

APPENDIX G

GROUNDWATER REMEDIATION SUPPORTING DOCUMENTS

SENSITIVITY ANALYSIS TO DETERMINE LIMITING CONSTITUENT FOR GROUNDWATER REMEDIATION - CHCTS 33-60' TO BACKGROUND
 STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC
 EAST WHITE LAKE FIELD
 VERMILION PARISH, LOUISIANA
 PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

Constituent	Impacted thickness (ft)	Porosity	Area of Plume (m ²)	Area of Plume (ft ²)	Pore Volume (gal)	Retardation Factor (Rf)	Target Cleanup Concentration (Cf)	Initial Concentration in Plume (Co)	NPV	Required Recovery Volume (gal)
Chloride	27	0.35	1,725,693	18,575,187	1,313,005,660	1	1000	3537	1.3	1,658,692,359
Benzene	27	0.35	98,358	1,058,716	74,836,376	1	0.005	0.019	1.3	99,906,642
Barium	27	0.35	595,194	6,406,609	452,857,542	1	1.03	7.0	1.9	867,834,161
TPH-D	27	0.35	35,323	380,213	26,875,753	1	0.13	0.18	0.3	8,745,972
Strontium	27	0.35	978,311	10,530,442	744,354,807	1	0.88	4.27	1.6	1,175,669,115
Radium	27	0.35	1,338,565	14,408,180	1,018,456,598	1	2.42	8.04	1.2	1,222,821,670

Number of recovery wells
 Pumping rate of a single well (gpm)
 Total recovery rate (gpd)
 Well depth

15
10
216,000
60

PORE VOLUME FLUSHING CALCULATIONS-CHCTS 33-60' TO BACKGROUND

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

EAST WHITE LAKE FIELD

VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

1. Calculate volume of contaminated groundwater (i.e., one pore volume)

$$PV = BnA$$

B = impacted thickness (ft)	=	27
n = formation porosity	=	0.35
A = area of plume (ft ²)	=	18,575,187

PV (ft ³)	=	175,535,516
PV (gal)	=	1,313,005,660

2. Calculate number of pore volume flushes to achieve cleanup goals (NPV)

$$NPV = -R_f \ln\left(\frac{C_f}{C_o}\right)$$

	Rf	Cf	Co	NPV	x2	Total Recovery for Cleanup (gal)
Chlorides	1	1000	3,537	1.3	2.5	3,317,384,719

3. Groundwater recovery rate (from Flow & Conc. worksheet)

Well recovery rate	=	216,000	gpd
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4. Time required to achieve cleanup goal

Cleanup time	=	15,358	days
		42	years

Cell: G14
Comment: Wayne Prejean:
Total price for treatment system "A" minus the cost of Grundfos pumps. Pumps added in under GW Recovery well costs. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

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assumes 10,000 gallon tank. From Water Tanks.com

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assumes 4 wells per 10 hr day

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SEE Chemical Dosing worksheet

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Based on Clean Harbors quote 12/9/09

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Comment: Wayne Prejean:
From Power Consumption worksheet

Cell: G85
Comment: Wayne Prejean:
price based on US Liquids quote of \$0.50/barrel for water (<1% solids)

Cell: I85
Comment: Wayne Prejean:
Based on 30% of total recovered volume

Cell: G86
Comment: Wayne New:
Transportation Unit rate based on following:
Tug - \$2000/day
Fuel - \$400/day
1500-bbl Barge (x2) - \$500/day
Total = \$2900/day - based on one tug pushing 2 barges.

Day rate multiplied by 2--Accounts for cost of one tug and 2 empty barges traveling to the site (or on standby) to be loaded in addition to one tug and two barges are being loaded at the site.--i.e., total cost \$5900/day. Assumes one trip per day.

unit rate = \$5900/3000 = \$1.90/bbl

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-2													
3	COSTS FOR GROUNDWATER RECOVERY WITH ONSITE INJECTION OF WASTEWATER - CHCTS 33-60' TO BACKGROUND													
4	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC													
5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10			Time by Task			Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
12			CAPITAL COSTS											
13			<u>Treatment System and Installation</u>											
14			RO Treatment System			\$694,310.40	/unit	1 systems		1 event				\$694,310
15			Treatment system enclosure			\$8,000.00	/unit	1 units		1 event				\$8,000
16			Storage tank for recovered water			\$9,000.00	/unit	2 units		1 event				\$18,000
17			Spud barge for Treatment System			\$500.00	/day	15,358 days		1 event				\$7,679,131
18													Subtotal	\$8,399,442
19			<u>SWD Well Installation</u>											
20			Installation of SWDW	<i>[Includes 20% Increase for Aged Bid from 2008]</i>		\$1,941,618.00	/well	2 wells		1 event				\$3,883,236
21			Engineer Oversight			\$90.00	/hour	1680 hours		1 event				\$151,200
22			Engineer per diem			\$150.00	/day	140 days		1 event				\$21,000
23			Electrical Hookup (electrician + laborers)			\$350.00	/hour	60 hours		1 event				\$21,000
24			2" Electrical conduit			\$10.50	/foot	1000 feet		1 event				\$10,500
25			LDNR Injection Permit Application (engineer)			\$90.00	/hour	160 hours		1 event				\$14,400
26													Subtotal	\$4,101,336
27			<u>GW Recovery Well Installation</u>											
28			Drill Rig Mobilization/Demobilization			\$1,500.00	/unit	1 unit		1 event				\$1,500
29			4" PVC Recovery well installation (includes labor & materials)			\$105.00	/foot	900 feet		1 event				\$94,500
30			1" Piezometer installation (for monitoring)			\$4.00	/foot	900 feet		1 event				\$3,600
31			GrundFos 10 SQE-180NE Pump			\$3,888.00	/unit	15 units		1 events				\$58,320
32			GW recovery distribution piping			\$39,347.45	/unit	1 unit		1 event				\$39,347
33			Plumbing (2-man crew)			\$130.00	/man hr	251 man hrs		1 event				\$32,630
34			Surface Completions (well pad, guard posts, etc)			\$800	/unit	15 units		1 event				\$12,000
35			Manholes (18"x12")			\$234	/unit	15 units		1 event				\$3,510
36			Electrical Hookup (electrician + 2 laborers)			\$350.00	/hour	240 hours		1 event				\$84,000
37			Support Vehicle Mileage	<i>[30miles to hotel in Abbeville; 85 miles shop-to-site]</i>		\$1.70	/mile	950 miles		1 event				\$1,615
38			Drilling Crew Per Diem			\$360.00	/day	15 days		1 event				\$5,400
39			Geologist Per Diem			\$150.00	/day	15 days		1 event				\$2,250
40			Well Development (Env. Specialist)			\$65.00	/hr	38 man/hrs		1 event				\$2,438
41			Environmental Specialist Per Diem			\$150.00	/day	4 days		1 event				\$563
42			Well Installation Logs (Geologist)			\$95.00	/hour	15 hours		1 event				\$1,425
43			LDNR Well Registration Forms Prep (geologist/engineer)			\$95.00	/hour	15 hours		1 event				\$1,425
44													Subtotal	\$344,522
45			<u>Recovery Well Surveying</u>											
46			Personnel (2-man crew)			\$130.00	/hr	10 hrs		1 event				\$1,300
47			Equipment			\$50.00	/day	1 days		1 event				\$50
48			Survey Crew Per Diem			\$300.00	/day	1 days		1 event				\$300
49													Subtotal	\$1,650
50			<u>LPDES Discharge</u>											
51			LPDES Permit Application (engineer)			\$75.00	/hr	80 hrs		1 event				\$6,000
52													Subtotal	\$6,000

