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) = $\frac{27}{0.35}$ A = area of plume (ft²) = $\frac{18,575,187}{18,575,187}$

 $PV (ft^3) = PV (gal) =$

175,535,516 1,313,005,660

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

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

 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

4. Time required to achieve cleanup goal

Cleanup time

15,358 days **42** years

A	ВС	D	E	F	G	Н	I	J	K	L	М	N	0
1													
	ABLE 3-3												
				WITH OFFSITE DISPOSAL OF WASTEWATER - CH									
				ARISH SCHOOL BOARD V LOUISIANA LAND AND	EXPLORATION ET AL; DO	CKET NO	, 82162, DIV "D";	15TH JDC					
	_	ITE LAKE											
			H, LOUISIANA										
7 P I	REPARE	D FOR T	ALBOT, CARMOUCHE,	AND MARCELLO									
8													
9													
10	Time I	by Task			Cost per	Unit	Numbe	r of Units	Number of	of Events		Markup	Total (\$)
11													
12	CAPI	TAL COS	TS										
13	Treatn	ment System	n and Installation										
14		O Treatmen			\$694,310,40	/unit	1	systems	1	event			\$694,310
15	-		stem enclosure		\$8,000.00			units		event			\$8,000
16			for recovered water		\$9,000.00			units		event			\$72,000
17			or Treatment System		\$500.00		15,358	days		event			\$7,679,131
18	-1		,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		700000	,,	10,000	,				Subtotal	\$8,453,442
19	GW R	Recovery W	ell Installation									Subtotal	ψο, του, ττ2
20			bilization/Demobilization		\$1,500.00	/unit	1	unit	1	event			\$1,500
21			very well installation (include	s labor & materials)	\$105.00			feet		event			\$94,500
22	-		r installation (for monitoring)	s moor & materialsy	\$4.00			feet		event			\$3,600
23	-		SQE-180NE Pump		\$3,888.00			units		events			\$58,320
24			distribution piping		\$39,347.45			unit		event			\$39,347
25		lumbing (2-	110		\$130.00			man hrs		event			\$32,630
26			pletions (well pad, guard posts	s etc)	1	/unit		units		event			\$12,000
27	-	Ianholes (18		5, 000)	\$234			units		event			\$3,510
28			okup (electrician + 2 laborers)	<u> </u>	\$350.00			hours		event			\$84,000
29			cle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70			miles		event			\$1,615
30		rilling Crew		[Somiles to note: in Abbeville, 65 miles snop-to-site]	\$360.00			davs		event			\$5,400
31	-	eologist Per			\$150.00			days		event			\$2,250
32			oment (Env. Specialist)		\$65.00			man/hrs		event			\$2,438
33			al Specialist Per Diem		\$150.00			days		event			\$563
34			tion Logs (Geologist)		\$95.00	,		hours		event			\$1,425
35			Registration Forms Prep (geol	ogist/angineer)	\$95.00			hours		event			\$1,425
36	Li	DIAK MEH	Registration Forms Frep (geor	ogisvengmeet)	\$93.00	/ HOUI	13	nouts	'	CVCIII	-	Subtotal	\$344.522
37	Recov	very Well St	urveving							+	-	Subtotal	φυττ,322
38		ersonnel (2-			\$130.00	/hr	10	hrs	1	event			\$1,300
39		quipment	man cicwj		\$50.00			days		event	<u> </u>		\$1,300
40	-	urvey Crew	Per Diem		\$300.00	-		days		event			\$300 \$300
41	30	ui rey ciew	I OI DIOIII		\$300.00	/uuy	1	uujo	'	CVCIII		Subtotal	\$1.650
42	I PDE	S Discharge	ρ							+		Subtotal	φ1,030
	-		nit Application (engineer)		\$75.00	/hr	90	hrs		event	<u> </u>		\$6,000
43 44	LI	L DES LEIII	in Application (engineer)		\$75.00	/111	80	1115		event	-	Subtotal	\$6,000 \$6,000
44								1				Subtotal	\$0,000

	A B C D F	G	Н	1	J	К	L M	N	0
1									
	TABLE 3-3								
	COSTS FOR GROUNDWATER RECOVERY WITH OFFSITE DISPOSAL OF WASTEWATER - CHCTS 33-6								
	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND EXPLORA	TION ET AL; DO	CKET NO	. 82162, DIV "D";	; 15TH JDC				
-	EAST WHITE LAKE FIELD								
	VERMILION PARISH, LOUISIANA								
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO								
8									
9			T 1.	N. 1	CII	N7 1	CF.)	TD + 1 (ft)
10	Time by Task	Cost per	Unit	Numbe	r of Units	Number o	f Events	Markup	Total (\$)
11	OPERATION AND MADERIAN OF								
45	OPERATION AND MAINTENANCE GW Monitoring/Reporting (performed semi-annually)					-			
46 47	GW Monitoring/Reporting (performed semi-annually) GW Sampling (Eviron. Specialist)	\$175.00	/well	15	wells/event	9.1	events		\$220,907
47	Lab Analysis - GW Samples (Metals by SW6010B) + QA/QC		/sample		samples/event			\$19,692.24	\$118,153
49	Lab Analysis - GW Samples (Medias by SW0010B) + QA/QC Lab Analysis - GW Samples (Chlorides by M4500-CL B) +QA/QC		/sample		samples/event			\$3,029.58	\$18,177
48 49 50	Lab Analysis - GW Samples (Chrothest by M1600 CE E) +QA/QC		/sample		samples/event			\$4,544.36	\$27,266
51	Lab Analysis - GW Samples (TPH-D by SW8015B) +QA/QC		/sample		samples/event			\$26,660.26	\$159,962
52	Lab Analysis - GW Samples (Volatiles by SW8260) +QA/QC		/sample		samples/event			\$26,660.26	\$159,962
52 53	Lab Analysis - GW Samples (Radium 226/228) +QA/QC	\$140.00		18	samples/event			\$42,414.05	\$254,484
54	GW Monitoring Report	\$2,500.00	/report	1	report/yr	42	reports		\$105,194
55								Subtotal	\$1,064,105
54 55 56 57 58 59	Treatment System/Recovery Well O&M								
57	RO Membrane Replacement	\$72,576.00					events		\$1,017,937
58	VAC Media Replacement	\$7,776.00			unit/yr		years		\$654,388
59	VQC Media Replacement	\$21,600.00			unit/yr		years		\$1,817,745
60 61	Sulfuric Acid		/gallon		gallons/qtr		Quarters		\$95,801
61	Sodium Hydroxide		/gallon		gallons/qtr		Quarters		\$37,437
62	Sludge Treatment/Disposal/Transportation GrundFos 10 SQE-180NE Pump Replacement (every 5 yrs)	\$3,888.00	/gallon		gallons/qtr units/event		Quarters events		\$141,188 \$490,791
63 64	Energy Consumption (treatment system)		per kWh		kWh/qtr		Quarters		\$2,556,229
65	Personnel (O&M)	\$65.00			hrs/qtr		Quarters		\$2,336,229
66	Materials (replacement)	\$1,500.00			unit/year		years		\$63,116
66 67	Project Management (Sr. Engineer)	\$90.00			hrs/qtr		Quarters		\$787,690
68	Project Management (Gr. Engineer)	\$70.00	7111	32	ins/qu	100	Quarters		\$14,773,410
69	Discharge Monitoring/Reporting								ψ11,770,110
70	Field Preparation, Travel, and Sampling (Environ. Specialist)	\$65.00	/hour	6	hours/QTR	168	Quarters		\$65,641
71 72	Lab Analytical Costs:								
72	Metals	\$85.00	/sample	3	samples/QTR	168	Quarters	\$8,583.80	\$51,503
73 74 75	Chloride	\$25.00	/sample	3	samples/QTR	168	Quarters	\$2,524.65	\$15,148
74	TDS		/sample		samples/QTR			\$1,514.79	\$9,089
75	TSS		/sample		samples/QTR		-	\$1,514.79	\$9,089
76	Oil and Grease		/sample		samples/QTR		` _	\$3,534.50	\$21,207
77	Turbidity		/sample		samples/QTR			\$1,514.79	\$9,089
78	Quaterly DMR Preparation	\$90.00	/hour	4	hours/QTR	168	Quarters	\$12,118.30	\$72,710 \$252,474
79 80	ANNUAL ACTIVITIES					1		Subtotal	\$253,474
81	ANNUAL ACTIVITIES Annual Water Quality Permit/Sanitation Fee	\$1,800.00	/unit	1	unit	42	years	+	\$75,739
82	Remediation System Manufacturer Service and Support	\$1,800.00			hours/year		years		\$75,739 \$29,454
82 83	Remediation System Manufacturer Service and Support	\$70.00	/ IIOui	10	ilouis/year	42	jours	Subtotal	\$105,194
84	OFFSITE DISPOSAL					+		Subtotal	ψ105,174
85	Offsite Disposal - for RO supersaturated discharge water	\$0.01	/gallon	995,215,416	gallons				\$11,942,585
86	Transportation by barge-3000 barrels per trip	\$1.90		23,695,605	10	1	1	i l	\$45,021,650
_				-,,-00				Subtotal	\$56,964,235
87 88 89 90 91 92 93								Subtotal	\$20,70 -1,2 33
80							ĺ	Total Estimate	\$81,966,031
90	 						-	Total Estillate	φ01,700,031
01	10% CONTINGENCY FOR PILOT TESTING, P	TIMP TESTING A	E VOIHEED	AND TREATMEN	T SVSTEM ODTIN	ITATION	RASED ON DESITE	2	\$8,196,603
91	10% CONTINGENCI FOR PILOT TESTING, P	UMI TESTING U	AQUITER	AND INEATIMEN	I SISIEM OF HIN	LIZATION	DASED ON RESULT	3	φο,190,003
92				 		+	Total Fatima	te With Contingency	\$90,162,634
93		1	l	I	1	I	10tai Estima	to the Contingency	φ20,102,034
94									

