GWOU ADMINISTRATIVE RECORD
SECTION TITLE:
GW-300-303-1.21

REV 60

DOCUMENT CONTROL SYSTEM - CORRESPONDENCE FILE

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

▶Document Type: **MO-SMSW-FILE**

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 _____ INITITATING DOCUMENT DIN _____

COMPLETION DATE _____ APPROVAL _____

COMMENTS _____

DISTRIBUTION	ATTACH W	ATTACH W/O	APPRVL. ROUTE ORDER	APPRVL. ROUTE INITIAL	DISTRIBUTION	ATTACH W	ATTACH W/O	APPRVL. ROUTE ORDER	APPRVL. ROUTE INITIAL	DISTRIBUTION	ATTACH W	ATTACH W/O
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W.L. DRNEC												
E.M. HEUER												
M.G. LUTZ	✓											
M.L. OAKS												
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J.R. THOMPSON												
T.R. UHLMEYER												
GJO												
M.C. BUTHERUS												
CORRESPONDENCE FILE												
ORIGINATOR:												

94355

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.

Capital Costs Costs include installation of wells and necessary equipment, piping, and construction of a treatment facility. Engineering and oversight costs are also included.	$ 5,170,000
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.	$ 2,150,000

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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Capital Costs Costs include installation and abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).	$ 540,000
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.	$ 345,000

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.

Capital Costs Costs include abandonment of wells. Engineering and oversight costs are also included (15% of subcontractor costs).	$ 450,000
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.	$ 160,000

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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Geologist	0.0	mhr	$110.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	4" Boring Abandonment	0.0	lf	$40.00	$0.00
31	6" Boring Abandonment	0.0	lf	$50.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	$220.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					$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 dated10/15/01)***

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

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Project GWOU – PP
Feature P&T W/ Injection Costs
Item

Contract No. 3589
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Sheet 1/2
File No.
Date
Date

CAPITAL COSTS.

(1) EXTRACTION & INJECTION WELL INSTALLATION (SEE ATTACHED) $1,515,175

(2) PUMPS 28 * $3500 $ 98,000

(3) PIPING (HDPE)
10000 FT * $38/FT
includes mat'l + labor $ 380,000

(4) TREATMENT FACILITY
GAC + ION EXCHANGE $2,500,000
EMERGENCY STORAGE OF WATER ($0.15M)
SITE PREP ($0.5M)
CONNECTION TO DISCHARGE (IF NECESSARY)
CONNECTION TO INJ PTS

(5) ENGINEERING + OVERSIGHT (15%) $ 673,976

TOTAL $5,167,151

OPERATIONS COSTS

(1) SYSTEM OPERATIONS
2* GWOU FIELD STUDY COSTS $907,586

(2) GENERAL EXPENSES
CHEMICALS
SUPPLIES $805,968
ANALYTICAL FOR DISCHARGE
REPLACEMENT PUMPS

(3) DISPOSAL / MAT'L TO ENVIROSAFE $5,000

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Project: GWOU – PP
Feature: P&T W/ INJECTION COSTS
Item:

Contract No.: 3589
Designed:
Checked:

Sheet: 2/2
File No.:
Date:
Date:

(4) GW MONITORING (@60% MNA)