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Assumes that 2 men can install 50' of pipe per hour.

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Hotel is Abbeville is approx. 30 miles. Shop to site is approx 85 mi.

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Comment: Wayne Prejean:
From Power Consumption worksheet

Cell: I78

Comment: Wayne Prejean:
Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	PIPING CALCULATIONS - CHCTS 33-60' TO BACKGROUND														
2	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC														
3	EAST WHITE LAKE FIELD														
4	VERMILION PARISH, LOUISIANA														
5	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO														
6															
7	GW RECOVERY WELL SYSTEM														
8	3" distribution piping (from wells to TS)														
9		Length (ft)	Cost/foot	Total Cost											
10		14,500	\$1.83	\$26,535.00											
11															
12	1.25" pipe (downhole pump discharge)														
13		Length (ft)	Cost/foot	Total Cost											
14		900	\$0.78	\$702.00											
15															
16	2" pipe (electrical conduit)														
17		Length (ft)	Cost/foot	Total Cost											
18		12,550	\$0.89	\$11,169.50											
19															
20	3" header (Infiltration gallery)														
21		Quantity	Cost	Total Cost											
22		3	\$250.00	\$750.00											
23															
24	3" to 1.25" reducer coupling														
25		Quantity	Cost	Total Cost											
26		15	\$2.80	\$42.00											
27															
28	3" T's														
29		Quantity	Cost	Total Cost											
30		15	\$5.91	\$88.65											
31	90° Elbow (1.25 to 2")														
32		Quantity	Cost	Total Cost											
33		15	\$4.02	\$60.30											
34															
35			TOTAL	\$39,347.45											

Cell: E35

Comment: Wayne New:

Piping and fitting costs from US Plastics website

PIPING CALCULATIONS - CHCTS 33-60' TO BACKGROUND

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

EAST WHITE LAKE FIELD

VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

TOTAL AREA				
	<u># of Units</u>	<u>Unit Rated Power</u> (kW)	<u>Duration of Daily</u> <u>Operation (hr)</u>	<u>Daily Energy Consumption</u> (kWh/d)
Grundfos Pump	15	1.35	24	486
Cyclone Transfer Pump	1	5.6	22	123.2
Polishing Media Transfer Pump	1	5.6	22	123.2
RO System Pump	1	55	22	1210
H ₂ SO ₄ Dosing Pumps	1	0.37	20	7.4
NaOH Dosing Pumps	1	0.37	10	3.7
<u>Miscellaneous</u>				<u>127</u>
TOTAL				2080.5
Consumption per quarter				189,846

SENSITIVITY ANALYSIS TO DETERMINE LIMITING CONSTITUENT FOR GROUNDWATER REMEDIATION - CHCTS 33-60' TO DRINKING WATER STANDARD
 STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC
 EAST WHITE LAKE FIELD
 VERMILION PARISH, LOUISIANA
 PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

Constituent	Impacted thickness (ft)	Porosity	Area of Plume (m ²)	Area of Plume (ft ²)	Pore Volume (gal)	Retardation Factor (Rf)	Target Cleanup Concentration (Cf)	Initial Concentration in Plume (Co)	NPV	Required Recovery Volume (gal)
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Benzene	27	0.35	98,358	1,058,716	74,836,376	1	0.005	0.019	1.3	99,906,642
Barium	27	0.35	210,436	2,265,112	160,111,711	1	2	8.77	1.5	236,675,470
Strontium	27	0.35	129,055	1,389,135	98,192,405	1	4	11.08	1.0	100,043,068
Radium	27	0.35	466,866	5,025,299	355,218,281	1	5	17.02	1.2	435,125,063

Number of recovery wells
 Pumping rate of a single well (gpm)
 Total recovery rate (gpd)
 Well depth

12
10
172,800
60

PORE VOLUME FLUSHING CALCULATIONS - CHCTS 33-60' TO DRINKING WATER STANDARD

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

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VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

1. Calculate volume of contaminated groundwater (i.e., one pore volume)

$$PV = BnA$$

B = impacted thickness (ft)	=	27
n = formation porosity	=	0.35
A = area of plume (ft ²)	=	13,137,846

PV (ft ³)	=	124,152,643
PV (gal)	=	928,661,772

2. Calculate number of pore volume flushes to achieve cleanup goals (NPV)

$$NPV = -R_f \ln\left(\frac{C_f}{C_o}\right)$$

	Rf	Cf	Co	NPV	x2	Total Recovery for Cleanup (gal)
Chlorides	1	1000	4,312	1.5	2.9	2,714,296,033

3. Groundwater recovery rate (from Flow & Conc. worksheet)

Well recovery rate	=	172,800	gpd
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4. Time required to achieve cleanup goal

Cleanup time	=	15,708	days
		43	years

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Total = \$2900/day - based on one tug pushing 2 barges.

