PART 3: RESPONSIVENESS SUMMARY

Part 3: Responsiveness Summary

The Responsiveness Summary serves the dual purpose of: (1) presenting stakeholder concerns about the Site and preferences regarding the Site and the remedial alternatives; and (2) explaining how those stakeholder concerns and preferences are addressed in the preferences factored in to the remedy selection process.

Comments were received from the public during the Public Meeting held on December 7, 2006, at the Sierra Middle School on East Spruce Avenue in Las Cruces, New Mexico. Responses to each comment are provided in the following paragraphs.

Comment: I'd like to know why you're going to take 14 years to clean it up?

Response: Calculations on the flow of ground water in the Las Cruces area show that about 14 years will be required to extract the contaminated ground water from the aquifer.

Comment: My question is the mailings that I've got in the past is drilling wells around different spots has been tested. Well, do all these wells go into the tank there off of I-25? And if so, why has that not been tested? I haven't seen anything on that.

Response: The tank referred to in the comment is the Upper Griggs Reservoir. The only well associated with the Griggs and Walnut Ground Water Plume Site that provides water to the Upper Griggs Reservoir is CLC Well No. 21. Other clean wells in the area also supply water to the Upper Griggs Reservoir. The water in the Upper Griggs Reservoir is tested by the City for compliance with the Safe Drinking Water Act.

Comment: I wasn't planning on speaking, but, Mr. Williams, would you, for the benefit of the couple of people who this may be their first time here, tell us how did the water become contaminated in the first place and how was it found.

Response: The original source of the PCE is uncertain. The data collected from the soil vapor and ground water at the Site suggests that the PCE was released at the ground surface at several locations in the area of the plume and migrated through the unsaturated zone to the ground water. The contamination was originally identified by NMED during the investigation of fuel-related releases associated with Underground Storage Tanks in the area. In routine sampling for the fuel-related constituents, PCE was also detected at some locations. Those detections alerted NMED and EPA to look further into the distribution of PCE.

Comment: I want to know when you clean up this water situation, are you going to clean up the

air, too? Because they say with the swamp coolers that we do get contaminated air. Is this possible?

Response: The potential for PCE contamination to occur in the air associated with swamp cooler operation was considered in the Remedial Investigation. The ATSDR also evaluated the risk of inhalation of PCE in air from swamp coolers. Because the concentrations in the taps are negligible (nondetectable in tap samples) and the water that is distributed to the homes meet drinking water standards, there is no risk associated with inhalation of water vapor. The treatment process associated with the selected remedy is air stripping of the contaminated ground water removed from the aquifer. During this treatment process, monitoring to evaluate the magnitude of emissions from the process will be performed. Preliminary calculations indicate any emissions will be negligible, but if the actual measured concentrations are high enough to warrant attention, a component will be added to the system to capture those emissions.

Stakeholder Comments and Lead Agency Responses (see Appendix C for State and Local Concurrence Letters)

Technical and Legal Issues (none)

APPENDIX A

RAGS D Tables

Table A1-1 SELECTION OF EXPOSURE PATHWAYS

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Groundwater	Groundwater	Tap Water	Resident	Adult	Ingestion, Dermal, Inhalation	Qual	Residents obtain potable water from the municipal water supply. Currently, volatile chemical concentrations are below MCLs due to the municipality's well management program. Radioactivity is
					Child	Ingestion, Dermal, Inhalation	Qual	naturally-occuring in groundwater above MCLs and is being addressed under the Safe Drinking Water Act. Future concentrations may exceed MCLs if additional wells are installed in the Rio Grande Alluvium or if existing wells become impacted by ground water migration and the well management program is not continued.
		Indoor Air	Indoor Air	Resident, Industrial	Adult	Inhalation	Quant	Decidents and destroying the proposed to relative short indexing
		(Vapor Intrusion)	(Vapor Intrusion)	Worker, Recreational Center User, Boxing	Child	Inhalation	Quant	Residents could potentially be exposed to volatile chemicals in groundwater through inhalation of indoor air from soil vapor
				Facility User	Adult/Child	Inhalation	Quant	intrusion.
		Indoor Air (Swamp Cooler)	Indoor Air (Swamp Cooler)	Resident	Adult	Inhalation	Qual	Residents use the municipal water supply in swamp coolers. ATSDR quantified this pathway and concluded insignificant risk with current municipal water at the MCLs (ATSDR, 2005). Future
					Child	Inhalation	Qual	concentrations may exceed MCLs if additional wells are installed in the Rio Grande Alluvium or if existing wells become impacted by ground water migration and the well management program is not continued.
		Irrigation Water	Homegrown Produce	Resident	Adult	Ingestion	Qual	The municipal water supply is used for irrigating homegrown produce, flower gardens, lawns, and city parks. Volatile
					Child	Ingestion	Qual	chemical concentrations are currently below MCLs, and PCE does not bioaccumulate in plants. Therefore, exposures are insignificant (ATSDR, 2005).
		Groundwater	Tap Water, Process Water	Industrial/Commercial Worker	Adult	Ingestion, Dermal, Inhalation		Industrial and commercial facilities use the municipal water supply for potable and process water. However, volatile chemical concentrations are currently below MCLs. Radioactivity is naturally-occuring in groundwater above MCLs and is being addressed under the Safe Drinking Water Act. Future concentrations may exceed MCLs if additional wells are installed in the Rio Grande Alluvium or if existing wells become impacted by ground water migration and the well management program is not continued.

Note:

Qual - Qualitative Analysis

Quant - Quantitative Analysis

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Table A1-2.1 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
lada a Ala Alas a lata a lata a la															
Indoor Air (Vapor Intrusion)															
Property A	127-18-4	TETRACHLOROETHYLENE (PCE)	34	460	ppbv	Property A - South	9/9	10 - 10	460	NA	120 C	NA		Yes	ASL
Property B	127-18-4	TETRACHLOROETHYLENE (PCE)	25	644	ppbv	Property B - East	8/8	10 - 10	644	NA	120 C	NA		Yes	ASL
Property C	127-18-4	TETRACHLOROETHYLENE (PCE)	165	578	ppbv	Property C - North	7 / 7	10 - 20	578	NA	120 C	NA		Yes	ASL
Property D	127-18-4	TETRACHLOROETHYLENE (PCE)	107	443	ppbv	Property D - West	8/8	10 - 10	443	NA	120 C	NA		Yes	ASL
Property E	127-18-4	TETRACHLOROETHYLENE (PCE)	57	248	ppbv	Property E - East and South	8/8	10 - 10	248	NA	120 C	NA		Yes	ASL
Property F	127-18-4	TETRACHLOROETHYLENE (PCE)	84	411	ppbv	Property F - West	4/4	10 - 10	411	NA	120 C	NA		Yes	ASL
Property G	127-18-4	TETRACHLOROETHYLENE (PCE)	126	228	ppbv	Property G - South	3/3	10 - 10	228	NA	120 C	NA	-	Yes	ASL

(1) Maximum concentration is used for screening.

(2) Background level is not available

(3) EPA draft generic screening levels for deep soil vapor concentration for indoor air vapor intrusion, based on a residential scenario, a target excess lifetime cancer risk (ELCR) of 1 x 10⁶ (EPA, 2002).

(4) Rationale Codes

Selection Reason: Above Screening Level (ASL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

C = Carcinogenic

NA = Not available

Table A1-2.2 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Indoor Air (Vapor Intrusion) PAL Boxing Facility	127-18-4	TETRACHLOROETHYLENE (PCE)	29	206	ppbv	Boxing Fac. W	8/8	10 - 10	206	NA	120 C	NA		Yes	ASL

(1) Maximum concentration is used for screening.

(2) Background level is not available

(3) EPA draft generic screening levels for deep soil vapor concentration for indoor air vapor intrusion, based on a residential scenario, a target

excess lifetime cancer risk (ELCR) of 1 x 10⁵ (EPA, 2002).

(4) Rationale Codes

Selection Reason: Above Screening Level (ASL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

C = Carcinogenic

NA = Not available

Table A1-2.3 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Indoor Air (Vapor Intrusion) Meerscheidt Recreational Center	127-18-4	TETRACHLOROETHYLENE (PCE)	21 X	21 X	ppbv	Meerscheidt N, Meerscheidt SE, Meerscheidt So	3/6	10 - 10	21	NA	120 C	NA		No	BSL

(1) Maximum concentration is used for screening.

Qualifier: X=Biased high due to matrix interference

(2) Background level is not available

(3) EPA draft generic screening levels for deep soil vapor concentration for indoor air vapor intrusion, based on a residential scenario, a target

excess lifetime cancer risk (ELCR) of 1 x 10⁵ (EPA, 2002).

(4) Rationale Codes

Deletion Reason: Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

C = Carcinogenic

NA = Not available

Table A1-2.4 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future Medium: Groundwater

Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Tap Water (Upper Griggs Reservoir [UGRES] and CLC Wells excluding CLC Wells blended in the UGRES and CLC Wells 18 and 19).	12587-46-1 7440-61-1 127-18-4 79-01-6	ALPHA, GROSS URANIUM, TOTAL TETRACHLOROETHYLENE (PCE) TRICHLOROETHYLENE (TCE)	2.2 1 0.67 0.1 L,J	21.1 132 3.2 0.1 L,J	pCi/L UG/L UG/L UG/L	CLC20 CLC24 UGRES CLC24	14 / 15 65 / 66 46 / 62 1 / 1	1 - 1 1 - 1 0.5 - 0.5 0.5 - 0.5	21.1 132 3.2 0.1	NA NA NA	15 MCL 30 MCL 5 MCL 5 MCL	NA NA NA		No No No No	RAD RAD BSL BSL

(1) Maximum concentration is used for screening.

Qualifier: L,J = Result is between the MDL and the CRQL and is estimated because of outlying quality control parameters.

(2) Background level is not available

(3) Federal Maximum Contaminant Levels (EPA, 2002).

(4) Rationale Codes

Deletion Reason: Below Screening Level (BSL)

Naturally-occurring radioactive chemicals will be addressed under the Safe Drinking Water Act (RAD).

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

MCL = Maximum Contaminant Level

Table A1-2.5 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Tap Water Private Well (LRG-3139)	107-06- 2	1,2-DICHLOROETHANE	1.1	1.1	UG/L	LRG-3191	1/2	0.5 - 0.5	1.1	NA	5 MCL	NA		No	BSL

(1) Maximum concentration is used for screening.

(2) Background level is not available

(3) Federal Maximum Contaminant Levels (EPA, 2002).

(4) Rationale Codes

Deletion Reason: Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

MCL = Maximum Contaminant Level

Table A1-2.6 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
5 Wells blended into the Upper Griggs Reservoir	12587-46-1 7440-61-1	ALPHA, GROSS URANIUM, TOTAL	2.4	5.6 50	pCi/L UG/L	CLC21 CLC10	4 / 4 28 / 28	1 - 1 1 - 1	5.6 50	NA NA	15 MCL 30 MCL	NA NA	-	No No	BSL, RAD RAD
(CLC Wells 10, 21, 29, 32, and 60)	1634-04-4 127-18-4	tert-BUTYL METHYL ETHER TETRACHLOROETHYLENE (PCE)	0.38 L,J 1.61	0.38 L,J 4.9	UG/L UG/L	CLC21 CLC21	1 / 5 28 / 36	0.5 - 0.5 0.5 - 0.5	0.38 4.9	NA NA	6.2 C/R6 5 MCL	NA NA	-	No No	BSL BSL

(1) Maximum concentration is used for screening.

Qualifier: L,J = Result is between the MDL and the CRQL and is estimated because of outlying quality control parameters.

(2) Background level is not available

Federal Maximum Contaminant Levels (EPA, 2002). EPA Region 6 MSSL (Tap Water) (EPA R6, 2005).

(4) Rationale Codes

(3)

Deletion Reason: Below Screening Level (BSL)

Naturally-occurring radioactive chemicals will be addressed under the Safe Drinking Water Act (RAD).

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

MCL = Maximum Contaminant Level

C = Carcinogenic

Table A1-2.7 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
CLC Wells 18 and 19	12587-46-1 7440-61-1 127-18-4 79-01-6	ALPHA, GROSS URANIUM, TOTAL TETRACHLOROETHYLENE (PCE) TRICHLOROETHYLENE (TCE)	10.8 51 2 0.63 L,J	54 45		CLC19 CLC19 CLC18 CLC18	1/1 2/2 19/20 1/1	1 - 1 1 - 1 0.5 - 1.3 1.3 - 1.3	10.8 54 45 0.63	NA NA NA	15 MCL 30 MCL 5 MCL 5 MCL	NA NA NA	 	No No Yes No	BSL, RAD RAD ASL BSL

(1) Maximum concentration is used for screening.

Qualifier: L,J = Result is between the MDL and the CRQL and is estimated because of outlying quality control parameters.

(2) Background level is not available

(3) Federal Maximum Contaminant Levels (EPA, 2002).

(4) Rationale Codes

Selection Reason: Above Screening Level (ASL)

Deletion Reason: Below Screening Level (BSL)

Naturally-occurring radioactive chemicals will be addressed under the Safe Drinking Water Act (RAD).