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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 coverted 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: 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 coverted 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: Wavne Preiean:
          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
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Comment: Wayne Prejean:

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 coverted 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 coverted 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 coverted 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 coverted 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: 185 Comment: Wayne Prejean: Based on 30% of total recovered volume Cell: G86 Comment: Wavne 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

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				ERY WITH ONSITE INJECTION OF WASTEWATER - CHCTS									
_				N PARISH SCHOOL BOARD V LOUISIANA LAND AND EXP	LORATION ET AL	; DOCKET	NO. 82162, D	OIV "D"; 15TH 、	JDC				
_			AKE FIELD										
			RISH, LOUISIANA										
7 P	REP/	RED FO	R TALBOT, CARMOUC	HE, AND MARCELLO									
8													
9													
10	T	ime by Tasi	k		Cost per	Unit	Numb	per of Units	Number of	of Events		Markup	Total (\$)
11													
12	C	APITAL (COSTS										
13	Т	reatment Sy	ystem and Installation										
14			tment System		\$694,310.40	/unit	1	systems	1	event			\$694,310
15		Treatmen	nt system enclosure		\$8,000.00	/unit		units	1	event			\$8,000
16			ank for recovered water		\$9,000.00			units	1	event			\$18,000
17		Spud bar	ge for Treatment System		\$500.00	/day	15,358	days	1	event			\$7,679,131
18												Subtotal	\$8,399,442
19	S	WD Well I											
20			on of SWDW	[Includes 20% Increase for Aged Bid from 2008]	\$1,941,618.00			wells		event			\$3,883,236
21			Oversight		\$90.00			hours		event			\$151,200
22			per diem		\$150.00			days		event			\$21,000
23 24			l Hookup (electrician + labor	ers)	\$350.00			hours		event			\$21,000
24			rical conduit		\$10.50		1000			event			\$10,500
25		LDNR I	njection Permit Application (engineer)	\$90.00	/hour	160	hours]	event			\$14,400
26 27			*** *						_			Subtotal	\$4,101,336
	C		ry Well Installation		Å1 500 00			4.					D1 50/
28			Mobilization/Demobilization		\$1,500.00 \$105.00			unit feet		event			\$1,500 \$94,500
29 30			Recovery well installation (in	<u> </u>				feet		event			1. ,
31			meter installation (for monito os 10 SQE-180NE Pump	ring)	\$4.00 \$3,888.00			units		event			\$3,600 \$58,320
32			overy distribution piping		\$39,347.45			unit		event			\$39,347
33			g (2-man crew)		- ' '	/man hr		man hrs		event			\$32,630
34			Completions (well pad, guard	nosts etc)	\$800	/unit		units		event			\$12,000
35			es (18'"x12")	posts, <i>etc)</i>	\$234	/unit		units		event			\$3,510
36			ll Hookup (electrician + 2 lab	orars)	\$350.00			hours		event			\$84,000
37			Vehicle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70			miles		event			\$1,615
38			Crew Per Diem	position to total in the evine, of mines stop to sucj	\$360.00			davs		event			\$5,400
39	\Box		st Per Diem		\$150.00			days		event			\$2,250
40			velopment (Env. Specialist)		\$65.00			man/hrs		event			\$2,438
41			nental Specialist Per Diem		\$150.00			days		event			\$563
42			tallation Logs (Geologist)		\$95.00	/hour	15	hours	1	event			\$1,425
43			Vell Registration Forms Prep	(geologist/engineer)	\$95.00	/hour	15	hours	1	event			\$1,425
44												Subtotal	\$344,522
45	R		ell Surveying										
46		Personne	el (2-man crew)		\$130.00			hrs		event			\$1,300
47		Equipme			\$50.00			days		event			\$50
48		Survey C	Crew Per Diem		\$300.00	/day	1	days	1	event			\$300
49										1		Subtotal	\$1,650
50	L	PDES Disc								1			
51		LPDES I	Permit Application (engineer)		\$75.00	/hr	80	hrs	1	event			\$6,000
52												Subtotal	\$6,000