Day rate multiplied by 2--Accounts for cost of one tug and 2 empty barges traveling to the site (or on standby) to be loaded in addition to one tug and two barges are being loaded at the site.---i.e., total cost \$5900/day. Assumes one trip per day.

unit rate = $\$5900/3000 = \$1.90/\text{bbl}$

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-2													
3	COSTS FOR GROUNDWATER RECOVERY WITH ONSITE INJECTION OF WASTEWATER - CHCTS 33-60' TO DRINKING WATER STANDARD													
4	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC													
5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10				Time by Task		Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
53	OPERATION AND MAINTENANCE													
54	<u>GW Monitoring/Reporting (performed semi-annually)</u>													
55				GW Sampling (Eviron. Specialist)		\$175.00/well		12 wells/event		86 events				\$180,747
56				Lab Analysis - GW Samples (Metals by SW6010B) + QA/QC		\$65.00/sample		15 samples/event		86 events		\$16,783.60		\$100,702
57				Lab Analysis - GW Samples (Chlorides by M4500-CL B) +QA/QC		\$10.00/sample		15 samples/event		86 events		\$2,582.09		\$15,493
58				Lab Analysis - GW Samples (TDS by SM2540C) +QA/QC		\$15.00/sample		15 samples/event		86 events		\$3,873.14		\$23,239
59				Lab Analysis - GW Samples (TPH-D by SW8015B) +QA/QC		\$88.00/sample		15 samples/event		86 events		\$22,722.42		\$136,335
60				Lab Analysis - GW Samples (Volatiles by SW8260) +QA/QC		\$88.00/sample		15 samples/event		86 events		\$22,722.42		\$136,335
61				Lab Analysis - GW Samples (Radium 226/228) +QA/QC		\$140.00/sample		15 samples/event		86 events		\$36,149.30		\$216,896
62				GW Monitoring Report		\$2,500.00/report		1 report/yr		43 reports				\$107,587
63														Subtotal
64				<u>Treatment System/Recovery Well O&M</u>										\$917,332
65				RO Membrane Replacement		\$72,576.00/event				14 events				\$1,041,100
66				VAC Media Replacement		\$7,776.00/unit		2 unit/yr		43 years				\$669,278
67				VQC Media Replacement		\$21,600.00/unit		2 unit/yr		43 years				\$1,859,107
68				Sulfuric Acid		\$5.82/gallon		97.8 gallons/qtr		172 Quarters				\$97,981
69				Sodium Hydroxide		\$6.62/gallon		33.6 gallons/qtr		172 Quarters				\$38,289
70				Sludge Treatment/Disposal/Transportation		\$6.82/gallon		123 gallons/qtr		172 Quarters				\$144,401
71				GrundFos 10 SQE-180NE Pump Replacement (every 5 yrs)		\$3,888.00/unit		12 units/event		9 events				\$401,567
72				Energy Consumption (treatment system)		\$0.08/per kWh		180,976 kWh/qtr		172 Quarters				\$2,492,252
73				Personnel (O&M)		\$65.00/hr		650 hrs/qtr		172 Quarters				\$7,272,895
74				Materials (replacement)		\$1,500.00/year		1 unit/year		43 years				\$64,552
75				Project Management (Sr. Engineer)		\$90.00/hr		52 hrs/qtr		172 Quarters				\$805,613
76														\$14,887,035
77				<u>SWD Well O&M</u>										
78				Energy Consumption (SWD)		\$0.08/per kWh		72,270 kWh/qtr		172 Quarters				\$995,242
79				Filter Element Replacement (SWD)		\$1,500.00/unit		2 units/qtr		172 Quarters				\$516,419
80				Workover (acid wash)		\$100,000.00/unit		2 unit/2yrs/event		22 events				\$4,303,488
81														Subtotal
82				<u>Discharge Monitoring/Reporting</u>										\$5,815,149
83				Field Preparation, Travel, and Sampling (Eviron. Specialist)		\$65.00/hour		6 hours/QTR		172 Quarters				\$67,134
84				Lab Analytical Costs:										
85				Metals		\$85.00/sample		3 samples/QTR		172 Quarters		\$8,779.12		\$52,675
86				Chloride		\$25.00/sample		3 samples/QTR		172 Quarters		\$2,582.09		\$15,493
87				TDS		\$15.00/sample		3 samples/QTR		172 Quarters		\$1,549.26		\$9,296
88				TSS		\$15.00/sample		3 samples/QTR		172 Quarters		\$1,549.26		\$9,296
89				Oil and Grease		\$35.00/sample		3 samples/QTR		172 Quarters		\$3,614.93		\$21,690
90				Turbidity		\$15.00/sample		3 samples/QTR		172 Quarters		\$1,549.26		\$9,296
91				Quarterly DMR Preparation		\$90.00/hour		4 hours/QTR		172 Quarters		\$12,394.05		\$74,364
92														Subtotal
93				ANNUAL ACTIVITIES										\$259,242
94				Annual Water Quality Permit/Sanitation Fee		\$1,800.00/unit		1 unit		43 years				\$77,463
95				Remediation System Manufacturer Service and Support		\$70.00/hour		10 hours/year		43 years				\$30,124
96														Subtotal
97														\$107,587
98														Total Estimate
99														\$34,964,031
100				10% CONTINGENCY FOR PILOT TESTING, PUMP TESTING OF AQUIFER AND TREATMENT SYSTEM OPTIMIZATION BASED ON RESULTS										\$3,496,403
101														
102														Total Estimate With Contingency
103														\$38,460,434

Cell: G14

Comment: Wayne Prejean:

Total price for treatment system "A" minus the cost of Grundfos pumps. Pumps added in under GW Recovery well costs. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G16

Comment: Wayne Prejean:

assumes 10,000 gallon tank. From Water Tanks.com

Cell: G17

Comment: Wayne Prejean:

from Broussard Bros. Does not include factor for price changes over time

Cell: I17

Comment: Wayne Prejean:

Based on 7 years of operation

Cell: G20

Comment: Wayne Prejean:

Includes 20% increase to account for aged bid (2008)

Cell: G29

Comment: Wayne Prejean:

LDEQ UST Trust Fund rate

Cell: G31

Comment: Wayne Prejean:

Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G32

Comment: Wayne Prejean:

SEE Pipe and Fittings worksheet

Cell: I33

Comment: Wayne Prejean:

Assumes that 2 men can install 50' of pipe per hour.

