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WELDON SPRING SITE REMEDIAL ACTION PROJECT
MK-FERGUSON CO., INC. WO 3589 (636) 441-8086
 7295 Highway 94 South
 St. Charles , MO 63304

Document Number: 94355

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Originators DCN: _____

▶ SUBJECT COST ESTIMATES FOR FINAL ALTERNATIVES PRESENTED IN THE SUPPORTING EVALUATION FOR THE PROPOSED PLAN FOR THE FINAL REMEDIAL ACTION FOR THE GWOU.

▶ AUTHOR CATO, REBECCA ▶ TO FILE _____ ▶ DATE _____

▶ WBS/SUBJECT CODE 85080

REFERENCED DOCUMENT(S) _____

ACTION ITEM TRACKING

INITIATE ACTION ITEM

INDIVIDUAL ASSIGNED TO ACTION _____ DEPARTMENT _____

ACTION REQUIRED _____

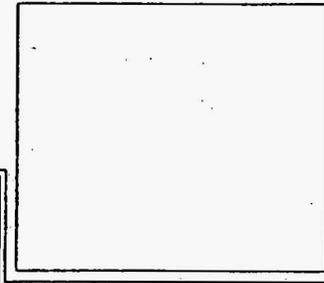
DUE DATE _____ ACTION ITEM LOG NUMBER _____

CLOSE ACTION ITEM

ACTION ITEM LOG NUMBER _____ INITIATING DOCUMENT DIN _____

COMPLETION DATE _____ APPROVAL _____

COMMENTS _____



DISTRIBUTION	ATTACH W W/O	APPRVL. ROUTE ORDER INITIAL	DISTRIBUTION	ATTACH W W/O	APPRVL. ROUTE ORDER INITIAL	DISTRIBUTION	ATTACH W W/O
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CORRESPONDENCE FILE							
ORIGINATOR:							

Stoller

Weldon Spring Site

established 1959

Memorandum

DATE: January 20, 2004

TO: File

FROM: Rebecca Cato *RC*
1/20/04

SUBJECT: Cost Estimates for Final Alternatives presented in the Supporting Evaluation for the Proposed Plan for the Final Remedial Action for the GWOU

The final alternatives reevaluated in the supporting evaluation were:

1. No Action
2. Groundwater Removal and Treatment
3. In Situ Chemical Oxidation of TCE
4. Monitored Natural Attenuation
5. Long-Term Monitoring

The cost estimates used in the Supporting Evaluation for the Proposed Plan are outlined below.

No Action

Costs associated with the no action alternative would include abandonment of the existing monitoring wells network (79 wells) and engineering/oversight costs, which are assumed to be 15% of the subcontract costs. Cost breakdowns are presented in Attachment 1.

Capital Costs Costs include abandonment of wells. Engineering and oversight costs are also included.	\$ 522,000
Operations and Maintenance Costs (annual cost) Costs include operation of the treatment facility, general expenses, analytical costs, and material disposal. Engineering and oversight costs are also included.	\$ 0

Groundwater Removal

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To provide the costs needed for comparing this technology with other being considered, estimates were developed by using best engineering judgement and information from the additional groundwater field studies. The estimates assume that artificial recharge would be utilized. The estimates shown are for a preliminary groundwater removal system and for costing purposes only. Assumptions regarding installation of about 28 extraction and 38 injection wells were based on a reasonable radius of influence estimated from the additional groundwater field studies. Cost breakdowns are presented in Attachment 2.

<p>Capital Costs Costs include installation of wells and necessary equipment, piping, and construction of a treatment facility. Engineering and oversight costs are also included.</p>	<p>\$ 5,170,000</p>
<p>Operations and Maintenance Costs (annual cost) Costs include operation of the treatment facility, general expenses, analytical costs, and material disposal. Engineering and oversight costs are also included.</p>	<p>\$ 2,150,000</p>

In Situ Chemical Oxidation

A preliminary estimate for a larger-scale effort intended to treat the entire plume was submitted by the specialty subcontractor who performed the pilot-phase project at the site. The subcontractor indicated that the capital cost would be great than \$9 million. A more definitive cost could not be estimated due to uncertainties that would need to be taken into account, such as rebound and non-uniform distribution of oxidant.

Additional costs would be associated with the remainder of the contaminants of concern (nitrate, uranium, and nitroaromatic compounds). Costs would be similar to the other alternatives presented below.