	TCE	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	$660	$3168

(A) $6798

SUPPLIES/SHIPPING (B) + $680

LABOR (C) + $84,000

TOTAL 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

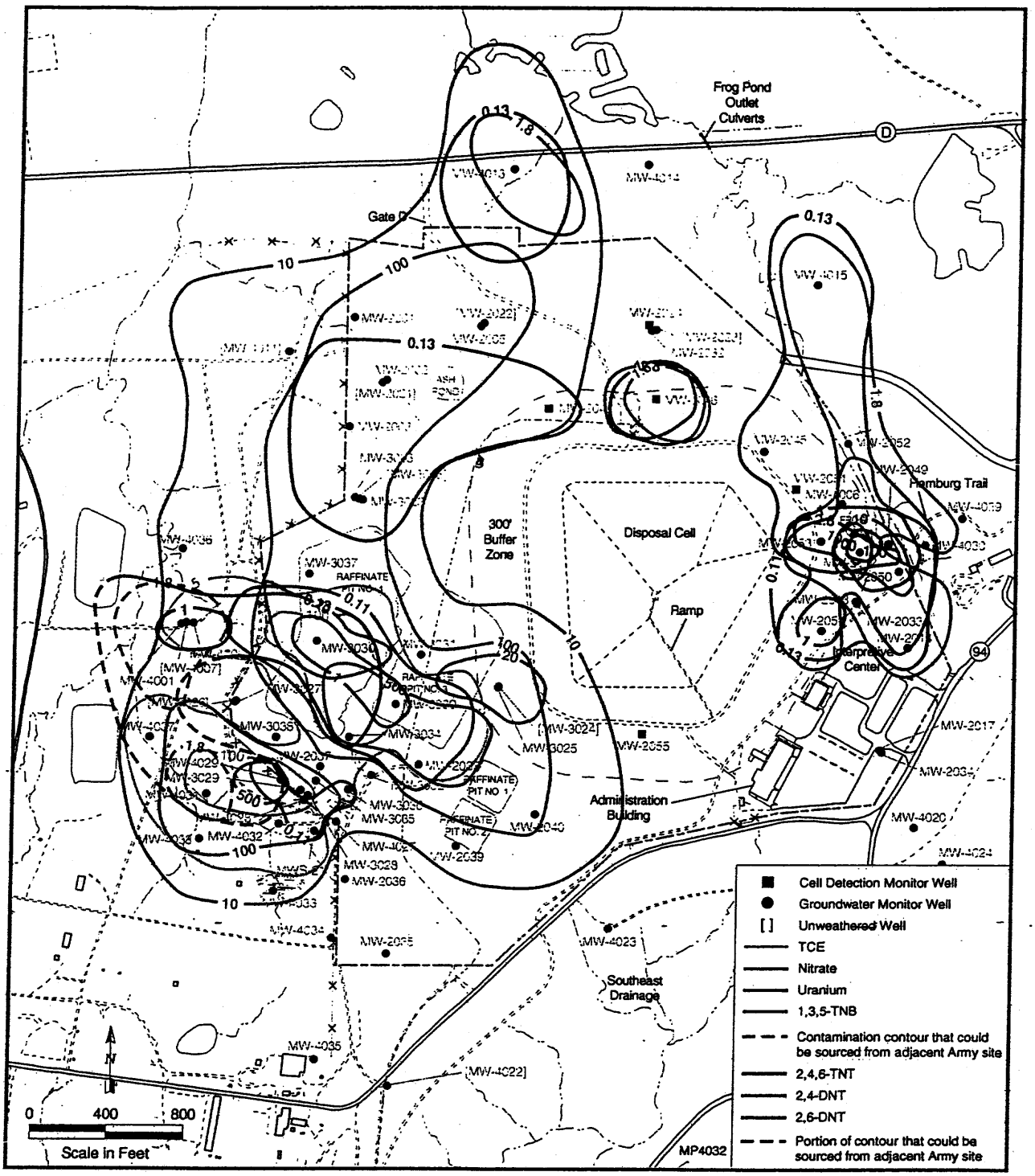
Task Description: Installation of 28 extraction and 38 injection wells
Weathered well assumed to be 60 ft deep (30 ft OB and 30 Rock) - Soil sampling and packer testing
Assume SS construction and 6-inch diameter well material for extraction wells and 2-inch for injection wells (20-ft screen)

Item	Item Description	Quantity	Unit	Rate	Cost
5	Geologist	0.0	mhr	$110.00	$0.00
9	Shelby Tube Sampling	0.0	ea	$35.00	$0.00
11	Continuous Sampling	0.0	lf	$15.00	$0.00
12	Collect & Transport Samples	0.0	chr	$150.00	$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
28	Well Certification (Abandonments)	0.0	ea	$60.00	$0.00
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
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 dated10/15/01)***
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***