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

MCL = Maximum Contaminant Level

Table A1-2.8 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Future Medium: Groundwater Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier	Maximum Concentration Qualifier (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Rio Grande Alluvium	75.05.4	1.1-DICHI OROFTHENE	0.41	0.41.1	1104	GWMW06	1 / 79	0.0749 - 2.5	0.4	NA	7 140	NA NA			500 DOI
Rio Grande Alluvium	75-35-4	1,,	0.1 L,J	0.1 L,J	UG/L				0.1		7 MCL		-	No	FOD, BSL BSL
	95-63-6	1,2,4-TRIMETHYLBENZENE	0.12 J	0.27 J 1.7	UG/L	GWMW11 MW-1	2/2	0.0461 - 0.0461	0.27 1.7	NA NA	12 N/R6	NA NA		No	
	107-06-2 108-67-8	1,2-DICHLOROETHANE	0.1 L,J 0.06 J	0.06 J	UG/L UG/L	GWMW11	3 / 79	0.0866 - 2.5 0.0595 - 0.0595	***	NA NA	5 MCL 12 N/R6	NA NA		No No	FOD, BSL BSL
	67-64-1	1,3,5-TRIMETHYLBENZENE (MESITYLENE) ACETONE	1.49	0.06 J 48 B		GWMW06	1/2 3/79	0.0595 - 0.0595	0.06	NA NA	5.475 N/R6	NA NA			_
		BENZENE	0.12 L.J	48 B 22 J	UG/L UG/L	MW-1	3 / 79 44 / 79	0.471 - 25	48 22	NA NA	5,475 N/R6 5 MCL	NA NA	-	No Yes	FOD, BSL ASL
	71-43-2 75-25-2	BROMOFORM	0.12 L,J 0.59	22 J 23 J.v	UG/L UG/L	GWMW04	44 / 79	0.0622 - 2.5	22	NA NA	80 MCL	NA NA	_	Yes No	BSL
	7440-70-2	CALCIUM	12.7	23 J,V 194	mg/L	MW-SF1	11 / 11	0.0632 - 2.5	23 194	NA NA	NA NA	NA NA		No No	NUT
	75-15-0	CARBON DISULFIDE	0.24 L.J	0.44 L.J	UG/L	GWMW09	2/77	0.2 - 0.2	0.44	NA NA	1.043 N/R6	NA NA		No No	FOD. BSL
	67-66-3	CHLOROFORM	0.24 L,3 0.87 J	11 J.v	UG/L	GWMW03	16 / 79	0.0871 - 2.5	11	NA NA	80 MCL	NA NA		No No	BSL BSL
	74-87-3	CHLOROMETHANE	0.87 J 0.15 L.J	0.15 L.J	UG/L	GWMW11	1/79	0.0406 - 2.5	0.15	NA NA	2.1 C/R6	NA NA		No No	FOD, BSL
	156-59-2	cis-1.2-DICHI OROFTHYI FNF	0.15 L,3	0.13 L,3 0.21 L.J	UG/L	GWMW01	3 / 79	0.0400 - 2.5	0.13	NA NA	70 MCL	NA NA		No.	FOD, BSL
		cis-1,3-DICHLOROPROPENE	0.1 L,J	0.21 L,3 0.41 L.J	UG/L	GWMW03	1/79	0.0373 - 2.5	0.41	NA NA	0.40 C/R6	NA NA		No No	FOD, BSL
	110-82-7	CYCLOHEXANE	0.41 L,J	0.41 E,3	UG/L	MW-1	13 / 77	0.5 - 2.5	0.59	NA NA	12.514 N/R6	NA NA		No.	BSL
	75-71-8	DICHLORODIFLUOROMETHANE	0.11 L,0	1.5 J	UG/L	MW-SF10	9 / 79	0.0536 - 2.5	1.5	NA NA	395 N/R6	NA NA		No	BSL
	100-41-4	ETHYLBENZENE	0.11 L.J	1.2 J	UG/L	MW-1	2 / 79	0.0558 - 2.5	1.2	NA NA	700 MCL	NA.		No	FOD. BSL
	98-82-8	ISOPROPYLBENZENE (CUMENE)	0.25 L.J	0.25 L.J	UG/L	MW-1	1 / 79	0.0495 - 2.5	0.25	NA NA	658 N/R6	NA.		No	FOD, BSL
	7439-95-4	MAGNESIUM	7.09	43	mg/L	GWMW01	9 / 11	0.05 - 0.05	43	NA	NA	NA		No	NUT
	78-93-3	METHYL ETHYL KETONE (2-BUTANONE)	1 L.J	23	UG/L	GWMW06	15 / 79	0.286 - 25	23	NA	7.065 N/R6	NA		No	BSL
	95-47-6	O-XYLENE (1,2-DIMETHYLBENZENE)	0.07 J	0.07 J	UG/L	GWMW11	1/2	0.0603 - 0.0603	0.07	NA	10.000 MCL	NA.		No	BSL
	1634-04-4	tert-BUTYL METHYL ETHER	0.12 L.J	130 J.^	UG/L	GWMW08	6 / 79	0.057 - 5	130	NA	6.2 C/R6	NA		Yes	ASL
	127-18-4	TETRACHLOROETHYLENE(PCE)	0.09 J	25	UG/L	MW-SF1	53 / 79	0.0771 - 2.5	25	NA	5 MCL	NA	-	Yes	ASL
	108-88-3	TOLUENE	0.22 J	95 J	UG/L	GWMW09	49 / 79	0.0566 - 4.2	95	NA	1,000 MCL	NA		No	BSL
	156-60-5	trans-1,2-DICHLOROETHENE	0.17 L,J	0.17 L,J	UG/L	GWMW10	1 / 79	0.0726 - 2.5	0.17	NA	100 MCL	NA		No	FOD, BSL
	79-01-6	TRICHLOROETHYLENE (TCE)	0.13 L,J	2.8	UG/L	GWMW01	25 / 79	0.0714 - 2.5	2.8	NA	5 MCL	NA	-	No	BSL
	75-69-4	TRICHLOROFLUOROMETHANE	0.14 L,J	0.17 L,J	UG/L	MW-3	2 / 79	0.0648 - 2.5	0.17	NA	1,288 N/R6	NA	-	No	FOD, BSL
	1330-20-7	XYLENES, TOTAL	0.15 L,J	0.21 L,J	UG/L	GWMW07	2 / 77	0.5 - 2.5	0.21	NA	10,000 MCL	NA		No	FOD, BSL

Maximum concentration is used for screening.

Qualifier: B = Indicates that this result may be biased high because of laboratory or field contamination.

J = Estimated. This qualifier indicates that the analyte was detected, but the reported concentration should be considered estimated.

J,^ = Indicates that this result is an estimated concentration and may be biased high due to QA/QC issues. Actual concentration may be lower than the concentration reported.

J,v = Indicates that this result is an estimated concentration and may be biased low due to QA/QC issues. Actual concentration may be higher than the concentration reported.

L,J = Indicates that the reported concentration is below the CRQL and should be considered an estimated value.

(2) Background level is not available

(3) Federal Maximum Contaminant Levels (MCL; EPA, 2002).

When MCL is not available, EPA Region 6 Medium-Specific Screening Levels (MSSL) for Tap Water adjusted by HQ=1 (EPA R6, 2005) is used.

(4) Rationale Codes

Selection Reason: Above Screening Level (ASL) Deletion Reason: Below Screening Level (BSL) Essential Nutrient (NUT)

Frequency of Detection (FOD)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

MCL = Maximum Contaminant Level

NA = Not available

R6 = EPA Region 6 MSSL

C = Carcinogenic

N = Non-Carcinogenic

Table A1-3.1 RME MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Point	Chemical of	Units	Arithmetic Mean	95% UCL (N/T/NP/G)	Maximum Concentration		Exposure Po	oint Concentration	
	Potential Concern				(Qualifier)	Value	Units	Statistic	Rationale
Indoor Air (Vapor Intrusion)									
Property A	TETRACHLOROETHYLENE (PCE)	ppbv	157		460 =	460	ppbv	Maximum	(1)
Property B	TETRACHLOROETHYLENE (PCE)	ppbv	236		644 =	644	ppbv	Maximum	(1)
Property C	TETRACHLOROETHYLENE (PCE)	ppbv	313		578 =	578	ppbv	Maximum	(1)
Property D	TETRACHLOROETHYLENE (PCE)	ppbv	207		443 =	443	ppbv	Maximum	(1)
Property E	TETRACHLOROETHYLENE (PCE)	ppbv	167		248 =	248	ppbv	Maximum	(1)
Property F	TETRACHLOROETHYLENE (PCE)	ppbv	282		411 =	411	ppbv	Maximum	(1)
Property G	TETRACHLOROETHYLENE (PCE)	ppbv	174		228 =	228	ppbv	Maximum	(1)
PAL Boxing Facility	TETRACHLOROETHYLENE (PCE)	ppbv	88.9		206 =	206	ppbv	Maximum	(1)

⁽¹⁾ Maximum detected concentration was used as the Upper-Bound Case EPC.

Table A1-3.1 CTE MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Point	Chemical of	Units	Arithmetic Mean	95% UCL (N/T/NP/G)	Maximum Concentration		Exposure Po	oint Concentration	
	Potential Concern				(Qualifier)	Value	Units	Statistic	Rationale
Indoor Air (Vapor Intrusion)									
Property A	TETRACHLOROETHYLENE (PCE)	ppbv	157		460 =	157	ppbv	Mean	(1)
Property B	TETRACHLOROETHYLENE (PCE)	ppbv	236		644 =	236	ppbv	Mean	(1)
Property C	TETRACHLOROETHYLENE (PCE)	ppbv	313		578 =	313	ppbv	Mean	(1)
Property D	TETRACHLOROETHYLENE (PCE)	ppbv	207		443 =	207	ppbv	Mean	(1)
Property E	TETRACHLOROETHYLENE (PCE)	ppbv	167		248 =	167	ppbv	Mean	(1)
Property F	TETRACHLOROETHYLENE (PCE)	ppbv	282		411 =	282	ppbv	Mean	(1)
Property G	TETRACHLOROETHYLENE (PCE)	ppbv	174		228 =	174	ppbv	Mean	(1)

⁽¹⁾ Average concentration was used as the EPC.

Table A1-3 - Supplement A Parameters Used in the Johnson and Ettinger Model, Residential Land Use

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Symbol	Parameter	Description	Selected Value	Units	Sources
					Based on Figure 8 from the User's Guide (USEPA,
T _S	Average Soil Temperature		20	°C	2004)
L _F	Depth Below Grade to Bottom of Enclosed Space Floor	This is the depth from soil surface to the bottom of the floor in contact with soil	15	cm	Represents 6 inch thick concrete slab. Considered representative of structures at the residential development.
L _t	Depth Below Grade to Top of Contamination	This is the depth from soil surface to the top of VOC-contaminated soil. It represents the depth of a VOC contaminant source in soil, or the "dry zone" between the surface and VOC contaminant source	152	cm	Based on the depth of shallow soil gas sampling (5 feet).
h _A	Thickness of Soil Stratum A		152	cm	Thickness of soil stratum A is assumed consistent with average depth to top of soil contamination.
h _B	Thickness of Soil Stratum B		NA	cm	Not Used
h_{C}	Thickness of Soil Stratum C		NA	cm	Not Used
	Soil Stratum A SCS Soil Type	Used to estimate soil vapor permeability	LS	unitless	Assumed to be loamy sand, based on soil classification results the U.S. Geological Survey.
k _v	User-defined Effective Soil Vapor Permeability	A parameter associated with convective transport of vapors within the zone of influence of a building. It is related to the size and shape of connected soil pores	1.00E-07	cm ²	Soil permeability consistent with a sand. Represents a drainage layer underneath the foundation.
${\rho_b}^A$	Stratum A Soil Dry Bulk Density		NA	g/cm ³	Not used - conversion to soil gas concentration not required.
n ^A	Stratum A Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity	0.39	unitless	Default porosity provided in the model (USEPA, 2004).
$\theta_{\sf w}^{\;\sf A}$	Stratum A Soil Water-filled porosity	Used with total porosity to calculate air-filled porosity	0.076		Default moisture content provided in the model (USEPA, 2004).
ρ_b^B	Stratum B Soil Dry Bulk Density		NA	g/cm ³	Not Used
n ^B	Stratum B Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity (see below)	NA	unitless	Not Used
$\theta_{\sf w}^{\;\sf B}$	Stratum B Soil Water-filled porosity	Used with total porosity to calculate air-filled porosity	NA		Not Used
ρ _b C	Stratum C Soil Dry Bulk Density		NA	g/cm ³	Not Used
n ^C	Stratum C Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity (see below)	NA	unitless	Not Used

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Table A1-3 - Supplement A Parameters Used in the Johnson and Ettinger Model, Residential Land Use

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Symbol	Parameter	Description	Selected Value	Units	Sources
		Used with total porosity to calculate air-filled			
$\theta_{w'}{}^{C}$	Stratum C Soil Water-filled porosity	porosity (see below)	NA	cm ³ /cm ³	Not Used
L _{crack}	Enclosed Space Floor Thickness		15	cm	Represents 6 inch thick concrete slab
Δ_{P}	Soil-Building Pressure Differential		40	g/cm-s ²	Default in the User's Guide (USEPA, 2004).
L _B	Enclosed Space Floor Length		1180	cm	Length and width is based on the assumption of a 1,500 square foot home
W _B	Enclosed Space Floor Width		1180	cm	
H _B	Enclosed Space Heigh		244	cm	Indoor ceiling is assumed to be 8 fee
w	Floor-Wall Seam Crack Width	This assumed to be a gap present at the junction between the floor and the foundation perimeter. This gap is due to building design or concrete shrinkage. It represents the route for soil gas intrusion into a building. The crack-to-total area ratic (used to calculate vapor flow into the building) is proportional to the value of this parameter.	0.5	ст	Crack width and vapor permeability estimate produces a $Q_{\text{soil}}/Q_{\text{building}}$ ratio consistent with values published in the literature (Johnson, 2002). Calculated soil gas flow into structures (Qsoil) of 9.7 L/min) is higher than USEPA's default value for Q_{soil} of 5 L/min.
ER	Indoor air exchange rate	Building ventilation rate, expressed in units of air changes per hour (ACH)	0.25	(1/h)	USEPA, 2004
AT _C	Averaging Time for Carcinogens		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
AT _{NC}	Averaging Time for Noncarcinogens		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
ED	Exposure Duration		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
EF	Exposure Frequency		NA	days/yr	Not Used. Exposure parameters presented in Table 4.1 RME.
TR	Target Risk for Carcinogens	Used to calculate risk-based concentration	NA	unitless	Not Used. Exposure parameters presented in Table 4.1 RME.
THQ	Target Hazard Quotient for Noncarcinogens	Used to calculate risk-based concentration	NA	days/yr	Not Used. Exposure parameters presented in Table 4.1 RME.

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Table A1-3 - Supplement B

Parameters Used in the Johnson and Ettinger Model, Non-Residential Land Use (PAL)

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Symbol	Parameter	Description	Selected Value	Units	Sources
T _S	Average Soil Temperature		20	°C	Based on Figure 8 from the User's Guide (USEPA, 2004)
L _F	Depth Below Grade to Bottom of Enclosed Space Floor	This is the depth from soil surface to the bottom of the floor in contact with soil	15	cm	Represents 6 inch thick concrete slab. Considered representative of structures at the residential development.
L _t	Depth Below Grade to Top of Contamination	This is the depth from soil surface to the top of VOC-contaminated soil. It represents the depth of a VOC contaminant source in soil, or the "dry zone" between the surface and VOC contaminant source	152	cm	Based on the depth of shallow soil gas sampling (5 feet).
h _A	Thickness of Soil Stratum A		152	cm	Thickness of soil stratum A is assumed consistent with average depth to top of soil contamination.
h _B	Thickness of Soil Stratum B		NA	cm	Not Used
h _C	Thickness of Soil Stratum C		NA	cm	Not Used
	Soil Stratum A SCS Soil Type	Used to estimate soil vapor permeability	LS		Assumed to be loamy sand, based on soil classification results the U.S. Geological Survey.
k _v	User-defined Effective Soil Vapor Permeability	A parameter associated with convective transport of vapors within the zone of influence of a building. It is related to the size and shape of connected soil pores	1.00E-07	cm ²	Soil permeability consistent with a sand. Represents a drainage layer underneath the foundation.
${\rho_b}^A$	Stratum A Soil Dry Bulk Density		NA	g/cm ³	Not used - conversion to soil gas concentration not required.
n ^A	Stratum A Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity (see below)	0.39	unitless	Default porosity provided in the model (USEPA, 2004).
θ_{w}^{A}	Stratum A Soil Water-filled porosity	Used with total porosity to calculate air-filled porosity	0.076	cm ³ /cm ³	Default moisture content provided in the model (USEPA, 2004).
ρ _b	Stratum B Soil Dry Bulk Density		NA	g/cm ³	Not Used
n ^B	Stratum B Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity (see below)	NA	unitless	Not Used
θ_{w}^{B}	Stratum B Soil Water-filled porosity	Used with total porosity to calculate air-filled porosity	NA		Not Used
ρ _b C	Stratum C Soil Dry Bulk Density		NA	g/cm ³	Not Used
n ^C	Stratum C Total Soil Porosity	Used with water-filled porosity to calculate air-filled porosity (see below)	NA	unitless	Not Used