Monitored Natural Attenuation

Groundwater and springs would be monitored at the chemical plant site until MCLs are attained. It is estimated that this will occur within a period of approximately 100 years. It is assumed that 2 wells (1 in the weathered zone and the other in the unweathered zone) would be installed to augment the existing monitoring network and 41 existing wells that will not be included in the monitoring network would be abandoned. Cost breakdowns are presented in Attachment 3.

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<p>Capital Costs Costs include installation and abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).</p>	<p>\$ 540,000</p>
<p>Operations and Maintenance Costs (annual cost) Costs include analytical costs and well replacement costs. Engineering and oversight costs (15% of subcontractor costs) and contingency (10%) are included.</p>	<p>\$ 345,000</p>

Long-Term Monitoring

Groundwater and springs would be monitored at the chemical plant site to ensure that necessary steps are taken to prevent or minimize exposure to contaminants. It is assumed that a minimal monitoring network would be in place, approximately 19 wells and the remainder of the existing monitoring network would be abandoned. Cost breakdowns are presented in Attachment 4.

<p>Capital Costs Costs include abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).</p>	<p>\$ 450,000</p>
<p>Operations and Maintenance Costs (annual cost) Costs include analytical costs and well replacement costs. Engineering and oversight costs (15% of subcontractor costs) and contingency (10%) are included.</p>	<p>\$ 160,000</p>

ATTACHMENT: (4)

Distribution: Administrative Record File for the GWOU

Attachment 1

Cost Breakdown for No Action Alternative

Table #2: Groundwater Operable Unit - No Action Alternative Costs

Task Description: Abandon existing DOE wells (79)

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$8,000.00	\$8,000.00
2	Standby Time	150	chr	\$200.00	\$30,000.00
3	Decontamination Time	1200	chr	\$220.00	\$264,000.00
4	Demobilization	1.0	ea	\$4,500.00	\$4,500.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Field Decontamination Pad	1.0	ea	\$750.00	\$750.00
7	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
8	Soil Drilling	0.0	lf	\$20.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
14	Sand- Installation	0.0	lf	\$15.00	\$0.00
15	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
16	2" SS Screen	0.0	lf	\$45.00	\$0.00
17	2" SS Casing	0.0	lf	\$30.00	\$0.00
18	2" SS Plug	0.0	ea	\$40.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
27	Well Protection	0.0	ea	\$750.00	\$0.00
28	Well Certification (Abandonments)	79.0	ea	\$60.00	\$4,740.00
29	Access Road & Drilling Pads	300.0	lf	\$200.00	\$60,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	1698.0	lf	\$95.00	\$161,310.00
33	14" Boring Abandonment	3115.0	lf	\$180.00	\$560,700.00
34	6" Rotary Wash Abandonment	2203.0	lf	\$60.00	\$132,180.00
35	8" Rotary Wash Abandonment	535.0	lf	\$80.00	\$42,800.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	0.0	ea	\$60.00	\$0.00
42	Bentonite Grout- Abandonment 6" Hole	2262.0	lf	\$120.00	\$271,440.00
43	Bentonite Grout- Abandonment 8" Hole	535.0	lf	\$30.00	\$16,050.00
44	Bentonite Grout- Abandonment 10" Hole	100.0	lf	\$45.00	\$4,500.00
45	Bentonite Grout- Abandonment 14" Hole	3115.0	lf	\$75.00	\$233,625.00
46	Collection of Drilling Derived Wastes	600.0	hr	\$200.00	\$120,000.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
48	Access and Site Preparation	400.0	hr	\$200.00	\$80,000.00
					\$454,182.50

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

- 1 Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated 10/15/01)
- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

Attachment 2

Cost Breakdown for Groundwater Removal Alternative

Project GWOK - PP
Feature PAW/Injection Costs
Item _____

Contract No. 3589 Sheet 12
Designed _____ File No. _____
Checked _____ Date _____

<u>CAPITAL COSTS.</u>			
①	EXTRACTION & INJECTION WELL INSTALLATION (SEE ATTACHED)		\$1,575,175
②	PUMPS 28 x \$3500		\$ 98,000
③	PIPING (HDPE) 10000 FT x \$33/FT includes mat'l + labor		\$ 320,000
④	TREATMENT FACILITY GIAC + ION EXCHANGE EMERGENCY STORAGE OF WATER (0.15M) SITE PREP (0.15M) CONNECTION TO DISCHARGE (IF NECESSARY) CONNECTION TO INT PTS		\$ 2,500,000
⑤	ENGINEERING + OVERSIGHT (15%)		\$ 673,976
<u>OPERATIONS COSTS</u>			
①	SYSTEM OPERATIONS 2x GWOK FIELD STUDY COSTS		\$ 907,586
②	GENERAL EXPENSES CHEMICALS SUPPLIES ANALYTICAL FOR DISCHARGE REPLACEMENT PUMPS		\$ 805,968
③	DISPOSAL / MAT'L TO ENVIRONMENT		\$ 5,000
<u>TOTALS</u>			<u>\$ 5,167,157</u>