Cell: G35

Comment: Wayne Prejean:

price from Dean Bennett Supply in Denver, CO

Cell: I37

Comment: Wayne Prejean:

Hotel is Abbeville is approx. 30 miles. Shop to site is approx 85 mi.

Cell: I38

Comment: WP:

Assumes one well per day

Cell: I39

Comment: WP:

Assumes one well per day

Cell: I40

Comment: Wayne Prejean:

assumes 4 wells per 10 hr day

Cell: I42

Comment: WP:

Assumes 1 hr per log

Cell: I43

Comment: WP:

Assumes 1 hr per log

Cell: G55

Comment: Wayne Prejean:

Trust Fund rate

Cell: I56

Comment: Wayne Prejean:

3 QA/Qcsamples per event

Cell: I57

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I58

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I59

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I60

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I61

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: G65

Comment: Wayne Prejean:
based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: K65

Comment: Wayne Prejean:
based on one event every 3 years

Cell: G66

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G67

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: I68

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: I69

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: G70

Comment: Wayne Prejean:
Based on Clean Harbors quote 12/9/09

Cell: I70

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: G71

Comment: Wayne Prejean:
Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: I72

Comment: Wayne Prejean:
From Power Consumption worksheet

Cell: I78

Comment: Wayne Prejean:
Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	PIPING CALCULATIONS - CHCTS 33-60' TO DRINKING WATER STANDARD														
2	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC														
3	EAST WHITE LAKE FIELD														
4	VERMILION PARISH, LOUISIANA														
5	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO														
6															
7	GW RECOVERY WELL SYSTEM														
8	3" distribution piping (from wells to TS)														
9	Length (ft)	Cost/foot	Total Cost												
10	12,500	\$1.83	\$22,875.00												
11															
12	1.25" pipe (downhole pump discharge)														
13	Length (ft)	Cost/foot	Total Cost												
14	720	\$0.78	\$561.60												
15															
16	2" pipe (electrical conduit)														
17	Length (ft)	Cost/foot	Total Cost												
18	9,950	\$0.89	\$8,855.50												
19															
20	3" header (Infiltration gallery)														
21	Quantity	Cost	Total Cost												
22	3	\$250.00	\$750.00												
23															
24	3" to 1.25" reducer coupling														
25	Quantity	Cost	Total Cost												
26	12	\$2.80	\$33.60												
27															
28	3" T's														
29	Quantity	Cost	Total Cost												
30	12	\$5.91	\$70.92												
31	90° Elbow (1.25 to 2")														
32	Quantity	Cost	Total Cost												
33	12	\$4.02	\$48.24												
34															
35			TOTAL	\$33,194.86											

Cell: E35

Comment: Wayne New:

Piping and fitting costs from US Plastics website

PIPING CALCULATIONS - CHCTS 33-60' TO DRINKING WATER STANDARD

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

EAST WHITE LAKE FIELD

VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

TOTAL AREA				
	<u># of Units</u>	<u>Unit Rated Power</u> <u>(kW)</u>	<u>Duration of Daily</u> <u>Operation (hr)</u>	<u>Daily Energy Consumption</u> <u>(kWh/d)</u>
Grundfos Pump	12	1.35	24	388.8
Cyclone Transfer Pump	1	5.6	22	123.2
Polishing Media Transfer Pump	1	5.6	22	123.2
RO System Pump	1	55	22	1210
H ₂ SO ₄ Dosing Pumps	1	0.37	20	7.4
NaOH Dosing Pumps	1	0.37	10	3.7
<u>Miscellaneous</u>				<u>127</u>
TOTAL				1983.3
			Consumption per quarter	180,976

SENSITIVITY ANALYSIS TO DETERMINE LIMITING CONSTITUENT FOR GROUNDWATER REMEDIATION - CHCTS 60-90' TO BACKGROUND
 STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC
 EAST WHITE LAKE FIELD
 VERMILION PARISH, LOUISIANA
 PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

Constituent	Impacted thickness (ft)	Porosity	Area of Plume (m ²)	Area of Plume (ft ²)	Pore Volume (gal)	Retardation Factor (Rf)	Target Cleanup Concentration (Cf)	Initial Concentration in Plume (Co)	NPV	Required Recovery Volume (gal)
Chloride	35	0.35	2,638,374	28,399,194	2,602,218,137	1	487	831	0.5	1,390,536,043
Barium	35	0.35	247,584	2,664,969	244,191,148	1	1.03	1.37	0.3	69,655,998
TPH-D	35	0.35	191,453	2,060,781	188,829,358	1	0.13	1.30	2.3	434,795,665
Strontium	35	0.35	642,489	6,915,687	633,684,432	1	0.88	1.13	0.3	158,453,428
Radium	35	0.35	1,425,586	15,344,865	1,406,049,993	1	2.42	4.93	0.7	1,000,505,030

Number of recovery wells
 Pumping rate of a single well (gpm)
 Total recovery rate (gpd)
 Well depth

6
50
432,000
95

PORE VOLUME FLUSHING CALCULATIONS-CHCTS 60-90' TO BACKGROUND

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

EAST WHITE LAKE FIELD

VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

1. Calculate volume of contaminated groundwater (i.e., one pore volume)

$$PV = BnA$$

B = impacted thickness (ft)	=	35
n = formation porosity	=	0.35
A = area of plume (ft ²)	=	28,399,194

PV (ft ³)	=	347,890,125
PV (gal)	=	2,602,218,137

2. Calculate number of pore volume flushes to achieve cleanup goals (NPV)

$$NPV = -R_f \ln\left(\frac{C_f}{C_o}\right)$$

	Rf	Cf	Co	NPV	x2	Total Recovery for Cleanup (gal)
Chlorides	1	487	831	0.5	1.1	2,781,072,086

