,708	
Year				
1	\$825	LUC Inspection	\$825	LUC Inspection
	\$16,849	9-month LTM event	\$82,350	Quarterly LTM (total)
2	\$825	LUC Inspection	\$825	LUC Inspection
	\$16,849	18-month LTM event	\$20,587	Annual LTM
3	\$825	LUC Inspection	\$825	LUC Inspection
	\$33,698	27- & 36-month LTM events	\$20,587	Annual LTM
4	\$825	LUC Inspection	\$825	LUC Inspection
	\$16,849	Annual LTM	\$20,587	Annual LTM
5	\$825	LUC Inspection	\$825	LUC Inspection
	\$1,725	5YR	\$1,725	5YR
	\$2,869	Well Maintenance	\$2,869	Well Maintenance
	\$16,849	Annual LTM	\$104,857	Injection Performance Well Install & Sample
			\$1,401,971	Injection Well Installation and Injection
			\$99,918	Quarterly LTM (total)
6	\$825	LUC Inspection	\$825	LUC Inspection
	\$16,849	Annual LTM	\$25,363	Annual LTM
7	\$825	LUC Inspection	\$825	LUC Inspection
	\$4,517	Well Abandonment	\$25,363	Annual LTM
	\$16,849	Annual LTM		
8			\$825	LUC Inspection
			\$62,974	Well Abandonment
			\$25,363	Annual LTM

Table A-3.1
Area 3: Offsite VOCs > 500 ug/L
Cost Estimate for Alternative 1 - No Action
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No Action
Cost = \$0

Table A-3.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 6 wells for COCs and geochemical and biodegradation-related analyses.

No additional wells to be installed / necessary for performance monitoring.

MNA performance monitoring of 6 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annual event during final Year 7.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$1,000	\$1,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$3,750	\$3,750	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (6 existing Wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$2,286	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$240	
Lab & Data Validation	1	each	\$5,733	\$5,733	See lab & DV backup sheets
Report	1	each	\$3,125	\$3,125	
<i>Subtotal</i>				\$16,134	
<i>Contingency</i>	20%			\$3,227	
<i>Project Management</i>	10%			\$1,613	
<i>G&A</i>	10%			\$1,613	
<i>Fee</i>	8%			\$1,291	
Total Implementation Cost				\$23,879	
FUTURE COSTS (7 years)					
LUCs (Years 1-7)					
Annual Inspections and reporting (1 per year)	7	year	\$750	\$5,250	

Table A-3.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Subtotal</i>			\$750	\$5,250	
<i>Project Management</i>	10%		\$75	\$525	
<i>Subtotal</i>			\$825	\$5,775	
LUCs Future Annual Cost			\$825		
LUCs Total Future Cost				\$5,775	
<i>Present Value</i> <small>(0.8%)</small> <i>of Future Cost of LUCs</i>	7	year	0.8%	\$5,595	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$1,250	\$1,250	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$1,250	\$1,250	
<i>Contingency</i>	10%		\$125	\$125	
<i>Project Management</i>	10%		\$125	\$125	
<i>G&A</i>	10%		\$125	\$125	
<i>Fee</i>	8%		\$100	\$100	
<i>Subtotal</i>			\$1,725	\$1,725	
5YR Total Annual Cost at Year 5			\$1,725		
5YR Total Future Cost				\$1,725	
<i>Present Value</i> <small>(0.8%)</small> <i>of Future Cost of 5YRs</i>	5	year	0.8%	\$1,658	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$1,875	\$1,875	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$1,875	\$1,875	
<i>Contingency</i>	25%		\$469	\$469	
<i>Project Management</i>	10%		\$188	\$188	
<i>G&A</i>	10%		\$188	\$188	
<i>Fee</i>	8%		\$150	\$150	
<i>Subtotal</i>			\$2,869	\$2,869	
Well Maintenance Future Annual Cost at Year 5			\$2,869		

Table A-3.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Maintenance Total Future Cost				\$2,869	
<i>Present Value (0.8%) of Future Cost of Well Maintenance</i>	5	year	0.8%	\$2,757	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 7)					
Abandon wells when RAOs are achieved. Driller sub. Labor, ODCs, and Travel	5	well	\$300	\$1,500	
	0.1	week	\$9,525	\$953	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$500	\$500	
<i>Subtotal</i>				\$2,953	
<i>Contingency</i>	25%			\$738	
<i>Project Management</i>	10%			\$295	
<i>G&A</i>	10%			\$295	
<i>Fee</i>	8%			\$236	
<i>Subtotal</i>				\$4,517	
Well Abandonment Future Annual Cost at Year 7				\$4,517	
<i>Present Value (0.8%) of Future Cost of Well Abandonment</i>	7	year	0.8%	\$4,272	
Performance Groundwater Monitoring (6 wells) Months 9, 18, 27, and 36					Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event.
Labor, ODCs, travel	1.0	week	\$9,525	\$9,144	9, 18, 27, and 36 month events. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.0	week	\$1,000	\$960	
Lab & Data Validation	4	each	\$5,733	\$22,934	See lab & DV backup sheets
Report	4	each	\$3,125	\$12,500	
<i>Subtotal</i>				\$45,538	
<i>Contingency</i>	20%			\$9,108	
<i>Project Management</i>	10%			\$4,554	
<i>G&A</i>	10%			\$4,554	
<i>Fee</i>	8%			\$3,643	
<i>Subtotal</i>				\$67,396	

Table A-3.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Future Monitoring Annual Cost during each of Years 1 and 2			\$16,849		(Total / 4). 1 event each of years 1 and 2
Future Monitoring Annual Cost at Year 3			\$33,698		(Total / 2). 2 events in year 3
Total Future Monitoring Cost Years 1-3				\$67,396	
<i>Present Value (0.8%) of Future Cost of Groundwater Sampling Years 1-3</i>	3	year	0.8%	\$66,200	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 4-7 (6 wells) (annual sampling)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	1.0	week	\$9,525	\$9,144	
Equipment & Expendables	1.0	week	\$1,000	\$960	
Lab & Data Validation	4	each	\$5,733	\$22,934	See lab & DV backup sheets
Report	4	each	\$3,125	\$12,500	
<i>Subtotal</i>				\$45,538	
<i>Contingency</i>	20%			\$9,108	
<i>Project Management</i>	10%			\$4,554	
<i>G&A</i>	10%			\$4,554	
<i>Fee</i>	8%			\$3,643	
<i>Subtotal</i>				\$67,396	
Monitoring Future Annual Cost during each of Years 4-7			\$16,849		(Total / 4)
Monitoring Total Future Cost				\$67,396	
<i>Present Value (0.8%) of Future Cost of Groundwater Sampling Years 4-7</i>	7	year	0.8%	\$64,509	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$144,989	Y2011 PV calculated for 7-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 3 - MNA and LUCs			-30%	+50%	
	\$168,868		\$118,208	\$253,303	

Table A-3.2(b) - Lab Backup for Alternative 2 - LUCs and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 6 existing monitoring wells																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, & Ethene by RSK-175	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide by USEPA 376.1	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity by USEPA 310.1	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC by SW-846 9060 Quadruplicate analysis	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$5,733.43
TOTAL IMPLEMENTATION LAB COST																	\$5,733.43
Performance Monitoring																	
Months 9, 18, 27, and 36 -- Assume 6 wells																	
Groundwater wells																	
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, and Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$5,733.43
Total for 9,18,27&36 months																	\$22,933.71
Years 4 through 7 -- Assume 6 wells																	
Groundwater wells																	
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, and Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$5,733.43
Total for 4-7																	\$22,933.71
TOTAL FUTURE LAB COST																	\$45,867.43
Full QA/QC for COCs only. Also, duplicates for metals. MS/MSDs are billable Standard turnaround time																	

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 6 wells for COCs and geochemical and biodegradation-related analyses. Sample quarterly during Year 1 and annual during Years 2 through 4.

Install 10 new Injection Performance monitoring wells (varying depths) during Year 3. Sample quarterly during Year 5 and annually during Years 6 through 8.

Permanent injection wells. Assume 49 injection wells (varying depths) spaced 25-ft on center. 15-ft radius of injection. 4-inch diameter. 20-ft 0.010-slot continuous wrap screens.

2,630 pounds of 60% emulsified vegetable oil injected per well. EOS® 598B42 product assumed. Saturation dosage based on 0.0015 lbs EOS® per lb soil in treatment area. Mobile porosity at 15%. Total oil concentrate and mixture/chase water injected per well = 15,862 gallons. See Dosage calculation sheet.

Estimated Time to Complete Year 5 injection event (49 wells) = 31 days (4-well injection manifold; 15 gpm; 7 hrs injection/day).

Assume no re-injection. No bioaugmentation necessary. No pH buffering required.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$1,000	\$1,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, injection, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$28,750	\$28,750	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (6 existing Wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$2,286	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$240	
Lab & Data Validation	1	each	\$5,733	\$5,733	See lab & DV backup sheets
Report	1	each	\$3,125	\$3,125	
<i>Subtotal</i>				\$41,134	
<i>Contingency</i>	20%			\$8,227	
<i>Project Management</i>	10%			\$4,113	
<i>G&A</i>	10%			\$4,113	
<i>Fee</i>	8%			\$3,291	
Total Implementation Cost				\$60,879	

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
FUTURE COSTS (4 years)					
LUCs (Years 1-8)					
Annual Inspections and reporting (1 per year)	8	year	\$750	\$6,000	
<i>Subtotal</i>			\$750	\$6,000	
<i>Project Management</i>	10%		\$75	\$600	
<i>Subtotal</i>			\$825	\$6,600	
LUCs Future Annual Cost			\$825		
LUCs Total Future Cost				\$6,600	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of LUCs</i>	8	year	0.97%	\$6,321	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Year 5 only)					
5-Year Review	1	each	\$1,250	\$1,250	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$1,250	\$1,250	
<i>Contingency</i>	10%		\$125	\$125	
<i>Project Management</i>	10%		\$125	\$125	
<i>G&A</i>	10%		\$125	\$125	
<i>Fee</i>	8%		\$100	\$100	
<i>Subtotal</i>			\$1,725	\$1,725	
5YR Total Annual Cost at Year 5			\$1,725		
5YR Total Future Cost				\$1,725	
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of 5YRs</i>	5	year	0.97%	\$1,644	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Year 5 only)					
Repair flushmounts & vaults, potential well replacements, etc.	1	event	\$1,875	\$1,875	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$1,875	\$1,875	
<i>Contingency</i>	25%		\$469	\$469	

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Project Management</i>	10%		\$188	\$188	
<i>G&A</i>	10%		\$188	\$188	
<i>Fee</i>	8%		\$150	\$150	
<i>Subtotal</i>			\$2,869	\$2,869	
Well Maintenance Future Annual Cost at Year 5			\$2,869		
Well Maintenance Total Future Cost				\$2,869	
<i>Present Value (0.97%) of Future Cost of Well Maintenance</i>	5	year	0.97%	\$2,734	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 8)					
Abandon wells when RAOs are achieved. Driller sub. Labor, ODCs, and Travel	65	well	\$300	\$19,500	Abandon monitoring wells and injection wells.
IDW Disposal	2	week	\$9,525	\$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
	1	each	\$4,000	\$4,000	
<i>Subtotal</i>				\$42,550	
<i>Contingency</i>	20%			\$8,510	
<i>Project Management</i>	10%			\$4,255	
<i>G&A</i>	10%			\$4,255	
<i>Fee</i>	8%			\$3,404	
<i>Subtotal</i>				\$62,974	
Well Abandonment Future Annual Cost at Year 4				\$62,974	
<i>Present Value (0.97%) of Future Cost of Well Abandonment</i>	8	year	0.97%	\$58,294	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
New Injection Performance Well Installation (10 new wells) (Year 5)					assume 2 wells screened at 30-40 ft bgs, 4 wells screened at 40-50 ft bgs, and 4 wells screened at 60-70 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	\$625	\$625	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.7	week	\$9,525	\$16,510	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.7	week	\$200	\$347	
Drilling Subcontractor / well installation					

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well installation - HSA drilling & 2-inch PVC install	540	feet	\$36	\$19,440	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	10	each	\$325	\$3,250	
Travel	1.7	week	\$3,000	\$5,200	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.7	week	1,375	\$2,383	
Water usage (hydrant permit fee)	8.7	day	\$50	\$433	
Survey	1	each	\$250	\$250	
Water IDW Transport & Disposal	1,500	gallon	\$2	\$3,000	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.35	each	\$2,000	\$698	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$52,136	
<i>Contingency</i>	20%			\$10,427	
<i>Project Management</i>	10%			\$5,214	
<i>G&A</i>	10%			\$5,214	
<i>Fee</i>	8%			\$4,171	
<i>Subtotal Injection Performance Well Installation during Year 3</i>				\$77,162	
<i>Present Value (0.97%) of Future Well Installation Year 5</i>	5	year	0.97%	\$73,526	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Injection Performance Wells (10 wells)					
Labor, ODCs, travel	0.4	week	\$9,525	\$3,810	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.4	week	\$8,413	\$3,365	
Lab & Data Validation	1	each	\$8,413	\$8,413	
Report	1	each	\$3,125	\$3,125	
<i>Subtotal</i>				\$18,713	
<i>Contingency</i>	20%			\$3,743	
<i>Project Management</i>	10%			\$1,871	
<i>G&A</i>	10%			\$1,871	
<i>Fee</i>	8%			\$1,497	
<i>Subtotal Sample New Injection Performance Wells Year 3</i>				\$27,695	
<i>Present Value (0.97%) of Future Well Sample Year 5</i>	5	year	0.97%	\$26,390	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Biobarrier Well Installation and Injection (Year 5)					
Office Trailer, Storage Trailer, & Site Utilities	6				