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Table A1-3 - Supplement B

Parameters Used in the Johnson and Ettinger Model, Non-Residential Land Use (PAL)

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Symbol	Parameter	Description	Selected Value	Units	Sources
		Used with total porosity to calculate air-			
$\theta^{w_{C}}$	Stratum C Soil Water-filled porosity	filled porosity (see below)	NA	cm ³ /cm ³	Not Used
L _{crack}	Enclosed Space Floor Thickness		15	cm	Represents 6 inch thick concrete slab.
Δ_{P}	Soil-Building Pressure Differential		40	g/cm-s ²	Default in the User's Guide (USEPA, 2004).
L _B	Enclosed Space Floor Length		3048	cm	Length and width is based on the assumption of a 10,000 square foot building
W_B	Enclosed Space Floor Width		3048	cm	
H _B	Enclosed Space Height		366	cm	Indoor ceiling is assumed to be 12 feet.
w	Floor-Wall Seam Crack Width	This assumed to be a gap present at the junction between the floor and the foundation perimeter. This gap is due to building design or concrete shrinkage. It represents the route for soil gas intrusion into a building. The crack-to-total area ratio (used to calculate vapor flow into the building) is proportional to the value of this parameter.	0.5	cm	Crack width and vapor permeability produce a Q_{soil} of 25 L/min. It is uncertain if these assumptions overstate or understate vapor intrusion. Soil vapor flow has been reported only for residences, not commercial/municipal buildings.
ER	Indoor air exchange rate	Building ventilation rate, expressed in units of air changes per hour (ACH)	0.8	(1/h)	Estimated using outside air requirements presented in ASHRAE, 2001.
AT _C	Averaging Time for Carcinogens		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
AT _{NC}	Averaging Time for Noncarcinogens		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
ED	Exposure Duration		NA	yrs	Not Used. Exposure parameters presented in Table 4.1 RME.
EF	Exposure Frequency		NA	days/yr	Not Used. Exposure parameters presented in Table 4.1 RME.
TR	Target Risk for Carcinogens	Used to calculate risk-based concentration	NA	unitless	Not Used. Exposure parameters presented in Table 4.1 RME.
THQ	Target Hazard Quotient for Noncarcinogens	Used to calculate risk-based concentration	NA	days/yr	Not Used. Exposure parameters presented in Table 4.1 RME.

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Table A1-3 - Supplement C MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Exposure Point Concentration	n (RME) - Maxim	ium			
				Modeled	Modeled
	PCE in Soil	PCE in Soil	PCE in Soil	Indoor Air	Indoor Air
	Gas	Gas	Gas	Concentration	Concentration
Exposure Point	(ppbv)	(ug/L)	(ug/m³)	(ug/m³)	(mg/m ³)
Property A	460	3.17	3,173	8.41	0.00841
Property B	644	4.44	4,442	11.77	0.01177
Property C	578	3.99	3,987	10.56	0.01056
Property D	443	3.06	3,056	8.10	0.00810
Property E	248	1.71	1,711	4.53	0.00453
Property F	411	2.84	2,835	7.51	0.00751
Property G	228	1.57	1,573	4.17	0.00417

Exposure Point Concentrat	ion (CTE) - Averag	je			
				Modeled	Modeled
	PCE in Soil	PCE in Soil	PCE in Soil	Indoor Air	Indoor Air
	Gas	Gas	Gas	Concentration	Concentration
Exposure Point	(ppbv)	(ug/L)	(ug/m³)	(ug/m³)	(mg/m³)
Property A	157	1.08	1,083	2.87	0.00287
Property B	236	1.62	1,624	4.30	0.00430
Property C	313	2.16	2,158	5.72	0.00572
Property D	207	1.42	1,425	3.77	0.00377
Property E	167	1.15	1,155	3.06	0.00306
Property F	282	1.94	1,944	5.15	0.00515
Property G	174	1.20	1,200	3.18	0.00318

Notes:

Attenuation Factor from Johnson and Ettinger Model

(Residential) 2.65E-03

Molecular Weight (MW) -

PCE 165.83

Molar Volume (MV) @ 20

oC and 1 atm 24

Unit Conversion Equations:

PCE (ug/L) = PCE (ppbv) x MW (g/mol) / MV (L/mol) / 1000

PCE (ug/m3) = PCE (ug/L) x 1000 (L/m3)

PCE (mg/m3) = PCE (ug/m3) / 1000 (mg/ug)

PCE - perchloroethylene

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Table A1-3 - Supplement D

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Griggs and Walnut Groundwater Plume Site Las Cruces, NM

Exposure Point Concentratio	n (RME) - Maxim	ium										
Modeled Modeled												
	PCE in Soil	PCE in Soil	PCE in Soil	Indoor Air	Indoor Air							
	Gas	Gas	Gas	Concentration	Concentration							
Exposure Point	(ppbv)	(ug/L)	(ug/m³)	(ug/m³)	(mg/m ³)							
PAL Boxing Facility	206	1.42	1,421	0.49	0.00049							

Notes:

Attenuation Factor from Johnson and Ettinger Model

(Residential) 3.43E-04

Molecular Weight (MW) -

PCE 165.83

Molar Volume (MV) @ 20

oC and 1 atm 24

Unit Conversion Equations:

PCE (ug/L) = PCE (ppbv) x MW (g/mol) / MV (L/mol) / 1000

PCE (ug/m3) = PCE (ug/L) x 1000 (L/m3) PCE (mg/m3) = PCE (ug/m3) / 1000 (mg/ug)

PCE - perchloroethylene

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Table A1-4.1 RME VALUES USED FOR DAILY INTAKE CALCULATIONS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Indoor Air	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m³	See Table 3.1.RME	CDI (mg/kg-day) =
			(Vapor Intrusion)	IN	Inhalation Rate	20	m³/day	EPA, 1991	CA x IN x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	CA calculated using Johnson and Ettinger Model
				ED	Exposure Duration	24	years	EPA, 1991	based on measured soil vapor concentrations.
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Indoor Air	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m ³	See Table 3.1.RME	CDI (mg/kg-day) =
			(Vapor Intrusion)	IN	Inhalation Rate	10	m³/day	EPA R6 (1)	CA x IN x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	CA calculated using Johnson and Ettinger Model
				ED	Exposure Duration	6	years	EPA, 1991	based on measured soil vapor concentrations.
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Indoor Air	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m ³	See Table 3.1.RME	CDI (mg/kg-day) =
			(Vapor Intrusion)	IN-A	Inhalation Rate, Adult	20	m³/day	EPA, 1991	CA x IN-Adj x EF x 1/AT
				IN-C	Inhalation Rate, Child	10	m³/day	EPA R6 (1)	CA calculated using Johnson and Ettinger Model
				IN-Adj	Inhalation Rate, Age-adjusted	10.9	m ³ /hour	calculated	based on measured soil vapor concentrations.
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	IN-Adj (m³-year/kg-day) =
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	(ED-C x IN-C / BW-C) + (ED-A x IN-A / BW-A)
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Table A1-4.1 RME VALUES USED FOR DAILY INTAKE CALCULATIONS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Medium: Groundwater

Exposure Medium: Indoor Air (Vapor Intrusion)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Indoor Air	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m ³	See Table 3.1.RME	CDI (mg/kg-day) =
(cont.)	(PAL Boxing Facility)		(Vapor Intrusion)	IN	Inhalation Rate	20	m ³ /8 hr work day	EPA, 1991	CA x IN x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	CA calculated using Johnson and Ettinger Model
				ED	Exposure Duration	25	years	EPA, 1991	based on measured soil vapor concentrations.
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Recreational User	Adolescent	Indoor Air	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m ³	See Table 3.1.RME	CDI (mg/kg-day) =
	(PAL Boxing Facility)		(Vapor Intrusion)	IN	Inhalation Rate	20	m ³ /day	EPA, 1991	CA x IN x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	120	days/year	(2)	CA calculated using Johnson and Ettinger Model
				ET	Exposure Time	4	hours/day	(2)	based on measured soil vapor concentrations.
				ED	Exposure Duration	12	years	(2)	
				BW	Body Weight	45	kg	(3)	
				AT-N	Averaging Time (Non-Cancer)	4,380	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

- (1) EPA Region 6, Undated: Memorandum, Central Tendency and RME Exposure Parameters.
- (2) Best Professional Judgement.
- (3) Recreational use scenario body weight assumption is an averaged value for a child ranging between 6 and 18 years of age.

Table A1-5.1 NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Griggs and Walnut Ground Water Plume Site

Chemical of Potential	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal (2)		Primary Target	Combined Uncertainty/Modifying	RfD:Target Organ(s)	
Concern		Value	Units	(1)	Value	Units	Organ(s)	Factors	Source(s)	Date(s) (MM/DD/YYYY)
Benzene	Chronic	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Blood	300/1	IRIS	3/22/2006
Benzene	Subchronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Blood, Immune	3000	NCEA	7/2/1996
Methyl tertiary butyl ether (MTBE)	Chronic/Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	IRIS	3/29/2004
Tetrachloroethylene	Chronic	1.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Liver	1000/1	IRIS	3/22/2006
Tetrachloroethylene	Subchronic	1.0E-01	mg/kg-day	1	1.0E-01	mg/kg-day	Liver	100	HEAST	7/1/1997

Footnote Instructions:

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evalution Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.

(2) See Risk Assessment text for the derivation of the "Absorbed RfD for Dermal"

Definitions: HEAST = Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NCEA = National Center for Environmental Assessment

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Table A1-5.2 NON-CANCER TOXICITY DATA -- INHALATION

Griggs and Walnut Ground Water Plume Site

Chemical of Potential	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target	Combined Uncertainty/Modifying	RfC : Target Organ(s)		
Concern		Value	Units	Value	Units	Organ(s)	Factors	Source(s)	Date(s) (MM/DD/YYYY)	
Benzene	Chronic	3.0E-02	mg/m³	8.6E-03	mg/kg/day	Blood	300/1	IRIS	3/22/2006	
Benzene	Subchronic	6.0E-02	mg/m ³	1.7E-02	mg/kg/day	Blood	100	NCEA	7/2/1996	
Methyl tertiary butyl ether (MTBE)	Chronic	3.0E+00	mg/m ³	8.6E-01	mg/kg-day	Liver, Kidney	100/1	IRIS	3/22/2006	
Tetrachloroethylene	Chronic/Subchronic	4.0E-01	mg/m3	1.1E-01	mg/kg-day	Liver, Kidney	N/A	NCEA	6/20/1997	

(1) Inhalation RfC value was converted to a corresponding RfD value, assuming human body weight of 70 kg and inhalation rate of 20 m³/day,

as follows:

 $RfD [mg/kg/day] = RfC [mg/m3] \times 20 [m3/day] / 70 [kg]$

Definitions: IRIS = Integrated Risk Information System

NA = Not Available

NCEA = National Center for Environmental Assessment

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Table A1-6.1 CANCER TOXICITY DATA -- ORAL/DERMAL

Griggs and Walnut Ground Water Plume Site

Chemical of Potential	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline	Oral CSF	
Concern	Value	Units	(1)	Value	Units	Description	Source(s)	Date(s) (MM/DD/YYYY)
Benzene	5.5E-02	(mg/kg-day) ⁻¹	1	5.5E-02	(mg/kg-day) ⁻¹	Α	IRIS	3/22/2006
Methyl tertiary butyl ether (MTBE)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	5.4E-01	(mg/kg-day) ⁻¹	1	5.4E-01	(mg/kg-day) ⁻¹	C - B2	OSWER	6/12/2003

(1) Source: Risk Assessment Guidance for Superfund: Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1.

(2) See Risk Assessment text for derivation of the "Absorbed Cancer Slope Factor for Dermal".

Definitions:

OSWER = Office of Solid Waste and Emergency Response

IRIS = Integrated Risk Information System

Weight of Evidence definitions:

Group A chemicals (human carcinogens) are agents for which there is sufficient evidence of carcinogenicity based on evidence from epidemiological studies.

Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.

Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.

Table A1-6.2 CANCER TOXICITY DATA -- INHALATION

Griggs and Walnut Ground Water Plume Site

Chemical of Potential	Unit	Risk	Inhalation Cand	cer Slope Factor	Weight of Evidence/ Cancer Guideline	Unit Risk : Inhalation CSF	
Concern	Value	Units	Value	Units	Description	Source(s)	Date(s) (MM/DD/YYYY)
Benzene	7.8E-06	(µg/m³) ⁻¹	2.7E-02	(mg/kg-day) ⁻¹	Α	IRIS	3/22/2006
Methyl tertiary butyl ether (MTBE)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	5.9E-06	(µg/m³) ⁻¹	2.1E-02	(mg/kg-day) ⁻¹	C - B2	OSWER	6/12/2003

Weight of Evidence definitions:

Group A chemicals (human carcinogens) are agents for which there is sufficient evidence of carcinogenicity based on evidence from epidemiological studies.

Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.

Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.