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2 T	ABL	E 3-2										
3 (OST	S FOR G	ROUNDWATER RECOV	ERY WITH ONSITE INJECTION OF WASTEWATER - CHC	TS 33-60' TO BACK	GROUND						
4 8	TAT	E OF LOU	ISIANA AND VERMILIO	N PARISH SCHOOL BOARD V LOUISIANA LAND AND EX	(PLORATION ET A	; DOCKET	NO. 82162, D	IV "D"; 15TH JD	C			
5 E	AST	WHITE L	AKE FIELD									
6 V	/ERM	IILION PA	RISH, LOUISIANA									
7 F	REP	ARED FO	R TALBOT, CARMOUC	HE, AND MARCELLO								
8												
9												
10	,	Time by Tas	k		Cost per	Unit	Numl	er of Units	Number o	f Events N	larkup	Total (\$)
11												
53		OPERATIO	ON AND MAINTENANCE									
54	9		ring/Reporting (performed sen	ni-annually)								
55		_	npling (Eviron. Specialist)		\$175.00			wells/event		events		\$220,907
56			llysis - GW Samples (Metals b			/sample		samples/event			0,692.24	\$118,153
57			llysis - GW Samples (Chloride			/sample		samples/event			,029.58	\$18,177
58	+		dysis - GW Samples (TDS by			/sample		samples/event			,544.36	\$27,266
59	+		dysis - GW Samples (TPH-D	• • • •		/sample		samples/event			5,660.26	\$159,962
60 61	++		dysis - GW Samples (Volatile	• • • • • •		/sample /sample		samples/event samples/event			2,414.05	\$159,962 \$254,484
62	+		llysis - GW Samples (Radium nitoring Report	220/220) TQA/QC	\$2,500.00			report/yr		reports \$42	.,+14.03	\$254,484 \$105,194
63	+	G VV IVIO	mornig report		\$2,500.00	лерогі	1	10port yr	42	reports	Subtotal	
64	١,	Treatment S	vstem/Recovery Well O&M								Subtotal	\$1,004,105
65			nbrane Replacement		\$72,576.00	/event			14	events		\$1,017,937
66			edia Replacement		\$7,776.00	/unit	2	unit/yr	42	years		\$654,388
67		VQC M	edia Replacement		\$21,600.00	/unit	2	unit/yr	42	years		\$1,817,745
68		Sulfuric	Acid		\$5.82	/gallon	97.8	gallons/qtr	168			\$95,801
69			Hydroxide		\$6.62	/gallon		gallons/qtr	168	Quarters		\$37,437
70		Sludge 7	Freatment/Disposal/Transporta	ation	\$6.82	/gallon		gallons/qtr	168	Quarters		\$141,188
71			os 10 SQE-180NE Pump Repl		\$3,888.00			units/event		events		\$490,791
72			Consumption (treatment system	m)		per kWh		kWh/qtr		Quarters		\$2,556,229
73			el (O&M)		\$65.00			hrs/qtr		Quarters		\$7,111,086
74		_	s (replacement)		\$1,500.00			unit/year		years		\$63,116
75		Project 1	Management (Sr. Engineer)		\$90.00	/hr	52	hrs/qtr	168	Quarters		\$787,690
76	-	CMAD MA 11 4	2014									\$14,773,410
77 78		SWD Well	Consumption (SWD)		\$0.00	per kWh	72.270	1-XX/1-/	160	Quarters		\$973,100
79			ement Replacement (SWD)		\$1,500.00			kWh/qtr units/qtr		Quarters		\$973,100 \$504,929
80	+		er (acid wash)		\$1,500.00			unit/2yrs/event		events		\$4,207,743
81		WOIKOV	ci (acid wasii)		\$100,000.00	/ unit		unit/2y15/event	21	events	Subtotal	
82		Discharge M	Ionitoring/Reporting									72,002,112
83			eparation, Travel, and Samplin	ng (Environ. Specialist)	\$65.00	/hour	6	hours/QTR	168	Quarters		\$65,641
84			llytical Costs:	-				_				
85			Metals		\$85.00	/sample	3	samples/QTR	168	Quarters \$8	,583.80	\$51,503
86			Chloride			/sample		samples/QTR			,524.65	\$15,148
87	$\perp \perp$		TDS			/sample	3	samples/QTR			,514.79	\$9,089
88	\perp		TSS			/sample		samples/QTR			,514.79	\$9,089
89	+		Oil and Grease			/sample		samples/QTR	168		,534.50	\$21,207
90			Turbidity			/sample		samples/QTR	168		,514.79	\$9,089
91	+	Quaterly	DMR Preparation		\$90.00	/nour	4	hours/QTR	168	Quarters \$12	2,118.30	\$72,710 \$253,474
92 93	+	ANNITIAT	ACTIVITIES								Subtotal	\$253,474
93	+ + +		Water Quality Permit/Sanitation	nn Fee	\$1,800.00	/unit	1	unit	//2	years	1	\$75,739
95	+		ation System Manufacturer Se		\$1,800.00			hours/year		years	 	\$29,454
96		Remedi		- recount Support	φ/0.00	, 11041	10	nours/your	+2	J Caro	Subtotal	
97									1		Subtotal	φ103,174
98	+										Total Estimate	\$34,734,904
99	\dagger											ŢŢ, Ŋ, O, Ŋ, O, T
100		I	1	10% CONTINGENCY FOR PILOT TESTING, P	PUMP TESTING OF A	QUIFER AN	D TREATMEN	T SYSTEM OPTIM	IZATION	BASED ON RESULTS		\$3,473,490
101				,								
102										Total Estimate V	Vith Contingency	\$38,208,395
103												

```
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 coverted to US dollars using current exchange rate of 1 CAD = 0.72
     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 coverted 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:

Cell: Comment:	IS7 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	: I58 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	159 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	Book Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	H61 Wayne Prejean: 3 QA/Qcsamples per event
	G65 Wayne Prejean: based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	K65 Wayne Prejean: based on one event every 3 years
	G66 Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	G67 Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
Cell: Comment:	168 Wayne Prejean: SEE Chemical Dosing worksheet
Cell: Comment:	169 Wayne Prejean: SEE Chemical Dosing worksheet
	G70 Wayne Prejean: Based on Clean Harbors quote 12/9/09
Cell: Comment:	Nayne Prejean: SEE Chemical Dosing worksheet
	G71 Wayne Prejean: Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	172 Wayne Prejean: From Power Consumption worksheet
Cell: Comment:	: I78 : Wayne Prejean: Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

	ВС	D	l F	T =	G	Н	1 .		J	K		М	l N	0	Р
1		נ	 HCTS 33-60' TO E	F		П	'		J	Λ.	L	IVI	IN	0	Р
			VERMILION PAR	ISH SCHO	OL B	OARD V	LOUIS	IANA	LAND AND EXPL	ORATION	ET AL; DOCK	ET NO. 82	162, DIV "D)"; 15TH JD	C
3	EAST WHITE L	AKE FIELD													
4	VERMILION PA	ARISH, LOUISI	ANA												
5	PREPARED FO	R TALBOT, C	ARMOUCHE, AN	D MARCE	LLO										
6		,													
			'												
7	GW RE	COVERY WELI	L SYSTEM												
8		n piping (from wel													
9	Length (ft)	Cost/foot	Total Cost												
10	14,500	\$1.83	\$26,535.00												
11															
12	1.25" pipe (do	ownhole pump disc													
13	Length (ft)	Cost/foot	Total Cost												
14	900	\$0.78	\$702.00												
15															
16	2" pipe (electr														
17	Length (ft)	Cost/foot	Total Cost												
18	12,550	\$0.89	\$11,169.50												
19															
20		iltration gallery)													
21	Quantity	Cost	Total Cost												
22	3	\$250.00	\$750.00												
23	211 . 1 2511														
24		ducer coupling	T + 1 C +				-								
25	Quantity 15	Cost \$2.80	Total Cost \$42.00												
26 27	15	\$2.80	\$42.00												
28	3" T's			1				+				1		-	
29	Ouantity	Cost	Total Cost	1											
30	Qualitity 15	\$5.91	\$88.65	1											
			φοσ.υσ	1				+							
31	90° Elbow (1		T-4-1 C4	1											
32	Quantity	Cost	Total Cost	1											
33 34	15	\$4.02	\$60.30									1		-	
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				
		Unit Rated Power	Duration of Daily	Daily Energy Consumption
	# of Units	<u>(kW)</u>	Operation (hr)	<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

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)
Chloride	27	0.35	1,220,547	13,137,846	928,661,772	1	1000	4312	1.5	1,357,148,016
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

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

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) = $\frac{27}{0.35}$ A = area of plume (ft²) = $\frac{13,137,846}{0.35}$

$$PV (ft^3) = PV (gal) =$$

124,152,643 928,661,772

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

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

 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

4. Time required to achieve cleanup goal

Cleanup time

15,708 days **43** years

						1							
I . I A	ВС	D	E	F	G	Н	ı	J	K	L	М	N	0
1	10150												
	ABLE 3-3												
				WITH OFFSITE DISPOSAL OF WASTEWATER -CHO				L					
				ARISH SCHOOL BOARD V LOUISIANA LAND AND E	XPLORATION ET AL; DO	CKET NO	. 82162, DIV "D"	; 15TH JDC					
	AST WHI												
			SH, LOUISIANA										
7 P	REPARE	D FOR	TALBOT, CARMOUCHE,	AND MARCELLO									
8													
9													
10	Time	by Task			Cost per	Unit	Numbe	r of Units	Number of	of Events		Markup	Total (\$)
11													
12	CAPI	TAL CO	STS										
13	Treatr	ment Syste	em and Installation										
14	+ +		ent System		\$694,310.40	/unit	1	systems	1	event			\$694,310
15	Tı	reatment s	system enclosure		\$8,000.00	/unit	1	units	1	event			\$8,000
16			k for recovered water		\$9,000.00	/unit	ϵ	units	1	event			\$54,000
17			for Treatment System		\$500.00	/day	15,708	days	1	event			\$7,853,866
18			·			•						Subtotal	\$8,610,176
19	GW R	Recovery V	Well Installation										, , , , , ,
20	D:	rill Rig M	lobilization/Demobilization		\$1,500.00	/unit	1	unit	1	event			\$1,500
21	4"	" PVC Red	covery well installation (include	s labor & materials)	\$105.00	/foot	720	feet	1	event			\$75,600
22	1"	" Piezome	ter installation (for monitoring)	,	\$4.00	/foot	720	feet	1	event			\$2,880
22 23	G	rundFos 1	10 SQE-180NE Pump		\$3,888.00	/unit	12	units	1	events			\$46,656
24	G	W recove	ry distribution piping		\$33,194.86	/unit	1	unit	1	event			\$33,195
25	Pl	lumbing (2-man crew)		\$130.00	/man hr	199	man hrs	1	event			\$25,870
26	St	urface Co	mpletions (well pad, guard post	s, etc)	\$800	/unit	12	units	1	event			\$9,600
27	M	Ianholes (18"'x12")		\$234	/unit	12	units	1	event			\$2,808
28	El	lectrical H	Iookup (electrician + 2 laborers))	\$350.00	/hour	240	hours	1	event			\$84,000
29			hicle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70	/mile	950	miles	1	event			\$1,615
30			ew Per Diem	. , ,	\$360.00	/day		days	1	event			\$4,320
31	G	eologist P	Per Diem		\$150.00	/day	12	days	1	event			\$1,800
32	W	Vell Devel	opment (Env. Specialist)		\$65.00	/hr	30	man/hrs	1	event			\$1,950
33	Eı	nvironme	ntal Specialist Per Diem		\$150.00	/day	3	days	1	event			\$450
34			lation Logs (Geologist)		\$95.00	/hour	12	hours	1	event			\$1,140
35	LI	DNR Wel	l Registration Forms Prep (geol	ogist/engineer)	\$95.00	/hour	12	hours	1	event			\$1,140
36												Subtotal	\$294,524
37	Recov	very Well	Surveying										
38	Pe	ersonnel (2-man crew)		\$130.00	/hr	10	hrs	1	event			\$1,300
39	Ec	quipment			\$50.00	/day	1	days	1	event			\$50
40	Su	urvey Cre	w Per Diem		\$300.00	/day	1	days	1	event			\$300
41												Subtotal	\$1,650
42	LPDE	ES Dischar	rge										
43	LI	PDES Per	mit Application (engineer)		\$75.00	/hr	80	hrs	1	event			\$6,000
44												Subtotal	\$6,000

	ABC	D	E	1	F	G	Н	1 1	ı.	K	L M	N	0
1	7. 5 6				•	, ,			, ,				
2	TABLE 3-3	3											
3	COSTS FC	OR GRO	UNDWATER RECOVERY	WITH OFFSITE DI	SPOSAL OF WASTEWATER -CHCTS 33-6	0' TO DRINKING	WATER S	TANDARD					
4	STATE OF	LOUIS	IANA AND VERMILION P	PARISH SCHOOL BO	OARD V LOUISIANA LAND AND EXPLORA	TION ET AL; DO	CKET NO	. 82162, DIV "D";	15TH JDC				
5	EAST WHI	ITE LA	(E FIELD										
			SH, LOUISIANA										
7	PREPARE	D FOR	TALBOT, CARMOUCHE,	AND MARCELLO									
8													
9													
10	Time	by Task				Cost per	Unit	Number	r of Units	Number of	of Events	Markup	Total (\$)
11													
45			AND MAINTENANCE										
46 47			g/Reporting (performed semi-an	nnually)		0.55.00				0.1			0100.515
47			ling (Eviron. Specialist)	TICOLOR) O A /OC		\$175.00			wells/event		events	16.702.60	\$180,747
48			sis - GW Samples (Metals by SV sis - GW Samples (Chlorides by				/sample /sample		samples/event samples/event	_		16,783.60 \$2,582.09	\$100,702 \$15,493
48 49 50 51			sis - GW Samples (Chlorides by Sis - GW Samples (TDS by SM2				/sample		samples/event			\$3,873.14	\$23,239
51			sis - GW Samples (TPH-D by S				/sample		samples/event			22,722.42	\$136,335
52			sis - GW Samples (Volatiles by				/sample		samples/event			22,722.42	\$136,335
53			sis - GW Samples (Radium 226)			\$140.00			samples/event			36,149.30	\$216,896
52 53 54			oring Report			\$2,500.00			report/yr		reports		\$107,587
55												Subtotal	\$917,332
55 56 57			em/Recovery Well O&M										
57			rane Replacement			\$72,576.00					events		\$1,041,100
58			a Replacement			\$7,776.00			unit/yr		years		\$669,278
58 59 60			a Replacement			\$21,600.00			unit/yr		years		\$1,859,107
60		ulfuric Ac					/gallon		gallons/qtr gallons/qtr		Quarters Ouarters		\$97,981 \$38,289
61			atment/Disposal/Transportation				/gallon /gallon		gallons/qtr gallons/qtr		Quarters Quarters		\$38,289 \$144,401
62 63			10 SQE-180NE Pump Replacen			\$3,888.00			units/event		events		\$401,567
64			nsumption (treatment system)	nent (every 5 yrs)		. ,	per kWh		kWh/qtr		Quarters		\$2,492,252
64 65 66		ersonnel				\$65.00			hrs/qtr		Quarters		\$7,272,895
66			replacement)			\$1,500.00			unit/year		years		\$64,552
67			nagement (Sr. Engineer)			\$90.00			hrs/qtr		Quarters		\$805,613
68		,											\$14,887,035
69	Disch	arge Mor	nitoring/Reporting										
69 70	Fi	ield Prepa	aration, Travel, and Sampling (E	Environ. Specialist)		\$65.00	/hour	6	hours/QTR	172	Quarters		\$67,134
71	Li		tical Costs:										
72			Metals				/sample		samples/QTR			88,779.12	\$52,675
73			Chloride				/sample		samples/QTR			\$2,582.09	\$15,493
71 72 73 74 75			TDS				/sample		samples/QTR			\$1,549.26	\$9,296
75			TSS Oil and Grease				/sample /sample		samples/QTR samples/QTR			\$1,549.26 \$3,614.93	\$9,296 \$21,690
77			Turbidity				/sample /sample		samples/QTR			\$3,614.93 \$1,549.26	\$21,690 \$9,296
76 77 78	0		MR Preparation			\$90.00			hours/QTR			12,394.05	\$74,364
79		aucity D	reputation			\$70.00	, 11041	-		1/2	- Quarters p	Subtotal	\$259,242
80	ANNU	UAL AC	TIVITIES							1			,
81			nter Quality Permit/Sanitation Fe	ee		\$1,800.00	/unit	1	unit	43	years		\$77,463
82 83	Re	emediatio	on System Manufacturer Service	e and Support		\$70.00	/hour	10	hours/year	43	years		\$30,124
83												Subtotal	\$107,587
84			SPOSAL										
84 85 86			posal - for RO supersaturated di			•	/gallon	814,288,810				Ι Τ	\$9,771,466
86	Т	Transport	ation by barge-3000 barrels per	trip		\$1.90	/bbl	19,387,829	bbls				<u>\$36,836,875</u>
87												Subtotal	\$46,608,340
88	1										1		
89												Total Estimate	\$71,691,887
90	Ш,												
91					10% CONTINGENCY FOR PILOT TESTING, P	UMP TESTING O	F AQUIFER	AND TREATMEN	T SYSTEM OPTIN	IIZATION	BASED ON RESULTS	5	\$7,169,189
92													
93											Total Estimat	e With Contingency	\$78,861,076
94	T .												