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Installation (49 wells)					
Mobilization	1	each	\$10,000	\$10,000	Includes sub mob/demob, utility location, construction of staging area, and clearing.
Labor	8.5	week	\$9,525	\$80,899	Install 22 wells listed above. Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	8.5	week	\$200	\$1,699	
Drilling Subcontractor / well installation					Includes mob, materials, labor, travel
Well installation - HSA drilling & 4-inch PVC install	2,445	feet	\$38	\$92,910	Labor and materials. 6.25-inch ID HSA.
4-inch, 20-ft PVC 0.010-slot continuous-wrap screens	49	each	\$990	\$48,510	
Well Completion with bollards	49	each	\$325	\$15,925	
Travel	8.5	week	\$2,000	\$16,987	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	8.5	week	1,375	\$11,678	
Water usage (hydrant permit fee)	42.5	day	\$50	\$2,123	
Survey	1	each	\$4,000	\$4,000	
Water IDW Transport & Disposal	24,500	gallon	\$2	\$49,000	Assume 500 gallons per 4-inch well.
Water characterization - TCLP VOCs	2	each	\$116	\$232	
Soil IDW Transport & Disposal	2.99	each	\$2,000	\$5,976	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	3	each	\$132	\$396	1 per 20 cy.
Injection (49 wells)					
Labor, ODCs, Travel	6.2	week	\$14,450	\$89,136	3 people. 7 hrs injection time per day. 5 days/wk. Per diem at \$200/day. 2 rental trucks at \$65/day each.
Equipment	6.2	week	\$700	\$4,318	Trailer, generator, expendables
Injection parts and equipment	1	each	\$10,000	\$10,000	
Emulsified Oil material and delivery	309	drum	\$1,106	\$341,878	EOS® 598B42 brand. See dosage calculation sheet for dosage per well calc. Includes material, delivery, and NY taxes.
Water usage (hydrant permit fee)	30.8	day	\$50	\$1,542	
Drum disposal	309	drum	\$40	\$12,360	
Construction Report	1	each	\$30,000	\$30,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$829,569	
<i>Contingency</i>	25%			\$207,392	
<i>Project Management</i>	10%			\$82,957	
<i>Remedial Design</i>	6%			\$49,774	
<i>Construction Oversight</i>	10%			\$82,957	
<i>G&A</i>	10%			\$82,957	
<i>Fee</i>	8%			\$66,365	
Total Year 3 Injection				\$1,401,971	

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Injection during Year 5</i>	5	year	0.97%	\$1,335,910	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (6 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	1.9	week	\$9,525	\$18,288	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.9	week	\$1,000	\$1,920	
Lab & Data Validation	4	each	\$5,733	\$22,934	See lab & DV backup sheets
Report	4	each	\$3,125	\$12,500	
<i>Subtotal</i>				\$55,642	
<i>Contingency</i>	20%			\$11,128	
<i>Project Management</i>	10%			\$5,564	
<i>G&A</i>	10%			\$5,564	
<i>Fee</i>	8%			\$4,451	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$82,350	
<i>Total per year during each of Year 1</i>			\$82,350		(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>			\$20,587		(Year 1 Subtotal / 4)
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Groundwater Sampling Year 1</i>	1	year	0.97%	\$81,559	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (6 wells)					
Years 2-4 (Annual Event)					
Labor, ODCs, travel	1.4	week	\$9,525	\$13,716	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.4	week	\$1,000	\$1,440	
Lab & Data Validation	3	each	\$5,733	\$17,200	See lab & DV backup sheets
Report	3	each	\$3,125	\$9,375	
<i>Subtotal</i>				\$41,731	
<i>Contingency</i>	20%			\$8,346	
<i>Project Management</i>	10%			\$4,173	
<i>G&A</i>	10%			\$4,173	
<i>Fee</i>	8%			\$3,339	
<i>Total Future Groundwater Sampling Cost Years 2-4</i>				\$61,762	
<i>Total per year during each of Years 2-4</i>			\$20,587		(Years 2-4 Subtotal / 3)

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Groundwater Sampling Years 2-4</i>	4	year	0.97%	\$60,001	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (16 wells)					
Year 5 (Quarterly events)					
Labor, ODCs, travel	5.1	week	\$9,525	\$48,768	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	5.1	week	\$1,000	\$5,120	
Lab & Data Validation	4	each	\$281	\$1,124	See lab & DV backup sheets
Report	4	each	\$3,125	\$12,500	
<i>Subtotal</i>				\$67,512	
<i>Contingency</i>	20%			\$13,502	
<i>Project Management</i>	10%			\$6,751	
<i>G&A</i>	10%			\$6,751	
<i>Fee</i>	8%			\$5,401	
<i>Total Future Groundwater Sampling Cost Year 5</i>				\$99,918	
<i>Total per year during each of Year 5</i>			\$99,918		(Year 5 Subtotal / 1)
<i>Total per quarterly event</i>			\$24,979		(Year 5 Subtotal / 4)
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Groundwater Sampling Year 5</i>	5	year	0.97%	\$95,209	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 6-8 (annual) (16 wells)					
Labor, ODCs, travel	3.2	week	\$9,525	\$30,480	Annual sampling required by facility RCRA permit. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	3.2	week	\$1,000	\$3,200	
Lab & Data Validation	5	each	\$421	\$2,107	See lab & DV backup sheets
Report	5	each	\$3,125	\$15,625	
<i>Subtotal</i>				\$51,412	
<i>Contingency</i>	20%			\$10,282	
<i>Project Management</i>	10%			\$5,141	
<i>G&A</i>	10%			\$5,141	
<i>Fee</i>	8%			\$4,113	
<i>Total Future Groundwater Sampling Cost Years 6-8</i>				\$76,090	
<i>Total per year during each of Years 6-8</i>			\$25,363		(Total / 3)

Table A-3.3(a) - Cost Estimate for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Present Value</i> <small>(0.97%)</small> <i>of Future Cost of Groundwater Sampling Years 6-8</i>	8		0.97%	\$71,121	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs					
				\$1,812,708	Y2011 PV calculated for 8-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 5 - EISB, MNA, and LUCs			-30%	+50%	
		\$1,873,587	\$1,311,511	\$2,810,380	

Table A-3.3(b) - Lab Backup for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 6 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, & Ethene by RSK-175	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide by USEPA 376.1	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity by USEPA 310.1	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC by SW-846 9060 Quadruplicate analysis	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$5,733.43
TOTAL IMPLEMENTATION LAB COST																	\$5,733.43
Performance Monitoring																	
Year 1 - Quarterly Sampling Events - Assume 6 wells																	
Groundwater wells																	
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																	\$5,733.43
Total for Year 1																	\$22,933.71
Years 2-4 - Annual Event - Assume 6 wells																	
Groundwater wells																	
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Iron and Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																	\$5,733.43
Total for Year 2																	\$17,200.29
Year 5 - New Baseline (10 wells)																	
Groundwater wells																	
TCL VOCs	GW	10	1	2	1	2	1	1					18	18	\$111.71	\$2,010.78	\$2,010.78
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49
IDW - Purged groundwater and decon water & soil cuttings of new wells																	
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00
Subtotal +15% for Data Validation																	\$8,412.70
Total for Year 3																	\$8,412.70
Year 5 - Quarterly Sampling Events - Assume 16 wells																	
Groundwater wells																	
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49
IDW - Purged groundwater and decon water																	

Table A-3.3(b) - Lab Backup for Alternative 4 - Anaerobic Biodegradation, LUCs, and Monitoring
Area 3: Offsite VOCs > 500 ug/L
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$9,797.56	
Total for Year 3																\$39,190.25	
Years 6-8 - Annual Event - Assume 16 wells																	
Groundwater wells																	
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01
Methane, Ethane, & Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16
Nitrate, Nitrite, & Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52
Dissolved Arsenic, Iron, & Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$9,797.56	
Total for Years 4-8																\$29,392.69	
TOTAL FUTURE LAB COST																\$117,129.64	

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

**APPENDIX A - Area 4: Offsite VOCs < 500 ug/L
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY ADDENDUM
NWIRP CALVERTON, NEW YORK**

Alternative	Alternative 2 LUCs and Monitoring		
Alternative Evaluation Timeframe	10 years		
	-30%	Estimate	+50%
Total Implementation Costs	\$64,000	\$91,000	\$137,000
Present Value of Future Costs	\$497,000	\$710,000	\$1,066,000
Grand Total Present Value	\$561,000	\$801,000	\$1,203,000

Notes:

- Alternative 1 - No Action has no cost (\$0).

- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.
- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Area	4. Offsite VOCs < 500 ug/L	
Alternative	2 - LUCs & Monitoring	
Duration	10 years (geo mean of 6-14yr timeframe)	
TOTAL Present Value	\$801,754	
Implementation	\$91,286	LUC Implementation UFP-SAP Baseline Sampling & Install New wells
<i>Future Total PV</i>	\$710,469	
Year		
1	\$825 \$61,470	LUC Inspection 9-month LTM event
2	\$825 \$61,470	LUC Inspection 18-month LTM event
3	\$825 \$122,939	LUC Inspection 27- & 36-month LTM events
4	\$825 \$61,470	LUC Inspection Annual LTM
5	\$825 \$3,450 \$2,250 \$61,470	LUC Inspection 5YR Well Maintenance Annual LTM
6	\$825 \$61,470	LUC Inspection Annual LTM
7	\$825 \$61,470	LUC Inspection Annual LTM
8	\$825 \$61,470	LUC Inspection Annual LTM
9	\$825 \$61,470	LUC Inspection Annual LTM
10	\$825 \$3,450 \$2,250 \$22,895 \$61,470	LUC Inspection 5YR Well Maintenance Well Abandonment Annual LTM

Table A-4.1
Area 4: Offsite VOCs < 500 ug/L
Cost Estimate for Alternative 1 - No Action
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

No Action
Cost = \$0

Table A-4.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 4: Offsite VOCs < 500 ug/L
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NWIRP Calverton, New York
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 14 wells for COCs and geochemical and biodegradation-related analyses.

Following review of baseline data, install 4 new monitoring wells. Sample these for additional baseline data (COCs and geochem/biodeg analyses).

MNA performance monitoring of 16 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annually through Year 10.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$1,000	\$1,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$3,750	\$3,750	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (14 existing Wells)					
Labor, ODCs, travel	0.6	week	\$9,525	\$5,334	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.6	week	\$1,000	\$560	
Lab & Data Validation	1	each	\$8,814	\$8,814	See lab & DV backup sheets
Report	1	each	\$3,125	\$3,125	
New Well Installation (4 new wells)					
Mobilization & Site Setup	1	each	\$10,000	\$10,000	Assume 1 well at 20-30 ft bgs, 2 wells at 40-50 ft bgs, and 1 well at 60-70 ft bgs. Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	200	feet	\$36	\$7,200	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$250	\$250	

Table A-4.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 4: Offsite VOCs < 500 ug/L
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.13	each	\$2,000	\$259	20 cy rolloff. Note HSA outer diam = 8 inches.
Baseline Sample New Wells (4 wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$160	
Lab & Data Validation	1	each	\$4,130	\$4,130	
Report	1	each	\$3,125	\$3,125	
<i>Subtotal</i>				\$61,679	
<i>Contingency</i>	20%			\$12,336	
<i>Project Management</i>	10%			\$6,168	
<i>G&A</i>	10%			\$6,168	
<i>Fee</i>	8%			\$4,934	
Total Implementation Cost				\$91,286	
FUTURE COSTS (10 years)					
LUCs (Years 1-10)					
Annual Inspections and reporting (1 per year)	10	year	\$750	\$7,500	
<i>Subtotal</i>			\$750	\$7,500	
<i>Project Management</i>	10%		\$75	\$750	
<i>Subtotal</i>			\$825	\$8,250	
LUCs Future Annual Cost			\$825		
LUCs Total Future Cost				\$8,250	
<i>Present Value^(1.3%) of Future Cost of LUCs</i>	10	year	1.3%	\$7,690	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Years 5 and 10)					
5-Year Review	2	each	\$2,500	\$5,000	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.