Project GNON - PP
 Feature PAT X/INJECTION COSTS
 Item _____

Contract No. 3589
 Designed _____
 Checked _____

Sheet 2/2
 File No. _____
 Date _____
 Date _____

④ GW MONITORING (260% MNA)				
	GCE	NO ₃	U	TNT
# SAMPLES	10	10	5	12
FREQUENCY/YR	2	2	2	2
\$	\$110	\$25	\$60	\$120
QC	10%	10%	10%	10%
SUBTOTAL	\$2420	\$550	\$600	\$3168
$\begin{matrix} \swarrow & & \searrow \\ \text{A} & & \text{B} \end{matrix}$				
SUPPLIES/SHIPPING	① \$6793			
LABOR	② \$84,000			
<u>TOTAL</u>	A+B+C			\$91,478
⑤ ROUTINE WELL MAINTENANCE				\$50,000
⑥ OVERSIGHT 5%				\$93,000
⑦ CONTINGENCY 10%				\$195,303
				\$2,148,335

Table #6: Groundwater Operable Unit - Pump and Treat w/Injection Alternative

Task Description: Installation of 28 extraction and 38 Injection wells

Weathered well assumed to be 60 ft deep (30 ft OB and 30 Rock) - Soil sampling and packer testing

Assume SS construction and 6-inch diameter well material for extraction wells and 2-inch for injection wells (20-ft screen)

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	2.00	ea	\$6,000.00	\$12,000.00
2	Standby Time	10.00	chr	\$200.00	\$2,000.00
3	Decontamination Time	40.00	chr	\$220.00	\$8,800.00
4	Demobilization	2.00	ea	\$4,500.00	\$9,000.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Field Decontamination Pad	1.00	ea	\$750.00	\$750.00
7	Rock Coring/Cont. Sampling	1980.00	lf	\$80.00	\$158,400.00
8	Soil Drilling	1380.00	lf	\$28.00	\$38,640.00
9	Shelby Tube Sampling	0.0	ea	\$30.00	\$0.00
10	Split Spoon Sampling	36.00	ea	\$30.00	\$1,080.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout Installation	40.00	lf	\$15.00	\$600.00
14	Sand Installation	13.00	lf	\$15.00	\$225.00
15	Bentonite Pellets Installation	5.00	lf	\$40.00	\$200.00
16	2" SS Screen	60.00	lf	\$35.00	\$2,100.00
16A	6" SS Screen	560.00	lf	\$125.00	\$70,000.00
17	2" SS Casing	1710.00	lf	\$30.00	\$51,300.00
17A	6" SS Casing	260.00	lf	\$75.00	\$19,500.00
18	2" SS Plug	60.00	ea	\$10.00	\$600.00
18A	6" SS Plug	28.00	ea	\$90.00	\$2,520.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	66.00	ea	\$2,200.00	\$145,200.00
25	Packer Testing	198.00	chr	\$240.00	\$47,520.00
26	10" Rock Reaming	140.00	lf	\$70.00	\$9,800.00
26A	10" Rock Reaming	40.00	lf	\$135.00	\$5,400.00
27	Well Protection	86.00	ea	\$750.00	\$64,500.00
28	Well Certification (Abandonments)	0.0	ea	\$60.00	\$0.00
29	Access Roads & Drilling Pads	350.00	hr	\$200.00	\$70,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	30.00	lf	\$95.00	\$2,850.00
33	14" Boring Abandonment	0.0	lf	\$180.00	\$0.00
34	6" Rotary Wash- Abandonment	30.00	lf	\$60.00	\$1,800.00
35	8" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	1.0	ea	\$60.00	\$60.00
42	Bentonite Grout- Abandonment 6" Hole	30.00	lf	\$20.00	\$600.00
43	Bentonite Grout- Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
44	Bentonite Grout- Abandonment 10" Hole	30.00	lf	\$45.00	\$1,350.00
45	Bentonite Grout- Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
46	Collection of Drilling Derived Wastes	40.00	hr	\$200.00	\$8,000.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					\$1,515,175.00

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

- 1 Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated 10/15/01)
- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

LABOR COST
 OTHER COSTS

EQUIPMENT

TANKS

PIPING

$$\Delta t = \frac{\text{\# pore volumes} \cdot R \ln \frac{C_0}{C_{ns}} \cdot \text{pore volume} \cdot \phi}{nQ \cdot \text{\# wells}}$$

— porosity

— extraction rate.