Definitions: OSWER = Office of Solid Waste and Emergency Response

IRIS = Integrated Risk Information System

Table A1-7.1 RME CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS REASONABLE MAXIMUM EXPOSURE Griggs and Walnut Ground Water Plume Site

Scenario Timeframe:	Current/Future
Receptor Population:	Resident
Receptor Age: Adult	

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	EPC			Cance	r Risk Calcula	ations			Non-Ca	ncer Hazard Cald	culations	
				Potential Concern	Value	Units	Intake/Exposure	e Concentration	CSF	-/Unit Risk	Cancer Risk	Intake/Exposu	re Concentration	RfD	/RfC	Hazard Quotient
							Value	Units	Value	Units	1	Value	Units	Value	Units	Quotient
Ground Water	Indoor Air	Indoor Air (Property A)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.4E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.3E-03	mg/kg/day	1.1E-01	mg/kg/day	2.1E-02
			Exp. Route Total								0.0E+00		•		•	2.1E-02
		Exposure Point Total									0.0E+00					2.1E-02
	Exposure Medium Total										0.0E+00					2.1E-02
Ground Water and Total	, , , , , , , , , , , , , , , , , , , ,					1					0.0E+00					2.1E-02
Ground Water	Indoor Air	Indoor Air (Property B)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.2E-02	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	3.2E-03	mg/kg/day	1.1E-01	mg/kg/day	2.9E-02
	<u> </u>		Exp. Route Total								0.0E+00					2.9E-02
		Exposure Point Total									0.0E+00					2.9E-02
	Exposure Medium Total										0.0E+00					2.9E-02
Ground Water and Total											0.0E+00					2.9E-02
Ground Water	Indoor Air	Indoor Air (Property C)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.1E-02	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.9E-03	mg/kg/day	1.1E-01	mg/kg/day	2.6E-02
			Exp. Route Total								0.0E+00					2.6E-02
		Exposure Point Total									0.0E+00					2.6E-02
	Exposure Medium Total										0.0E+00					2.6E-02
Ground Water and Total											0.0E+00					2.6E-02
Ground Water	Indoor Air	Indoor Air (Property D)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.1E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.2E-03	mg/kg/day	1.1E-01	mg/kg/day	2.0E-02
			Exp. Route Total								0.0E+00					2.0E-02
		Exposure Point Total									0.0E+00					2.0E-02
	Exposure Medium Total										0.0E+00					2.0E-02
Ground Water and Total											0.0E+00					2.0E-02
Ground Water	Indoor Air	Indoor Air (Property E)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.5E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	1.2E-03	mg/kg/day	1.1E-01	mg/kg/day	1.1E-02
			Exp. Route Total								0.0E+00					1.1E-02
		Exposure Point Total									0.0E+00					1.1E-02
	Exposure Medium Total						1				0.0E+00					1.1E-02
Ground Water and Total					1			1		1	0.0E+00		1	1	1	1.1E-02
Ground Water	Indoor Air	Indoor Air (Property F)	Inhalation	TETRACHLOROETHYLENE (PCE)	7.5E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.0E-03	mg/kg/day	1.1E-01	mg/kg/day	1.9E-02
			Exp. Route Total								0.0E+00					1.9E-02
		Exposure Point Total									0.0E+00					1.9E-02
	Exposure Medium Total										0.0E+00					1.9E-02
Ground Water and Total	, 					1					0.0E+00				1	1.9E-02
Ground Water	Indoor Air	Indoor Air (Property G)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.2E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	1.1E-03	mg/kg/day	1.1E-01	mg/kg/day	1.0E-02
			Exp. Route Total								0.0E+00					1.0E-02
		Exposure Point Total									0.0E+00					1.0E-02
	Exposure Medium Total										0.0E+00					1.0E-02
Ground Water and Total							I				0.0E+00					1.0E-02

Table A1-7.1 RME CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS REASONABLE MAXIMUM EXPOSURE Griggs and Walnut Ground Water Plume Site

Scenario Timeframe:	Current/Euture
ocenano minename.	Current/Future
Receptor Population:	Resident
Receptor Age: Child	

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	EPC			Cancer	Risk Calcula	ations			Non-Ca	ncer Hazard Cald	culations	
				Potential Concern	Value	Units	Intake/Exposure	Concentration	CSF	/Unit Risk	Cancer Risk	Intake/Exposu	re Concentration	RfD/	/RfC	Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Indoor Air	Indoor Air (Property A)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.4E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	5.4E-03	mg/kg/day	1.1E-01	mg/kg/day	4.9E-02
			Exp. Route Total								0.0E+00					4.9E-02
		Exposure Point Total									0.0E+00					4.9E-02
Ground Waterand Total	Exposure Medium Total										0.0E+00 0.0E+00					4.9E-02 4.9E-02
															$\overline{}$	
Ground Water	Indoor Air	Indoor Air (Property B)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.2E-02	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	7.5E-03	mg/kg/day	1.1E-01	mg/kg/day	6.8E-02
			Exp. Route Total								0.0E+00					6.8E-02
		Exposure Point Total									0.0E+00					6.8E-02
Constant Material Table	Exposure Medium Total			Ir.							0.0E+00					6.8E-02
Ground Waterand Total	1				1			1			0.0E+00				$\overline{}$	6.8E-02
Ground Water	Indoor Air	Indoor Air (Property C)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.1E-02	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	6.8E-03	mg/kg/day	1.1E-01	mg/kg/day	6.1E-02
			Exp. Route Total								0.0E+00					6.1E-02
		Exposure Point Total									0.0E+00					6.1E-02
	Exposure Medium Total			T.							0.0E+00					6.1E-02
Ground Waterand Total											0.0E+00					6.1E-02
Ground Water	Indoor Air	Indoor Air (Property D)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.1E-03	mg/m³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	5.2E-03	mg/kg/day	1.1E-01	mg/kg/day	4.7E-02
			Exp. Route Total								0.0E+00					4.7E-02
		Exposure Point Total									0.0E+00					4.7E-02
	Exposure Medium Total										0.0E+00					4.7E-02
Ground Waterand Total	1		T					<u> </u>		_	0.0E+00		_	1		4.7E-02
Ground Water	Indoor Air	Indoor Air (Property E)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.5E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.9E-03	mg/kg/day	1.1E-01	mg/kg/day	2.6E-02
			Exp. Route Total								0.0E+00					2.6E-02
	E M. F T. I.I.	Exposure Point Total									0.0E+00					2.6E-02
Ground Waterand Total	Exposure Medium Total			li .							0.0E+00 0.0E+00					2.6E-02 2.6E-02
Ground Waterand Total	1							1			0.0E+00					2.0E-U2
Ground Water	Indoor Air	Indoor Air (Property F)	Inhalation	TETRACHLOROETHYLENE (PCE)	7.5E-03	mg/m ³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	4.8E-03	mg/kg/day	1.1E-01	mg/kg/day	4.4E-02
			Exp. Route Total								0.0E+00					4.4E-02
		Exposure Point Total									0.0E+00					4.4E-02
	Exposure Medium Total			i			-				0.0E+00					4.4E-02
Ground Waterand Total	1		1	<u> </u>	1			1			0.0E+00					4.4E-02
Ground Water	Indoor Air	Indoor Air (Property G)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.2E-03	mg/m³	NA	mg/kg/day	NA	1/(mg/kg-day)	NA	2.7E-03	mg/kg/day	1.1E-01	mg/kg/day	2.4E-02
			Exp. Route Total								0.0E+00					2.4E-02
	1	Exposure Point Total						-		· · · · · · · · · · · · · · · · · · ·	0.0E+00					2.4E-02
				•												
Ground Waterand Total	Exposure Medium Total	·									0.0E+00 0.0E+00					2.4E-02 2.4E-02

Table A1-7.1 RME CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS REASONABLE MAXIMUM EXPOSURE Griggs and Walnut Ground Water Plume Site

Scenario Timeframe:	Current/Future
Receptor Population:	Resident
Receptor Age: Adult/	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	Е	PC		Cance	r Risk Calcula	ations			Non-Can	er Hazard Calcul	ations	
				Potential Concern	Value	Units	Intake/Exposure	e Concentration	CSF	/Unit Risk	Cancer Risk	Intake/Exposu	re Concentration	RfD/	RfC	Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Indoor Air	Indoor Air (Property A)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.4E-03	mg/m ³	1.2E-03	mg/kg/day	2.1E-02	1/(mg/kg-day)	2.6E-05	NA	mg/kg/day	NA	mg/kg/day	NA
	1		Exp. Route Total								2.6E-05					0.0E+00
		Exposure Point Total									2.6E-05					0.0E+00
	Exposure Medium Total										2.6E-05					0.0E+00
Ground Waterand Total	T		T		1	1		1		1	2.6E-05		1	1	1	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property B)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.2E-02	mg/m ³	1.7E-03	mg/kg/day	2.1E-02	1/(mg/kg-day)	3.6E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								3.6E-05					0.0E+00
		Exposure Point Total	-								3.6E-05		-			0.0E+00
	Exposure Medium Total										3.6E-05					0.0E+00
Ground Waterand Total					,			,		1	3.6E-05			1		0.0E+00
Ground Water	Indoor Air	Indoor Air (Property C)	Inhalation	TETRACHLOROETHYLENE (PCE)	1.1E-02	mg/m ³	1.6E-03	mg/kg/day	2.1E-02	1/(mg/kg-day)	3.2E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								3.2E-05		•			0.0E+00
		Exposure Point Total									3.2E-05					0.0E+00
	Exposure Medium Total										3.2E-05					0.0E+00
Ground Waterand Total											3.2E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property D)	Inhalation	TETRACHLOROETHYLENE (PCE)	8.1E-03	mg/m³	1.2E-03	mg/kg/day	2.1E-02	1/(mg/kg-day)	2.5E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								2.5E-05					0.0E+00
		Exposure Point Total									2.5E-05					0.0E+00
	Exposure Medium Total										2.5E-05					0.0E+00
Ground Waterand Total	_										2.5E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property E)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.5E-03	mg/m³	6.7E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.4E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.4E-05					0.0E+00
		Exposure Point Total									1.4E-05					0.0E+00
	Exposure Medium Total										1.4E-05					0.0E+00
Ground Waterand Total	_		1		1			1		1	1.4E-05		1	1		0.0E+00
Ground Water	Indoor Air	Indoor Air (Property F)	Inhalation	TETRACHLOROETHYLENE (PCE)	7.5E-03	mg/m ³	1.1E-03	mg/kg/day	2.1E-02	1/(mg/kg-day)	2.3E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								2.3E-05					0.0E+00
		Exposure Point Total									2.3E-05					0.0E+00
	Exposure Medium Total										2.3E-05					0.0E+00
Ground Waterand Total											2.3E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property G)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.2E-03	mg/m³	6.2E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.3E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.3E-05					0.0E+00
		Exposure Point Total									1.3E-05					0.0E+00
	Exposure Medium Total										1.3E-05					0.0E+00
Ground Waterand Total											1.3E-05	<u> </u>				0.0E+00

Table A1-7.1 CTE CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS CENTRAL TENDENCY EXPOSURE Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future	_
Receptor Population: Resident	
Receptor Age: Adult/Child	

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	E	PC		Cance	er Risk Calcula	itions			Non-Can	cer Hazard Calcul	lations	
				Potential Concern	Value	Units	Intake/Exposur	e Concentration	CSF	/Unit Risk	Cancer Risk	Intake/Exposu	re Concentration	RfD	/RfC	Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Indoor Air	Indoor Air (Property A)	Inhalation	TETRACHLOROETHYLENE (PCE)	2.9E-03	mg/m ³	4.3E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	8.8E-06	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								8.8E-06					0.0E+00
		Exposure Point Total									8.8E-06					0.0E+00
	Exposure Medium Total										8.8E-06					0.0E+00
Ground Waterand Total	1		1								8.8E-06		1		1	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property B)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.3E-03	mg/m³	6.4E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.3E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.3E-05					0.0E+00
		Exposure Point Total									1.3E-05					0.0E+00
	Exposure Medium Total										1.3E-05					0.0E+00
Ground Waterand Total						,			1		1.3E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property C)	Inhalation	TETRACHLOROETHYLENE (PCE)	5.7E-03	mg/m³	8.5E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.8E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total				İ				1.8E-05					0.0E+00
		Exposure Point Total									1.8E-05					0.0E+00
	Exposure Medium Total										1.8E-05					0.0E+00
Ground Waterand Total											1.8E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property D)	Inhalation	TETRACHLOROETHYLENE (PCE)	3.8E-03	mg/m³	5.6E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.2E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.2E-05					0.0E+00
		Exposure Point Total									1.2E-05					0.0E+00
	Exposure Medium Total										1.2E-05					0.0E+00
Ground Waterand Total											1.2E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property E)	Inhalation	TETRACHLOROETHYLENE (PCE)	3.1E-03	mg/m³	4.5E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	9.4E-06	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								9.4E-06					0.0E+00
		Exposure Point Total									9.4E-06					0.0E+00
	Exposure Medium Total										9.4E-06					0.0E+00
Ground Waterand Total	1		1		1	1			1		9.4E-06	ļ	1		1	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property F)	Inhalation	TETRACHLOROETHYLENE (PCE)	5.1E-03	mg/m ³	7.6E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	1.6E-05	NA	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.6E-05					0.0E+00
		Exposure Point Total									1.6E-05					0.0E+00
	Exposure Medium Total		-	-							1.6E-05		-			0.0E+00
Ground Waterand Total											1.6E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property G)	Inhalation	TETRACHLOROETHYLENE (PCE)	3.2E-03	mg/m³	4.7E-04	mg/kg/day	2.1E-02	1/(mg/kg-day)	9.7E-06	NA	mg/kg/day	NA	mg/kg/day	NA
] .		Exp. Route Total								9.7E-06					0.0E+00
		Exposure Point Total				-					9.7E-06					0.0E+00
	Exposure Medium Total						<u> </u>				9.7E-06	<u> </u>				0.0E+00
Ground Waterand Total							l				9.7E-06					0.0E+00

Table A1-7.2 RME CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future Receptor Population: Industrial Worker Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	EPC			Cance	r Risk Calcula	tions		Non-Cancer Hazard Calculations				
				Potential Concern	Value	Units	Intake/Exposure	Concentration	CSF	/Unit Risk	Cancer Risk	Intake/Exposur	e Concentration	RfD/	RfC	Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Indoor Air	Indoor Air (PAL Boxing Facility)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.9E-04	mg/m ³	3.4E-05	mg/kg/day	2.1E-02	1/(mg/kg-day)	7.0E-07	9.5E-05	mg/kg/day	1.1E-01	mg/kg/day	8.6E-04
			Exp. Route Total								7.0E-07					8.6E-04
		Exposure Point Total									7.0E-07					8.6E-04
	Exposure Medium Total										7.0E-07					8.6E-04
Ground Waterand Total											7.0E-07					8.6E-04

Table A1-7.2 RME CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future Receptor Population: Recreator (Boxing Facility User) Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of	EPC			Cance	r Risk Calcula	tions		Non-Cancer Hazard Calculations				
				Potential Concern	Value	Units	Intake/Exposure	Concentration	CSF	Unit Risk	Cancer Risk	Intake/Exposur	e Concentration	RfD/	/RfC	Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Indoor Air	Indoor Air (PAL Boxing Facility)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.9E-04	mg/m ³	2.0E-06	mg/kg/day	2.1E-02	1/(mg/kg-day)	4.2E-08	7.6E-06	mg/kg/day	1.1E-01	mg/kg/day	6.9E-05
			Exp. Route Total								4.2E-08					6.9E-05
		Exposure Point Total									4.2E-08					6.9E-05
	Exposure Medium Total										4.2E-08					6.9E-05
Ground Waterand Total											4.2E-08					6.9E-05

Table A1-9.1 RME SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe:	Current/Future
Receptor Population:	Resident
Receptor Age: Adult	

Medium	Exposure Medium	Exposure Point	Chemical of Potential		Carcir	ogenic Risk		Non-Carcino	ogenic Hazard (Quotient		
			Concern	Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Indoor Air	Indoor Air (Property A)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.1E-02	NA	2.1E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.1E-02	NA	2.1E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	2.1E-02	NA	2.1E-02
Ground Water and Total	T	T		NA	NA	NA	0.0E+00		NA	2.1E-02	NA	2.1E-02
Ground Water	Indoor Air	Indoor Air (Property B)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.9E-02	NA	2.9E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.9E-02	NA	2.9E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	2.9E-02	NA	2.9E-02
Ground Water and Total	1			NA	NA	NA	0.0E+00		NA	2.9E-02	NA	2.9E-02
Ground Water	Indoor Air	Indoor Air (Property C)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.6E-02	NA	2.6E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02
Ground Water and Total				NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02
Ground Water	Indoor Air	Indoor Air (Property D)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.0E-02	NA	2.0E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.0E-02	NA	2.0E-02
	Exposure Medium Total	•		NA	NA	NA	0.0E+00		NA	2.0E-02	NA	2.0E-02
Ground Water and Total				NA	NA	NA	0.0E+00		NA	2.0E-02	NA	2.0E-02
Ground Water	Indoor Air	Indoor Air (Property E)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	1.1E-02	NA	1.1E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	1.1E-02	NA	1.1E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	1.1E-02	NA	1.1E-02
Ground Water and Total	1	,		NA	NA	NA	0.0E+00		NA	1.1E-02	NA	1.1E-02
Ground Water	Indoor Air	Indoor Air (Property F)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	1.9E-02	NA	1.9E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	1.9E-02	NA	1.9E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	1.9E-02	NA	1.9E-02
Ground Water and Total				NA	NA	NA	0.0E+00		NA	1.9E-02	NA	1.9E-02
Ground Water	Indoor Air	Indoor Air (Property G)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	1.0E-02	NA	1.0E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	1.0E-02	NA	1.0E-02
	Exposure Medium Total	·	-	NA	NA	NA	0.0E+00		NA	1.0E-02	NA	1.0E-02
Ground Water and Total			·	NA	NA	NA	0.0E+00		NA	1.0E-02	NA	1.0E-02