Table A-4.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring

Area 4: Offsite VOCs < 500 ug/L

Southern Area Feasibility Study Addendum

NWIRP Calverton, New York

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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Subtotal</i>			\$2,500	\$5,000	
<i>Contingency</i>	10%		\$250	\$500	
<i>Project Management</i>	10%		\$250	\$500	
<i>G&A</i>	10%		\$250	\$500	
<i>Fee</i>	8%		\$200	\$400	
<i>Subtotal</i>			\$3,450	\$6,900	
5YR Total Annual Cost during each of Years 5 and 10			\$3,450		
5YR Total Future Cost				\$6,900	
<i>Present Value</i> ^(1.3%) <i>of Future Cost of 5YRs</i>	10	year	1.3%	\$6,266	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Years 5 and 10)					
Repair flushmounts & vaults, potential well replacements, etc.	2	event	\$15,000	\$30,000	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$15,000	\$30,000	
<i>Contingency</i>	25%		\$3,750	\$7,500	
<i>Project Management</i>	10%		\$1,500	\$3,000	
<i>G&A</i>	10%		\$1,500	\$3,000	
<i>Fee</i>	8%		\$1,200	\$2,400	
<i>Subtotal</i>			\$22,950	\$45,900	
Well Maintenance Future Annual Cost during each of Years 5 & 10			\$22,950		
Well Maintenance Total Future Cost				\$45,900	
<i>Present Value</i> ^(1.3%) <i>of Future Cost of Well Maintenance</i>	10	year	1.3%	\$41,684	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 10)					
Abandon wells when RAOs are achieved. Driller sub.	18	well	\$300	\$5,400	
Labor, ODCs, and Travel	1.0	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW Disposal	1	each	\$2,000	\$2,000	
<i>Subtotal</i>				\$16,925	
<i>Contingency</i>	25%			\$4,231	
<i>Project Management</i>	10%			\$1,693	
<i>G&A</i>	10%			\$1,693	

Table A-4.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 4: Offsite VOCs < 500 ug/L
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Fee</i>	8%			\$1,354	
<i>Subtotal</i>				\$25,895	
Well Abandonment Future Annual Cost at Year 10				\$25,895	
<i>Present Value (1.3%) of Future Cost of Well Abandonment</i>	10	year	1.3%	\$22,758	
Performance Groundwater Monitoring (16 wells)					
Months 9, 18, 27, and 36					Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event.
Labor, ODCs, travel	2.6	week	\$9,525	\$24,384	9, 18, 27, and 36 month events. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	2.6	week	\$1,000	\$2,560	
Lab & Data Validation	4	each	\$9,798	\$39,190	See lab & DV backup sheets
Report	4	each	\$25,000	\$100,000	
<i>Subtotal</i>				\$166,134	
<i>Contingency</i>	20%			\$33,227	
<i>Project Management</i>	10%			\$16,613	
<i>G&A</i>	10%			\$16,613	
<i>Fee</i>	8%			\$13,291	
<i>Subtotal</i>				\$245,879	
Future Monitoring Annual Cost during each of Years 1 and 2			\$61,470		(Total / 4). 1 event in each of years 1 and 2
Future Monitoring Annual Cost during Year 3			\$122,939		(Total / 2). 2 events in year 3
Total Future Monitoring Cost Years 1-3				\$245,879	
<i>Present Value (1.3%) of Future Cost of Groundwater Sampling Years 1-3</i>	3	year	1.3%	\$238,850	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 4-10 (16 wells) (annual sampling)					
Labor, ODCs, travel	4.5	week	\$9,525	\$42,672	Annual sampling required by facility RCRA permit. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	4.5	week	\$1,000	\$4,480	
Lab & Data Validation	7	each	\$9,798	\$68,583	See lab & DV backup sheets
Report	7	each	\$25,000	\$175,000	
<i>Subtotal</i>				\$290,735	

Table A-4.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 4: Offsite VOCs < 500 ug/L
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Contingency</i>	20%			\$58,147	
<i>Project Management</i>	10%			\$29,073	
<i>G&A</i>	10%			\$29,073	
<i>Fee</i>	8%			\$23,259	
<i>Subtotal</i>				\$430,288	
Monitoring Future Annual Cost during each of Years 4-10			\$61,470		(Total / 7)
Monitoring Total Future Cost				\$430,288	
<i>Present Value</i> <small>(1.3%)</small> <i>of Future Cost of Groundwater Sampling Years 4-10</i>	10	year	1.3%	\$393,222	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$710,469	Y2011 PV calculated for 8-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 3 - MNA and LUCs			-30%	+50%	
	\$801,754		\$561,228	\$1,202,632	

Table A-4.2(b) - Lab Backup for Alternative 2 - LUCs and Monitoring
Area 4: Offsite VOCs < 500 ug/L
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 14 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	14	2	3	1	3	2	2					27	27	\$111.71	\$3,016.17	\$3,016.17	
Methane, Ethane, & Ethene by RSK-175	GW	9	0	0	0	0	1	1					11	11	\$105.18	\$1,156.98	\$1,156.98	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	9	0	0	0	0	1	1					11	11	\$50.87	\$559.57	\$559.57	
Sulfide by USEPA 376.1	GW	9	0	0	0	0	1	1					11	11	\$35.12	\$386.32	\$386.32	
Alkalinity by USEPA 310.1	GW	9	0	0	0	0	1	1					11	11	\$13.73	\$151.03	\$151.03	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	9	0	0	0	0	1	1					11	11	\$134.90	\$1,483.90	\$1,483.90	
TOC by SW-846 9060 Quadruplicate analysis	GW	9	0	0	0	0	1	1					11	11	\$33.21	\$365.31	\$365.31	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	9	1	0	0	0	1	1					12	12	\$35.73	\$428.76	\$428.76	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$8,813.65
Additional Baseline -- Assume 4 new wells																		
Groundwater wells																		
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$95.00	\$950.00	\$950.00	
Methane, Ethane, Ethene	GW	4	0	0	0	0	1	1					6	6	\$101.09	\$606.54	\$606.54	
Nitrate, Nitrite, Sulfate	GW	4	0	0	0	0	1	1					6	6	\$48.82	\$292.92	\$292.92	
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$21.91	\$131.46	\$131.46	
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.18	\$79.08	\$79.08	
VFAs	GW	4	0	0	0	0	1	1					6	6	\$128.57	\$771.42	\$771.42	
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26	
Dissolved Arsenic, Iron, and Manganese	GW	4	1	0	0	0	1	1					7	7	\$28.08	\$196.56	\$196.56	
IDW - (1) Soil cuttings from new well installations; (2) Drilling decon water and well development water; and (3) Purged groundwater and decon water. Soil IDW sample rate is 1 sample per 200 cubic yards if soil.																		
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00	
																Subtotal + 15% for Data Validation		\$4,129.93
																TOTAL IMPLEMENTATION LAB COST		\$12,943.57
Performance Monitoring																		
Months 9, 18, 27, and 36 -- Assume 16 wells																		
Groundwater wells																		
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01	
Methane, Ethane, Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16	
Nitrate, Nitrite, Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44	
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44	
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76	
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80	
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52	
Dissolved Arsenic, Iron, and Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$9,797.56
																Total for 9,18,27&36 months		\$39,190.25
Years 4 through 10 -- Assume 16 wells																		
Groundwater wells																		
TCL VOCs	GW	16	2	4	1	4	2	2					31	31	\$111.71	\$3,463.01	\$3,463.01	
Methane, Ethane, Ethene	GW	10	0	0	0	0	1	1					12	12	\$105.18	\$1,262.16	\$1,262.16	
Nitrate, Nitrite, Sulfate	GW	10	0	0	0	0	1	1					12	12	\$50.87	\$610.44	\$610.44	
Sulfide	GW	10	0	0	0	0	1	1					12	12	\$35.12	\$421.44	\$421.44	
Alkalinity	GW	10	0	0	0	0	1	1					12	12	\$13.73	\$164.76	\$164.76	
VFAs	GW	10	0	0	0	0	1	1					12	12	\$134.90	\$1,618.80	\$1,618.80	
TOC	GW	10	0	0	0	0	1	1					12	12	\$33.21	\$398.52	\$398.52	
Dissolved Arsenic, Iron, and Manganese	GW	10	1	0	0	0	1	1					13	13	\$35.73	\$464.49	\$464.49	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$9,797.56
																Total for 4-14		\$68,582.94
																TOTAL FUTURE LAB COST		\$107,773.19
Full QA/QC for COCs only. Also, duplicates for metals.		MS/MSDs are billable			Standard turnaround time													

**APPENDIX A - Area 5: Peconic River
SUMMARY OF COST ANALYSIS
SOUTHERN AREA FEASIBILITY STUDY
NWIRP CALVERTON, NEW YORK**

Alternative	Alternative 2 LUCs and Monitoring			Alternative 3 Air Sparge, LUCs, and Monitoring			Alternative 4 Extraction, Treatment, & Discharge, LUCs, and Monitoring		
Alternative Evaluation Timeframe	17 years			24 years			24 years		
	-30%	Estimate	+50%	-30%	Estimate	+50%	-30%	Estimate	+50%
Total Implementation Costs	\$24,000	\$34,000	\$50,000	\$24,000	\$34,000	\$50,000	\$24,000	\$34,000	\$50,000
Present Value of Future Costs	\$246,000	\$352,000	\$528,000	\$4,054,000	\$5,792,000	\$8,687,000	\$12,419,000	\$17,741,000	\$26,612,000
Grand Total Present Value	\$270,000	\$386,000	\$578,000	\$4,078,000	\$5,826,000	\$8,737,000	\$12,443,000	\$17,775,000	\$26,662,000

Notes:

- Alternative 1 - No Action has no cost (\$0).

- The "Real" Discount Rate used to calculate the Present Value (PV) is timeframe dependent per the Office of Management and Budget (OMB), *Circular A-94, Appendix C, Revised December 2010, "Discount Rates for Cost Effectiveness, Lease Purchase, and Related Analysis" for Calendar Year 2011*, http://www.whitehouse.gov/omb/circulars_a094_a94_appx-cl.

The Real Discount Rates are a forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the December 2012 Budget Baseline. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

- EPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01. EPA/540/G-89/004. October.

- EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. With the U.S. Army Corps of Engineers. OSWER 9355.0-75. EPA 540-R-00-002. July.

- The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during Baseline Sampling and the Remedial Design phase. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (per EPA, 1988 and 2000).

Area		5. Peconic River Area					
Alternative	2 - LUCs & Monitoring		3. Air Sparge, LUCs, & Monitoring		4. Extraction, Treatment, Disposal, LUCs, & Monitoring		
Duration	17 years (geo mean of 8-36yr timeframe)		24 years (prescribed timeframe/steps)		24 years (prescribed timeframe/steps)		
TOTAL Present Value	\$385,534		\$5,825,303		\$17,774,699		
Implementation	\$33,645	LUC Implementation UFP-SAP Baseline Sampling existing wells	\$33,645	LUC Implementation UFP-SAP Baseline Sampling existing wells	\$33,645	LUC Implementation UFP-SAP Baseline Sampling existing wells	
Future Total PV	\$351,889		\$5,791,658		\$17,741,054		
Year							
1	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	9-month LTM event	\$90,801	Quarterly LTM (total)	\$90,801	Quarterly LTM (total)	
2	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	18-month LTM event	\$22,700	Annual LTM	\$22,700	Annual LTM	
3	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$39,170	27- & 36-month LTM events	\$22,700	Annual LTM	\$22,700	Annual LTM	
4	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$22,700	Annual LTM	\$22,700	Annual LTM	
5	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$3,450	5YR	\$3,450	5YR	\$3,450	5YR	
	\$5,738	Well Maintenance	\$5,738	Well Maintenance	\$5,738	Well Maintenance	
	\$19,585	Annual LTM	\$71,696	New Performance Well Install & Sample	\$51,898	New Performance Well Install & Sample	
			\$1,988,522	Air Sparge System Install & Startup	\$4,248,292	Extraction System Install & Startup	
			\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$137,423	Quarterly LTM (total)	\$118,085	Quarterly LTM (total)	
6	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
7	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
8	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
9	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
10	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$3,450	5YR	\$3,450	5YR	\$3,450	5YR	
	\$5,738	Well Maintenance	\$5,738	Well Maintenance	\$5,738	Well Maintenance	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
11	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
12	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
13	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
14	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
15	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$3,450	5YR	\$3,450	5YR	\$3,450	5YR	
	\$5,738	Well Maintenance	\$5,738	Well Maintenance	\$5,738	Well Maintenance	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
16	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$19,585	Annual LTM	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
17	\$1,650	LUC Inspection	\$1,650	LUC Inspection	\$1,650	LUC Inspection	
	\$4,517	Well abandonment	\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
	\$19,585	Annual LTM	\$27,502	Annual LTM	\$23,914	Annual LTM	
18			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
19			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$231,479	Air Sparge O&M	\$991,876	Extraction O&M	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
20			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$3,450	5YR	\$3,450	5YR	
			\$5,738	Well Maintenance	\$5,738	Well Maintenance	
			\$231,479	Air Sparge O&M (shut down Air Sparge)	\$991,876	Extraction O&M (shut down Extraction)	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
21			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
22			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
23			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$27,502	Annual LTM	\$23,914	Annual LTM	
24			\$1,650	LUC Inspection	\$1,650	LUC Inspection	
			\$74,518	Well Abandonment	\$24,901	Well Abandonment	
			\$67,397	Demo/Abandon Air Sparge System	\$79,994	Demo/Abandon Extraction System	
			\$27,502	Annual LTM	\$23,914	Annual LTM	

Table A-5.1
Area 5: Peconic River
Cost Estimate for Alternative 1 - No Action
Southern Area Feasibility Study
NWIRP Calverton, New York

No Action
Cost = \$0

Table A-5.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
Area 5: Peconic River
Southern Area Feasibility Study Addendum
NWIRP Calverton, New York
Page 1 of 4

Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 5 wells for COCs and geochemical and biodegradation-related analyses.