Zone 1

ASSUME 20 PORE VOLUMES TO CLEAN UP

$$\Delta t = \frac{(20) (1.6 \times 10^9 \text{ gal}) (0.3)}{10 (10 \text{ g/min})} \rightarrow 9.6 \times 10^7 \text{ min}$$

6.4×10^7

15 wells = 12.2 yrs

* 18 wells = 101 yrs

$\Delta t = 365 \text{ yrs @ } 5 \text{ gpm.}$
 Average over area.

at 10 gpm 182 yrs

For all but Uran.

Zone 2

2/4-DNT #PV = $4.6 \ln \frac{1800}{0.11} = 45$

2/4-DNT #PV = $8.3 \ln \frac{1500}{0.13} = 77.6$

ASSUME 50 PORE VOLS TO CLEAN UP.

$$\Delta t = \frac{50 (3.7 \times 10^8) \text{ gal} (0.3)}{6 (10 \text{ gpm})} = 9.25 \times 10^7 \text{ min}$$

5.55×10^9

176 yrs.

12 wells = 88 yrs

* 10 wells = 106 yrs

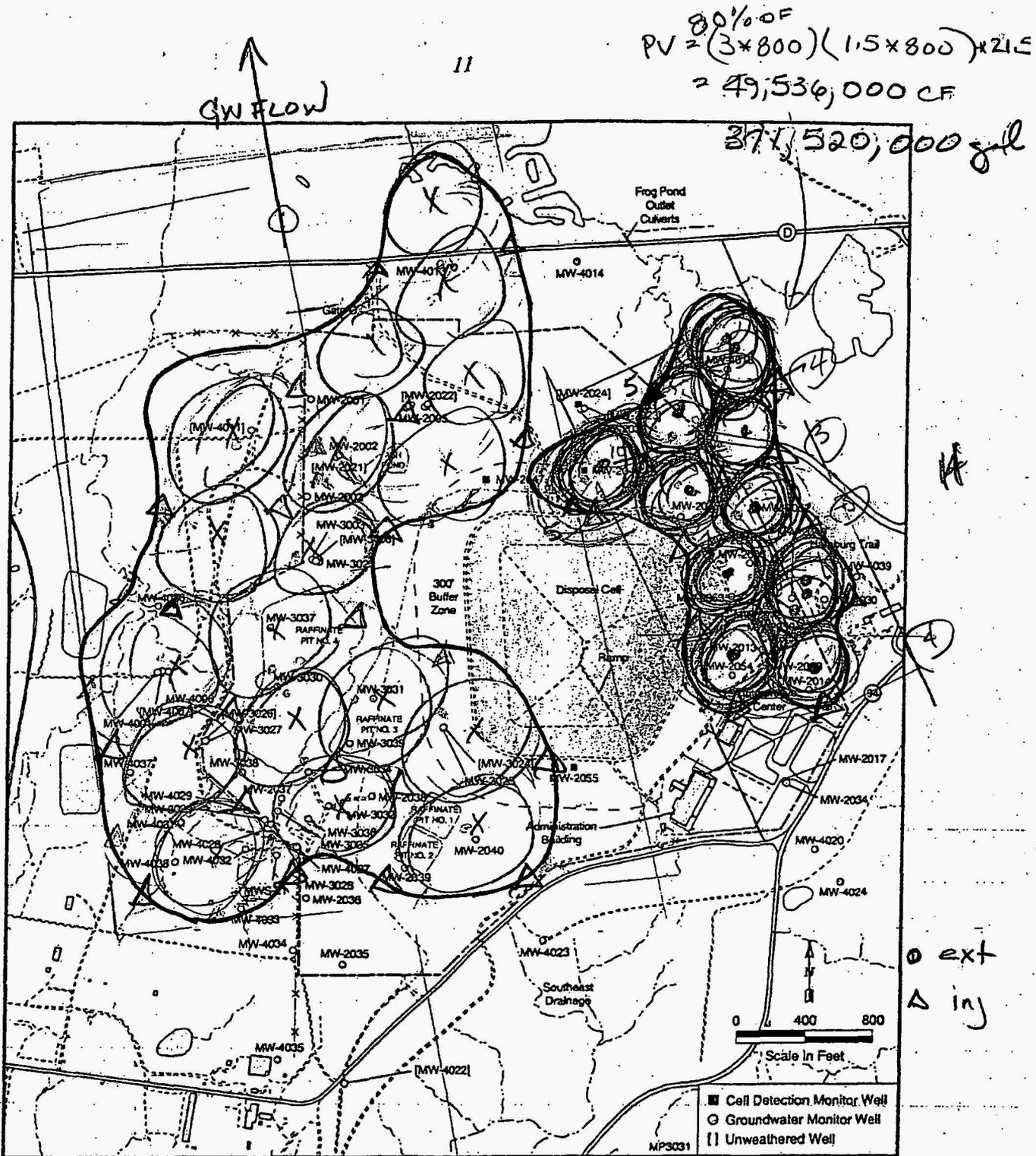


FIGURE 2.3 Locations of Monitoring Wells at the Chemical Plant Area

ZONE 1	ZONE 2
18 ext	10 ext
24 inj	14 inj

ASSUME RADIUS OF INFLUENCE
300'

PORE VOLUMES

$$\left[(5.5 \times 800)(4.0 \times 800) \times 21.5 \right] 70\%$$

$$21,190,400 \times \frac{7.5 \text{ gal}}{\text{CF}} = 1.6 \times 10^9 \text{ gal}$$

Project GMOU - PP Cost
 Feature PAT Alternative
 Item Costs

Contract No. 3589 Sheet _____
 Designed _____ File No. _____
 Checked _____ Date _____

PAT w/ Rainjection

① Drilling (C)
 2.8 EXTRACTION WELLS
 3.8 INJECTION WELLS

ASSUME 30' OVERBURDEN } DEPOSED AFTER 14
 30" ROCK } MONTH
 20" SS SCREENS
 6" - 1" INCH DIAMETER EXTRACTION WELLS
 2" - 1" INCH DIAMETER INJECTION WELLS
 X Pumps \$3500 X 28 wells = \$98,000

② System OPERATIONS (A)
 USE EARLYTECH COSTS FOR GYM FIBER STUDY
 X \$453,793 / 6 MONTHS