```
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 coverted 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: 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 coverted 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: Wavne Preiean:
          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:

C	Cell:	151
Comme		Wayne Prejean:
		3 QA/Qcsamples per event
_		
	Cell:	
JOHIIII		Wayne Prejean: 3 QA/Qcsamples per event
		s davidesamples per event
_	Cell:	153
		Wayne Prejean:
Johnne		wayne i tojeani. 3 gA/Qcsamples per event
		o de recourripeo por overit
C	Cell:	G57
		Wayne Prejean:
		based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
C	Cell:	K57
Comme	ent:	Wayne Prejean:
		based on one event every 3 years
_		
		G58
Jomme		Wayne Prejean:
		Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
_	Soll.	G59
		Wayne Prejean:
JUITIN		wayire riejeani. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
		includes 20% increase to account for aged bid (2000). Cost in Gariadian dollars covered to 60 dollars doing current excitange rate of 10x0 = 0.72 000
(Cell:	160
		Wayne Prejean:
		SEÉ Chemical Dosing worksheet
		·
C	Cell:	K60
Comme	ent:	Wayne Prejean:
		Based on 7 year cleanup
_		
	Cell:	
Jomme		Wayne Prejean:
		SEE Chemical Dosing worksheet
_	Cell:	K61
		Wayne Prejean:
		Based on 7 year cleanup
C	Cell:	G62
Comme	ent:	Wayne Prejean:
		Based on Clean Harbors quote 12/9/09
	Cell:	
Comme		Wayne Prejean:
		SEE Chemical Dosing worksheet
_		Ven
		K62
ornme		Wayne Prejean:
		Based on 7 year cleanup
_	elle:	G63
		Wayne Prejean:
		Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
C	Cell:	164
		Wayne Prejean:
		From Power Consumption worksheet
	Cell:	
Comme		Wayne Prejean:
		Based on 7 year cleanup
C	:ell:	K65 Wayne Prejean:

Cell: K67

Comment: Wayne Prejean: Based on 7 year cleanup Cell: K70 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K72 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K73 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K74 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K75 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K76 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K77 Comment: Wayne Prejean: Based on 7 year cleanup Cell: K78 Comment: Wayne Prejean: Based on 7 year cleanup 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

А	ВС	D	Е	F	G	Н	I	J	K	L	М	N	0
1													
	BLE	-											
				ERY WITH ONSITE INJECTION OF WASTEWATER - CH									
				N PARISH SCHOOL BOARD V LOUISIANA LAND AND	EXPLORATION ET AL	; DOCKET	NO. 82162, D	IV "D"; 15TH .	JDC				
_			KE FIELD										
			RISH, LOUISIANA										
7 PI	REPA	RED FO	R TALBOT, CARMOUC	HE, AND MARCELLO									
8													
9													
10	Ti	me by Tasl	(Cost per	Unit	Numb	per of Units	Number of	of Events		Markup	Total (\$)
11													
12	C	APITAL C	COSTS										
13	Tr	eatment Sy	stem and Installation										
14			ment System		\$694,310.40	/unit	1	systems	1	event			\$694,310
15		Treatmer	t system enclosure		\$8,000.00	/unit		units	1	event			\$8,000
16		Storage t	ank for recovered water		\$9,000.00	/unit	2	units	1	event			\$18,000
17		Spud bar	ge for Treatment System		\$500.00	/day	15,708	days	1	event			\$7,853,866
18												Subtotal	\$8,574,176
19	SV	VD Well In											
20		Installation	on of SWDW	[Includes 20% Increase for Aged Bid from 2008]	\$1,941,618.00	/well	2	wells]	event			\$3,883,236
21		Engineer	Oversight		\$90.00			hours		event			\$151,200
22			per diem		\$150.00			days		event			\$21,000
23 24			Hookup (electrician + labor	ers)	\$350.00			hours		event			\$21,000
24			ical conduit		\$10.50		1000			event			\$10,500
25		LDNR Ir	jection Permit Application (e	engineer)	\$90.00	/hour	160	hours	1	event			\$14,400
26 27												Subtotal	\$4,101,336
	G\		y Well Installation		** ***								A. 70/
28		U	Mobilization/Demobilization		\$1,500.00			unit		event			\$1,500
29 30			Recovery well installation (in	· · · · · · · · · · · · · · · · · · ·	\$105.00			feet		event			\$75,600
30			meter installation (for monito	ring)	\$4.00 \$3,888.00			feet units		event			\$2,880 \$46,656
31 32			s 10 SQE-180NE Pump very distribution piping		\$3,888.00			units		events			\$46,656
33		_	(2-man crew)		\$130.00			man hrs		event			\$25,870
34			(2-man crew) Completions (well pad, guard	nosts etc)	\$800	/unit		units		event			\$9,600
35			s (18"'x12")	posts, etc)	\$234	/unit		units		event			\$2,808
36			Hookup (electrician + 2 lab	OPORC)	\$350.00			hours		event			\$84,000
37			Vehicle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70			miles		event	-		\$1,615
38	\vdash		Crew Per Diem	[Somies to note in Abbeville, 65 miles shop-to-she]	\$360.00			davs		event		+	\$4,320
39			t Per Diem		\$150.00			days		event			\$1,800
40			velopment (Env. Specialist)		\$65.00			man/hrs		event		1	\$1,950
40			nental Specialist Per Diem		\$150.00			days		event			\$450
42			allation Logs (Geologist)		\$95.00			hours		event			\$1,140
43			ell Registration Forms Prep	(geologist/engineer)	\$95.00			hours		event			\$1,140
44												Subtotal	
45	Re	covery We	ell Surveying										
46		Personne	l (2-man crew)		\$130.00			hrs	1	event			\$1,300
47		Equipme			\$50.00			days	1	event			\$50
48		Survey C	rew Per Diem		\$300.00	/day	1	days	1	event			\$300
49												Subtotal	\$1,650
50	LF	DES Discl											
51		LPDES I	Permit Application (engineer)		\$75.00	/hr	80	hrs	1	event			\$6,000
52												Subtotal	\$6,000

\Box	ΑВ	С	E	Ī F	G	Н	1 1		К	L M	N	0
1				·				ŭ	IX.			Ü
2	ГАВІ	E 3-2										
3 (cos	TS FOR	GROUNDWATER RECOV	YERY WITH ONSITE INJECTION OF WASTEWATER - (CHCTS 33-60' TO DRIN	KING WAT	TER STANDAR	D				
4 \$	STAT	E OF L	OUISIANA AND VERMILIC	ON PARISH SCHOOL BOARD V LOUISIANA LAND AN	D EXPLORATION ET A	; DOCKE	T NO. 82162, D	IV "D"; 15TH JE	C			
5	EAST	T WHITE	LAKE FIELD									
6	/ERI	MILION	PARISH, LOUISIANA									
7	PREF	PARED	FOR TALBOT, CARMOUC	HE, AND MARCELLO								
8												
9												
10		Time by	Task		Cost per	Unit	Numb	er of Units	Number o	f Events N	larkup	Total (\$)
11												
53		OPERA	TION AND MAINTENANCE									
54			nitoring/Reporting (performed se	mi-annually)								
55			Sampling (Eviron. Specialist)		\$175.00			wells/event		events		\$180,747
56			Analysis - GW Samples (Metals			/sample		samples/event			5,783.60	\$100,702
57	-		Analysis - GW Samples (Chlorid			/sample		samples/event			,582.09	\$15,493
58	-		Analysis - GW Samples (TDS by			/sample		samples/event			,873.14	\$23,239
59	+		Analysis - GW Samples (TPH-D	• • • • • • • • • • • • • • • • • • • •		/sample		samples/event			2,722.42	\$136,335
60 61	-	_	Analysis - GW Samples (Volatile			/sample		samples/event samples/event			2,722.42 5,149.30	\$136,335 \$216,896
62	+		Analysis - GW Samples (Radium Monitoring Report	1 220/220) †QM/QC	\$2,500.00			report/yr		reports \$30	J,1+7.3U	\$216,896 \$107,587
63	+	UW	riomornig report		\$2,500.00	лероп	1	report yr	+3	геропа	Subtotal	
64		Treatme	nt System/Recovery Well O&M								Subtotal	ψ>11,532
65			Membrane Replacement		\$72,576.00	/event			14	events		\$1,041,100
66		-	Media Replacement		\$7,776.00		2	unit/yr		years		\$669,278
67		VQC	Media Replacement		\$21,600.00	/unit	2	unit/yr	43	years		\$1,859,107
68		Sulf	ric Acid		\$5.82	/gallon	97.8	gallons/qtr	172	Quarters		\$97,981
69			ım Hydroxide		\$6.62	/gallon		gallons/qtr		Quarters		\$38,289
70			ge Treatment/Disposal/Transport			/gallon		gallons/qtr	172	Quarters		\$144,401
71			dFos 10 SQE-180NE Pump Rep		\$3,888.00			units/event		events		\$401,567
72			gy Consumption (treatment syste	em)		per kWh		kWh/qtr		Quarters		\$2,492,252
73			onnel (O&M)		\$65.00			hrs/qtr		Quarters		\$7,272,895
74			rials (replacement)		\$1,500.00			unit/year		years		\$64,552
75	-	Proj	ect Management (Sr. Engineer)		\$90.00	/hr	52	hrs/qtr	172	Quarters		\$805,613
76	-	CMD M	11.0034									\$14,887,035
77 78	-		ell O&M gy Consumption (SWD)		\$0.00	per kWh	72.270	kWh/qtr	172	Quarters		\$995,242
79			r Element Replacement (SWD)		\$1,500.00			units/qtr		Quarters		\$516,419
80			(over (acid wash)		\$1,500.00			unit/2yrs/event		events		\$4,303,488
81		1101	deld wash)		\$100,000.00	/ unit		unit/2yis/event		events	Subtotal	
82		Dischars	e Monitoring/Reporting									40,000,00
83			Preparation, Travel, and Sampli	ing (Environ. Specialist)	\$65.00	/hour	6	hours/QTR	172	Quarters		\$67,134
84			Analytical Costs:					-				
85			Metals		\$85.00	/sample	3	samples/QTR	172	Quarters \$8	,779.12	\$52,675
86			Chloride			/sample		samples/QTR		` .	,582.09	\$15,493
87		\Box	TDS			/sample		samples/QTR			,549.26	\$9,296
88		\vdash	TSS			/sample		samples/QTR			,549.26	\$9,296
89	-		Oil and Grease			/sample		samples/QTR			,614.93	\$21,690
90	-	\Box	Turbidity			/sample		samples/QTR			,549.26	\$9,296
91	+	Qua	erly DMR Preparation		\$90.00	/hour	4	hours/QTR	172	Quarters \$12	2,394.05	\$74,364 \$250,242
92	+	A NINIT 7 A	L ACTIVITIES								Subtotal	\$259,242
93	+		L ACTIVITIES ual Water Quality Permit/Sanitati	ion Fee	\$1,800.00	/unit	1	unit	//2	years	1	\$77,463
95	+		ediation System Manufacturer Se		\$70.00			hours/year		years	 	\$30,124
96		I I I			φ70.00	1	10	and your	1,43	J - 245	Subtotal	
97											Subtotal	Ψ107,507
98											Total Estimate	\$34,964,031
99												, . , . ,
100		Γ΄	*	10% CONTINGENCY FOR PILOT TESTIN	NG, PUMP TESTING OF A	QUIFER A	ND TREATMEN	T SYSTEM OPTIN	MIZATION	BASED ON RESULTS		\$3,496,403
101												
102										Total Estimate V	Vith Contingency	\$38,460,434
103												