Assume no new monitoring wells needed.

MNA performance monitoring of 5 wells at 9-month intervals through Year 3 to determine seasonal variations. Then annually through Year 17 (geometric mean of 8-36 yr timeframe).

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP					
Work Plan for additional sampling, well installation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$7,500	\$7,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (5 existing Wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,905	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$200	
Lab & Data Validation	1	each	\$4,878	\$4,878	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$22,733	
<i>Contingency</i>	20%			\$4,547	
<i>Project Management</i>	10%			\$2,273	
<i>G&A</i>	10%			\$2,273	
<i>Fee</i>	8%			\$1,819	
Total Implementation Cost				\$33,645	
FUTURE COSTS (17 years)					
LUCs (Years 1-17)					
Annual Inspections and reporting (1 per year)	17	year	\$1,500	\$25,500	
<i>Subtotal</i>			\$1,500	\$25,500	

Table A-5.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Project Management</i>	10%		\$150	\$2,550	
<i>Subtotal</i>			\$1,650	\$28,050	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$28,050	
<i>Present Value</i> <small>(1.86%)</small> <i>of Future Cost of LUCs</i>	17	year	1.86%	\$23,860	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Years 5, 10, 15)					
5-Year Review	3	each	\$2,500	\$7,500	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$7,500	
<i>Contingency</i>	10%		\$250	\$750	
<i>Project Management</i>	10%		\$250	\$750	
<i>G&A</i>	10%		\$250	\$750	
<i>Fee</i>	8%		\$200	\$600	
<i>Subtotal</i>			\$3,450	\$10,350	
5YR Total Annual Cost during each of Years 5, 10, and 15			\$3,450		
5YR Total Future Cost				\$10,350	
<i>Present Value</i> <small>(2.3%)</small> <i>of Future Cost of 5YRs</i>	17	year	1.86%	\$8,632	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Maintenance (Years 5, 10, 15)					
Repair flushmounts & vaults, potential well replacements, etc.	3	event	\$3,750	\$11,250	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$11,250	
<i>Contingency</i>	25%		\$938	\$2,813	
<i>Project Management</i>	10%		\$375	\$1,125	
<i>G&A</i>	10%		\$375	\$1,125	
<i>Fee</i>	8%		\$300	\$900	
<i>Subtotal</i>			\$5,738	\$17,213	
Well Maintenance Future Annual Cost during each of Years 5, 10, and 15			\$5,738		

Table A-5.2(a) - Cost Estimate for Alternative 2 - LUCs and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Maintenance Total Future Cost				\$17,213	
<i>Present Value</i> <small>(1.86%)</small> of Future Cost of Well Maintenance	17	year	1.86%	\$14,356	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Well Abandonment (Year 17)					
Abandon wells when RAOs are achieved. Driller sub. Labor, ODCs, and Travel	5	well	\$300	\$1,500	
IDW Disposal	0.1	week	\$9,525	\$953	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
	1	each	\$500	\$500	
<i>Subtotal</i>				\$2,953	
<i>Contingency</i>	25%			\$738	
<i>Project Management</i>	10%			\$295	
<i>G&A</i>	10%			\$295	
<i>Fee</i>	8%			\$236	
<i>Subtotal</i>				\$4,517	
Well Abandonment Future Annual Cost at Year 17				\$4,517	
<i>Present Value</i> <small>(1.86%)</small> of Future Cost of Well Abandonment	17	year	1.86%	\$3,302	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (5 wells)					
Months 9, 18, 27, and 36					Year 1 includes 9-month event; Year 2 includes 18-month event; and Year 3 includes 27- and 36-month event.
Labor, ODCs, travel	0.8	week	\$9,525	\$7,620	9, 18, 27, and 36 month events. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.8	week	\$1,000	\$800	
Lab & Data Validation Report	4	each	\$4,878	\$19,512	See lab & DV backup sheets
	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$52,932	
<i>Contingency</i>	20%			\$10,586	
<i>Project Management</i>	10%			\$5,293	
<i>G&A</i>	10%			\$5,293	
<i>Fee</i>	8%			\$4,235	
<i>Subtotal</i>				\$78,339	

Table A-5.2(b) - Lab Backup for Alternative 2 - LUCs and Monitoring
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost	
Implementation																		
Baseline Sampling - Assume 5 existing monitoring wells for COCs and other technology-performance monitoring analyses																		
Groundwater wells																		
TCL VOCs by CLP OLM04.3	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81	
Methane, Ethane, & Ethene by RSK-175	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26	
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09	
Sulfide by USEPA 376.1	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84	
Alkalinity by USEPA 310.1	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11	
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30	
TOC by SW-846 9060 Quadruplicate analysis	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47	
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84	
IDW - Purged groundwater and decon water																		
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$4,877.98
																TOTAL IMPLEMENTATION LAB COST		\$4,877.98
Performance Monitoring																		
Months 9, 18, 27, and 36																		
Groundwater wells - Assume 5 wells																		
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81	
Methane, Ethane, Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26	
Nitrate, Nitrite, Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09	
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84	
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11	
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30	
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47	
Dissolved Arsenic, Iron, and Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$4,877.98
																Total for 9,18,27&36 months		\$19,511.91
Years 4 through 17 (annual)																		
Groundwater wells - Assume 5 wells																		
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81	
Methane, Ethane, Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26	
Nitrate, Nitrite, Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09	
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84	
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11	
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30	
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47	
Dissolved Arsenic, Iron, and Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84	
IDW - Purged groundwater and decon water																		
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00	
																Subtotal + 15% for Data Validation		\$4,877.98
																Total for 4-17		\$68,291.69
																TOTAL FUTURE LAB COST		\$87,803.60
Full QA/QC for COCs only. Also, duplicates for metals. MS/MSDs are billable Standard turnaround time																		

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 5 wells for COCs and geochemical and biodegradation-related analyses. Assume no new monitoring wells needed. Sample quarterly during Year 1, annual Years 2-4.

Install and start Air Sparge at river area in Year 5. Install new 6 Sparge Performance wells in Year 5 and baseline sample.

Performance monitoring: 11 wells. Quarterly during Year 5, and then annually through Year 24.

Peconic River Area contains 80 vertical air sparge wells at 1 location (2 curtains of 40 wells); all screened 95-100 ft bgs; spaced 25 ft; 15 ft radius of influence; 5 cfs per well; 2-inch PVC.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, sparge operation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$7,500	\$7,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (5 existing Wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,905	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$200	
Lab & Data Validation	1	each	\$4,878	\$4,878	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$22,733	
<i>Contingency</i>	20%			\$4,547	
<i>Project Management</i>	10%			\$2,273	
<i>G&A</i>	10%			\$2,273	
<i>Fee</i>	8%			\$1,819	
Total Implementation Cost				\$33,645	
FUTURE COSTS (24 years)					