3. Groundwater recovery rate (from Flow & Conc. worksheet)

Well recovery rate	=	432,000	gpd
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4. Time required to achieve cleanup goal

Cleanup time	=	6,438	days
		18	years

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-3													
3	COSTS FOR GROUNDWATER RECOVERY WITH OFFSITE DISPOSAL OF WASTEWATER - CHCTS 60-90' TO BACKGROUND													
4	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC													
5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10			Time by Task			Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
12	CAPITAL COSTS													
13	<u>Treatment System and Installation</u>													
14			RO Treatment System			\$694,310.40	/unit	1	systems		1	event		\$694,310
15			Treatment system enclosure			\$8,000.00	/unit	1	units		1	event		\$8,000
16			Storage tank for recovered water			\$9,000.00	/unit	10	units		1	event		\$90,000
17			Spud barge for Treatment System			\$500.00	/day	6,438	days		1	event		\$3,218,833
18													Subtotal	\$4,011,144
19	<u>GW Recovery Well Installation</u>													
20			Drill Rig Mobilization/Demobilization			\$1,500.00	/unit	1	unit		1	event		\$1,500
21			4" PVC Recovery well installation (includes labor & materials)			\$105.00	/foot	570	feet		1	event		\$59,850
22			1" Piezometer installation (for monitoring)			\$4.00	/foot	570	feet		1	event		\$2,280
23			GrundFos 10 SQE-180NE Pump			\$3,888.00	/unit	6	units		1	events		\$23,328
24			GW recovery distribution piping			\$38,975.48	/unit	1	unit		1	event		\$38,975
25			Plumbing (2-man crew)			\$130.00	/man hr	251	man hrs		1	event		\$32,630
26			Surface Completions (well pad, guard posts, etc)			\$800	/unit	6	units		1	event		\$4,800
27			Manholes (18"x12")			\$234	/unit	6	units		1	event		\$1,404
28			Electrical Hookup (electrician + 2 laborers)			\$350.00	/hour	160	hours		1	event		\$56,000
29			Support Vehicle Mileage		<i>[30miles to hotel in Abbeville; 85 miles shop-to-site]</i>	\$1.70	/mile	410	miles		1	event		\$697
30			Drilling Crew Per Diem			\$360.00	/day	6	days		1	event		\$2,160
31			Geologist Per Diem			\$150.00	/day	6	days		1	event		\$900
32			Well Development (Env. Specialist)			\$65.00	/hr	15	man/hrs		1	event		\$975
33			Environmental Specialist Per Diem			\$150.00	/day	2	days		1	event		\$225
34			Well Installation Logs (Geologist)			\$95.00	/hour	6	hours		1	event		\$570
35			LDNR Well Registration Forms Prep (geologist/engineer)			\$95.00	/hour	6	hours		1	event		\$570
36													Subtotal	\$226,864
37	<u>Recovery Well Surveying</u>													
38			Personnel (2-man crew)			\$130.00	/hr	10	hrs		1	event		\$1,300
39			Equipment			\$50.00	/day	1	days		1	event		\$50
40			Survey Crew Per Diem			\$300.00	/day	1	days		1	event		\$300
41													Subtotal	\$1,650
42	<u>LPDES Discharge</u>													
43			LPDES Permit Application (engineer)			\$75.00	/hr	80	hrs		1	event		\$6,000
44													Subtotal	\$6,000

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-3													
3	COSTS FOR GROUNDWATER RECOVERY WITH OFFSITE DISPOSAL OF WASTEWATER - CHCTS 60-90' TO BACKGROUND													
4	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC													
5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10			Time by Task			Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
45	OPERATION AND MAINTENANCE													
46	<u>GW Monitoring/Reporting (performed semi-annually)</u>													
47			GW Sampling (Eviron. Specialist)			\$175.00 /well		6 wells/event		35 events				\$37,039
48			Lab Analysis - GW Samples (Metals by SW6010B) + QA/QC			\$65.00 /sample		9 samples/event		35 events		\$4,127.16		\$24,763
49			Lab Analysis - GW Samples (Chlorides by M4500-CL B) +QA/QC			\$10.00 /sample		9 samples/event		35 events		\$634.95		\$3,810
50			Lab Analysis - GW Samples (TDS by SM2540C) +QA/QC			\$15.00 /sample		9 samples/event		35 events		\$952.42		\$5,715
51			Lab Analysis - GW Samples (TPH-D by SW8015B) +QA/QC			\$88.00 /sample		9 samples/event		35 events		\$5,587.54		\$33,525
52			Lab Analysis - GW Samples (Volatiles by SW8260) +QA/QC			\$88.00 /sample		9 samples/event		35 events		\$5,587.54		\$33,525
53			Lab Analysis - GW Samples (Radium 226/228) +QA/QC			\$140.00 /sample		9 samples/event		35 events		\$8,889.27		\$53,336
54			GW Monitoring Report			\$2,500.00 /report		1 report/yr		18 reports				\$44,094
55														Subtotal
56			Treatment System/Recovery Well O&M											\$235,806
57			RO Membrane Replacement			\$72,576.00 /event				6 events				\$426,685
58			VAC Media Replacement			\$7,776.00 /unit		2 unit/yr		18 years				\$274,298
59			VQC Media Replacement			\$21,600.00 /unit		2 unit/yr		18 years				\$761,938
60			Sulfuric Acid			\$5.82 /gallon		97.8 gallons/qr		71 Quarters				\$40,157
61			Sodium Hydroxide			\$6.62 /gallon		33.6 gallons/qr		71 Quarters				\$15,693
62			Sludge Treatment/Disposal/Transportation			\$6.82 /gallon		123 gallons/qr		71 Quarters				\$59,181
63			GrundFos 10 SQE-180NE Pump Replacement (every 5 yrs)			\$3,888.00 /unit		6 units/event		4 events				\$82,289
64			Energy Consumption (treatment system)			\$0.08 per kWh		189,846 kWh/qr		71 Quarters				\$1,071,485
65			Personnel (O&M)			\$65.00 /hr		650 hrs/qr		71 Quarters				\$2,980,728
66			Materials (replacement)			\$1,500.00 /year		1 unit/year		18 years				\$26,456
67			Project Management (Sr. Engineer)			\$90.00 /hr		52 hrs/qr		71 Quarters				\$330,173
68														\$6,069,082
69	<u>Discharge Monitoring/Reporting</u>													
70			Field Preparation, Travel, and Sampling (Environ. Specialist)			\$65.00 /hour		6 hours/QTR		71 Quarters				\$27,514
71			Lab Analytical Costs:											
72			Metals			\$85.00 /sample		3 samples/QTR		71 Quarters		\$3,598.04		\$21,588
73			Chloride			\$25.00 /sample		3 samples/QTR		71 Quarters		\$1,058.25		\$6,349
74			TDS			\$15.00 /sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
75			TSS			\$15.00 /sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
76			Oil and Grease			\$35.00 /sample		3 samples/QTR		71 Quarters		\$1,481.55		\$8,889
77			Turbidity			\$15.00 /sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
78			Quarterly DMR Preparation			\$90.00 /hour		4 hours/QTR		71 Quarters		\$5,079.58		\$30,478
79														Subtotal
80	ANNUAL ACTIVITIES													
81			Annual Water Quality Permit/Sanitation Fee			\$1,800.00 /unit		1 unit		18 years				\$31,747
82			Remediation System Manufacturer Service and Support			\$70.00 /hour		10 hours/year		18 years				\$12,346
83														Subtotal
84	OFFSITE DISPOSAL													
85			Offsite Disposal - for RO supersaturated discharge water			\$0.01 /gallon		834,321,626 gallons						\$10,011,860
86			Transportation by barge-3000 barrels per trip			\$1.90 /bbl		19,864,801 bbls						\$37,743,121
87														Subtotal
88														\$47,754,981
89														Total Estimate
90														\$58,455,868
91	10% CONTINGENCY FOR PILOT TESTING, PUMP TESTING OF AQUIFER AND TREATMENT SYSTEM OPTIMIZATION BASED ON RESULTS													
92														\$5,845,587
93														Total Estimate With Contingency
94														\$64,301,455