③ GENERAL EXPENSE (A)
 CHEMICALS } USE PAT GYM EXP -
 SUPPLIES } \$250K FOR ANALYTICAL
 ANALYTICAL FOR }
 REINJECTOR } \$605,968 / yr
 DISCHARGE / PUMPS

④ CONSTRUCTION (C)
 TREATMENT FACILITY / USED FS COSTS
 X SITE PREP \$477,490
 X PIPING 38/ft mat'l labor 75000 ft - \$285,000
 DRAW - EST
 71 KWH

⑤ DISPOSAL \$156/ld

Attachment 3

Cost Breakdown for Monitored Natural Attenuation Alternative

Project GNOK-PP
Feature MNA Costs
Item _____

Contract No. 3589
Designed _____
Checked _____

Sheet 1/2
File No. _____
Date _____
Date _____

CAPITAL COSTS

INSTALLATION (1W & 1UW)
(See Table 1) \$184,010

ABANDONMENT (41 existing wells)
(See Table 4) \$285,142

ENGINEERING / OVERSIGHT (15%) 70,373

\$539,525

OPERATIONS / MAINTENANCE

Analytical	<u>TLE</u>	<u>NO3</u>	<u>U</u>	<u>Nitros</u>
#	17	17	11	21
FREQ/yr*	2	2	2	2
\$	\$10	\$25	\$160	\$1200
QC	10%	10%	10%	10%
TOTAL	\$4114	\$935	\$1452	\$5544

ANALYTICAL TOTAL \$12,045

SUPPLIES / SHIPPING (10%) \$1,205

LABOR (existing contract costs) \$160,000

* frequency/yr - average of all Q, S, A locations



MORRISON KNUDSEN CORPORATION
M.K. FERGUSON GROUP

CALCULATION SHEET
ENG-9s.1, REV.0, 9/92

Project GUDDA - PP
Feature MMA CASH
Item _____

Contract No. 3589
Designed _____
Checked _____

Sheet 2/2
File No. _____
Date _____
Date _____

WELL MAINTENANCE / REPAIRS		
INSTALL / LABORERS PER YEAR	(SECTORS)	42,945
OVERSIGHT (15%)		\$32,429
Contingency (10%)		\$24,862
ANNUAL INSPECTION & REPAIRS		\$70,000
* Cost based on 1/3 costs for project US&M costs		
TOTAL		\$343,480