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
LUCs (Years 1-24)					
Annual Inspections and reporting (1 per year)	24	year	\$1,500	\$36,000	
<i>Subtotal</i>			\$1,500	\$36,000	
<i>Project Management</i>	10%		\$150	\$3,600	
<i>Subtotal</i>			\$1,650	\$39,600	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$39,600	
<i>Present Value</i> ^(1.62%) <i>of Future Cost of LUCs</i>	24	year	1.62%	\$32,594	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Years 5, 10, 15, 20)					
5-Year Review	4	each	\$2,500	\$10,000	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$10,000	
<i>Contingency</i>	10%		\$250	\$1,000	
<i>Project Management</i>	10%		\$250	\$1,000	
<i>G&A</i>	10%		\$250	\$1,000	
<i>Fee</i>	8%		\$200	\$800	
<i>Subtotal</i>			\$3,450	\$13,800	
5YR Total Annual Cost during each of Years 5, 10, 15, 20			\$3,450		
5YR Total Future Cost				\$13,800	
<i>Present Value</i> ^(1.62%) <i>of Future Cost of 5YRs</i>	20	year	1.62%	\$11,334	
Well Maintenance (Years 5, 10, 15, 20)					
Repair flushmounts & vaults, potential well replacements, etc.	4	event	\$3,750	\$15,000	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$15,000	
<i>Contingency</i>	25%		\$938	\$3,750	
<i>Project Management</i>	10%		\$375	\$1,500	
<i>G&A</i>	10%		\$375	\$1,500	
<i>Fee</i>	8%		\$300	\$1,200	
<i>Subtotal</i>			\$5,738	\$22,950	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Maintenance Future Annual Cost during each of Years 5, 10, 15, 20			\$5,738		
Well Maintenance Total Future Cost				\$22,950	
<i>Present Value</i> <small>(1.62%)</small> <i>of Future Cost of Well Maintenance</i>	24	year	1.62%	\$18,849	
Well Abandonment (Year 24)					
Abandon wells when RAOs are achieved. Driller sub.	91	well	\$300	\$27,300	Abandon all monitoring wells and air sparge wells.
Labor, ODCs, and Travel	2.0	week	\$9,525	\$19,050	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
IDW disposal	1	each	\$4,000	\$4,000	minimal IDW generated.
<i>Subtotal</i>				\$50,350	
<i>Contingency</i>	20%			\$10,070	
<i>Project Management</i>	10%			\$5,035	
<i>G&A</i>	10%			\$5,035	
<i>Fee</i>	8%			\$4,028	
<i>Subtotal</i>				\$74,518	
<i>Present Value</i> <small>(1.62%)</small> <i>of Future Cost of Well Abandonment</i>	24	year	1.62%	\$50,671	
New Sparge Performance Well Installation (6 new wells) (Year 5)					
					assume 1 well screened at 30-40 ft bgs, 1 well screened at 40-50 ft bgs, and 4 wells screened at 60-70 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	\$1,250	\$1,250	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.0	week	\$9,525	\$9,906	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	1.0	week	\$200	\$208	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	360	feet	\$36	\$12,960	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	6	each	\$325	\$1,950	
Travel	1.0	week	\$3,000	\$3,120	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.0	week	1,375	\$1,430	
Water usage (hydrant permit fee)	5.2	day	\$50	\$260	
Survey	1	each	\$500	\$500	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water IDW Transport & Disposal	900	gallon	\$2	\$1,800	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.23	each	\$2,000	\$465	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$33,849	
<i>Contingency</i>	20%			\$6,770	
<i>Project Management</i>	10%			\$3,385	
<i>G&A</i>	10%			\$3,385	
<i>Fee</i>	8%			\$2,708	
<i>Subtotal Sparge Performance Well Installation during Year 5</i>				\$50,097	
<i>Present Value ^(1.62%)</i> <i>of Future Well Installation Year 5</i>	5	year	1.62%	\$46,229	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Injection Performance Wells (6 wells) (Year 5)					
Labor, ODCs, travel	0.2	week	\$9,525	\$2,286	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$165	\$40	
Lab & Data Validation	1	each	\$6,019	\$6,019	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$14,594	
<i>Contingency</i>	20%			\$2,919	
<i>Project Management</i>	10%			\$1,459	
<i>G&A</i>	10%			\$1,459	
<i>Fee</i>	8%			\$1,168	
<i>Subtotal Sample New Sparge Performance Wells Year 5</i>				\$21,599	
<i>Present Value ^(1.62%)</i> <i>of Future Well Sample Year 5</i>	5	year	1.62%	\$19,932	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
PECONIC RIVER AREA - Vertical Air Sparge System Installation & Startup (Year 5)					
Pilot Scale Testing	1	each	\$30,000	\$30,000	
Office Trailer, Storage Trailer, & Site Utilities	9	month	\$610	\$5,486	
Drilling/Well Installation Equipment and Subcontractor					
Mobilization and Site Setup	1	each	\$15,000	\$15,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	19.2	week	\$9,525	\$182,880	Install 1 well/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for development.
Equipment & Expendables	19.2	week	\$200	\$3,840	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	8,000	feet	\$32	\$256,000	Labor & materials. 4.25-inch ID HSA. 5-ft 0.010-slot PVC screens included.
Well Completion with pads	80	each	\$120	\$9,600	includes miscellaneous vaults and accesses.
Travel	19.2	week	\$3,000	\$57,600	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	19.2	week	1,375	\$26,400	
Water usage (hydrant permit fee)	96.0	day	\$50	\$4,800	
Water IDW Transport & Disposal	12,000	gallon	\$2	\$24,000	Assume 150 gallons per 2-inch well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	5.17	each	\$2,000	\$10,343	20 cy rolloff. Note HSA outer diam = 8 inches.
Soil characterization - TCLP VOCs	6	each	\$132	\$792	1 per 20 cy.
Air Sparge System Equipment & Setup					
System Storage/Operations Building	600	sq ft	\$400	\$240,000	20 ft x 30 ft building.
Electricity Conveyance & Hookup	1	each	\$75,000	\$75,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary switch. Navy provides all else.
Conveyance Piping Materials					
6-inch HDPE (to system area)	800	feet	\$3.80	\$3,040	
4-inch HDPE (to curtains)	500	feet	\$3.50	\$1,750	
2-inch HDPE (along curtains)	800	feet	\$3.20	\$2,560	
Trenching & Installation	4.2	week	\$10,025	\$42,105	2,100 ft. 100 ft/day. 2 persons. Includes equipment.
Jack & Bore under railroad	1	each	\$50,000	\$50,000	
Ball valve (per 5 Air Sparge wells)	16	each	\$30	\$480	
Misc Piping, Fittings, Materials	1	each	\$15,000	\$15,000	
60 HP, 3-Phase VSD Rotary Screw Combination 240-Gallon Tank & Refrigerated Dryer with Coalescing Filter	1	ea	\$36,449	\$36,449	Eaton Compressor & Fabrication, Inc. 10-year warranty. Includes installation.
Equipment Delivery	1	each	\$2,500	\$2,500	
Switchgear	1	each	\$2,600	\$2,600	
Instrumentation	1	each	\$15,000	\$15,000	
Telemetry System	1	each	\$3,000	\$3,000	
Post-Construction Site Survey	1	LS	\$6,000	\$6,000	
Air Sparge System Startup & Testing					
Labor, ODCs, travel	4	week	\$9,525	\$38,100	2 people.
Startup Equipment Rental	4	week	\$300	\$1,200	
Construction Report	1	each	\$15,000	\$15,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$1,176,640	
<i>Contingency</i>	25%			\$294,160	
<i>Project Management</i>	10%			\$117,664	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Remedial Design</i>	6%			\$70,598	
<i>Construction Oversight</i>	10%			\$117,664	
<i>G&A</i>	10%			\$117,664	
<i>Fee</i>	8%			\$94,131	
<i>Subtotal</i>				\$1,988,522	
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Air Sparge Installatin & Startup</i>	5	year	1.62%	\$1,834,993	
PECONIC RIVER AREA Vertical Air Sparge System O&M (Years 5-20)					System shut down after 16 years of operation.
Weekly System Checks	832	event	\$850	\$707,200	labor and travel
Monthly O&M Labor + Travel	192	event	\$950	\$182,400	labor and travel
Quarterly "Heavy" Maintenance	64	event	\$1,600	\$102,400	labor and travel
Telemetry System	16	year	\$1,200	\$19,200	
O&M Supplies	16	year	\$2,000	\$32,000	
Electrical usage (36 years)	6,559,488	kw/yr	\$0.21	\$1,377,492	Power for 16 years continual operation. Power cost assumes \$0.21/kW-hr. 60 HP compressor at 460 V & 96 A. 60 HP dryer at 220 V & 12 A.
<i>Subtotal</i>				\$2,420,692	
<i>Contingency</i>	25%			\$605,173	
<i>Project Management</i>	10%			\$242,069	
<i>G&A</i>	10%			\$242,069	
<i>Fee</i>	8%			\$193,655	
<i>Air Sparge O&M Years 5-20 Subtotal</i>				\$3,703,659	
<i>Air Sparge O&M Subtotal per year</i>			\$231,479		(Years 5-20 Subtotal / 16)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Air Sparge O&M Years 5-20</i>	20	year	1.62%	\$3,037,961	
Demo/Abandonment of Air Sparge System (Year 24)					Air sparge well abandonment accounted for above with monitoring well abandonment.
Abandon Air Sparge system when RAOs are achieved. Demo sub.	1	each	\$15,000	\$15,000	Demo and abandon Peconic River Air Sparge building. Demo and abandon trenched conveyance piping.
Labor, ODCs, and Travel	2.0	week	\$9,525	\$19,050	
IDW disposal	1	each	\$10,000	\$10,000	
<i>Subtotal</i>				\$44,050	
<i>Contingency</i>	25%			\$11,013	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Project Management</i>	10%			\$4,405	
<i>G&A</i>	10%			\$4,405	
<i>Fee</i>	8%			\$3,524	
<i>Subtotal</i>				\$67,397	
<i>Present Value ^(1.62%) of Future Cost of System Abandonment</i>	24	year	1.62%	\$45,829	
Performance Groundwater Monitoring (5 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	1.6	week	\$9,525	\$15,240	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.6	week	\$1,000	\$1,600	
Lab & Data Validation	4	each	\$4,878	\$19,512	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$61,352	
<i>Contingency</i>	20%			\$12,270	
<i>Project Management</i>	10%			\$6,135	
<i>G&A</i>	10%			\$6,135	
<i>Fee</i>	8%			\$4,908	
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$90,801	
<i>Total per year during each of Year 1</i>			\$90,801		(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>			\$22,700		(Year 1 Subtotal / 4)
<i>Present Value ^(1.62%) of Future Cost of Groundwater Sampling Year 1</i>	1	year	1.62%	\$89,353	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (5 wells)					
Years 2-4 (Annual Events)					
Labor, ODCs, travel	1.2	week	\$9,525	\$11,430	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.2	week	\$1,000	\$1,200	
Lab & Data Validation	3	each	\$4,878	\$14,634	See lab & DV backup sheets
Report	3	each	\$6,250	\$18,750	
<i>Subtotal</i>				\$46,014	
<i>Contingency</i>	20%			\$9,203	
<i>Project Management</i>	10%			\$4,601	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
G&A	10%			\$4,601	
Fee	8%			\$3,681	
<i>Total Future Groundwater Sampling Cost Years 2-4</i>				\$68,101	
<i>Total per year during each of Years 2, 3, and 4</i>				\$22,700	(Years 2-4 Subtotal / 3)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Years 2-4</i>				\$64,901	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (11 wells)					
Year 5 (Quarterly events)					
Labor, ODCs, travel	3.5	week	\$9,525	\$33,528	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	3.5	week	\$1,000	\$3,520	
Lab & Data Validation	4	each	\$7,701	\$30,805	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$92,853	
<i>Contingency</i>	20%			\$18,571	
<i>Project Management</i>	10%			\$9,285	
<i>G&A</i>	10%			\$9,285	
<i>Fee</i>	8%			\$7,428	
<i>Total Future Groundwater Sampling Cost Year 5</i>				\$137,423	
<i>Total per year during each of Year 5</i>				\$137,423	(Year 5 Subtotal / 1)
<i>Total per quarterly event</i>				\$34,356	(Year 5 Subtotal / 4)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Year 5</i>				\$126,812	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 6-24 (annual) (11 wells)					
Labor, ODCs, travel	8.4	week	\$9,525	\$79,629	Annual sampling required by facility RCRA permit. 2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	8.4	week	\$1,000	\$8,360	
Lab & Data Validation	19	each	\$7,701	\$146,324	See lab & DV backup sheets
Report	19	each	\$6,250	\$118,750	
<i>Subtotal</i>				\$353,063	
<i>Contingency</i>	20%			\$70,613	
<i>Project Management</i>	10%			\$35,306	
<i>G&A</i>	10%			\$35,306	

Table A-5.3(a) - Cost Estimate for Alternative 3 - Air Sparge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Fee</i>	8%			\$28,245	
<i>Total Future Groundwater Sampling Cost Years 6-24</i>				\$522,533	
<i>Total per year during each of Years 6-24</i>			\$27,502		(Total / 19)
<i>Present Value ^(1.62%) of Future Cost of Groundwater Sampling Years 6-24</i>	24		1.62%	\$412,199	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$5,791,658	Y2011 PV calculated for 36-yrs-future-cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 4 - Air Sparge, LUCs, and Monitoring			-30%	+50%	
	\$5,825,303		\$4,077,712	\$8,737,954	

Table A-5.3(b) - Lab Backup for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 5: Peconic River
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling																	
Groundwater wells - Assume 5 existing wells																	
TCL VOCs by CLP OLM04.3	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene by RSK-175	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide by USEPA 376.1	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity by USEPA 310.1	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC by SW-846 9060 Quadruplicate analysis	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																\$4,877.98	
TOTAL IMPLEMENTATION LAB COST																	\$4,877.98
LTM & Performance Monitoring																	
Year 1 - Quarterly Sampling Events - Assume 5 wells																	
Groundwater wells																	
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, & Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Arsenic, Iron, & Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$4,877.98	
Total for Year 1																	\$19,511.91
Years 2-4 - Annual Event - Assume 5 wells																	
Groundwater wells																	
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Iron and Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$4,877.98	
Total for Years 2-4																	\$14,633.93
Year 5 - New Baseline (6 wells)																	
Groundwater wells																	
TCL VOCs	GW	6	1	2	1	2	1	1					14	14	\$111.71	\$1,563.94	\$1,563.94
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water & soil cuttings of new wells																	
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00
Subtotal +15% for Data Validation																\$6,018.63	
Total for Year 5																	\$6,018.63
Year 5 - Quarterly Sampling Events - Assume 11 wells																	
Groundwater wells																	
TCL VOCs	GW	11	2	3	1	3	1	1					22	22	\$111.71	\$2,457.62	\$2,457.62
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03
IDW - Purged groundwater and decon water																	

**Table A-5.3(b) - Lab Backup for Alternative 3 - Air Sparge, LUCs, and Monitoring
Area 5: Peconic River
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$7,701.26	
Total for Year 5																\$30,805.05	
Years 6-24 - Annual Event - Assume 11 wells																	
Groundwater wells																	
TCL VOCs	GW	11	2	3	1	3	1	1					22	22	\$111.71	\$2,457.62	\$2,457.62
Methane, Ethane, & Ethene	GW	8	0	0	0	0	1	1					10	10	\$105.18	\$1,051.80	\$1,051.80
Nitrate, Nitrite, & Sulfate	GW	8	0	0	0	0	1	1					10	10	\$50.87	\$508.70	\$508.70
Sulfide	GW	8	0	0	0	0	1	1					10	10	\$35.12	\$351.20	\$351.20
Alkalinity	GW	8	0	0	0	0	1	1					10	10	\$13.73	\$137.30	\$137.30
VFAs	GW	8	0	0	0	0	1	1					10	10	\$134.90	\$1,349.00	\$1,349.00
TOC	GW	8	0	0	0	0	1	1					10	10	\$33.21	\$332.10	\$332.10
Dissolved Arsenic, Iron, & Manganese	GW	8	1	0	0	0	1	1					11	11	\$35.73	\$393.03	\$393.03
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$7,701.26	
Total for Years 6-24																\$146,323.99	
TOTAL FUTURE LAB COST																\$217,293.51	

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Assumptions:

LUC RD prepared by contractor. 5YR performed with other NWIRP Calverton sites. Annual inspections performed by contractor. Well maintenance required every 5yrs.

Baseline sampling of 5 wells for COCs and geochemical and biodegradation-related analyses. Assume no new monitoring wells needed. Sample quarterly during Year 1, annual Years 2-4.

Install and start Extraction System at river area in Year 5. Install new 4 Extractin Performance wells in Year 5 and baseline sample.

Performance monitoring: 9 wells. Quarterly during Year 5, and then annually through Year 24.

Peconic River Area Extraction Wells - 2 4-inch steel extraction wells screened 30-90 ft bgs. Extraction at 100 gpm each.

Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
IMPLEMENTATION COST					
LUCs					
LUC Remedial Design and implementation into Navy's LUC Tracker.	1	each	\$2,000	\$2,000	Includes Draft and Final LUC Plans. Assume contractor prepares LUC RD.
UFP-SAP & Remedial Action Work Plan					
Work Plan for additional sampling, well installation, sparge operation, and groundwater performance monitoring (in Navy's UFP-SAP format).	1	each	\$7,500	\$7,500	Pre-Draft, Draft, Draft Final, & Final. Includes Scoping sessions. Recent similar project.
Baseline Sampling (5 existing Wells)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,905	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$1,000	\$200	
Lab & Data Validation	1	each	\$4,878	\$4,878	See lab & DV backup sheets
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$22,733	
<i>Contingency</i>	20%			\$4,547	
<i>Project Management</i>	10%			\$2,273	
<i>G&A</i>	10%			\$2,273	
<i>Fee</i>	8%			\$1,819	
Total Implementation Cost				\$33,645	
FUTURE COSTS (24 years)					