Frog Pond Outlet Culverts
Gate D
300' Buffer Zone
Disposal Cell
Ramp
Hamburg Trail
Interpretive Center
Administration Building
Southeast Drainage
RAFFINATE PIT NO 1
RAFFINATE PIT NO 2
ASH POND
Cell Detection Monitor Well
Groundwater Monitor Well
Unweathered Well
TCE
Nitrate
Uranium
1,3,5-TNB
Contamination contour that could be sourced from adjacent Army site
2,4,6-TNT
2,4-DNT
2,6-DNT
Portion of contour that could be sourced from adjacent Army site
0 400 800
Scale in Feet
MP4032

LABOR COST
CHEM COSTS

EQUIPMENT
TANKS
PIPING

pore volumes

pore volume

$$\Delta t = \frac{R \ln \frac{C_o}{C_w} \, LWT \phi}{n Q}$$

ϕ — porosity

Q — extraction rate.

n — # wells

ZONE 1

ASSUME 20 PORE VOLUMES TO CLEAN UP

9.6×10^9

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

6.4×10^7

15 wells = 122 yrs

~~* 18 wells = 101 yrs~~

$\Delta t = 365$ yrs @ 5 gpm.

Average over area.

at 10 gpm 182 yrs

FOR all but Uran.

ZONE 2

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

2,6-DNT $\#PV = 8.3 \ln \frac{1500}{0.13} = 77.6$

ASSUME 50 PORE VOLS TO CLEAN UP.

5.55×10^9

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

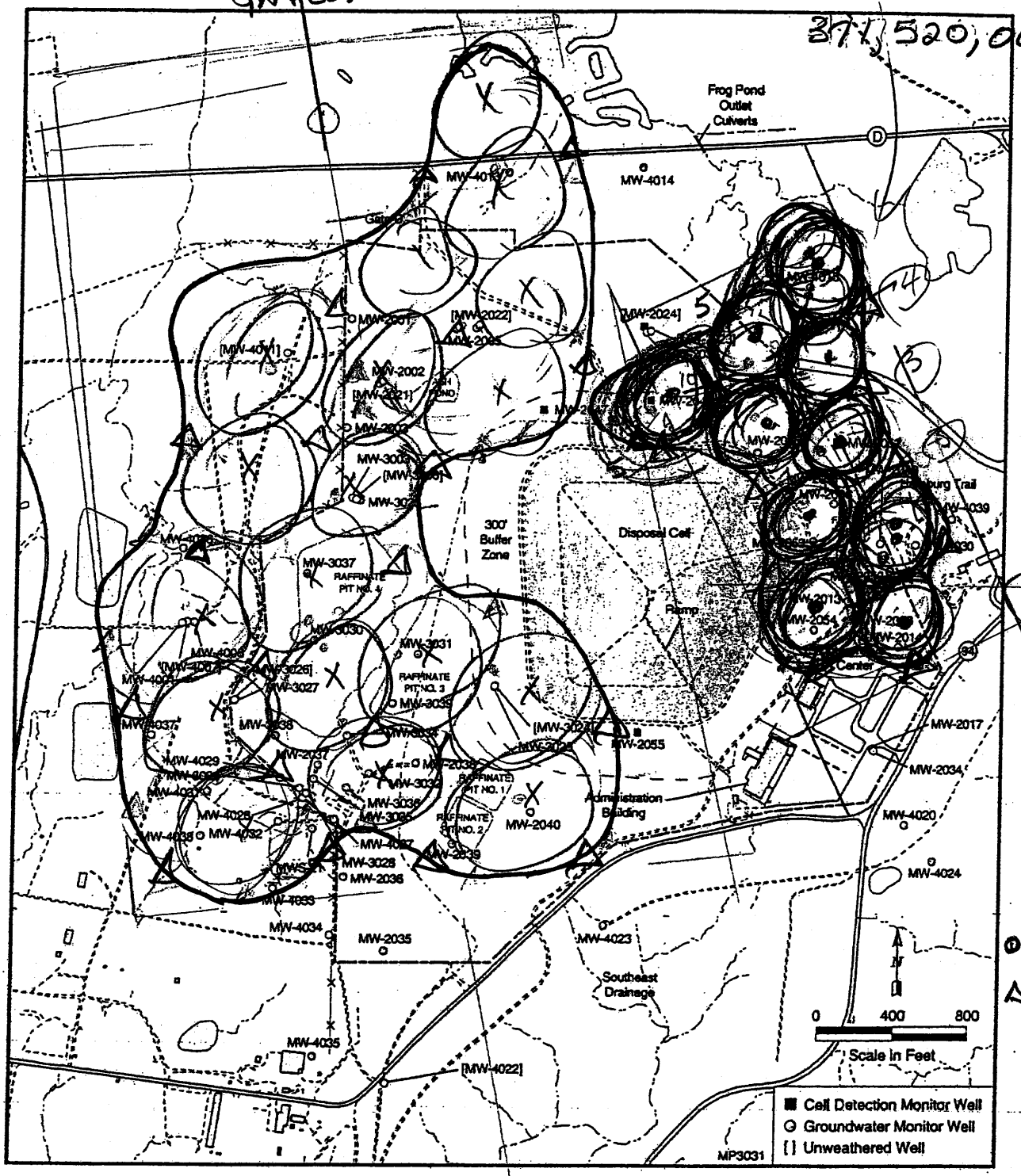
176 yrs.