Total Circulatory HI Across Media =	NA
Total Kidney HI Across Media =	NA

Table A1-9.1 RME SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe:	Current/Future
Receptor Population:	Resident
Receptor Age: Child	

Medium	Exposure Exposure Medium Point		Chemical of Potential		Carcir	nogenic Risk		Non-Carcinogenic Hazard Quotient				
			Concern	Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Indoor Air	Indoor Air (Property A)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	4.9E-02	NA	4.9E-02
<u> </u>	Chemical Total				NA NA	NA	0.0E+00		NA	4.9E-02	NA	4.9E-02
	Exposure Medium Total					NA	0.0E+00		NA	4.9E-02	NA	4.9E-02
Ground Waterand Total	ı	1	1	NA	NA	NA	0.0E+00		NA	4.9E-02	NA	4.9E-02
Ground Water	Indoor Air	Indoor Air (Property B)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	6.8E-02	NA	6.8E-02
	Chemical Total			NA	NA	NA	0.0E+00		NA	6.8E-02	NA	6.8E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	6.8E-02	NA	6.8E-02
Ground Waterand Total	T			NA	NA	NA	0.0E+00		NA	6.8E-02	NA	6.8E-02
Ground Water	Indoor Air	Indoor Air (Property C)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	6.1E-02	NA	6.1E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	6.1E-02	NA	6.1E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	6.1E-02	NA	6.1E-02
Ground Waterand Total				NA	NA	NA	0.0E+00		NA	6.1E-02	NA	6.1E-02
Ground Water	Indoor Air	Indoor Air (Property D)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	4.7E-02	NA	4.7E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	4.7E-02	NA	4.7E-02
	Exposure Medium Total	•		NA	NA	NA	0.0E+00		NA	4.7E-02	NA	4.7E-02
Ground Waterand Total				NA	NA	NA	0.0E+00		NA	4.7E-02	NA	4.7E-02
Ground Water	Indoor Air	Indoor Air (Property E)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.6E-02	NA	2.6E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02
Exposure Medium Total		NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02		
Ground Waterand Total			NA	NA	NA	0.0E+00		NA	2.6E-02	NA	2.6E-02	
Ground Water	Indoor Air	Indoor Air (Property F)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	4.4E-02	NA	4.4E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	4.4E-02	NA	4.4E-02
Exposure Medium Total				NA	NA	NA	0.0E+00		NA	4.4E-02	NA	4.4E-02
Ground Waterand Total			NA	NA	NA	0.0E+00		NA	4.4E-02	NA	4.4E-02	
Ground Water	Indoor Air	Indoor Air (Property G)	TETRACHLOROETHYLENE (PCE)	NA	NA	NA	NA	Liver	NA	2.4E-02	NA	2.4E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	2.4E-02	NA	2.4E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	2.4E-02	NA	2.4E-02
Ground Waterand Total			NA	NA	NA	0.0E+00		NA	2.4E-02	NA	2.4E-02	

Total Circulatory HI Across Media =	NA
Total Kidney HI Across Media =	NA

Table A1-9.1 RME SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future Receptor Population: Resident Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Chemical Point of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient					
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Indoor Air	Indoor Air (Property A)	TETRACHLOROETHYLENE (PCE)	NA	2.6E-05	NA	2.6E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	2.6E-05	NA	2.6E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total					NA	2.6E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	2.6E-05	NA	2.6E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property B)	TETRACHLOROETHYLENE (PCE)	NA	3.6E-05	NA	3.6E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	3.6E-05	NA	3.6E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	3.6E-05	NA	3.6E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	3.6E-05	NA	3.6E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property C)	TETRACHLOROETHYLENE (PCE)	NA	3.2E-05	NA	3.2E-05	NA	NA	NA	NA	NA
		Chemical Total	•	NA	3.2E-05	NA	3.2E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total				3.2E-05	NA	3.2E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	3.2E-05	NA	3.2E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property D)	TETRACHLOROETHYLENE (PCE)	NA	2.5E-05	NA	2.5E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	2.5E-05	NA	2.5E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total				2.5E-05	NA	2.5E-05		NA	NA	NA	0.0E+00
Ground Waterand Total	'			NA	2.5E-05	NA	2.5E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property E)	TETRACHLOROETHYLENE (PCE)	NA	1.4E-05	NA	1.4E-05	NA NA	NA	NA	NA	NA
		Chemical Total		NA	1.4E-05	NA	1.4E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	1.4E-05	NA	1.4E-05		NA	NA	NA	0.0E+00
Ground Waterand Total			NA	1.4E-05	NA	1.4E-05		NA	NA	NA	0.0E+00	
Ground Water	Indoor Air	Indoor Air (Property F)	TETRACHLOROETHYLENE (PCE)	NA	2.3E-05	NA	2.3E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	2.3E-05	NA	2.3E-05		NA	NA	NA	0.0E+00
Exposure Medium Total					2.3E-05	NA	2.3E-05		NA	NA	NA	0.0E+00
Ground Waterand Total			NA	2.3E-05	NA	2.3E-05		NA	NA	NA	0.0E+00	
Ground Water	Indoor Air	Indoor Air (Property G)	TETRACHLOROETHYLENE (PCE)	NA	1.3E-05	NA	1.3E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00

Table A1-9.1 CTE SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS CENTRAL TENDENCY EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future	
Receptor Population: Resident	
Receptor Age: Adult/Child	

Medium	Medium Exposure Exposure Chemical Medium Point of Potential			Carcii	nogenic Risk		Non-Carcinogenic Hazard Quotient					
			Concern	Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Indoor Air	Indoor Air (Property A)	TETRACHLOROETHYLENE (PCE)	NA	8.8E-06	NA	8.8E-06	NA NA	NA	NA	NA	NA
		Chemical Total		NA	8.8E-06	NA	8.8E-06		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	8.8E-06	NA	8.8E-06		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	8.8E-06	NA	8.8E-06		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property B)	TETRACHLOROETHYLENE (PCE)	NA	1.3E-05	NA	1.3E-05	NA NA	NA	NA	NA	NA
		Chemical Total		NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	1.3E-05	NA	1.3E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property C)	TETRACHLOROETHYLENE (PCE)	NA	1.8E-05	NA	1.8E-05	NA	NA	NA	NA	NA
		Chemical Total		NA	1.8E-05	NA	1.8E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total				1.8E-05	NA	1.8E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	1.8E-05	NA	1.8E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property D)	TETRACHLOROETHYLENE (PCE)	NA	1.2E-05	NA	1.2E-05	NA	NA	NA	NA	NA
		Chemical Total	•	NA	1.2E-05	NA	1.2E-05		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	1.2E-05	NA	1.2E-05		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	1.2E-05	NA	1.2E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property E)	TETRACHLOROETHYLENE (PCE)	NA	9.4E-06	NA	9.4E-06	NA NA	NA	NA	NA	NA
		Chemical Total		NA	9.4E-06	NA	9.4E-06		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	9.4E-06	NA	9.4E-06		NA	NA	NA	0.0E+00
Ground Waterand Total				NA	9.4E-06	NA	9.4E-06		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property F)	TETRACHLOROETHYLENE (PCE)	NA	1.6E-05	NA	1.6E-05	NA NA	NA	NA	NA	NA
		Chemical Total	•	NA	1.6E-05	NA	1.6E-05		NA	NA	NA	0.0E+00
Exposure Medium Total			NA	1.6E-05	NA	1.6E-05		NA	NA	NA	0.0E+00	
Ground Waterand Total	· II			NA	1.6E-05	NA	1.6E-05		NA	NA	NA	0.0E+00
Ground Water	Indoor Air	Indoor Air (Property G)	TETRACHLOROETHYLENE (PCE)	NA	9.7E-06	NA	9.7E-06	NA	NA	NA	NA	NA
		Chemical Total		NA	9.7E-06	NA	9.7E-06		NA	NA	NA	0.0E+00
	Exposure Medium Total			NA	9.7E-06	NA	9.7E-06		NA	NA	NA	0.0E+00
Ground Waterand Total		•		NA	9.7E-06	NA	9.7E-06		NA	NA	NA	0.0E+00

Table A1-9.2 RME SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future Receptor Population: Industrial Worker Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient					
			Concern	Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total	
Ground Water	Indoor Air	Indoor Air (PAL Boxing Facility)	TETRACHLOROETHYLENE (PCE)	NA	7.0E-07	NA	7.0E-07	Liver	NA	8.6E-04	NA	8.6E-04	
		Chemical Total		NA	NA	NA	7.0E-07		NA	8.6E-04	NA	8.6E-04	
	Exposure Medium Total		NA	NA	NA	7.0E-07		NA	8.6E-04	NA	8.6E-04		
Ground Waterand Total		NA	NA	NA	7.0E-07		NA	8.6E-04	NA	8.6E-04			

009907

Table A1-9.2 RME SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS REASONABLE MAXIMUM EXPOSURE

Griggs and Walnut Ground Water Plume Site

Scenario Timeframe: Current/Future

Receptor Population: Recreator (Boxing Facility User)

Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential		Carcir	nogenic Risk		Non-Carcinogenic Hazard Quotient				
			Concern	Ingestion	Inhalation	Dermal	Exposure	Primary	Ingestion	Inhalation	Dermal	Exposure
							Routes Total	Target Organ(s)				Routes Total
Ground Water	Indoor Air	Indoor Air (PAL Boxing Facility)	TETRACHLOROETHYLENE (PCE)	NA	4.2E-08	NA	4.2E-08	Liver	NA	6.9E-05	NA	6.9E-05
		Chemical Total		NA	NA	NA	4.2E-08		NA	6.9E-05	NA	6.9E-05
	Exposure Medium Total		NA	NA	NA	4.2E-08		NA	6.9E-05	NA	6.9E-05	
Ground Waterand Total			NA	NA	NA	4.2E-08		NA	6.9E-05	NA	6.9E-05	

009908

APPENDIX B

Cost Tables

COST ESTIMATE SUMMARY²

Griggs and Walnut Superfund Site Feasibility Study Griggs and Walnut Superfund Site - Las Cruces, New Mexico PROJECT: SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: PREPARED BY: Ground Water Extraction and Treatment with Air Stripper

L.Colella, T.Palaia 346535.FS.01 PROJECT NUMBER:

Capital Cost		
Construction	\$	1,764,781
Project Management	\$	141,182
Design	\$	264,717
Construction Management	\$	264,717
Subcontractor General Requirements	\$	88,239
G&A	\$	353,309
Overhead	\$	126,182
Tax	\$	179,809
Contingency	\$	630,909
Bonding& Insurance	\$	76,277
Fee	\$ \$	305,108
Total Capital Cost	Ð	4,195,230
Year 1 Operations and Maintenance System Startup	\$	27,050
Routine System O&M	\$	357,127
Reporting (Annual Report and Construction Completion Report)	\$	73,500
Professional Services ¹	\$	105,266
Subcontractor General Requirements	\$	22,884
G&A	\$	82,016
Overhead	\$	29,291
Tax	\$	41,740
Contingency	\$	146,457
Bonding& Insurance	\$	-
Fee	\$	70,826
Total Year 1 Operations and Maintenance	\$	956,157
Annual Operations and Maintenance Cost: Years 2-5		
Routine System O&M	\$	304,087
Reporting (Annual Reports)	\$	18,375
Professional Services 1	\$	74,166
Subcontractor General Requirements	\$	16,123
G&A	\$	57,785
Overhead	\$	20,638
New Mexico Gross Receipts Tax	\$ \$	29,409
Contingency		103,188
Bonding& Insurance Fee	\$ \$	49,902
Total Annual Operations and Maintenance Cost: Years 2-5	\$	673,672
Annual Operations and Maintenance Cost: Years 6-14	•	007.744
Routine System O&M	\$	287,711
Reporting (Annual Reports)	\$	18,375
Professional Services ¹	\$	74,166
Subcontractor General Requirements G&A	\$ \$	16,123
Overhead	\$	55,493
New Mexico Gross Receipts Tax	\$	19,819 28,242
Contingency	\$	99,094
Bonding& Insurance	\$	33,034
Fee	\$	47,922
Total Annual Operations and Maintenance Cost: Years 6-14	\$	646,944
Post Closure Cost		
Closure Reporting	\$	18,375
Equipment Demobilization and Well Abandonment	\$	184,000
Professional Services ¹	\$	66,784
Subcontractor General Requirements	\$	10,119
G&A	\$	39,099
Overhead	\$	13,964
New Mexico Gross Receipts Tax	\$	19,899
Contingency	\$	69,819
Bonding& Insurance	\$	8,441
Fee Total Part Classes Cart	\$	33,765
Total Post Closure Cost	\$	464,264
TOTAL PRESENT WORTH	\$	14,132,838
		, - ,

^{1 -} Professional Services includes Project Management, Design/Technical Support, and Construction Management.
2 - The cost estimates provided are to an accuracy of +50 percent to -30 percent and are prepared for the sole purpose of alternative comparison. The alternative cost estimates are in 2006 dollars and are based on conceptual design from information available at the time of this study. The actual cost of the project would depend on the final scope and design of the selected remedial action, the schedule of implementation, competitive market conditions, and other variables.

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Site Background Data

Elevation of Site = 4100 ft amsl or 12.68 psia Volume of Contaminated Ground Water greater than 5 ug/L= 7,350 acre-ft based on JSAI model Volume of Contaminated Ground Water greater than 1 ug/L= 25,700 acre-ft based on JSAI model

PCE Concentrations in wells sampled December 2005.