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
Area 5: Peconic River
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
LUCs (Years 1-24)					
Annual Inspections and reporting (1 per year)	24	year	\$1,500	\$36,000	
<i>Subtotal</i>			\$1,500	\$36,000	
<i>Project Management</i>	10%		\$150	\$3,600	
<i>Subtotal</i>			\$1,650	\$39,600	
LUCs Future Annual Cost			\$1,650		
LUCs Total Future Cost				\$39,600	
<i>Present Value</i> <small>(1.62%)</small> <i>of Future Cost of LUCs</i>	24	year	1.62%	\$32,594	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
5-Year Reviews (Years 5, 10, 15, 20)					
5-Year Review	4	each	\$2,500	\$10,000	5YR conducted once every 5 years. To be conducted in conjunction with other post-ROD sites. Includes pre-draft, draft, draft final, final, fact sheet, and public notices.
<i>Subtotal</i>			\$2,500	\$10,000	
<i>Contingency</i>	10%		\$250	\$1,000	
<i>Project Management</i>	10%		\$250	\$1,000	
<i>G&A</i>	10%		\$250	\$1,000	
<i>Fee</i>	8%		\$200	\$800	
<i>Subtotal</i>			\$3,450	\$13,800	
5YR Total Annual Cost during each of Years 5, 10, 15, 20			\$3,450		
5YR Total Future Cost				\$13,800	
<i>Present Value</i> <small>(1.62%)</small> <i>of Future Cost of 5YRs</i>	20	year	1.62%	\$11,334	
Well Maintenance (Years 5, 10, 15, 20)					
Repair flushmounts & vaults, potential well replacements, etc.	4	event	\$3,750	\$15,000	Assume well repairs needed approximately every 5 years.
<i>Subtotal</i>			\$3,750	\$15,000	
<i>Contingency</i>	25%		\$938	\$3,750	
<i>Project Management</i>	10%		\$375	\$1,500	
<i>G&A</i>	10%		\$375	\$1,500	
<i>Fee</i>	8%		\$300	\$1,200	
<i>Subtotal</i>			\$5,738	\$22,950	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Well Maintenance Future Annual Cost during each of Years 5, 10, 15, 20			\$5,738		
Well Maintenance Total Future Cost				\$22,950	
<i>Present Value (1.62%) of Future Cost of Well Maintenance</i>	24	year	1.62%	\$18,849	
Well Abandonment (Year 24)					
Abandon wells when RAOs are achieved. Driller sub. Labor, ODCs, and Travel	11	well	\$300	\$3,300	Abandon all monitoring wells and extraction wells.
IDW disposal	1.0	week	\$9,525	\$9,525	Abandon 10 wells/day. 2 people. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
	1	each	\$4,000	\$4,000	minimal IDW generated.
<i>Subtotal</i>				\$16,825	
<i>Contingency</i>	20%			\$3,365	
<i>Project Management</i>	10%			\$1,683	
<i>G&A</i>	10%			\$1,683	
<i>Fee</i>	8%			\$1,346	
<i>Subtotal</i>				\$24,901	
<i>Present Value (1.62%) of Future Cost of Well Abandonment</i>	24	year	1.62%	\$16,932	
New Extraction Performance Well Installation (4 new wells) (Year 5)					
					assume 1 well screened at 30-40 ft bgs, 1 well screened at 40-50 ft bgs, and 2 wells screened at 60-70 ft bgs. 2-inch PVC.
Mobilization & Site Setup	1	each	\$1,250	\$1,250	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	0.7	week	\$9,525	\$6,604	Install 1.5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people. 2 hrs per well for well development.
Equipment & Expendables	0.7	week	\$200	\$139	
Drilling Subcontractor / well installation					
Well installation - HSA drilling & 2-inch PVC install	220	feet	\$36	\$7,920	Labor & materials. 4.25-inch ID HSA. 10-ft 0.010-slot PVC screens included.
Well Completion with bollards	4	each	\$325	\$1,300	
Travel	0.7	week	\$3,000	\$2,080	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	0.7	week	1,375	\$953	
Water usage (hydrant permit fee)	3.5	day	\$50	\$173	
Survey	1	each	\$500	\$500	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Water IDW Transport & Disposal	600	gallon	\$2	\$1,200	Assume 150 gallons per 2-inch well.
Soil IDW Transport & Disposal	0.14	each	\$2,000	\$284	20 cy rolloff. Note HSA outer diam = 8 inches.
<i>Subtotal</i>				\$22,404	
<i>Contingency</i>	20%			\$4,481	
<i>Project Management</i>	10%			\$2,240	
<i>G&A</i>	10%			\$2,240	
<i>Fee</i>	8%			\$1,792	
<i>Subtotal Extraction Performance Well Installation during Year 5</i>				\$33,158	
<i>Present Value ^(1.62%)</i> <i>of Future Well Installation Year 5</i>	5	year	1.62%	\$30,598	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Baseline Sample New Injection Performance Wells (4 wells) (Year 5)					
Labor, ODCs, travel	0.2	week	\$9,525	\$1,524	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	0.2	week	\$165	\$26	
Lab & Data Validation	1	each	\$4,565	\$4,565	
Report	1	each	\$6,250	\$6,250	
<i>Subtotal</i>				\$12,365	
<i>Contingency</i>	20%			\$2,473	
<i>Project Management</i>	10%			\$1,237	
<i>G&A</i>	10%			\$1,237	
<i>Fee</i>	8%			\$989	
<i>Subtotal Sample New Extraction Performance Wells Year 5</i>				\$18,300	
<i>Present Value ^(1.62%)</i> <i>of Future Well Sample Year 5</i>	5	year	1.62%	\$16,887	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Peconic River Area Extraction & Treatment System Installation & Startup (Year 5)					
Drilling/Well Installation Equipment and Subcontractor					2 vertical extraction wells screened 30-90 ft bgs.
Mobilization and Site Setup	1	each	\$5,000	\$5,000	Includes sub mob/demob, utility location, and clearing.
Labor, ODCs, travel	1.2	week	\$7,500	\$9,000	3 days per well. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day. 2 people.
Equipment & Expendables	1.2	week	\$200	\$240	
Drilling Subcontractor / well installation					
12-inch Mud Rotary drilling	180	feet	\$48	\$8,640	Labor & materials. 12-inch mud rotary drilling.
8-inch carbon steel riser installed	60	feet	\$48	\$2,880	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring

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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
8-inch stainless steel 10-ft screen	12	each	\$1,650	\$19,800	
Well Completion pads with bollards	2	each	\$575	\$1,150	
Travel	1.2	week	\$3,000	\$3,600	1 rig, 3-person crew. Per diem at \$200/day. 5 day/wk.
Loader/Backhoe for IDW management	1.2	week	1,375	\$1,650	
Water usage (hydrant permit fee)	6.0	day	\$50	\$300	
Water IDW Transport & Disposal	2,000	gallon	\$2	\$4,000	Assume 1000 gallons per well.
Water characterization - TCLP VOCs	1	each	\$116	\$116	
Soil IDW Transport & Disposal	0.22	each	\$2,000	\$440	20 cy rolloff. Note HSA outer diam = 11 inches.
Soil characterization - TCLP VOCs	1	each	\$132	\$132	1 per 20 cy.
Submersible Centrifugal Pump & Installation	2	ea	\$5,000	\$10,000	100 gpm, 100 ft head, 54 HP
Equipment Delivery	1	each	\$500	\$500	
Extraction System Equipment & Setup					
Mobilization and Site Setup	1	each	\$30,000	\$30,000	Includes sub mob/demob, utility location, and clearing.
System Storage/Operations Building	3,000	sq ft	\$400	\$1,200,000	50 ft x 60 ft building.
Electricity Conveyance & Hookup	1	each	\$50,000	\$50,000	LIPA shares some of the cost of primary connections due to longevity of system use. LIPA provides primary switch. Navy provides all else.
Conveyance Piping					
Fenline Extraction Well - 4-inch HDPE	1,300	feet	\$3.50	\$4,550	
River Area Extraction Wells (2) - 4-inch HDPE	4,000	feet	\$3.50	\$14,000	
Trenching & Installation	5.3	week	\$10,025	\$53,133	5,300 ft. 200 ft/day. 2 persons. Includes equipment.
Misc Piping, Fittings, Materials	1	each	\$15,000	\$15,000	
Discharge Beds & Piping					
6-inch Holed PVC	5,000	feet	\$13.00	\$65,000	
Trenching & Installation	5.0	week	\$10,025	\$50,125	5,000 ft. 200 ft/day. 2 persons. Includes equipment.
Geotextile for Infiltration Beds	1,200	sy	\$2.00	\$2,400	includes labor
Gravel layer, 2 beds, each 500 ft long, 6 inches x 1 ft	150	cy	\$34.19	\$5,129	includes equipment and labor.
Re-vegetation	1	each	\$6,000.00	\$6,000	
Treatment Plant					
Equalization Tank - 15-ft diam, 20 ft high (20,000 gal)	1	each	\$41,585.40	\$41,585	materials, installation, and equipment
Top mounted low-speed turbine-type mixer (2 hp)	1	each	\$55,250.00	\$55,250	materials, installation, and equipment
Horizontal-Centrifugal Pump, 300 gpm, 10 hp, 100 ft head	2	each	\$7,205.50	\$14,411	materials, installation, and equipment
Clairfier Tank, 30-ft diam (80,000 gal)	1	each	\$332,193.94	\$332,194	materials, installation, and equipment
Bag filter, multi-bag (242 sq ft total)	4	each	\$12,410.00	\$49,640	materials, installation, and equipment
Air Stripper, 2,400 cfm blower & control panel (300 gpm)	1	each	\$84,000.00	\$84,000	materials, installation, and equipment
Caustic Feed System	1	each	\$21,640.00	\$21,640	materials, installation, and equipment
Air Feed Feed System	1	each	\$15,000.00	\$15,000	materials, installation, and equipment
Sludge Holding Tank (20,000 gal)	1	each	\$60,000.00	\$60,000	materials, installation, and equipment

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring

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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
Filter Press (20 cubic ft)	1	each	\$120,000.00	\$120,000	materials, installation, and equipment
Switchgear	1	each	\$2,600.00	\$2,600	materials, installation, and equipment
Heat Tracing	200	feet	\$17.00	\$3,400	materials, installation, and equipment
Plumb/electrical systems	1	each	\$19,056.00	\$19,056	materials, installation, and equipment
Post-Construction Site Survey	1	LS	\$6,000	\$6,000	
System Startup & Testing					
Labor, ODCs, travel	4	week	\$9,525	\$38,100	2 people.
Construction Report	1	each	\$30,000	\$30,000	Draft and Final Construction Completion Report
<i>Subtotal</i>				\$2,455,660	
<i>Contingency</i>	25%			\$613,915	
<i>Project Management</i>	10%			\$245,566	
<i>Construction Oversight</i>	10%			\$245,566	
<i>Remedial Design</i>	10%			\$245,566	
<i>G&A</i>	10%			\$245,566	
<i>Fee</i>	8%			\$196,453	
<i>Subtotal</i>				\$4,248,292	
<i>Present Value ^(1.62%) of Future Well Sample Year 5</i>	5	year	1.62%	\$3,920,292	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Extraction System O&M (Years 5-20)					
Electrical usage	7,100,506	kW-hr	\$0.21	\$1,491,106	Power for 16 years continual operation. Power cost assumes \$0.21/kW-hr. 3 5-hp extraction pumps; 2 hp turbine mixer; 10 hp horizontal-centrifugal pump; 30 hp blower; 10 hp clarifier; 1 hp for air feed system.
Maintenance	16	each	\$122,783	\$1,964,528	5% of installation cost
Caustic Soda	1,152	drum	\$2,000	\$2,304,000	26 tons per yr @ 700 lbs per drum = 74 drums/yr
Influent & Effluent Sampling					Once per month. VOCs only. 30% QA/QC
Labor, ODCs, & Travel	192	day	\$800	\$153,600	
Equipment & Expendables	192	day	\$100	\$19,200	
VOC Samples (2 extraction wells and 1 effluent)	944	sample	\$112	\$105,728	
Sludge Handling					
Disposal	1,216	ton	\$200	\$243,200	Assume 76 ton/yr
Labor, ODCs, & Travel	832	week	\$4,225	\$3,515,200	40 hrs per wk
O&M Report	192	each	\$3,000	\$576,000	
<i>Subtotal</i>				\$10,372,562	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Contingency</i>	25%			\$2,593,141	
<i>Project Management</i>	10%			\$1,037,256	
<i>G&A</i>	10%			\$1,037,256	
<i>Fee</i>	8%			\$829,805	
<i>Extraction System O&M Year 5-20 Subtotal</i>				\$15,870,021	
<i>O&M per year</i>			\$991,876		(Years 5-20 Subtotal / 16)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Extraction&Treatment O&M Years 5-20</i>	20	year	1.62%	\$13,017,531	
Demo/Abandonment of Extraction System (Year 24)					
Abandon Extraction system when RAOs are achieved. Demo sub.	1	each	\$25,000	\$25,000	Demo and abandon extraction & treatment system building. Demo and abandon trenched conveyance and discharge piping.
Labor, ODCs, and Travel	2.0	week	\$9,525	\$19,050	
IDW disposal	1	each	\$10,000	\$10,000	
<i>Subtotal</i>				\$54,050	
<i>Contingency</i>	20%			\$10,810	
<i>Project Management</i>	10%			\$5,405	
<i>G&A</i>	10%			\$5,405	
<i>Fee</i>	8%			\$4,324	
<i>Subtotal</i>				\$79,994	
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Well Abandonment</i>	24	year	1.62%	\$54,395	
Performance Groundwater Monitoring (5 wells)					
Year 1 (Quarterly events)					
Labor, ODCs, travel	1.6	week	\$9,525	\$15,240	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.6	week	\$1,000	\$1,600	
Lab & Data Validation	4	each	\$4,878	\$19,512	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$61,352	
<i>Contingency</i>	20%			\$12,270	
<i>Project Management</i>	10%			\$6,135	
<i>G&A</i>	10%			\$6,135	
<i>Fee</i>	8%			\$4,908	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Total Future Groundwater Sampling Cost Year 1</i>				\$90,801	
<i>Total per year during each of Year 1</i>			\$90,801		(Year 1 Subtotal / 1)
<i>Total per quarterly event</i>			\$22,700		(Year 1 Subtotal / 4)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Year 1</i>	1	year	1.62%	\$89,353	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (5 wells)					
Years 2-4 (Annual Events)					
Labor, ODCs, travel	1.2	week	\$9,525	\$11,430	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	1.2	week	\$1,000	\$1,200	
Lab & Data Validation	3	each	\$4,878	\$14,634	See lab & DV backup sheets
Report	3	each	\$6,250	\$18,750	
<i>Subtotal</i>				\$46,014	
<i>Contingency</i>	20%			\$9,203	
<i>Project Management</i>	10%			\$4,601	
<i>G&A</i>	10%			\$4,601	
<i>Fee</i>	8%			\$3,681	
<i>Total Future Groundwater Sampling Cost Years 2-4</i>				\$68,101	
<i>Total per year during each of Years 2, 3, and 4</i>			\$22,700		(Years 2-4 Subtotal / 3)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Years 2-4</i>	4	year	1.62%	\$64,901	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Performance Groundwater Monitoring (9 wells)					
Year 5 (Quarterly events)					
Labor, ODCs, travel	2.9	week	\$9,525	\$27,432	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	2.9	week	\$1,000	\$2,880	
Lab & Data Validation	4	each	\$6,119	\$24,475	See lab & DV backup sheets
Report	4	each	\$6,250	\$25,000	
<i>Subtotal</i>				\$79,787	
<i>Contingency</i>	20%			\$15,957	
<i>Project Management</i>	10%			\$7,979	
<i>G&A</i>	10%			\$7,979	
<i>Fee</i>	8%			\$6,383	