Table #1: Groundwater Operable Unit - W & UW Well Installation Costs

Task Description: Installation of 1 weathered and 1 unweathered well (including drilling of three borings)

Weathered well to be optimally located by drilling three borings and selecting the best one for well installation

All borings will be packer tested throughout the bedrock portion

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$3,000.00	\$3,000.00
2	Standby Time	5.0	chr	\$200.00	\$1,000.00
3	Demobilization Time	1.0	chr	\$220.00	\$220.00
4	Demobilization	1.0	ea	\$3,500.00	\$3,500.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Field Decontamination Pads	1.0	ea	\$750.00	\$750.00
7	Rock Coring w/ Comp. Sampling	160.0	lf	\$150.00	\$24,000.00
8	Soil Drilling	120.0	lf	\$20.00	\$2,400.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Soil Spoon Sampling	48.0	ea	\$30.00	\$1,440.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout Installation	20.0	lf	\$15.00	\$300.00
14	Sand Installation	30.0	lf	\$15.00	\$450.00
15	Bentonite Pellets Installation	10.0	lf	\$40.00	\$400.00
16	2" SS Screen	20.0	lf	\$45.00	\$900.00
17	2" SS Casing	40.0	lf	\$30.00	\$1,200.00
18	2" SS Plug	2.0	ea	\$40.00	\$80.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	Rock Reaming	100.0	lf	\$70.00	\$7,000.00
27	Well Protection	2.0	ea	\$750.00	\$1,500.00
28	Well Certification (Abandonments)	2.0	ea	\$60.00	\$120.00
29	Access Roads & Drilling Pads	650.0	hr	\$200.00	\$130,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	60.0	lf	\$50.00	\$3,000.00
32	10" Boring Abandonment	0.0	lf	\$95.00	\$0.00
33	14" Boring Abandonment	0.0	lf	\$180.00	\$0.00
34	6" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
35	8" Rotary Wash- Abandonment	0.0	lf	\$80.00	\$0.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout Abandonment 4" Hole	6.0	lf	\$25.00	\$150.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Register	2.0	ea	\$80.00	\$160.00
42	Bentonite Grout- Abandonment 6" Hole	0.0	lf	\$20.00	\$0.00
43	Bentonite Grout- Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
44	Bentonite Grout- Abandonment 10" Hole	0.0	lf	\$45.00	\$0.00
45	Bentonite Grout- Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
46	Collection of Drilling Derived Wastes	16.0	hr	\$200.00	\$3,200.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					\$184,010.00

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

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- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

Table #4: Groundwater Operable Unit - MNA Alternative Costs

Task Description: Abandon existing DOE wells 41

Also include costs from Table #1 for new well installation

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$6,000.00	\$6,000.00
2	Standby Time	13.0	chr	\$200.00	\$3,000.00
3	Decontamination Time	75.0	chr	\$220.00	\$16,500.00
4	Demobilization	1.0	ea	\$3,500.00	\$3,500.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Field Decontamination Pad	1.0	ea	\$750.00	\$750.00
7	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
8	Soil Drilling	0.0	lf	\$20.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
14	Sand- Installation	0.0	lf	\$15.00	\$0.00
15	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
16	2" SS Screen	0.0	lf	\$45.00	\$0.00
17	2" SS Casing	0.0	lf	\$30.00	\$0.00
18	2" SS Plug	0.0	ea	\$40.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
27	Well Protection	0.0	ea	\$750.00	\$0.00
28	Well Cementation (Abandonments)	4.0	ea	\$60.00	\$240.00
29	Access Road & Drilling Pads	200.0	lf	\$20.00	\$4,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	5.0	lf	\$95.00	\$475.00
33	14" Boring Abandonment	3.0	lf	\$160.00	\$480.00
34	Rotary Wash Abandonment	106.0	lf	\$60.00	\$6,360.00
35	Rotary Wash Abandonment	274.0	lf	\$80.00	\$21,920.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	0.0	ea	\$60.00	\$0.00
42	Bentonite Grout Abandonment 6" Hole	14.0	lf	\$20.00	\$280.00
43	Bentonite Grout Abandonment 8" Hole	27.0	lf	\$30.00	\$810.00
44	Bentonite Grout Abandonment 10" Hole	5.0	lf	\$45.00	\$225.00
45	Bentonite Grout Abandonment 14" Hole	3.0	lf	\$75.00	\$225.00
46	Collection of Drilling Devised Wastes	40.0	hr	\$200.00	\$8,000.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
48	Access and Site Preparation	40.0	hr	\$200.00	\$8,000.00

\$285,142.50

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

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- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

Table #5: Groundwater Operable Unit - Abandonment-Installation Costs for 1 Well

Task Description: Abandonment and Installation of 1 weathered well for annual maintenance costs
 Assume new well to be installed as original (abandoned) well.