Cell: G14
Comment: Wayne Prejean:
Total price for treatment system "A" minus the cost of Grundfos pumps. Pumps added in under GW Recovery well costs. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G16
Comment: Wayne Prejean:
assumes 10,000 gallon tank. From Water Tanks.com

Cell: G17
Comment: Wayne Prejean:
from Broussard Bros.

Cell: G21
Comment: Wayne Prejean:
LDEQ UST Trust Fund rate

Cell: G23
Comment: Wayne Prejean:
Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G24
Comment: Wayne Prejean:
SEE Pipe and Fittings worksheet

Cell: I25
Comment: Wayne Prejean:
Assumes that 2 men can install 50' of pipe per hour.

Cell: G27
Comment: Wayne Prejean:
price from Dean Bennett Supply in Denver, CO

Cell: I29
Comment: Wayne Prejean:
Hotel is Abbeville is approx. 30 miles. Shop to site is approx 85 mi.

Cell: I30
Comment: WP:
Assumes one well per day

Cell: I31
Comment: WP:
Assumes one well per day

Cell: I32
Comment: Wayne Prejean:
assumes 4 wells per 10 hr day

Cell: I34
Comment: WP:
Assumes 1 hr per log

Cell: I35
Comment: WP:
Assumes 1 hr per log

Cell: G47
Comment: Wayne Prejean:
Trust Fund rate

Cell: I48
Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I49
Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I50
Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I51
Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I52

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I53

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: G57

Comment: Wayne Prejean:
based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: K57

Comment: Wayne Prejean:
based on one event every 3 years

Cell: G58

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G59

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: I60

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: I61

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: G62

Comment: Wayne Prejean:
Based on Clean Harbors quote 12/9/09

Cell: I62

Comment: Wayne Prejean:
SEE Chemical Dosing worksheet

Cell: G63

Comment: Wayne Prejean:
Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: I64

Comment: Wayne Prejean:
From Power Consumption worksheet

Cell: G85

Comment: Wayne Prejean:
price based on US Liquids quote of \$0.50/barrel for water (<1% solids)

Cell: I85

Comment: Wayne Prejean:
Based on 30% of total recovered volume

Cell: G86

Comment: Wayne New:
Transportation Unit rate based on following:
Tug - \$2000/day
Fuel - \$400/day
1500-bbl Barge (x2) - \$500/day
Total = \$2900/day - based on one tug pushing 2 barges.

Day rate multiplied by 2--Accounts for cost of one tug and 2 empty barges traveling to the site (or on standby) to be loaded in addition to one tug and two barges are being loaded at the site.--i.e., total cost \$5900/day. Assumes one trip per day.