Table A-5.4(a) - Cost Estimate for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Item/Activity	Qty	Unit	Unit Cost	Cost	Notes & Comments
<i>Total Future Groundwater Sampling Cost Year 5</i>				\$118,085	
<i>Total per year during each of Year 5</i>			\$118,085		(Year 5 Subtotal / 1)
<i>Total per quarterly event</i>			\$29,521		(Year 5 Subtotal / 4)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Year 5</i>	5	year	1.62%	\$108,968	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Years 6-24 (annual) (9 wells)					Annual sampling required by facility RCRA permit.
Labor, ODCs, travel	6.8	week	\$9,525	\$65,151	2 people. Sample 5 wells/day. 10-hr days. 5 days/week. Per diem at \$200/day. Rental truck at \$65/day.
Equipment & Expendables	6.8	week	\$1,000	\$6,840	
Lab & Data Validation	19	each	\$6,119	\$116,258	See lab & DV backup sheets
Report	19	each	\$6,250	\$118,750	
<i>Subtotal</i>				\$306,999	
<i>Contingency</i>	20%			\$61,400	
<i>Project Management</i>	10%			\$30,700	
<i>G&A</i>	10%			\$30,700	
<i>Fee</i>	8%			\$24,560	
<i>Total Future Groundwater Sampling Cost Years 6-24</i>				\$454,358	
<i>Total per year during each of Years 6-24</i>			\$23,914		(Total / 19)
<i>Present Value ^(1.62%)</i> <i>of Future Cost of Groundwater Sampling Years 6-24</i>	24		1.62%	\$358,419	Y2011 PV calculated for future cost using Real Discount Rate per OMB (2010).
Total Present Value of All Future Costs				\$17,741,054	Y2011 PV calculated for future cost using Real Discount Rates detailed above per OMB (2010).
TOTAL PV Cost of Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring			-30%	+50%	
	\$17,774,699		\$12,442,289	\$26,662,049	

Table A-5.4(b) - Lab Backup for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
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Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
Implementation																	
Baseline Sampling - Assume 5 existing monitoring wells for COCs and other technology-performance monitoring analyses																	
Groundwater wells																	
TCL VOCs by CLP OLM04.3	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene by RSK-175	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, & Sulfate by USEPA 300.0	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide by USEPA 376.1	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity by USEPA 310.1	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
Volatile Fatty Acids (VFAs) (Acetic, Butyric, Pyruvic, Propionic, & Lactic Acid) by AM23G	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC by SW-846 9060 Quadruplicate analysis	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Arsenic, Iron, & Manganese by SW-846 6010B	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs (1311/ 8260B)	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$4,877.98
TOTAL IMPLEMENTATION LAB COST																	\$4,877.98
LTM & Performance Monitoring																	
Year 1 - Quarterly Sampling Events - Assume 5 wells																	
Groundwater wells																	
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, & Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Arsenic, Iron, & Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$4,877.98
Total for Year 1																	\$19,511.91
Years 2-4 - Annual Event - Assume 5 wells																	
Groundwater wells																	
TCL VOCs	GW	5	1	1	1	1	1	1					11	11	\$111.71	\$1,228.81	\$1,228.81
Methane, Ethane, & Ethene	GW	5	0	0	0	0	1	1					7	7	\$105.18	\$736.26	\$736.26
Nitrate, Nitrite, Sulfate	GW	5	0	0	0	0	1	1					7	7	\$50.87	\$356.09	\$356.09
Sulfide	GW	5	0	0	0	0	1	1					7	7	\$35.12	\$245.84	\$245.84
Alkalinity	GW	5	0	0	0	0	1	1					7	7	\$13.73	\$96.11	\$96.11
VFAs	GW	5	0	0	0	0	1	1					7	7	\$134.90	\$944.30	\$944.30
TOC	GW	5	0	0	0	0	1	1					7	7	\$33.21	\$232.47	\$232.47
Dissolved Iron and Manganese	GW	5	1	0	0	0	1	1					8	8	\$35.73	\$285.84	\$285.84
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal + 15% for Data Validation																	\$4,877.98
Total for Years 2-4																	\$14,633.93
Year 5 - New Baseline (4 wells)																	
Groundwater wells																	
TCL VOCs	GW	4	1	1	1	1	1	1					10	10	\$111.71	\$1,117.10	\$1,117.10
Methane, Ethane, & Ethene	GW	4	0	0	0	0	1	1					6	6	\$105.18	\$631.08	\$631.08
Nitrate, Nitrite, & Sulfate	GW	4	0	0	0	0	1	1					6	6	\$50.87	\$305.22	\$305.22
Sulfide	GW	4	0	0	0	0	1	1					6	6	\$35.12	\$210.72	\$210.72
Alkalinity	GW	4	0	0	0	0	1	1					6	6	\$13.73	\$82.38	\$82.38
VFAs	GW	4	0	0	0	0	1	1					6	6	\$134.90	\$809.40	\$809.40
TOC	GW	4	0	0	0	0	1	1					6	6	\$33.21	\$199.26	\$199.26
Dissolved Arsenic, Iron, & Manganese	GW	4	1	0	0	0	1	1					7	7	\$35.73	\$250.11	\$250.11
IDW - Purged groundwater and decon water & soil cuttings of new wells																	
TCLP VOCs	Aqueous & Solid	2							1	1	\$132.00	\$132.00	2	2	\$116.00	\$232.00	\$364.00
Subtotal + 15% for Data Validation																	\$4,564.66
Total for Year 5																	\$4,564.66
Year 5 - Quarterly Sampling Events - Assume 9 wells																	
Groundwater wells																	
TCL VOCs	GW	9	1	2	1	2	1	1					17	17	\$111.71	\$1,899.07	\$1,899.07
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	

Table A-5.4(b) - Lab Backup for Alternative 4 - Extraction, Treatment, Discharge, LUCs, and Monitoring
 Area 5: Peconic River
 Southern Area Feasibility Study Addendum
 NWIRP Calverton, New York

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Matrix Spike	Matrix Spike Duplicate	Total Number of Solid Samples	Total Billable Solid Samples	Solid Unit Price	Solid Subtotal Cost	Total Number of Liquid Samples	Total Billable Liquid Samples	Liquid Unit Price	Liquid Subtotal Cost	Total Analytical Cost
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$6,118.83	
Total for Year 5																\$24,475.31	
Years 6-24 - Annual Event - Assume 9 wells																	
Groundwater wells																	
TCL VOCs	GW	9	1	2	1	2	1	1					17	17	\$111.71	\$1,899.07	\$1,899.07
Methane, Ethane, & Ethene	GW	6	0	0	0	0	1	1					8	8	\$105.18	\$841.44	\$841.44
Nitrate, Nitrite, & Sulfate	GW	6	0	0	0	0	1	1					8	8	\$50.87	\$406.96	\$406.96
Sulfide	GW	6	0	0	0	0	1	1					8	8	\$35.12	\$280.96	\$280.96
Alkalinity	GW	6	0	0	0	0	1	1					8	8	\$13.73	\$109.84	\$109.84
VFAs	GW	6	0	0	0	0	1	1					8	8	\$134.90	\$1,079.20	\$1,079.20
TOC	GW	6	0	0	0	0	1	1					8	8	\$33.21	\$265.68	\$265.68
Dissolved Arsenic, Iron, & Manganese	GW	6	1	0	0	0	1	1					9	9	\$35.73	\$321.57	\$321.57
IDW - Purged groundwater and decon water																	
TCLP VOCs	Aqueous	1											1	1	\$116.00	\$116.00	\$116.00
Subtotal +15% for Data Validation																\$6,118.83	
Total for Years 6-24																\$116,257.73	
TOTAL FUTURE LAB COST																\$179,443.55	

Full QA/QC for COCs only. Also, duplicates for metals.

MS/MSDs are billable

Standard turnaround time

APPENDIX B
BACKUP CALCULATIONS

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No:	BY: SK	PAGE: 1 of 5
SUBJECT: Appendix B Southern Area Groundwater Plume Mass Calculations NWIRP Calverton, New York, CMS Addendum		CHECKED BY: SK	DATE: 7/28/2011

1. PURPOSE:

Determine the mass of 1,1-Dichloroethane (DCA), 1,1,1-Trichloroethane (TCA), Chloroethane (CA) and total Volatile Organic Compounds (VOCs) present in contaminated groundwater in the Southern Area Plume. Mass estimates are based on isoconcentration contours 5-500 and >500 micrograms per liter (µg/L) DCA as shown in Figure 2-1 in the March 2011 CMS. Characteristics are representative of free VOCs and do not include VOCs adsorbed onto soil particles within the aquifer.

2. APPROACH:

Use isoconcentration contour mapping as the basis to determine the extent of contamination. Divide the plume into five areas using DCA Isoconcentration (isoconc.) contours of 5-500 and >500 µg/L to calculate the mass of contaminants. The five main areas are the Source Area, the Fence Line Area, the Offsite Southern Area, VOCs greater than 500 µg/L, the Offsite Southern Area, VOCs less than 500 µg/L, and the Peconic River Area. Note that calculations are based on previous plume dimensions as defined by data taken during 2009 and 2010 sampling events. Figure B-1 shows the designation of the five main areas. Current plume boundaries are based on seasonal fluctuations.

3. ESTIMATE TOTAL MASS OF VOCs IN THE SOURCE AREA BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN THE SOURCE AREA⁽¹⁾:

⁽¹⁾See Area, Volume, Concentration and Mass Calculations in the March 2011 Feasibility Study for the Southern Area Plume for previous calculations based on specific contours.

Well ID	SA-TW348 ⁽²⁾
Date Sampled	Sep-10
Screen Depth (ft bgs)	20-25
1,1,1-Trichloroethane (µg/L)	550
1,1-Dichloroethane (µg/L)	1,500
1,1-Dichloroethene (µg/L)	68
Chloroethene (µg/L)	340

2 = Well identified as having the maximum total VOC concentration in the Source Area.

Estimated concentration of total VOCs:	2,459 µg/L
Percentage of total VOC concentration that is DCA:	61 %
Percentage of total VOC concentration that is TCA:	22 %
Percentage of total VOC concentration that is CA:	14 %

Volume of contaminated groundwater in isoconc. contour (gallons)	Geometric mean concentration of DCA within contour (µg/L)	Geometric mean concentration of TCA within contour (µg/L)	Geometric mean concentration of CA within contour (µg/L)	Mass DCA (pounds(lbs))	Mass TCA (lbs)	Mass CA (lbs)	Mass VOCs (lbs)
12,940,139	121	43	28	13	4.7	3.0	21

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No:	BY: SK	PAGE: 2 of 5
SUBJECT: Appendix B Southern Area Groundwater Plume Mass Calculations NWIRP Calverton, New York, CMS Addendum		CHECKED BY: SK	DATE: 7/28/2011

4. ESTIMATE TOTAL MASS OF VOCs IN THE **FENCE LINE AREA** BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN THE **FENCE LINE AREA**⁽¹⁾:

⁽¹⁾See Area, Volume, Concentration and Mass Calculations in the March 2011 Feasibility Study for the Southern Area Plume for previous calculations based on specific contours.

Well ID	SA-TW335 ⁽³⁾
Date Sampled	Jun-10
Screen Depth (ft bgs)	30-35
1,1,1-Trichloroethane (µg/L)	570
1,1-Dichloroethane (µg/L)	2,100
1,1-Dichloroethene (µg/L)	110
Chloroethene (µg/L)	470

3 = Well identified as having the maximum total VOC concentration in the Fence Line Area.