Sample Location	PCE (μg/l
MW-SF1	11
MW-SF10	17
GWMW01 Port 2	21
GWMW01 Port 6	. 6

μg/L, average concentration

Pumping Rates for Plume Containment and Remediation: 14 Years (per JSAI modeling)

CLC-18	460	gpm
CLC-27	620	gpm

New Well #1 to replace operation of CLC-18 after 5 years per JSAI modeling 300

MMgal Total Annual: Years 1-5 568 Total Annual: Years 6-14 484 MMgal

Mass Estimate

based on JSAI model - JSAI estimate based on an effective porosity of 20% Mass of PCE above MCL in ground water = 150 kg of PCE and does not address potential PCE mass in additional pore space

Conceptual Design

Pumping System Design Parameters

Estimated Number of Pumping Wells = Estimated pumping rate from CLC-18 =

460 gpm (based on JSAI modeling results) Estimated pumping rate from CLC-27 = 620 gpm (based on JSAI modeling results)

Estimated pumping rate from New Well = 300 gpm (to replace operation of CLC-18 after 5 years)

Total Pumping Rate in Years 1-5= 1,080 gpm (assumes CLC-18 and 27 only) Total Pumping Rate in Years 6-14= 920 gpm (assumes CLC-27 and new well only)

Depth of new pumping well = 450 ft bgs

System Construction Time

Estimated drilling rate = 125 If/day based on invoice Total linear footage drilling = 900 8 days (rounded up)

Estimated duration of drilling = 7.2 days or

Estimated linear footage of field piping per pumping well = 1500 ft per well

average of piping required for all wells Total linear footage of connection piping = 500 If assumed 500 lf to stub up to treatment system and reconnect to existing CLC-27 line to UGR connection of CLC-18 to CLC -27 connection to Upper Griggs Reservoir; CLC estimated 1000 If new piping needed in addition to the approximate length of 500 If of existing

Total linear footage of effluent field piping= 1.000 If Total linear footage of effluent field piping= estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir 750 If Estimated field piping placing rate = 75 If/day

Estimated duration of field piping = 30.0 days or 30 days (rounded up) Total construction timeframe = 38 days

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Air Stripper Design Parameters

Stripper design flowrate 1080 gpm

Unit flow rate 540 gpm (NEEP Model 41251 Tray Air stripper) 2 units in series needed for treatment

Governing contaminant PCE at 14 μg/L

Governing contaminant is based on consideration of a combination of low Henry's Constant and highest concentration versus MCL.

Influent temperature 50 °F

Unit Size: 12.5 ft x 7.3 ft NEEP Model 41251 Tray Air stripper

The Henry's Law Constant for PCE (25°C) = 176.5 atm Converting the Henry's Constant for an actual temperature of

Converting the Henry's Constant for an actual temperature of Actual Henry's Constant is 224 atm which is greater than the 10 atm threshold for effective air stripping.

Assume 100% of PCE is stripped and discharged untreated to the atmosphere. PCE is the controlling contaminant for air stripper design.

Vendor modeling indicates the Tray Air stripper uses a blower airflow rate of 2,400 scfm

PCE emissions 0.007 lbs/hr or 0.18 lbs/day or 65.2 lbs/yr

Average PCE emissions concentration is 0.8 mg/m³ or 0.2 ppmv

PCE is a hazardous air pollutant and therefore is a regulated air pollutant

The NIOSH PEL (10-hr TWA) for PCE is 25 ppmv or 136.5 mg/m³ or at 68°F and 1 atm THEREFORE, NO OFFGAS EMISSIONS CONTROL WILL BE REQUIRED SINCE MASS EMISSIONS IS VERY LOW AND

THE CONCENTRATION IS TWO ORDERS OF MAGNITUDE LOWER THAN THE NIOSH STANDARD WITHOUT CONSIDERING ATMOSPHERIC DISPERSION.

Pretreatment Design Parameters - Langlier Index and Ryznar Stability Index for CaCO3 Scaling Potential

2 (estimate of parameters water) within the

			suipper)
Flow	gpm	1080	1080
Temperature	Deg . F	60	77
Alkalinity, Total	mg/l CaCO ₃	211	211
pH TDS	Std. Units	7.39	8.00
TDS	mg/l	919	919
Calcium	mg/I CaCO ₃	305	305
Magnesium	mg/I CaCO ₃	124	123.6
Sulfate	mg/l SO ₄ ²⁻	243	243
Chloride	mg/l Cl ⁻	165	165
LSI		0.170	0.936
RSI		7.05	6.13

LSI greater than 1 indicates potential for scaling RSI less than 6 indicates potential for scaling

The LSI is close to the level indicating potential for scaling

The RSI, which is more commonly used, is close to the level that indicates that there is a potential for scaling once the stripping process begins. Slight changes in parameters affect the results of these calculations.

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pa
PROJECT NUMBER: 346535.FS.01

Assumptions

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

. See Conceptual Design Spreadsheet for basis of cost estimate assumpti

The number of new nested monitor wells required to be installed
 Number of new ground water extraction wells to be installed =

5. Number of piezometers to be installed =6. Number of reinjection wells to be installed=

6. Number of reinjection wells to be installed=

7. Assume that the duration of construction is

8. The number of wells to be sampled for VOCs is

9. The number of wells on-site to be abandoned for post-closure is

10. The G&A rate is

11. The overhead rate is

12. The Bonding & Insurance rate is

13. The fee rate is

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST					
Item/Activity	Qty Unit	Unit Cost		Cost	Comments and References
Construction					
Underground Piping from CLC-18 to CLC-27					estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting,
connection to Upper Griggs Reservoir	1,000 ft	\$ 100.17	\$	100,170	asphalt repaving (RS Means)
Underground Piping from new extraction well to CLC-					
27 connection to Upper Griggs Reservoir	750 ft	\$ 100.17		75,128	10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Piping Connection to Treatment System	500 If	\$ 100.17	\$		10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Ground Water Extraction Well Installation	1 well	\$ 200,000.00	\$	200,000	JSP Memo 7/8/06
Pumping Well Modifications	2 ea	\$ 25,000.00	\$		JSP Memo 7/8/06
Ground Water Extraction Pumps	3 ea	\$ 10,000.00			assume new + replace city pumps, vendor quote; 100gpm, 15 hp, 3-phase, 230V, 6 inch
Influent Equalization Tank	21,600 gal	\$ 1.00	\$	21,600	provides 20-minutes of storage
Tank Effluent Pump	0 ea	\$ 4,000.00	\$	-	included with air stripper
Influent and Effluent Bag Filters	2 LS	\$ 7,500.00	\$	15,000	1080 gpm size filter
					Assume 540 gpm NEEP Model 41251 Tray Air stripper (controls, piping, skid, blower,
Low-Profile Tray Air Stripper Package	2 LS	\$ 70,000.00	\$	140,000	influent and effleunt pumps)
Protective Enclosure	1 ea	\$ 150,000.00	\$	150,000	Assume 30'x25' building at \$200/sf, includes overhead crane, pre-fab metal
Repair discharge line on CLC-27	1 LS	\$ 300.00	\$	300	
Sulfuric Acid Bulk Storage Tank - Pretreatment Unit	1 LS	\$ 65,663.20	\$	65,663	5,000 gal tank. 1 month supply, prorated costs for similar system, 1,000 gal unit at
					Fruit Ave, Albuquerque
Dessicant Dryer Unit - Pretreatment Unit	1 LS	\$ 39,397.92	\$	39,398	5,000 gal unit. prorated costs for similar system, 1,000 gal unit at Fruit Ave,
					Albuquerque
Acid Feed Pump System - Pretreatment Unit	1 LS	\$ 83,384.29	\$	83,384	Prorated costs for similar system, 100 gpm system at Fruit Ave, Albuquerque.
Acid Feed System Piping - Pretreatment Unit	1 LS	\$ 44,923.64	\$	44,924	Prorated costs based on facility size for similar system, 100 gpm at Fruit Ave,
• • •					Albuquerque
Health and Safety Provisions - Pretreatment Unit	1 LS	\$ 8,000.00	\$	8,000	Prorated costs for similar system, 100 gpm at Fruit Ave, Albuquerque
Acid Storage Facility - Pretreatment Unit	1 LS	\$ 89,847.27	\$	89,847	Assume 35'x35' for 5,000 gal tank incl. canopy, 2° concrete containment, and fencing.
•					Prorated costs for similar system, 1,000 gal tank system at Fruit Ave, Albuquerque
					resided code for onimal eyeleni, 1,000 gai talik eyeleni at i fatt we, ribaquerque
Well Permits	1 ea	\$ 30.00	\$	30	new extraction well
Equipment Rental	26 wk	\$ 200.00			MultiRAE
Subtotal Capital Cost	-	 	_	1.168.729	

wells

wells

oiezometers

wells per round

wells

129

0

14%

2%

8%

included under ground water monitoring

included under ground water monitoring

included under ground water monitoring

includes new extraction wells only

working days (includes 90 working days for treatment system construction and installation)

COST ESTIMATE DETAILS

Griggs and Walnut Superfund Site Feasibility Study PROJECT: Griggs and Walnut Superfund Site - Las Cruces, New Mexico SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper PREPARED BY: L.Colella, T.Palaia

PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed 4. Number of new ground water extraction wells to be installed =

5. Number of piezometers to be installed = 6. Number of reinjection wells to be installed=

wells 129 working days (includes 90 working days for treatment system construction and installation)

wells

wells

piezometers

included under ground water monitoring

included under ground water monitoring

7. Assume that the duration of construction is 8. The number of wells to be sampled for VOCs is 0 wells per round 9. The number of wells on-site to be abandoned for post-closure is

included under ground water monitoring includes new extraction wells only

10. The G&A rate is

13. The fee rate is

11. The overhead rate is 12. The Bonding & Insurance rate is 14% 2% 8%

CAPITAL COST								
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References	
Site Work Allowance	7%	of	\$	1,168,728.81	\$	81,811		
Mechanical Allowance	15%	of	\$	1,168,728.81	\$	175,309		
Instrumentation and Controls Allowance	12%	of	\$	1,168,728.81	\$	140,247	including SCADA system	
Electrical Allowance	12%	of	\$	1,168,728.81	\$	140,247		
Miscellaneous Equipment Allowance	5%	of	\$	1,168,728.81	\$	58,436		
Subtotal Capital Cost					\$	1,764,781		
Project Management	8%	of	\$	1,764,780.51	\$	141,182		
Design	15%	of		1,764,780.51		264,717		
Construction Management	15%	of		1,764,780.51		264,717		
Subcontractor General Requirements	5%	of		1,764,780.51	\$	88,239		
Subtotal Capital Cost					\$	2,523,636		
G&A	14%	of	\$	2.523.636.12	\$	353,309		
Overhead	5%	of	\$	2,523,636.12	\$	126,182		
New Mexico Gross Receipts Tax	7.125%	of		2,523,636.12		179,809		
Contingency	25%	of		2,523,636.12		630,909		
Subtotal Capital Cost			·			3,813,845		
Bonding& Insurance	2%	of	¢	3,813,845.09	œ.	76,277		
Fee	8%	of		3,813,845.09		305,108		
TOTAL CAPITAL COST	070	- 01	Ψ	0,010,040.00	-	4,195,230		

YEAR 1 OPERATIONS AND MAINTENANCE					
Item/Activity	Qty Unit	Uı	nit Cost	Cost	Comments
System Startup					
Labor - Technician	150 hr	\$	75.00	\$ 11,250	Assume 15 days for startup, 10 hrs/day
Labor - Engineer	100 hr	\$	120.00	\$ 12,000	Assume 10 days for startup, 10 hrs/day
Air Sample Analysis	6 sample	\$	150.00	\$ 900	quarterly sampling to prove de minimis VOC emissions, plus 2 QA/QC
Water Sample Analysis	6 sample	\$	150.00	\$ 900	3 sets, VOC analysis for infl/effl, incl data valid.
Startup Equipment Rental	2 week	\$	1,000.00	\$ 2,000	water quality monitoring for pretreatment effectiveness
Total System Startup				\$ 27,050	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pala PROJECT NUMBER: 346535.FS.01

Assumptions

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Decign" spreadchest for basis of cost estimate assumptions

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = piezometers included under ground water monitoring 6. Number of reinjection wells to be installed= wells 129 7. Assume that the duration of construction is working days (includes 90 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is 0 wells per round included under ground water monitoring 9. The number of wells on-site to be abandoned for post-closure is wells includes new extraction wells only

9. The number of wells on-site to be abandoned for post-closure is
10. The G&A rate is
11. The overhead rate is
12. The Bonding & Insurance rate is
2%
13. The fee rate is
8%

CAPITAL COST							
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
Routine System O&M							
Labor - Technician	416 hr		\$	75.00	\$	31,200	8 hours/week
Labor - Engineer	416 hr		\$	120.00	\$	49,920	100% of the Tech time for first year
Water Sample Analysis	29 sar	nple	\$	150.00	\$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0 sar	nple	\$	100.00	\$	-	none needed after startup
Acid Supply - Pretreatment Unit	1 LS		\$	110,067.27	\$	110,067	Prorated from 100 gpm system at Fruit Ave.
O&M Supplies and Cleaning Subcontractor	1 LS		\$	4,000.00	\$	4,000	Annual air stripper tray cleaning by subcontractor
Electricity	588,146 kw	-hr	\$	0.08	\$		Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
•							98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values
Annual Extraction Well and Distribution Operating Cost	568 MN	/IGal	\$	194.73	\$	110,538	(used avg. for CLC 19, 21, 27)
Total Routine System O&M			-		\$	357,127	
Reporting (Annual Report and Construction Completion Repo	ort)						
Labor - Engineer/Hydrogeologist	400 hr		•	120.00	\$	48.000	
Labor - Editor	200 hr		¢ ¢	85.00	\$	17.000	
Labor - CAD Technician	100 hr		\$	85.00	\$	8,500	
Total Annual Reporting	100 111		Ψ	03.00	\$	73,500	
Subtotal Year 1 Operations and Maintenance					\$	457.677	
Cubicial Fedi Feperations and Maintenance					Ψ	401,011	
Project Management	8%	of	\$	457,677.09	\$	36,614	
Technical Support	15%	of	\$	457.677.09	\$	68.652	
Construction Management	0%	of	\$	457,677.09			
Subcontractor General Requirements	5%	of	\$		\$	22,884	
Subtotal Year 1 Operations and Maintenance				,	\$	585,827	
G&A	14%	of	\$	585,826.67	\$	82,016	
Overhead	5%	of	\$	585,826.67	\$	29,291	
New Mexico Gross Receipts Tax	7.125%	of	\$	585,826.67	\$	41,740	
Contingency	25%	of	\$	585,826.67	\$	146,457	
Subtotal Year 1 Operations and Maintenance					\$	885,331	•
		_	_		_		
Bonding& Insurance	0%	of	\$	885,330.56			Bonding only applies to Capital Costs
Fee	8%	of	\$	885,330.56	\$	70,826	
TOTAL YEAR 1 OPERATIONS AND MAINTENANCE COST	T .				\$	956,157	

COST ESTIMATE DETAILS

Griggs and Walnut Superfund Site Feasibility Study PROJECT: Griggs and Walnut Superfund Site - Las Cruces, New Mexico SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper PREPARED BY: L.Colella, T.Palaia

PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30% 2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed

included under ground water monitoring 4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = piezometers included under ground water monitoring 6. Number of reinjection wells to be installed= wells 129 7. Assume that the duration of construction is working days (includes 90 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is 0 wells per round included under ground water monitoring

wells

9. The number of wells on-site to be abandoned for post-closure is 10. The G&A rate is 14% 11. The overhead rate is 12. The Bonding & Insurance rate is 2% 13. The fee rate is 8%