12 wells = 88 yrs

* 10 wells = 106 yrs

80% OF
PV = (3*800)(1.5*800)*21.5
= 49,536,000 CF
371,520,000 gal

GW FLOW



○ ext
△ inj

FIGURE 2.3 Locations of Monitoring Wells at the Chemical Plant Area

ASSUME RADIUS OF INFLUENCE
300'

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

PORE VOLUMES

$$\left[(5.5*800)(4.0*800)*\overset{T_{AVE}}{21.5}\right] 70\%$$

$$211{,}904{,}000 * \frac{7.5\ gal}{CF} = 1.6\times10^{9}\ gal$$

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Project GWOU - PP COST
Feature P&T Alternative
Item Costs

Contract No. 3589
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Sheet
File No.
Date
Date

P&T w/ Reinjection

(1) DRILLING (C)

(66) 28 EXTRACTION WELLS
38 INJECTION WELLS

ASSUME 30' OVERBURDEN } DRILLED THRU W UNIT
30' ROCK
20' SS SCREENS
6" - INCH DIAMETER EXTRACTION WELLS
2" - INCH DIAMETER INJECTION WELLS
SEE ATTACHED SPREADSHEET

PUMPS $3500 * 28 wells - $98,000

(2) SYSTEM OPERATIONS (A)

USE EARTHTECH COSTS FOR GWOU FIELD STUDY

$453,793 / 6 MONTHS

(3) GENERAL EXPENSE (A)

CHEMICALS
SUPPLIES
ANALTICAL FOR
RE-INJECT OR
DISCHARGE / PUMPS

USE P&T GEN EXP - $250K FOR ANALYTICAL

$805968 / yr

CONTINUOUS

(4) CONSTRUCTION (C)

TREATMENT FACILITY / USED DROM FS COSTS → EST $2M
SITE PREP $476,902
PIPING 38/ft mat'l/labor 7500 ft - $285000

(5) DISPOSAL $150/yd

Attachment 3

Cost Breakdown for Monitored Natural Attenuation Alternative

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Project GWOU-PP
Feature MNA Costs
Item

Contract No. 3589
Designed
Checked

Sheet 1/2
File No.
Date
Date

CAPITAL COSTS

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

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

ENGINEERING / OVERSIGHT (15%) 70,373

$539,525

OPERATIONS / MAINTENANCE

Analytical	TCE	NO3	U	Nitros
#	17	17	11	21
FREQ/yr*	2	2	2	2
$	$10	$25	$60	$120
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
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CALCULATION SHEET
ENG-9s.1, REV.0, 9/92