Estimated concentration of total VOCs:	3,231 µg/L
Percentage of total VOC concentration that is DCA:	65 %
Percentage of total VOC concentration that is TCA:	18 %
Percentage of total VOC concentration that is CA:	15 %

Volume of contaminated groundwater in isoconc. contour (gallons)	Geometric mean concentration of DCA within contour (µg/L)	Geometric mean concentration of TCA within contour (µg/L)	Geometric mean concentration of CA within contour (µg/L)	Mass DCA (lbs)	Mass TCA (lbs)	Mass CA (lbs)	Mass VOCs (lbs)
49,745,173	417	120	102	45	13	11	74

5. ESTIMATE TOTAL MASS OF VOCs IN THE **OFFSITE SOUTHERN AREA, VOCs GREATER THAN 500 µg/L**, BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN THE **OFFSITE SOUTHERN AREA, VOCs GREATER THAN 500 µg/L**⁽¹⁾:

⁽¹⁾See Area, Volume, Concentration and Mass Calculations in the March 2011 Feasibility Study for the Southern Area Plume for previous calculations based on specific contours.

Well ID	SA-TW312 ⁽⁴⁾
Date Sampled	Sep-09
Screen Depth (ft bgs)	41-46
1,1,1-Trichloroethane (µg/L)	280
1,1-Dichloroethane (µg/L)	1200 J
1,1-Dichloroethene (µg/L)	55
Chloroethene (µg/L)	91

4 = Well identified as having the maximum total VOC concentration in the Offsite Southern Area, VOCs greater than 500 µg/L and VOCs less than 500 µg/L.

Estimated concentration of total VOCs:	1,622 µg/L
Percentage of total VOC concentration that is DCA:	74 %
Percentage of total VOC concentration that is TCA:	17 %
Percentage of total VOC concentration that is CA:	5.6 %

Volume of contaminated groundwater in isoconc. contour (gallons)	Geometric mean concentration of DCA within contour (µg/L)	Geometric mean concentration of TCA within contour (µg/L)	Geometric mean concentration of CA within contour (µg/L)	Mass DCA (lbs)	Mass TCA (lbs)	Mass CA (lbs)	Mass VOCs (lbs)
61,711,527	1,051	241	79	114	26	8.6	153

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No:	BY: SK	PAGE: 3 of 5
SUBJECT: Appendix B Southern Area Groundwater Plume Mass Calculations NWIRP Calverton, New York, CMS Addendum		CHECKED BY: SK	DATE: 7/28/2011

6. ESTIMATE TOTAL MASS OF VOCs IN THE **OFFSITE SOUTHERN AREA, VOCs LESS THAN 500 µg/L**, BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN THE **OFFSITE SOUTHERN AREA, VOCs LESS THAN 500 µg/L**⁽¹⁾:

⁽¹⁾See Area, Volume, Concentration and Mass Calculations in the March 2011 Feasibility Study for the Southern Area Plume for previous calculations based on specific contours.

Volume of contaminated groundwater in isoconc. contour (gallons)	Geometric mean concentration of DCA within contour (µg/L) ⁽⁵⁾	Geometric mean concentration of TCA within contour (µg/L) ⁽⁵⁾	Geometric mean concentration of CA within contour (µg/L) ⁽⁵⁾	Mass DCA (lbs)	Mass TCA (lbs)	Mass CA (lbs)	Mass VOCs (lbs)
179,289,248	831	194	63	90	21	6.8	122

⁽⁵⁾Value estimated using well SA-TW312 also.

7. ESTIMATE TOTAL MASS OF VOCs IN THE **PECONIC RIVER AREA** BASED ON THE DCA CONCENTRATION IN THE SAMPLE WITH THE MAXIMUM TOTAL VOC CONCENTRATION IN THE **PECONIC RIVER AREA**⁽¹⁾:

⁽¹⁾See Area, Volume, Concentration and Mass Calculations in the March 2011 Feasibility Study for the Southern Area Plume for previous calculations based on specific contours.

Well ID	SA-PZ124 ⁽⁶⁾
Date Sampled	Sep-10
Screen Depth (ft bgs)	3-6
1,1,1-Trichloroethane (µg/L)	0
1,1-Dichloroethane (µg/L)	22
1,1-Dichloroethene (µg/L)	5.2
Chloroethene (µg/L)	0

⁶ = Well identified as having the maximum total VOC concentration in the Peconic River Area.

Estimated concentration of total VOCs: 27 µg/L
 Percentage of total VOC concentration that is DCA: 81 %
 Percentage of total VOC concentration that is TCA: 0 %
 Percentage of total VOC concentration that is CA: 0 %

Volume of contaminated groundwater in isoconc. contour (gallons)	Geometric mean concentration of DCA within contour (µg/L)	Geometric mean concentration of TCA within contour (µg/L)	Geometric mean concentration of CA within contour (µg/L)	Mass DCA (lbs)	Mass TCA (lbs)	Mass CA (lbs)	Mass VOCs (lbs)
54,112,208	44	0	0	4.7	0	0	5.8

8. TOTAL MASS OF DCA, VOCs IN THE **SOUTHERN AREA PLUME**:

Mass DCA (lbs)	Mass VOCs (lbs)
266	376

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: USN CLEAN	FILE No:	BY: SK	PAGE: 4 of 5
SUBJECT: Appendix B Southern Area Groundwater Plume Mass Flux Calculations for DCA and Total VOCs NWIRP Calverton, New York, CMS Addendum		CHECKED BY: SK	DATE: 7/28/2011

9. PURPOSE:

Determine the rate of mass flux of 1,1-Dichloroethane (DCA) and total volatile organic compounds (VOCs) present in contaminated groundwater in the Southern Area Plume. Mass flux estimates were determined using DCA Isoconcentration (Isoconc.) contours of 5-500 and >500 µg/L as shown in Figure 2-1 in the March 2011 CMS. Estimates are representative of free VOCs within the aquifer.

10. APPROACH:

Use isoconcentration contour mapping as the basis to determine the extent of contamination. The plume is divided into five main areas, the Source Area, the Fence Line Area, the Offsite Southern Area, VOCs greater than 500 µg/L, the Offsite Southern Area, VOCs less than 500 µg/L, and the Peconic River Area. See Figure B-1 for current plume boundaries at each flow line. Note that calculations are based on previous plume dimensions as defined in the March 2011 CMS.

11. CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING FROM THE SOURCE AREA⁽¹⁾:

Flow (ft ³ /day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (pounds(lbs) / year)	Mass flow VOCs (lbs/year)
3,681	104	2.2	3.6
Percentage of VOCs that is DCA			61%

⁽¹⁾Note that the rate of mass flux from the Source Area is the same for most of the on-site portion of the Southern Area Plume and these values were taken directly from previous calculations in the March 2011 Feasibility Study.

12. CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING FROM THE FENCE LINE AREA⁽²⁾:

Flow (ft ³ /day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (lbs/year)	Mass flow VOCs (lbs/year)
13,461	101	7.7	13
Percentage of VOCs that is DCA			60%

⁽²⁾The rate of mass flux from the Fence Line Area was taken directly from previous calculations in the March 2011 Feasibility Study.

13. CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING FROM THE OFFSITE SOUTHERN AREA, VOCs GREATER THAN 500 µg/L:

Flow (ft ³ /day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (lbs/year)	Mass flow VOCs (lbs/year)
2,808	158	2.5	3.4
1,140	866	5.6	7.6
3,948		8.2	11
Percentage of VOCs that is DCA			74%

CLIENT: USN CLEAN	FILE No:	BY: SK	PAGE: 5 of 5
SUBJECT: Appendix B Southern Area Groundwater Plume Mass Flux Calculations for DCA and Total VOCs NWIRP Calverton, New York, CMS Addendum		CHECKED BY: SK	DATE: 7/28/2011

14. CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING FROM THE OFFSITE SOUTHERN AREA, VOCs LESS THAN 500 µg/L (TO PECONIC RIVER AREA):

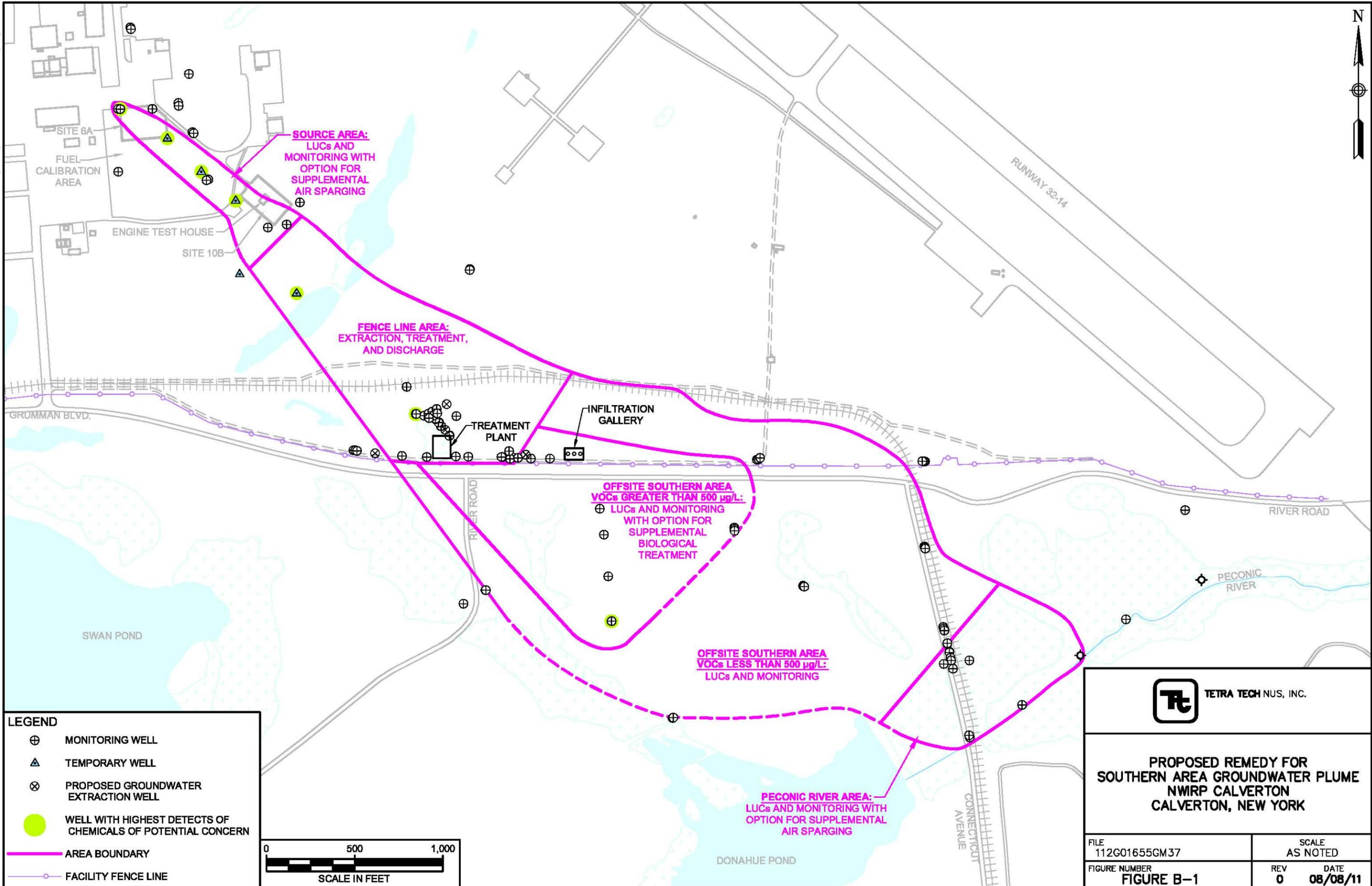
Flow (ft ³ /day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (lbs/year)	Mass flow VOCs (lbs/year)
14,529	16	1.3	1.8
2,808	158	2.5	3.4
17,337		3.8	5.2

Percentage of VOCs that is DCA 74%

15. CALCULATE MASS FLOW RATE OF DCA AND TOTAL VOCs FLOWING FROM THE PECONIC RIVER AREA (TO THE PECONIC RIVER):

Flow (ft ³ /day)	Geometric mean concentration of DCA within contour (µg/L)	Mass flow DCA (lbs/year)	Mass flow VOCs (lbs/year)
5,859	16	0.53	0.65

Percentage of VOCs that is DCA 81%



LEGEND

- ⊕ MONITORING WELL
- △ TEMPORARY WELL
- ⊗ PROPOSED GROUNDWATER EXTRACTION WELL
- WELL WITH HIGHEST DETECTS OF CHEMICALS OF POTENTIAL CONCERN
- AREA BOUNDARY
- - - FACILITY FENCE LINE



TETRA TECH NUS, INC.

**PROPOSED REMEDY FOR
SOUTHERN AREA GROUNDWATER PLUME
NWRP CALVERTON
CALVERTON, NEW YORK**

FILE 112G01655GM37	SCALE AS NOTED
FIGURE NUMBER FIGURE B-1	REV DATE 0 08/08/11