Detailed Capital and Operations and Maintenance Costs

tem/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE CO	ST - YEARS 2-	5 (ANN	UAL (COST)			
Item/Activity	Qtv Un	it		Unit Cost		Cost	Comments
Routine System O&M							
_abor - Technician	208 hr		\$	75.00	\$	15,600	4 hours/week
abor - Engineer	104 hr		\$	120.00	\$	12.480	50% of the Tech time
Vater Sample Analysis	29 sar	nple	\$	150.00	\$	4.350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Acid Supply - Pretreatment Unit	1 LS		\$	110.067.27	\$		Prorated from 100 gpm system at Fruit Ave.
0&M Supplies and Cleaning Subcontractor	1 LS		\$	4.000.00	\$		Annual air stripper tray cleaning by subcontractor
Electricity	588.146 kw	-hr	\$	0.08	\$		Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
• • • •			•			,	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values
Annual Extraction Well and Distribution Operating Cost	568 MN	//Gal	\$	194.73	\$	110.538	(used avg. for CLC 19, 21, 27)
Total Routine System O&M			-		\$	304,087	(44444444444444444444444444444444444444
•							
Reporting (Annual Reports)	400.1		_	400.00	_	40.000	
.abor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$	12,000	
abor - Editor	50 hr		\$	85.00	\$	4,250	
_abor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 2-5 Operations and Maintenance					\$	322,462	
Project Management	8%	of	\$	322.462.09	\$	25,797	
Fechnical Support	15%	of	\$	322,462.09	-	48,369	
Construction Management	0%	of	\$	322,462.09		.0,000	
Subcontractor General Requirements	5%	of	\$	322,462.09		16,123	
Subtotal Year 2-5 Operations and Maintenance	070			022,102.00	\$	412,751	
G&A	14%	of	\$	412,751.47		57,785	
Overhead	5%	of	\$	412,751.47		20,638	
New Mexico Gross Receipts Tax	7.125%	of	\$	412,751.47		29,409	
Contingency	25%	of	\$	412,751.47		103,188	<u>-</u>
Subtotal Year 2-5 Operations and Maintenance					\$	623,771	_
onding& Insurance	0%	of	\$	623.770.67	\$	_	Bonding only applies to Capital Costs
ee	8%	of	\$	623,770.67	\$	49,902	J . 7 . rr
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND				-,	\$	673,672	

includes new extraction wells only

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pal
PROJECT NUMBER: 346535.FS.01

Assumptions

13. The fee rate is

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.
 The number of new nested monitor wells required to be installed
 Number of new ground water extraction wells to be installed = 1 wells
 Number of piezometers to be installed = 0 piezometers
 Number of reinjection wells to be installed = 0 wells
 Number of reinjection of construction is 129 working days (includes 90 working days for treatment system construction and installation)

8. The number of wells to be sampled for VOCs is
9. The number of wells on-site to be abandoned for post-closure is
10. The G&A rate is
11. The overhead rate is
12. The Bonding & Insurance rate is
2%

8%

CAPITAL COST							
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE CO	ST - YEARS 6-	14 (ANN	UAL	COST)			
Item/Activity	Qtv Un	it		Unit Cost		Cost	Comments
Routine System O&M							
Labor - Technician	208 hr		\$	75.00	\$	15,600	4 hours/week
Labor - Engineer	104 hr		\$	120.00	\$	12,480	50% of the Tech time
Water Sample Analysis	29 sar	nple	\$	150.00	\$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Acid Supply - Pretreatment Unit	1 LS		\$	110,067.27	\$	110,067	Prorated from 100 gpm system at Fruit Ave.
O&M Supplies and Cleaning Subcontractor	1 LS		\$	4,000.00	\$		Annual air stripper tray cleaning by subcontractor
Electricity	588,146 kw	-hr	\$	0.08	\$	47,052	Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
•							98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values
Annual Extraction Well and Distribution Operating Cost	484 MN	/IGal	\$	194.73	\$	94,162	(used avg. for CLC 19, 21, 27)
Total Routine System O&M					\$	287,711	/
-							
Reporting (Annual Reports)							
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$	12,000	
Labor - Editor	50 hr		\$	85.00	\$	4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 6-14 Operations and Maintenance					\$	306,086	
Project Management	8%	of	\$	322.462.09	\$	25.797	
Technical Support	15%	of	φ	322,462.09	-	48.369	
Construction Management	0%	of	φ	322,462.09		40,309	
Subcontractor General Requirements	5%	of	φ \$	322,462.09		16.123	
Subtotal Year 6-14 Operations and Maintenance	370	UI	φ	322,402.09	\$	396,375	
Subtotal Teal 0-14 Operations and Maintenance					φ	380,373	
G&A	14%	of	\$	396,375.46	\$	55,493	
Overhead	5%	of	\$	396,375.46		19,819	
New Mexico Gross Receipts Tax	7.125%	of	\$	396,375.46		28,242	
Contingency	25%	of	\$	396,375,46		99,094	
Subtotal Year 6-14 Operations and Maintenance				, ,	\$	599,022	- -
Bonding& Insurance	0%	of	\$	599,022.41	s	_	Bonding only applies to Capital Costs
Fee	8%	of	\$	599.022.41		47,922	bortaing only applies to capital costs
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AN			φ	JJJ,UZZ.41	\$	646.944	
TOTAL ANNUAL COST. TEARS 0-14 OPERATIONS AND	D WAIN I ENANC	E 0031			φ	040,944	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper
PREPARED BY: L.Colella, T. Palaia

PROJECT NUMBER: L.Coleila, 1.Pail

Assumptions

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed = 1 wells

4. Number of new ground water extraction wells to be installed =
5. Number of piezometers to be installed =
6. Number of reinjection wells to be installed=
0
0
0

piezometers included under ground water monitoring wells

included under ground water monitoring

7. Assume that the duration of construction is 8. The number of wells to be sampled for VOCs is

working days (includes 90 working days for treatment system construction and installation)

wells per round included under ground water monitoring

1 wells includes new extraction wells only

9. The number of wells on-site to be abandoned for post-closure is
10. The G&A rate is

14% 5% 2% 8%

129

0

11. The overhead rate is12. The Bonding & Insurance rate is

13. The fee rate is

CAPITAL COST							
Item/Activity	Qty Unit			Unit Cost		Cost	Comments and References
POST CLOSURE COST							
Item/Activity	Qty Uni	it		Unit Cost		Cost	Comments
Closure Reporting	-						
Labor - Engineer/Hydrogeologist	100 hr			\$120.00	\$	12,000	
Labor - Editor	50 hr			\$85.00	\$	4,250	
Labor - CAD Technician	25 hr			\$85.00	\$	2,125	
Total Closure Reporting					\$	18,375	
Equipment Demobilization and Well Abandonment							
Well Abandonment	1 wel	II	\$	10,000.00	\$	10,000	new extraction wells only, others included under ground water monitoring
Equipment Demobilization	1 LS		\$	150,000.00	\$	150,000	
Subtotal Equipment Demobilization and Well Abandonment					\$	160,000	
Site Work Allowance	10%	of	\$	160,000.00		16,000	
Mechanical Allowance	0%	of	\$	160,000.00		-	
Instrumentation and Controls Allowance	0%	of	\$	160,000.00		-	
Electrical Allowance	5%	of	\$	160,000.00		8,000	
Miscellaneous Equipment Allowance	0%	of	\$	160,000.00		-	
Total Equipment Demobilization and Well Abandonment					\$	184,000	
Subtotal Post-Closure Cost					\$	202,375	
Desirat Management	8%		•	202.375.00	•	16,190	
Project Management Technical Support	8% 15%	of of	\$ \$		\$	30,356	
Construction Management	10%	of	\$ \$	202,375.00		20,238	
Subcontractor General Requirements	5%	of	\$ \$	202,375.00		10,119	
Subtotal Post-Closure Cost	3%	OI	φ	202,375.00	\$	279,278	
Subtotal Post-Closure Cost					Þ	219,218	
G&A	14%	of	\$	279.277.50	\$	39.099	
Overhead	5%	of	\$	279,277.50		13,964	
New Mexico Gross Receipts Tax	7.125%	of	\$	279,277.50		19,899	
Contingency	25%	of	\$	279,277.50		69,819	
Subtotal Post-Closure Cost			7	,	\$	422,058	•
Decide of terrors	00/	- 6	•	100.050.10	•	0.444	
Bonding& Insurance	2%	of	\$	422,058.12		8,441	
Fee	8%	of	\$	422,058.12	_	33,765	
TOTAL POST CLOSURE COST					\$	464,264	

Alternative 4 - Enhanced Ground Water Extraction with Treatment **PRESENT WORTH ANALYSIS**

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. Real Discount Rate 3.00% Source: OMB Ciruclar No. A-94, Jan. 2007 version of Appendix C obtained from http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html

2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

3. Escalation factor is 3.00%

Present Worth Analysis

		E	Α		В		C=A+B		A*E		B*E		C*E			
									Total PV					-		
		Discount									apital Costs	То	tal PV O&M		Total PV	Balance of Interest Bearing
Elapsed Time	Year	Factor at 3%	Capital Cost	C	D&M Cost	7	Total Cost		at 3%	С	osts at 3%	С	osts at 3%	Account at 3%		
0	2007	1.000	\$ 4,195,230			\$	4,195,230	\$	4,195,230	\$	-	\$	4,195,230	\$ 10,235,736		
1	2008	0.971		\$	984,842	\$	984,842	\$	-	\$	956,157	\$	956,157	\$ 9,528,421		
2	2009	0.943		\$	714,699	\$	714,699	\$	-	\$	673,672	\$	673,672	\$ 9,078,134		
3	2010	0.915		\$	736,140	\$	736,140	\$	-	\$	673,672	\$	673,672	\$ 8,592,254		
4	2011	0.888		\$	758,224	\$	758,224	\$	-	\$	673,672	\$	673,672	\$ 8,069,051		
5	2012	0.863		\$	780,971	\$	780,971	\$	-	\$	673,672	\$	673,672	\$ 7,506,722		
6	2013	0.837		\$	772,485	\$	772,485	\$	-	\$	646,944	\$	646,944	\$ 6,936,264		
7	2014	0.813		\$	795,660	\$	795,660	\$	-	\$	646,944	\$	646,944	\$ 6,324,823		
8	2015	0.789		\$	819,530	\$	819,530	\$	-	\$	646,944	\$	646,944	\$ 5,670,452		
9	2016	0.766		\$	844,115	\$	844,115	\$	-	\$	646,944	\$	646,944	\$ 4,971,126		
10	2017	0.744		\$	869,439	\$	869,439	\$	-	\$	646,944	\$	646,944	\$ 4,224,738		
11	2018	0.722		\$	895,522	\$	895,522	\$	-	\$	646,944	\$	646,944	\$ 3,429,093		
12	2019	0.701		\$	922,388	\$	922,388	\$	_	\$	646,944	\$	646,944	\$ 2,581,906		
13	2020	0.681		\$	950,059	\$	950,059	\$	_	\$	646,944	\$	646,944	\$ 1,680,802		
14	2021	0.661	\$ 702,241	\$	978,561	\$	1,680,802	\$	464,264	\$	646,944	\$	1,111,208	\$ 0		
Total Alternative 4 E	nhanced G	Fround Water Ex	\$ 4,897,470	\$.	11,822,635	\$	16,720,105	\$	4,659,494	\$	9,473,344	\$	14,132,838			

COST ESTIMATE SUMMARY²

Griggs and Walnut Superfund Site Feasibility Study Griggs and Walnut Superfund Site - Las Cruces, New Mexico PROJECT: SITE: ALTERNATIVE: DESCRIPTION: PREPARED BY: 4 Enhanced Ground Water Extraction with Treatment

Ground Water Extraction and Treatment with Chemcial/UV Oxidation

L.Colella, T.Palaia 346535.FS.01 PROJECT NUMBER:

Capital Cost		
Construction	\$	1,763,925
Project Management	\$	141,114
Design	\$	264,589
Construction Management	\$	264,589
Subcontractor General Requirements	\$	88,196
G&A	\$	353,138
Overhead	\$	126,121
Tax	\$	179,722
Contingency	\$	630,603
Bonding& Insurance	\$	76,240
Fee	\$	304,960
Total Capital Cost	\$	4,193,197
Year 1 Operations and Maintenance		
System Startup	\$	53,400
Routine System O&M	\$	252,240
Reporting (Annual Report and Construction Completion Report)	\$	73,500
Professional Services ¹	\$	87,202
Subcontractor General Requirements	\$	18,957
G&A	\$	67,942
Overhead	\$	24,265
Tax	\$	34,578
Contingency	\$	121,325
Bonding& Insurance	\$	-
Fee Total Year 1 Operations and Maintenance	\$ \$	58,673 792,081
	3	792,001
Annual Operations and Maintenance Cost: Years 2-5	\$	100 200
Routine System O&M		199,200
Reporting (Annual Reports)	\$	18,375
Professional Services 1	\$	50,042
Subcontractor General Requirements	\$	10,879
G&A	\$	38,989
Overhead	\$	13,925
New Mexico Gross Receipts Tax	\$ \$	19,843
Contingency	\$	69,624
Bonding& Insurance Fee	\$	33,670
Total Annual Operations and Maintenance Cost: Years 2-5	\$	454,547
	,	,
Annual Operations and Maintenance Cost: Years 6-14		
Routine System O&M	\$	182,824
Reporting (Annual Reports)	\$	18,375
Professional Services ¹	\$	50,042
Subcontractor General Requirements	\$	10,879
G&A	\$	36,697
Overhead	\$	13,106
New Mexico Gross Receipts Tax	\$	18,676
Contingency	\$	65,530
Bonding& Insurance	\$	
Fee	\$	31,690
Total Annual Operations and Maintenance Cost: Years 6-14	\$	427,819
Post Closure Cost		
Closure Reporting	\$	18,375
Equipment Demobilization and Well Abandonment	\$	184,000
Professional Services ¹	\$	66,784
Subcontractor General Requirements	\$	10,119
G&A	\$	39,099
Overhead	\$	13,964
New Mexico Gross Receipts Tax	\$	19,899
Contingency	\$	69,819
Bonding& Insurance	\$	8,441
Fee Tatal Past Clasura Cost	\$	33,765
Total Post Closure Cost	\$	464,264
TOTAL PRESENT WORTH	•	11 110 104
IOIAL FRESENI WORIT	\$	11,118,104

^{1 -} Professional Services includes Project Management, Design/Technical Support, and Construction Management.
2 - The cost estimates provided are to an accuracy of +50 percent to -30 percent and are prepared for the sole purpose of alternative comparison. The alternative cost estimates are in 2006 dollars and are based on conceptual design from information available at the time of this study. The actual cost of the project would depend on the final scope and design of the selected remedial action, the schedule of implementation, competitive market conditions, and other variables.

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia
PROJECT NUMBER: 346535.FS.01

Site Background Data

Elevation of Site =	4100 ft amsl or	12.68	psia	
Volume of Contaminated Groun	d water greater than 5 ug/L=	7,350	acre-ft	based on JSAI model
Volume of Contaminated Groun	d water greater than 1 ug/L=	25,700	acre-ft	based on JSAI model

PCE Concentrations in wells sampled December 2005.