Weathered well assumed to be 60 ft deep and no testing performed

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$6,000.00	\$6,000.00
2	Standby Time	1.0	chr	\$200.00	\$200.00
3	Decontamination Time	2.0	chr	\$220.00	\$440.00
4	Demobilization	1.0	ea	\$1,500.00	\$1,500.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Field Decontamination Pad	1.0	ea	\$750.00	\$750.00
7	Rock Coring w/ Cont. Sam. Jigs	20.0	lf	\$80.00	\$1,600.00
8	Soil Drilling	20.0	lf	\$20.00	\$600.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout Installation	40.0	lf	\$45.00	\$1,800.00
14	Sand Installation	15.0	lf	\$15.00	\$225.00
15	Bentonite Pellets Installation	5.0	lf	\$40.00	\$200.00
16	2" SSI Screen	10.0	lf	\$45.00	\$450.00
17	2" SS Casing	55.6	lf	\$30.00	\$1,668.00
18	2" SS Plug	1.0	ea	\$40.00	\$40.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	30.0	lf	\$70.00	\$2,100.00
27	Well Protection	1.0	ea	\$750.00	\$750.00
28	Well Certification (Abandonments)	1.0	ea	\$60.00	\$60.00
29	Access Roads & Drilling Pads	50.0	lf	\$20.00	\$1,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	30.0	lf	\$95.00	\$2,850.00
33	14" Boring Abandonment	0.0	lf	\$160.00	\$0.00
34	6" Rotary Wash Abandonment	30.0	lf	\$60.00	\$1,800.00
35	8" Rotary Wash Abandonment	0.0	lf	\$80.00	\$0.00
36	Neat Cement Grout - Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout - Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	1.0	ea	\$60.00	\$60.00
42	Bentonite Grout - Abandonment 6" Hole	30.0	lf	\$20.00	\$600.00
43	Bentonite Grout - Abandonment 8" Hole	0.0	lf	\$30.00	\$0.00
44	Bentonite Grout - Abandonment 10" Hole	30.0	lf	\$45.00	\$1,350.00
45	Bentonite Grout - Abandonment 14" Hole	0.0	lf	\$75.00	\$0.00
46	Collection of Drilling Derived Wastes	16.0	hr	\$200.00	\$3,200.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site Preparation	0.0	hr	\$200.00	\$0.00
					\$42,945.00

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

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- 2 Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others
- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment

Attachment 4

Cost Breakdown for Long Term Monitoring Alternative



MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

CALCULATION SHEET
ENG-9s.1, REV. 0, 9/92

Project GMWA-PP
Feature Long-Term Monitoring Costs
Item _____

Contract No. 3589
Designed _____
Checked _____

Sheet 1/2
File No. _____
Date _____
Date _____

<u>Drillout Costs</u>					
Abandonment	2	60	existing wells		\$386,532
			(See Table 3)		
Engineering + Oversight			(15%)		\$57,980
					<u>\$444,512</u>
<u>OPERATIONS / MAINTENANCE</u>					
Analysis		ICE	ND3	UC	TRU
#	9	9	9	6	11
Fee/yr	\$110	\$25	\$100	\$120	
DC	15%	10%	10%	10%	
TOTALS	\$1089	\$248	\$396		\$1452
TOTAL ANALYTICAL	\$3185				
SUPPLIES/STORAGE	(10%)	\$318			
LABOR	(1/2 existing contract)	\$40,000			
WELL MAINTENANCE/REPAIRS	(60% MIN. COSTS)	\$25747			
ENGINEERING / OVERSIGHT	(15%)	\$10,890			
CONTINGENCY	(10%)	\$7,980			

Project CWOU - PP
Feature Long Term Mon. Costs
Item _____

Contract No. 3589
Designed _____
Checked _____

Sheet 2/2
File No. _____
Date _____
Date _____

ANNUAL INSPECTION & REPORTING
(13 COSTS FOR PROJECT LTRM COSTS)