unit rate = \$5900/3000 = \$1.90/bbl

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-2													
3	COSTS FOR GROUNDWATER RECOVERY WITH ONSITE INJECTION OF WASTEWATER - CHCTS 60-90' TO BACKGROUND													
4	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC													
5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10			Time by Task			Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
12			CAPITAL COSTS											
13			<u>Treatment System and Installation</u>											
14			RO Treatment System			\$694,310.40	/unit	1 systems		1 event				\$694,310
15			Treatment system enclosure			\$8,000.00	/unit	1 units		1 event				\$8,000
16			Storage tank for recovered water			\$9,000.00	/unit	2 units		1 event				\$18,000
17			Spud barge for Treatment System			\$500.00	/day	6,438 days		1 event				\$3,218,833
18													Subtotal	\$3,939,144
19			<u>SWD Well Installation</u>											
20			Installation of SWDW		<i>[Includes 20% Increase for Aged Bid from 2008]</i>	\$1,941,618.00	/well	2 wells		1 event				\$3,883,236
21			Engineer Oversight			\$90.00	/hour	1680 hours		1 event				\$151,200
22			Engineer per diem			\$150.00	/day	140 days		1 event				\$21,000
23			Electrical Hookup (electrician + laborers)			\$350.00	/hour	60 hours		1 event				\$21,000
24			2" Electrical conduit			\$10.50	/foot	1000 feet		1 event				\$10,500
25			LDNR Injection Permit Application (engineer)			\$90.00	/hour	160 hours		1 event				\$14,400
26													Subtotal	\$4,101,336
27			<u>GW Recovery Well Installation</u>											
28			Drill Rig Mobilization/Demobilization			\$1,500.00	/unit	1 unit		1 event				\$1,500
29			4" PVC Recovery well installation (includes labor & materials)			\$105.00	/foot	570 feet		1 event				\$59,850
30			1" Piezometer installation (for monitoring)			\$4.00	/foot	570 feet		1 event				\$2,280
31			GrundFos 10 SQE-180NE Pump			\$3,888.00	/unit	6 units		1 events				\$23,328
32			GW recovery distribution piping			\$38,975.48	/unit	1 unit		1 event				\$38,975
33			Plumbing (2-man crew)			\$130.00	/man hr	251 man hrs		1 event				\$32,630
34			Surface Completions (well pad, guard posts, etc)			\$800	/unit	6 units		1 event				\$4,800
35			Manholes (18"x12")			\$234	/unit	6 units		1 event				\$1,404
36			Electrical Hookup (electrician + 2 laborers)			\$350.00	/hour	160 hours		1 event				\$56,000
37			Support Vehicle Mileage		<i>[30miles to hotel in Abbeville; 85 miles shop-to-site]</i>	\$1.70	/mile	410 miles		1 event				\$697
38			Drilling Crew Per Diem			\$360.00	/day	6 days		1 event				\$2,160
39			Geologist Per Diem			\$150.00	/day	6 days		1 event				\$900
40			Well Development (Env. Specialist)			\$65.00	/hr	15 man/hrs		1 event				\$975
41			Environmental Specialist Per Diem			\$150.00	/day	2 days		1 event				\$225
42			Well Installation Logs (Geologist)			\$95.00	/hour	6 hours		1 event				\$570
43			LDNR Well Registration Forms Prep (geologist/engineer)			\$95.00	/hour	6 hours		1 event				\$570
44													Subtotal	\$226,864
45			<u>Recovery Well Surveying</u>											
46			Personnel (2-man crew)			\$130.00	/hr	10 hrs		1 event				\$1,300
47			Equipment			\$50.00	/day	1 days		1 event				\$50
48			Survey Crew Per Diem			\$300.00	/day	1 days		1 event				\$300
49													Subtotal	\$1,650
50			<u>LPDES Discharge</u>											
51			LPDES Permit Application (engineer)			\$75.00	/hr	80 hrs		1 event				\$6,000
52													Subtotal	\$6,000

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1														
2	TABLE 3-2													
3	COSTS FOR GROUNDWATER RECOVERY WITH ONSITE INJECTION OF WASTEWATER - CHCTS 60-90' TO BACKGROUND													
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5	EAST WHITE LAKE FIELD													
6	VERMILION PARISH, LOUISIANA													
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO													
8														
9														
10				Time by Task		Cost per Unit		Number of Units		Number of Events		Markup		Total (\$)
11														
53	OPERATION AND MAINTENANCE													
54	<u>GW Monitoring/Reporting (performed semi-annually)</u>													
55				GW Sampling (Eviron. Specialist)		\$175.00/well		6 wells/event		35 events				\$37,039
56				Lab Analysis - GW Samples (Metals by SW6010B) + QA/QC		\$65.00/sample		9 samples/event		35 events		\$4,127.16		\$24,763
57				Lab Analysis - GW Samples (Chlorides by M4500-CL B) +QA/QC		\$10.00/sample		9 samples/event		35 events		\$634.95		\$3,810
58				Lab Analysis - GW Samples (TDS by SM2540C) +QA/QC		\$15.00/sample		9 samples/event		35 events		\$952.42		\$5,715
59				Lab Analysis - GW Samples (TPH-D by SW8015B) +QA/QC		\$88.00/sample		9 samples/event		35 events		\$5,587.54		\$33,525
60				Lab Analysis - GW Samples (Volatiles by SW8260) +QA/QC		\$88.00/sample		9 samples/event		35 events		\$5,587.54		\$33,525
61				Lab Analysis - GW Samples (Radium 226/228) +QA/QC		\$140.00/sample		9 samples/event		35 events		\$8,889.27		\$53,336
62				GW Monitoring Report		\$2,500.00/report		1 report/yr		18 reports				\$44,094
63														Subtotal
64				<u>Treatment System/Recovery Well O&M</u>										\$235,806
65				RO Membrane Replacement		\$72,576.00/event				6 events				\$426,685
66				VAC Media Replacement		\$7,776.00/unit		2 unit/yr		18 years				\$274,298
67				VQC Media Replacement		\$21,600.00/unit		2 unit/yr		18 years				\$761,938
68				Sulfuric Acid		\$5.82/gallon		97.8 gallons/qtr		71 Quarters				\$40,157
69				Sodium Hydroxide		\$6.62/gallon		33.6 gallons/qtr		71 Quarters				\$15,693
70				Sludge Treatment/Disposal/Transportation		\$6.82/gallon		123 gallons/qtr		71 Quarters				\$59,181
71				GrundFos 10 SQE-180NE Pump Replacement (every 5 yrs)		\$3,888.00/unit		6 units/event		4 events				\$82,289
72				Energy Consumption (treatment system)		\$0.08/per kWh		189,846 kWh/qtr		71 Quarters				\$1,071,485
73				Personnel (O&M)		\$65.00/hr		650 hrs/qtr		71 Quarters				\$2,980,728
74				Materials (replacement)		\$1,500.00/year		1 unit/year		18 years				\$26,456
75				Project Management (Sr. Engineer)		\$90.00/hr		52 hrs/qtr		71 Quarters				\$330,173
76														\$6,069,082
77				<u>SWD Well O&M</u>										
78				Energy Consumption (SWD)		\$0.08/per kWh		72,270 kWh/qtr		71 Quarters				\$407,891
79				Filter Element Replacement (SWD)		\$1,500.00/unit		2 units/qtr		71 Quarters				\$211,649
80				Workover (acid wash)		\$100,000.00/unit		2 unit/2yrs/event		9 events				\$1,763,744
81														Subtotal
82				<u>Discharge Monitoring/Reporting</u>										\$2,383,284
83				Field Preparation, Travel, and Sampling (Eviron. Specialist)		\$65.00/hour		6 hours/QTR		71 Quarters				\$27,514
84				Lab Analytical Costs:										
85				Metals		\$85.00/sample		3 samples/QTR		71 Quarters		\$3,598.04		\$21,588
86				Chloride		\$25.00/sample		3 samples/QTR		71 Quarters		\$1,058.25		\$6,349
87				TDS		\$15.00/sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
88				TSS		\$15.00/sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
89				Oil and Grease		\$35.00/sample		3 samples/QTR		71 Quarters		\$1,481.55		\$8,889
90				Turbidity		\$15.00/sample		3 samples/QTR		71 Quarters		\$634.95		\$3,810
91				Quarterly DMR Preparation		\$90.00/hour		4 hours/QTR		71 Quarters		\$5,079.58		\$30,478
92														Subtotal
93				ANNUAL ACTIVITIES										\$106,248
94				Annual Water Quality Permit/Sanitation Fee		\$1,800.00/unit		1 unit		18 years				\$31,747
95				Remediation System Manufacturer Service and Support		\$70.00/hour		10 hours/year		18 years				\$12,346
96														Subtotal
97														\$44,094
98														Total Estimate
99														\$17,113,508
100				10% CONTINGENCY FOR PILOT TESTING, PUMP TESTING OF AQUIFER AND TREATMENT SYSTEM OPTIMIZATION BASED ON RESULTS										\$1,711,351
101														
102														Total Estimate With Contingency
103														\$18,824,859