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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 coverted to US dollars using current exchange rate of 1 CAD = 0.72
     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 coverted 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
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Comment: Wayne Prejean:

Cell: Comment:	IS7 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	: I58 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	159 Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	Book Wayne Prejean: 3 QA/Qcsamples per event
Cell: Comment:	H61 Wayne Prejean: 3 QA/Qcsamples per event
	G65 Wayne Prejean: based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	K65 Wayne Prejean: based on one event every 3 years
	G66 Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	G67 Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
Cell: Comment:	168 Wayne Prejean: SEE Chemical Dosing worksheet
Cell: Comment:	169 Wayne Prejean: SEE Chemical Dosing worksheet
	G70 Wayne Prejean: Based on Clean Harbors quote 12/9/09
Cell: Comment:	Nayne Prejean: SEE Chemical Dosing worksheet
	G71 Wayne Prejean: Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
	172 Wayne Prejean: From Power Consumption worksheet
Cell: Comment:	: I78 : Wayne Prejean: Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

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			VERMILION PARI	ISH SCHO	OL B	OARD V	LOUISIA	NA LAND	AND EXPL	LORATION	ET AL; DOC	KET NO. 82	162, DIV "D)"; 15TH JD	C
3	EAST WHITE L	AKE FIELD													
4	VERMILION PA	RISH, LOUISI	ANA												
5	PREPARED FO	R TALBOT, C	ARMOUCHE, AN	D MARCE	LLO										
6		•													
	•		'												
7	GW RE	COVERY WELI	L SYSTEM												
8		n piping (from wel													
9	Length (ft)	Cost/foot	Total Cost												
10	12,500	\$1.83	\$22,875.00												
11															
12		wnhole pump dise													
13	Length (ft)	Cost/foot	Total Cost												
14	720	\$0.78	\$561.60												
15															
16	2" pipe (electr														
17	Length (ft)	Cost/foot	Total Cost												
18	9,950	\$0.89	\$8,855.50												
19															
20		iltration gallery)	m 10	<u> </u>											
21	Quantity	Cost	Total Cost												
22	3	\$250.00	\$750.00												
23 24	2" to 1 25" may	ducer coupling													
25	Quantity	Cost	Total Cost		+										
26	Quality 12	\$2.80	\$33.60												
27	12	\$2.00	\$55.00									+			
28	3" T's														
29	Quantity	Cost	Total Cost												
30	12	\$5.91	\$70.92												
31	90° Elbow (1		7.00												
32	Ouantity Ouantity	Cost	Total Cost		+										
33	12	\$4.02	\$48.24												
34	12	ψτ.υ2	ψτυ.2-τ												
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				
		Unit Rated Power	Duration of Daily	Daily Energy Consumption
	# of Units	<u>(kW)</u>	Operation (hr)	(kWh/d)
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
Miscellaneous				<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

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) = $\frac{35}{0.35}$ A = area of plume (ft²) = $\frac{28,399,194}{0.35}$

 $PV (ft^3) = PV (gal) =$

347,890,125 2,602,218,137

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

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

 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

4. Time required to achieve cleanup goal

Cleanup time

6,438 days **18** vears

. /	А В С	D	E	F	G	Н	I	J	K	L	M	N	0
1													
	ABLE 3	-											
				WITH OFFSITE DISPOSAL OF WASTEWATER - CH									
				ARISH SCHOOL BOARD V LOUISIANA LAND AND E	EXPLORATION ET AL; DO	CKET NO	. 82162, DIV "D";	15TH JDC					
	_		KE FIELD										
			RISH, LOUISIANA										
7 F	REPAR	ED FOR	TALBOT, CARMOUCHE,	AND MARCELLO									
8													
9													
10	Tin	ne by Task			Cost per	Unit	Number	of Units	Number of	of Events		Markup	Total (\$)
11													
12	CA	PITAL C	OSTS										
13	Tre	atment Sv	stem and Installation										
14			ment System		\$694,310.40	/unit	1	systems	1	event			\$694,310
15			t system enclosure		\$8,000,00			units		event			\$8,000
16			nk for recovered water		\$9,000.00			units		event			\$90,000
17			ge for Treatment System		\$500.00		6,438			event			\$3,218,833
18		1					.,					Subtotal	\$4,011,144
19	GW	/ Recovery	Well Installation									Subtotui	ψ.,011,1
20	_		Mobilization/Demobilization		\$1,500.00	/unit	1	unit	1	event			\$1,500
21		U	ecovery well installation (include	s labor & materials)	\$105.00			feet		event			\$59,850
22			neter installation (for monitoring)		\$4.00			feet	1	event			\$2,280
23			10 SQE-180NE Pump		\$3,888.00			units		events			\$23,328
24			very distribution piping		\$38,975.48			unit		event			\$38,975
25			(2-man crew)		\$130.00			man hrs		event			\$32,630
26		U	completions (well pad, guard post	s. etc)		/unit		units		event			\$4,800
27	-		(18"'x12")	,,,	\$234			units	_	event			\$1,404
28	-		Hookup (electrician + 2 laborers)		\$350.00			hours		event			\$56,000
29			/ehicle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70			miles		event			\$697
30			Crew Per Diem	to meet in the evine, so miles shop to she	\$360.00			days		event			\$2,160
31			Per Diem		\$150.00			days		event			\$900
32			elopment (Env. Specialist)		\$65.00			man/hrs		event			\$975
33			ental Specialist Per Diem		\$150.00			days		event			\$225
34			allation Logs (Geologist)		\$95.00	,		hours		event			\$570
35			ell Registration Forms Prep (geol	ogist/engineer)	\$95.00			hours		event			\$570
36			le de la constant de		4,5.00				-	1		Subtotal	\$226,864
37	Rec	covery We	ll Surveying							1			
38			(2-man crew)		\$130.00	/hr	10	hrs	1	event			\$1,300
39		Equipmen			\$50.00			days	_	event			\$50
40			rew Per Diem		\$300.00	,		days	1	event			\$300
41					,,,,,,,,,			,				Subtotal	\$1,650
42	LPI	DES Disch	arge										
43			ermit Application (engineer)		\$75.00	/hr	80	hrs	1	event			\$6,000
44			[F]		475.00					1		Subtotal	\$6,000
	' ' '										•		,