Project GWOM - PP
Feature MNA Costs
Item

Contract No. 3589
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Sheet 2/2
File No.
Date
Date

WELL MAINTENANCE/REPLACEMENT

1 INSTALL/1 ABANDON PER YEAR 42,945
(see table #5)

OVERSIGHT (15%) $32,429

CONTINGENCY (10%) $24,862

ANNUAL INSPECTION & REPORTING* $70,000

* Cost based on 1/3 costs for project LTS&M costs

O&M TOTAL $343,486

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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Geologist	0.0	mhr	$110.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	Shelby Tube Sampling	0.0	ea	$35.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	Continuous Sampling	0.0	lf	$15.00	$0.00
12	Collect & Transport Samples	0.0	chr	$150.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	4" Boring Abandonment	0.0	lf	$40.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	10" Boring Abandonment	0.0	lf	$95.00	$0.00
33	14" Boring Abandonment	0.0	lf	$160.00	$0.00
34	6" Rotary Wash- Abandonment	0.0	lf	$60.00	$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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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

1 ***Subcontractor has increased pricing based on GWOU rock coring experience @ WSSRAP (see attached letter dated10/15/01)***
2 ***Subcontractor has increased pricing based on experience @ WSSRAP and having to provide access for the air rotary rig w/ no assistance from others***
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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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Geologist	0.0	mhr	$110.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	4" Boring Abandonment	0.0	lf	$40.00	$0.00
31	6" Boring Abandonment	0.0	lf	$50.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	$220.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					$285,142.50

Comments:

Rates based on Layne-Christensen WP-563 Bid costs

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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.
Weathred well assumed to be 60 ft deep and no testing performed

Item	Item Description	Quantity	Unit	Rate	Cost
[redacted]					
5	Geologist	0.0	mhr	$110.00	$0.00
[redacted]					
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
[redacted]					
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
[redacted]					
30	4" Boring Abandonment	0.0	lf	$40.00	$0.00
31	6" Boring Abandonment	0.0	lf	$50.00	$0.00
[redacted]					
33	14" Boring Abandonment	0.0	lf	$160.00	$0.00
[redacted]					
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
[redacted]					
43	Bentonite Grout- Abandonment 8" Hole	0.0	lf	$30.00	$0.00
[redacted]					
45	Bentonite Grout- Abandonment 14" Hole	0.0	lf	$75.00	$0.00
[redacted]					
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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Attachment 4

Cost Breakdown for Long Term Monitoring Alternative

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Sheet 1/2

Project GWOU-PP
Feature Long-Term Monitoring Costs
Item

Contract No. 3589
Designed
Checked

File No.
Date
Date

CAPITOL COSTS

Abandonment of 40 existing wells (See Table 3) $386,532

Engineering + Oversight (15%) 57,980

$444,512

OPERATIONS / MAINTENANCE

Analytical	TCE	NO_3	U	TNT
# FREQ/yr	9	9	6	11
$	$110	$25	$60	$120
QC	10%	10%	10%	10%
TOTALS	$1089	$248	$396	$1452

TOTAL ANALYTICAL $3185

SUPPLIES/SHIPPING (10%) $318

LABOR (1/4 existing contract) $40,000

WELL MAINTENANCE/REPLACEMENT $25,767
(60% MNA COSTS)

ENGINEERING / OVERSIGHT (15%) $10390

CONTINGENCY (10%) $7,964

MORRISON KNUDSEN CORPORATION
MK-FERGUSON GROUP

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

Project GWOW - PP
Feature Long Term Mon. Costs
Item

Contract No. 3589
Designed
Checked

Sheet 2/2
File No.
Date
Date

ANNUAL INSPECTION & REPORTING (1/3 COSTS FOR PROJECT LT O&M COSTS) $70,000

O&M 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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Geologist	0.0	mhr	$110.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	4" Boring Abandonment	0.0	lf	$40.00	$0.00
31	6" Boring Abandonment	0.0	lf	$50.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	Monitoring Well Repair & Retrofit Labor	0.0	hr	$220.00	$0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					$386,532.50

Comments:

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