Cell: G14

Comment: Wayne Prejean:

Total price for treatment system "A" minus the cost of Grundfos pumps. Pumps added in under GW Recovery well costs. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G16

Comment: Wayne Prejean:

assumes 10,000 gallon tank. From Water Tanks.com

Cell: G17

Comment: Wayne Prejean:

from Broussard Bros.

Cell: G20

Comment: Wayne Prejean:

Includes 20% increase to account for aged bid (2008)

Cell: G29

Comment: Wayne Prejean:

LDEQ UST Trust Fund rate

Cell: G31

Comment: Wayne Prejean:

Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars converted to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G32

Comment: Wayne Prejean:

SEE Pipe and Fittings worksheet

Cell: I33

Comment: Wayne Prejean:

Assumes that 2 men can install 50' of pipe per hour.

Cell: G35

Comment: Wayne Prejean:

price from Dean Bennett Supply in Denver, CO

Cell: I37

Comment: Wayne Prejean:

Hotel is Abbeville is approx. 30 miles. Shop to site is approx 85 mi.

Cell: I38

Comment: WP:

Assumes one well per day

Cell: I39

Comment: WP:

Assumes one well per day

Cell: I40

Comment: Wayne Prejean:

assumes 4 wells per 10 hr day

Cell: I42

Comment: WP:

Assumes 1 hr per log

Cell: I43

Comment: WP:

Assumes 1 hr per log

Cell: G55

Comment: Wayne Prejean:

Trust Fund rate

Cell: I56

Comment: Wayne Prejean:

3 QA/Qcsamples per event

Cell: I57

Comment: Wayne Prejean:

3 QA/Qcsamples per event

Cell: I58

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I59

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I60

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: I61

Comment: Wayne Prejean:
3 QA/Qcsamples per event

Cell: G65

Comment: Wayne Prejean:
based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: K65

Comment: Wayne Prejean:
based on one event every 3 years

Cell: G66

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G67

Comment: Wayne Prejean:
Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: G70

Comment: Wayne Prejean:
Based on Clean Harbors quote 12/9/09

Cell: G71

Comment: Wayne Prejean:
Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars covered to US dollars using current exchange rate of 1 CAD = 0.72 USD

Cell: I72

Comment: Wayne Prejean:
From Power Consumption worksheet

Cell: I78

Comment: Wayne Prejean:
Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	PIPING CALCULATIONS - CHCTS 60-90' TO BACKGROUND														
2	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC														
3	EAST WHITE LAKE FIELD														
4	VERMILION PARISH, LOUISIANA														
5	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO														
6															
7	GW RECOVERY WELL SYSTEM														
8	3" distribution piping (from wells to TS)														
9		Length (ft)	Cost/foot	Total Cost											
10		14,500	\$1.83	\$26,535.00											
11															
12	1.25" pipe (downhole pump discharge)														
13		Length (ft)	Cost/foot	Total Cost											
14		570	\$0.78	\$444.60											
15															
16	2" pipe (electrical conduit)														
17		Length (ft)	Cost/foot	Total Cost											
18		12,550	\$0.89	\$11,169.50											
19															
20	3" header (Infiltration gallery)														
21		Quantity	Cost	Total Cost											
22		3	\$250.00	\$750.00											
23															
24	3" to 1.25" reducer coupling														
25		Quantity	Cost	Total Cost											
26		6	\$2.80	\$16.80											
27															
28	3" T's														
29		Quantity	Cost	Total Cost											
30		6	\$5.91	\$35.46											
31	90° Elbow (1.25 to 2")														
32		Quantity	Cost	Total Cost											
33		6	\$4.02	\$24.12											
34															
35			TOTAL	\$38,975.48											

Cell: E35

Comment: Wayne New:

Piping and fitting costs from US Plastics website

PIPING CALCULATIONS - CHCTS 60-90' TO BACKGROUND

STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORATION ET AL; DOCKET NO. 82162, DIV "D"; 15TH JDC

EAST WHITE LAKE FIELD

VERMILION PARISH, LOUISIANA

PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO

TOTAL AREA				
	<u># of Units</u>	<u>Unit Rated Power</u> <u>(kW)</u>	<u>Duration of Daily</u> <u>Operation (hr)</u>	<u>Daily Energy Consumption</u> <u>(kWh/d)</u>
Grundfos Pump	15	1.35	24	486
Cyclone Transfer Pump	1	5.6	22	123.2
Polishing Media Transfer Pump	1	5.6	22	123.2
RO System Pump	1	55	22	1210
H ₂ SO ₄ Dosing Pumps	1	0.37	20	7.4
NaOH Dosing Pumps	1	0.37	10	3.7
<u>Miscellaneous</u>				<u>127</u>
TOTAL				2080.5
			Consumption per quarter	189,846