	A B C D E F	G	Н	1	J	К	L M	N	0
1									
	COSTS FOR GROUNDWATER RECOVERY WITH OFFSITE DISPOSAL OF WASTEWATER - C								
	STATE OF LOUISIANA AND VERMILION PARISH SCHOOL BOARD V LOUISIANA LAND AND	EXPLORATION ET AL; DO	OCKET NO	D. 82162, DIV "D"	; 15TH JDC				
7	PREPARED FOR TALBOT, CARMOUCHE, AND MARCELLO								
9									
10		Cost per l	Init	Numbo	r of Units	Number o	of Events	Markup	Total (\$)
11		Cost per	Jiii	Numbe	I of Clits	Tvuilloci (of Events	Warkup	Total (\$)
45									
46									
47	GW Sampling (Eviron. Specialist)	\$175.00	/well	6	wells/event	35	events		\$37,039
48	Lab Analysis - GW Samples (Metals by SW6010B) + OA/OC	\$65.00	/sample	9	samples/event			\$4,127.16	\$24,763
49 50	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		/sample		samples/event		events	\$952.42	\$5,715
51	Lab Analysis - GW Samples (TPH-D by SW8015B) +QA/QC		/sample		samples/event			\$5,587.54	\$33,525
52 53	Lab Analysis - GW Samples (Volatiles by SW8260) +QA/QC		/sample		samples/event			\$5,587.54	\$33,525
53 E4	Lab Analysis - GW Samples (Radium 226/228) +QA/QC GW Monitoring Report	\$140.00 \$2,500.00			samples/event report/yr		s events reports	\$8,889.27	\$53,336 \$44,094
55	GW Monitoring Report	\$2,300.00	лероп	1	report/yr	10	reports	Subtotal	\$235,806
54 55 56 57 58 59	Treatment System/Recovery Well O&M			+				Subtotal	φ233,600
57	RO Membrane Replacement	\$72,576.00	/event			6	events		\$426,685
58	VAC Media Replacement	\$7,776.00		2	unit/yr		years years		\$274,298
59	VQC Media Replacement	\$21,600.00	/unit	2	unit/yr	18	years years		\$761,938
60 61	Sulfuric Acid		/gallon	97.8	gallons/qtr		Quarters		\$40,157
61	Sodium Hydroxide		/gallon		gallons/qtr		Quarters		\$15,693
62	Sludge Treatment/Disposal/Transportation		/gallon		gallons/qtr		Quarters		\$59,181
63 64	GrundFos 10 SQE-180NE Pump Replacement (every 5 yrs)	\$3,888.00			units/event		events		\$82,289
64	Energy Consumption (treatment system)		per kWh		kWh/qtr		Quarters		\$1,071,485
65	Personnel (O&M)	\$65.00 \$1,500.00			hrs/qtr unit/year		Quarters years		\$2,980,728
66 67	Materials (replacement) Project Management (Sr. Engineer)	\$1,500.00			hrs/qtr		Quarters		\$26,456 \$330,173
68	Project Management (St. Engineer)	\$90.00	/111	32	liis/qu	71	Quarters		\$6,069,082
69	Discharge Monitoring/Reporting								ψ0,002,002
70	Field Preparation, Travel, and Sampling (Environ. Specialist)	\$65.00	/hour	6	hours/QTR	71	Quarters		\$27,514
71 72	Lab Analytical Costs:								
72	Metals Metals	\$85.00	/sample	3	samples/QTR			\$3,598.04	\$21,588
73	Chloride		/sample		samples/QTR			\$1,058.25	\$6,349
73 74 75	TDS		/sample		samples/QTR		Quarters	\$634.95	\$3,810
75	TSS		/sample		samples/QTR		Quarters	\$634.95	\$3,810
76 77	Oil and Grease		/sample		samples/QTR		Quarters Quarters	\$1,481.55	\$8,889
78	Turbidity Quaterly DMR Preparation	\$15.00	/sample		samples/QTR hours/QTR			\$634.95 \$5,079.58	\$3,810 \$30,478
79	Quantity Differ Topiatation	\$70.00	,	+		/1	- Zamiois	Subtotal	\$106,248
80	ANNUAL ACTIVITIES								, 10
81	Annual Water Quality Permit/Sanitation Fee	\$1,800.00	/unit	1	unit	18	years years		\$31,747
82 83	Remediation System Manufacturer Service and Support	\$70.00	/hour	10	hours/year	18	years		\$12,346
83								Subtotal	\$44,094
84	OFFSITE DISPOSAL								
85	Offsite Disposal - for RO supersaturated discharge water		/gallon	834,321,626	1-	1			\$10,011,860
86		\$1.90	/bbl	19,864,801	bbls				\$37,743,121
87	4							Subtotal	\$47,754,981
87 88 89 90 91 92 93	4 ,						1	1	
89	94							Total Estimate	\$58,455,868
90									
91	10% CONTINGENCY FOR PILOT T	TESTING, PUMP TESTING O	F AQUIFEI	R AND TREATMEN	T SYSTEM OPTI	MIZATION	BASED ON RESULTS	S	\$5,845,587
92	<u> </u>			+			1 1	1	
				1	1	1	Total Estima	te With Contingency	\$64,301,455
94	!								

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 coverted 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 coverted 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: I52

Cell: I51 Comment: Wayne Prejean:

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 coverted 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 coverted 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 coverted 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 coverted 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: 185 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

1 A					_								
	ВС	D	E	F	G	Н		J	K	L	М	N	0
	BLE 3		OUNDWATER RESOLU	EDVINITU ONOITE IN IEOTION OF WASTEWATER OUT	0 00 001 TO DAO!								
				ERY WITH ONSITE INJECTION OF WASTEWATER - CHCT				N/ "D" 45TH 15					
				N PARISH SCHOOL BOARD V LOUISIANA LAND AND EXF	LORATION ET AL	.; DOCKET	NO. 82162, L) V "D"; 15 H JL)(
	_		KE FIELD										
			RISH, LOUISIANA	UE AND MARGELLO									
	EPAF	ED FOI	R TALBOT, CARMOUCH	HE, AND MARCELLO									
8													
9	m:	1 75 1				<u> </u>	.,	CYY	27 1	C.F.			m . 1 (d)
10	Tin	ne by Tasl	(Cost per	Unit	Numt	per of Units	Number o	f Events	1	Markup	Total (\$)
11													
12		PITAL C											
13	_		stem and Installation										
14			ment System		\$694,310.40			systems		event			\$694,310
15	-		t system enclosure		\$8,000.00			units	_	event			\$8,000
16		· ·	ank for recovered water		\$9,000.00 \$500.00			units		event			\$18,000
17		spua bar	ge for Treatment System		\$500.00	/uay	6,438	uays	1	event		6.14 ()	\$3,218,833
18 19	CIV	D W-11 1	stallation									Subtotal	\$3,939,144
20			on of SWDW	[Includes 20% Increase for Aged Bid from 2008]	\$1,941,618.00	/rr:a11	,	wells	1	event			\$3,883,236
21			Oversight	[Includes 20% increase for Agea Bia from 2008]	\$90.00			hours		event			\$151,200
22			per diem		\$150.00			davs	_	event			\$21,000
23			Hookup (electrician + labore	ers)	\$350.00	-		hours		event			\$21,000
24			ical conduit			/foot	1000			event			\$10,500
25			jection Permit Application (e	ngineer)	\$90.00			hours		event			\$14,400
26			J 11									Subtotal	\$4,101,336
27	GW	Recover	y Well Installation										
28		Drill Rig	Mobilization/Demobilization		\$1,500.00	/unit	1	unit	1	event			\$1,500
29			Recovery well installation (inc	· · · · · · · · · · · · · · · · · · ·	\$105.00			feet		event			\$59,850
30			meter installation (for monitor	ring)	\$4.00			feet		event			\$2,280
31			s 10 SQE-180NE Pump		\$3,888.00			units		events			\$23,328
32 33			very distribution piping		\$38,975.48			unit	_	event			\$38,975
33			g (2-man crew)			/man hr		man hrs		event			\$32,630
34			Completions (well pad, guard	posts, etc)	\$800	/unit		units		event			\$4,800
35			s (18""x12")			/unit		units		event			\$1,404
36			Hookup (electrician + 2 labo		\$350.00			hours		event	-		\$56,000
37	-		Vehicle Mileage	[30miles to hotel in Abbeville; 85 miles shop-to-site]	\$1.70			miles days		event		+	\$697 \$2,160
38 39	+		Crew Per Diem t Per Diem		\$360.00 \$150.00			days		event	-		\$2,160 \$900
40			velopment (Env. Specialist)		\$65.00			man/hrs		event			\$900
41			nental Specialist Per Diem		\$150.00			days		event			\$225
42			allation Logs (Geologist)		\$95.00	-		hours		event			\$570
43			Vell Registration Forms Prep ((geologist/engineer)	\$95.00			hours		event			\$570
44					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							Subtotal	\$226,864
45	Rec	overy We	ell Surveying										. ,
46		Personne	l (2-man crew)		\$130.00		10	hrs	1	event			\$1,300
47		Equipme	nt		\$50.00			days	1	event			\$50
48		Survey C	rew Per Diem		\$300.00	/day	1	days	1	event			<u>\$300</u>
49												Subtotal	\$1,650
50	LPI	DES Discl											
51		LPDES F	Permit Application (engineer)		\$75.00	/hr	80	hrs	1	event			\$6,000
52												Subtotal	\$6,000