\$70,000

GRAND TOTAL \$157,426

Table #3: Groundwater Operable Unit - Long-Term Monitoring Alternative Costs

Task Description: Abandon existing DOE wells (60)

Assume removal of all unweathered wells

Item	Item Description	Quantity	Unit	Rate	Cost
1	Mobilization	1.0	ea	\$6,000.00	\$6,000.00
2	Standby Time	15.0	chr	\$200.00	\$3,000.00
3	Decontamination Turn	120.0	chr	\$220.00	\$26,400.00
4	Demobilization	1.0	ea	\$4,500.00	\$4,500.00
5	Geologist	0.0	mhr	\$110.00	\$0.00
6	Fixed Decontamination Pads	1.0	ea	\$750.00	\$750.00
7	Rock Coring w/ Cont. Sampling	0.0	lf	\$80.00	\$0.00
8	Soil Drilling	0.0	lf	\$20.00	\$0.00
9	Shelby Tube Sampling	0.0	ea	\$35.00	\$0.00
10	Split Spoon Sampling	0.0	ea	\$30.00	\$0.00
11	Continuous Sampling	0.0	lf	\$15.00	\$0.00
12	Collect & Transport Samples	0.0	chr	\$150.00	\$0.00
13	Bentonite Grout- Installation	0.0	lf	\$15.00	\$0.00
14	Sand- Installation	0.0	lf	\$15.00	\$0.00
15	Bentonite Pellets- Installation	0.0	lf	\$40.00	\$0.00
16	2" SS Screen	0.0	lf	\$45.00	\$0.00
17	2" SS Casing	0.0	lf	\$30.00	\$0.00
18	2" SS Plug	0.0	ea	\$40.00	\$0.00
19	2" SS Cap	0.0	ea	\$40.00	\$0.00
20	2" PVC Screen	0.0	lf	\$15.00	\$0.00
21	2" PVC Casing	0.0	lf	\$8.00	\$0.00
22	2" PVC Plug	0.0	ea	\$20.00	\$0.00
23	2" PVC Cap	0.0	ea	\$20.00	\$0.00
24	Well Development	0.0	ea	\$2,200.00	\$0.00
25	Packer Testing	0.0	chr	\$240.00	\$0.00
26	6" Rock Reaming	0.0	lf	\$70.00	\$0.00
27	Well Protection	0.0	ea	\$750.00	\$0.00
28	Well Certification/Abandonments	60.0	ea	\$60.00	\$3,600.00
29	Access Roads & Drilling Pads	250.0	hr	\$200.00	\$50,000.00
30	4" Boring Abandonment	0.0	lf	\$40.00	\$0.00
31	6" Boring Abandonment	0.0	lf	\$50.00	\$0.00
32	10" Boring Abandonment	567.0	lf	\$95.00	\$53,865.00
33	14" Boring Abandonment	342.5	lf	\$160.00	\$54,800.00
34	6" Rotary Wash/Abandonment	1572.0	lf	\$60.00	\$94,320.00
35	18" Rotary Wash/Abandonment	535.0	lf	\$80.00	\$42,800.00
36	Neat Cement Grout- Abandonment	0.0	lf	\$25.00	\$0.00
37	Bentonite Grout- Abandonment 4" Hole	0.0	lf	\$25.00	\$0.00
38	4" Cutter	0.0	ea	\$3,500.00	\$0.00
39	6" Cutter	0.0	ea	\$7,500.00	\$0.00
40	10" Cutter	0.0	ea	\$9,500.00	\$0.00
41	Well Registration	0.0	ea	\$60.00	\$0.00
42	Bentonite Grout/Abandonment 6" Hole	163.0	lf	\$20.00	\$3,260.00
43	Bentonite Grout/Abandonment 8" Hole	535.0	lf	\$30.00	\$16,050.00
44	Bentonite Grout/Abandonment 10" Hole	905.0	lf	\$45.00	\$27,225.00
45	Bentonite Grout/Abandonment 14" Hole	342.5	lf	\$75.00	\$25,687.50
46	Collection/Drilling/Service Wastes	50.0	hr	\$200.00	\$10,000.00
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	\$220.00	\$0.00
50	Access and Site/Preparation	40.0	hr	\$200.00	\$8,000.00
					\$386,532.50

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

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- 3 Subcontractor is entirely responsible for providing access to the drilling location, which includes mobilization and set-up of various additional equipment