Δ	ВО	C D	E	F	G	Н	T 1	.1	К	L M	N	0
1				'						L		Ŭ
2 T	ABLE	3-2										
3 C	osts	FOR GF	OUNDWATER RECOV	ERY WITH ONSITE INJECTION OF WASTEWATER - CH	CTS 60-90' TO BACK	GROUND						
4 S	TATE	OF LOU	ISIANA AND VERMILIO	N PARISH SCHOOL BOARD V LOUISIANA LAND AND E	XPLORATION ET AI	; DOCKET	Г NO. 82162, D	IV "D"; 15TH JD	С			
5 E	AST V	WHITE LA	AKE FIELD									
6 V	ERMI	LION PA	RISH, LOUISIANA									
7 P	REPA	RED FO	R TALBOT, CARMOUC	HE, AND MARCELLO								
8												
9												
10	Ti	ime by Tas	k		Cost per	Unit	Numb	er of Units	Number o	f Events N	larkup	Total (\$)
11												
53	О	PERATIC	ON AND MAINTENANCE									
54	G	W Monitor	ring/Reporting (performed sen	ni-annually)								
55		GW San	npling (Eviron. Specialist)		\$175.00	/well		wells/event		events		\$37,039
56			lysis - GW Samples (Metals b			/sample		samples/event			,127.16	\$24,763
57				es by M4500-CL B) +QA/QC		/sample		samples/event			534.95	\$3,810
58			lysis - GW Samples (TDS by			/sample		samples/event			952.42	\$5,715
59			lysis - GW Samples (TPH-D	• • • • • • • • • • • • • • • • • • • •		/sample		samples/event			,587.54	\$33,525
60	\vdash		lysis - GW Samples (Volatile			/sample		samples/event			,587.54	\$33,525
61			lysis - GW Samples (Radium	226/228) +QA/QC		/sample		samples/event			,889.27	\$53,336
62		GW Mo	nitoring Report		\$2,500.00	/report	1	report/yr	18	reports	6.14.4.1	\$44,094
63 64	-	mantm t C	ystem/Recovery Well O&M				1				Subtotal	\$235,806
65	$ - ^{1}$		hbrane Replacement		\$72,576.00	/event	+			events	-	\$426,685
66			edia Replacement		\$7,776.00		2	unit/yr		years	+	\$274,298
67		_	edia Replacement		\$21,600.00			unit/yr		years		\$761,938
68		Sulfuric				/gallon		gallons/qtr		Quarters		\$40,157
69			Hydroxide			/gallon		gallons/qtr		Quarters		\$15,693
70			reatment/Disposal/Transporta	ntion		/gallon		gallons/qtr		Quarters		\$59,181
71			os 10 SQE-180NE Pump Repl		\$3,888.00	-		units/event		events		\$82,289
72			Consumption (treatment system			per kWh	189,846	kWh/qtr	71	Quarters		\$1,071,485
73		Personne	el (O&M)		\$65.00	/hr	650	hrs/qtr	71	Quarters		\$2,980,728
74		Material	s (replacement)		\$1,500.00	/year	1	unit/year	18	years		\$26,456
75		Project N	Management (Sr. Engineer)		\$90.00	/hr	52	hrs/qtr	71	Quarters		\$330,173
76												\$6,069,082
77	S	WD Well (
78			Consumption (SWD)			per kWh		kWh/qtr		Quarters		\$407,891
79		_	ement Replacement (SWD)		\$1,500.00			units/qtr		Quarters		\$211,649
80		Workove	er (acid wash)		\$100,000.00	/unit	2	unit/2yrs/event	9	events		\$1,763,744
81											Subtotal	\$2,383,284
82	<u>D</u>		onitoring/Reporting	(T) ((((((((((((((((((007.74
83			eparation, Travel, and Samplin	ng (Environ. Specialist)	\$65.00	/hour	6	hours/QTR	71	Quarters		\$27,514
84	\vdash	Lab Ana	lytical Costs: Metals		\$05.00	/sample	1	samples/QTR	71	Quarters \$3	,598.04	\$21,588
85 86	\vdash		Chloride			/sample		samples/QTR			,058.25	\$21,388 \$6,349
87	\vdash		TDS			/sample		samples/QTR			534.95	\$3,810
88	\vdash		TSS			/sample	3	samples/QTR			534.95	\$3,810
89			Oil and Grease		\$35.00	<u> </u>		samples/QTR			,481.55	\$8,889
90			Turbidity			/sample		samples/QTR			534.95	\$3,810
91	\vdash	Quaterly	DMR Preparation		\$90.00			hours/QTR			,079.58	\$30,478
92					7,0100		1		1	43.	Subtotal	
93	A	NNUAL A	CTIVITIES									
94			Water Quality Permit/Sanitation	on Fee	\$1,800.00	/unit	1	unit	18	years		\$31,747
95		Remedia	tion System Manufacturer Se	rvice and Support	\$70.00	/hour	10	hours/year	18	years		\$12,346
96											Subtotal	\$44,094
97												
98											Total Estimate	\$17,113,508
99												
100	\Box			10% CONTINGENCY FOR PILOT TESTING,	PUMP TESTING OF A	QUIFER AN	D TREATMEN	T SYSTEM OPTIM	IIZATION	BASED ON RESULTS		\$1,711,351
101	$\sqcup \bot$											
102	$\sqcup \bot$						 		1	Total Estimate V	Vith Contingency	\$18,824,859
103							1					

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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 coverted 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 coverted 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
```

Comment: Wayne Prejean: 3 QA/Qcsamples per event

Cell: I57

l: I58 t: Wayne Prejean: 3 QA/Qcsamples per event
t: I59 t: Wayne Prejean: 3 QA/Qcsamples per event
l: I60 l: Wayne Prejean: 3 QA/Qcsamples per event
l: I61 I: Wayne Prejean: 3 QA/Qcsamples per event
e: G65 :: Wayne Prejean: based on replacing 24 membranes every 3 years. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
l: K65 I: Wayne Prejean: based on one event every 3 years
l: G66 I: Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
t: G67 t: Wayne Prejean: Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
t: G70 t: Wayne Prejean: Based on Clean Harbors quote 12/9/09
i: G71 :: Wayne Prejean: Cost from ERE bid. Includes 20% increase to account for aged bid (2008). Cost in Canadian dollars coverted to US dollars using current exchange rate of 1 CAD = 0.72 USD
i: I72 :: Wayne Prejean: From Power Consumption worksheet
l: I78 I: Wayne Prejean: Based on 2 SWD's requiring 33kWhr/day over 12 hour runtime each day.

	в С	D	l F	T =	G	Н	Т .		J	l K l		М	l N	0	Р
1		נ	L	VCKCBO		- 11	<u> </u>		J	IX.	L	IVI	IN	U	Г
						04001/			D AND EVEL	ODATION	T AL - DOO!	TET NO. 00	460 DIV "D	". 45TH ID	_
			VERMILION PAR	ISH SCHO	OL B	OARD V	LOUISIA	ANA LAN	D AND EXPL	LORATION	ET AL; DOCK	EI NO. 82	162, DIV "D	"; 151H JU	.
	EAST WHITE L														
	VERMILION PA														
5	PREPARED FO	R TALBOT, C	ARMOUCHE, AN	D MARCE	LLO										
6		·													
7	GW RE	COVERY WELI	L SYSTEM												
8	3" distribution	n piping (from wel	lls to TS)												
9	Length (ft)	Cost/foot	Total Cost												
10	14,500	\$1.83	\$26,535.00												
11															
12		wnhole pump dise													
13	Length (ft)	Cost/foot	Total Cost												
14	570	\$0.78	\$444.60												
15															
16	2" pipe (electr														
17	Length (ft)	Cost/foot	Total Cost												
18	12,550	\$0.89	\$11,169.50												
19															
20		iltration gallery)	T + 1 C +												
21	Quantity 3	Cost \$250.00	Total Cost \$750.00												
22	3	\$250.00	\$750.00												
24	3" to 1 25" rad	ducer coupling													
25	Quantity	Cost	Total Cost												
26	6	\$2.80	\$16.80												
27	0	Ψ2.00	Ψ10.00												
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		,		İ											
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				
		Unit Rated Power	Duration of Daily	Daily Energy Consumption
	# of Units	<u>(kW)</u>	Operation (hr)	<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