Sample Location	PCE (μg/
MW-SF1	11
MW-SF10	17
GWMW01 Port 2	21
GWMW01 Port 6	6

μg/L, average concentration

Pumping Rates for Plume Containment and Remediation <20 Years (per JSAI modeling)

CLC-18 460 gpm CLC-27 620 gpm

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

New Well #1 to replace operation of CLC-18 after 5 years per JSAI modeling

300 gpm

Total Annual: Years 1-5 568 Total Annual: Years 6-14 484

MMgal MMgal

Mass Estimate

Mass of PCE above MCL in ground water =

150 kg of PCE

based on JSAI model - JSAI estimate based on an effective porosity of 20% and does not address potential PCE mass in additional pore space

Conceptual Design

Pumping System Design Parameters

Estimated Number of Pumping Wells =

Estimated pumping rate from CLC-18 = 460 gpm (based on JSAI modeling results) Estimated pumping rate from CLC-27 = 620 gpm (based on JSAI modeling results)

Estimated pumping rate from New Well = 300

Total Pumping Rate in Years 1-5=

Total Pumping Rate in Years 6-14=

1,080 gpm (assumes CLC-18 and 27 only)

920 gpm (assumes CLC-27 and new well only)

Depth of new pumping wells = 450 ft bas

System Construction Time

Estimated drilling rate = Total linear footage drilling =

125 If/day 900 If 7.2 days or

Estimated duration of drilling = Estimated linear footage of field piping per pumping well =

Total linear footage of connection piping =

based on invoice

8 days (rounded up)

1500 ft per well average of piping required for all wells 500 If

assumed 500 lf to stub up to treatment system and reconnect to existing CLC-27 line to UGR connection of CLC-18 to CLC -27 connection to Upper Griggs Reservoir; CLC estimated

1000 If new piping needed in addition to the approximate length of 500 If of existing piping.

Total linear footage of effluent field piping= 1.000 If 750 If Total linear footage of effluent field piping= Estimated field piping placing rate =

75 If/day Estimated duration of field piping = 30.0 days or estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir 30 days (rounded up)

Total construction timeframe = 38 days

HiPOx Treatment System Components (1080 gpm system)

System Costs: Operating Costs (per year - Vendor Quote 531,250 (Vendor quote [Applied Process Technology] of \$425,000 plus 25% uncertainty factor, plus FOB and taxes)

Oxygen Generator \$ 8.760

\$

Hydrogen Peroxide \$ 6,389 Assumes NSF grade

O3 Generator Electricity \$ 4.739 Consumable Costs 19,888 TOTAL ANNUAL COST \$ 39,776

Note: HiPOx is a specific patented ex-situ chemical oxidation process that combines ozone and hydrogen peroxide to destroy contaminants in the influent ground water

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.
3. The number of new nested monitor wells required to be installed 0 wells included under ground water monitoring

4. Number of new ground water extraction wells to be installed = 1 wells

5. Number of piezometers to be installed = 0 piezometers included under ground water monitoring

6. Number of reinjection wells to be installed = 0 wells

7. Assume that the duration of construction is 129 working days (includes 90 working days for treatment system construction and installation)

8. The number of wells to be sampled for VOCs is 0 wells per round included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

CAPITAL COST							
Item/Activity	Qty Unit			Unit Cost		Cost	Comments and References
Construction							
Underground Piping from CLC-18 to CLC-27 connection							estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting,
to Upper Griggs Reservoir	1,000 ft		\$	100.17	\$	100,170	asphalt repaving (RS Means)
Underground Piping from new extraction well to CLC-27							
connection to Upper Griggs Reservoir	750 ft		\$	100.17	\$	75,128	10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Piping Connection to Treatment System	500 If		\$	100.17	\$		10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Pumping Well Modifications	2 ea		\$	25,000.00	\$		JSP Memo 7/8/06
Ground Water Extraction Well Installation	1 well		\$	200,000.00	\$	200,000	JSP Memo 7/8/06
Ground Water Extraction Pumps	3 ea		\$	10,000.00	\$	30,000	assume new + replace city pumps, vendor quote; 100gpm, 15 hp, 3-phase, 230V, 6 inch
Influent Equalization Tank	0 gal		\$	1.00	\$	-	provides 20 of storage
Tank Effluent Pump	2 ea		\$	4,000.00	\$	8,000	Assumes two 10 hp units (Pump with motor controls for 540 GPM @ 50'TDH)
Influent and Effluent Bag Filters	2 LS		\$	7,500.00	\$	15,000	gpm size filter
							Equipment is skid mounted, pre-assembled, pre-tested, and fully automated. Equipment
							includes reactor, instruments, controls, H2O2 storage, O3 generator/chiller, and on-site
HiPOx Treatment System	1 LS		\$	531,250.00	\$	531,250	O2 generation system
HiPOx Bench Test	410		•	2 222 22	•	0.000	
	1 LS		\$	3,000.00			1-time bench test to accurately determine dosing requirements and equipment sizing
Protective Enclosure	1 ea		\$	100,000.00		300	Vendor quote: 8' x 40' climate-controlled enclosure
Repair discharge line on CLC-27 Well Permits	1 LS		\$	300.00 30.00	\$		new extraction well
	1 ea 26 wk		ð.		-		
Equipment Rental Subtotal Capital Cost	20 WK		Þ	200.00	\$	1,168,163	MultiRAE
Site Work Allowance	7%	of	•	1.168.162.50		81.771	
Mechanical Allowance	15%	of	ų e	1,168,162.50		175.224	
Instrumentation and Controls Allowance	12%	of	φ	1,168,162.50		- /	including SCADA system
Electrical Allowance	12%	of	ą ę	1,168,162.50	φ \$	140,180	including SOADA system
Miscellaneous Equipment Allowance	5%	of	ų Ç	1,168,162.50	\$	58.408	
Subtotal Capital Cost	J /0	UI	φ	1,100,102.50		1,763,925	
Subtotal Capital Cost					φ	1,703,923	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: Griggs and warnut Superrund Site - Las Cruces, New Mexic

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed =
5. Number of piezometers to be installed =
6. Number of reinjection wells to be installed =
7. Number of reinjection wells to be installed =
8. Number of reinjection wells to be installed =
9. Diezometers

8. The number of wells to be sampled for VOCs is

working days (includes 90 working days for treatment system construction and installation)

working days for treatment system construction and installation)

working days for treatment system construction and installation)

wells per round

included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

10. The G&A rate is 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

CAPITAL COST					
Item/Activity	Qty Un	it	Unit Cost	Cost	Comments and References
Project Management	8%	of	\$ 1,763,925.38	\$ 141,114	
Design	15%	of	\$ 1,763,925.38	\$ 264,589	
Construction Management	15%	of	\$ 1,763,925.38	\$ 264,589	
Subcontractor General Requirements	5%	of	\$ 1,763,925.38	\$ 88,196	
Subtotal Capital Cost				\$ 2,522,413	
G&A	14%	of	\$ 2,522,413.29	\$ 353,138	
Overhead	5%	of	\$ 2,522,413.29	\$ 126,121	
New Mexico Gross Receipts Tax	7.125%	of	\$ 2,522,413.29	\$ 179,722	
Contingency	25%	of	\$ 2,522,413.29	\$ 630,603	
Subtotal Capital Cost				\$ 3,811,997	-
Bonding& Insurance	2%	of	\$ 3,811,997.08	\$ 76,240	
Fee	8%	of	\$ 3,811,997.08	\$ 304,960	
TOTAL CAPITAL COST				\$ 4,193,197	

YEAR 1 OPERATIONS AND MAINTENANCE				
Item/Activity	Qty Unit	Unit Cost	Cost	Comments
System Startup				
_abor - Technician	300 hr	\$ 75.00	\$ 22,500	Assume 30 days for startup, 10 hrs/day
_abor - Engineer	200 hr	\$ 120.00	\$ 24,000	Assume 20 days for startup, 10 hrs/day
Vater Sample Analysis	6 sample	\$ 150.00	\$ 900	3 sets, VOC analysis for infl/effl, incl data valid.
Air Sample Analysis	0 sample	\$ 150.00	\$ -	no air emissions from HiPOx
Startup Equipment Rental	6 week	\$ 1,000.00	\$ 6,000	intensive water quality monitoring
otal System Startup			\$ 53,400	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new pested monitor wells required to be installed.

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed =
5. Number of piezometers to be installed =
6. Number of reinjection wells to be installed =
7. Assume that the duration of construction is

129

wells
included under ground water monitoring
included under ground water monitoring
wells

included under ground water monitoring
wells

included under ground water monitoring
displayed under ground water monitoring
wells
included under ground water monitoring
wells
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o

8. The number of wells to be sampled for VOCs is 0 wells per round included under ground water monitoring 9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

9. The number of wells on-site to be abandoned for post-closure is 1 wells inclu

10. The G&A rate is 14%

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

Routine System O&M	CAPITAL COST							
Labor - Technician	Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
Labor - Engineer 416 hr \$ 120.00 \$ 49.920 100% of the Tech time for first year monthly inflieffl sampling for permit, plus 20% extra for QA/QC Air Sample Analysis 0 sample 1 LS \$ 6,000.00 \$ 4,350 monthly inflieffl sampling for permit, plus 20% extra for QA/QC Air Sample Analysis 0 sample 1 LS \$ 6,000.00 \$ 6,000 no air emissions from HiPCx Q&M Supplies 1 LS \$ 6,000.00 \$ 6,000 \$ 50,000	Routine System O&M							
Water Sample Analysis 29 sample (apalysis) 150.00 (apalysis) 4.350 (apalysis) monthly inflight sampling for permit, plus 20% extra for QA/QC (apalysis) no air emissions from HIPOx (apalysis) monthly inflight sampling for permit, plus 20% extra for QA/QC (apalysis) no air emissions from HIPOx (apalysis) no demical (apalysis) no demical (apalysis) no air emissions from HIPOx (apalysis)	Labor - Technician	416 hr		\$	75.00	\$	31,200	8 hours/week
Air Sample Analysis 0 sample 1 10.00 \$ - no air emissions from HIPOX O&M Supplies 1 130,699 kw-hr \$ 0.00 \$	Labor - Engineer	416 hr		\$	120.00	\$	49,920	100% of the Tech time for first year
O&M Supplies 1 LS' \$ 6,000,00 \$ 6,000 Electricity 130,699 kw-hr \$ 0.08 \$ 10,456 Assumes continuous operation of the tank effleunt pumps HIPO'X System O&M 1 LS' \$ 39,776.00 \$ 39,776 chemical and O3 generator electrical costs per vendor 98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used and Distribution Operating Cost 568 MMGal \$ 194.73 \$ 110,538 avg, for CLC 19, 21, 27) Total Routine System O&M \$ 194.73 \$ 110,538 avg, for CLC 19, 21, 27) The control operating Cost of Class of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) The control operating Cost of CL 19, 21, 27) <td>Water Sample Analysis</td> <td>29 sai</td> <td>mple</td> <td>\$</td> <td>150.00</td> <td>\$</td> <td>4,350</td> <td>monthly infl/effl sampling for permit, plus 20% extra for QA/QC</td>	Water Sample Analysis	29 sai	mple	\$	150.00	\$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Electricity	Air Sample Analysis	0 sai	mple	\$	100.00	\$	-	no air emissions from HiPOx
HiPOx System O&M 1 LS \$ 39,776.00 \$ 39,776 chemical and O3 generator electrical costs per vendor 98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used Annual Extraction Well and Distribution Operating Cost Total Routine System O&M Reporting (Annual Report and Construction Completion Report) Labor - Engineer/Hydrogeologist Labor - Editor Labor - Engineer/Hydrogeologist Labor - Editor Labor - CAD Technician 100 hr \$ 85.00 \$ 17,000 Labor - CAD Technician 100 hr \$ 85.00 \$ 8,500 Total Annual Reporting Subtotal Year 1 Operations and Maintenance Project Management 8% of \$ 379,140.05 \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ 56,871 Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance Reporting (Annual Reporting) Subcontractor General Requirements 5% of \$ 379,140.05 \$ 56,871 Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance Reporting (Annual Reporting) Subcontractor General Requirements 5% of \$ 485,299.26 \$ 67,942 Overhead Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7,125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	O&M Supplies	1 LS		\$	6,000.00	\$	6,000	
Secontrol Seco	Electricity	130,699 kw	-hr	\$	0.08	\$	10,456	Assumes continuous operation of the tank effleunt pumps
Annual Extraction Well and Distribution Operating Cost 568 MMGal \$ 194.73 \$ 110.538 avg. for CLC 19, 21, 27)	HiPOx System O&M	1 LS		\$	39,776.00	\$	39,776	chemical and O3 generator electrical costs per vendor
Section System O&M Section S								98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Reporting (Annual Report and Construction Completion Report)	Annual Extraction Well and Distribution Operating Cost	568 MN	/IGal	\$	194.73	\$	110,538	avg. for CLC 19, 21, 27)
Labor - Engineer/Hydrogeologist 400 hr \$ 120.00 \$ 48,000 Labor - Editor 200 hr \$ 85.00 \$ 17,000 Labor - CAD Technician 100 hr \$ 85.00 \$ 8,500 Total Annual Reporting \$ 73,500 Subtotal Year 1 Operations and Maintenance \$ 379,140.05 \$ 379,140.05 Project Management 8% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ - Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Total Routine System O&M					\$	252,240	
Labor - Editor 200 hr \$ 85.00 \$ 17,000 Labor - CAD Technician 100 hr \$ 85.00 \$ 8,500 Total Annual Reporting \$ 73,500 Subtotal Year 1 Operations and Maintenance \$ 379,140 Project Management 8% of \$ 379,140.05 \$ 30,331 Technical Support 15% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ - Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Reporting (Annual Report and Construction Completion Report	·)						
Labor - CAD Technician 100 hr \$ 85.00 \$ 8,500 Total Annual Reporting \$ 73,500 Subtotal Year 1 Operations and Maintenance \$ 379,140 Project Management 8% of \$ 379,140.05 \$ 30,331 Technical Support 15% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ - Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Labor - Engineer/Hydrogeologist	400 hr		\$	120.00	\$	48,000	
Total Annual Reporting	Labor - Editor	200 hr		\$	85.00	\$	17,000	
Subtotal Year 1 Operations and Maintenance \$ 379,140 Project Management 8% of \$ 379,140.05 \$ 30,331 Technical Support 15% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ - Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Labor - CAD Technician	100 hr		\$	85.00	\$	8,500	
Project Management 8% of \$ 379,140.05 \$ 30,331 Technical Support 15% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ 56,871 Construction Management 0% of \$ 379,140.05 \$ - Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299 G&A 14% of \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Total Annual Reporting					\$	73,500	
Technical Support 15% of S79,140.05 \$ 379,140.05 \$ 56,871 Construction Management Subcontractor General Requirements 5% of S79,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299 \$ 67,942 Overhead Overhead New Mexico Gross Receipts Tax 7.125% of S485,299.26 \$ 485,299.26 \$ 34,578 Contingency 25% of S485,299.26 \$ 121,325	Subtotal Year 1 Operations and Maintenance					\$	379,140	
Technical Support 15% of S79,140.05 \$ 379,140.05 \$ 56,871 Construction Management Subcontractor General Requirements 5% of S79,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299 \$ 67,942 Overhead Overhead New Mexico Gross Receipts Tax 7.125% of S485,299.26 \$ 485,299.26 \$ 34,578 Contingency 25% of S485,299.26 \$ 121,325	B :	00/		•	070 440 05	•	00.004	
Construction Management 0% of subcontractor General Requirements 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299 G&A 14% of subcontractor General Requirements \$ 67,942 Overhead 5% of subcontractor General Requirements \$ 24,265 New Mexico Gross Receipts Tax 7.125% of subcontractor General Requirements \$ 379,140.05 Contingency 25% of subcontractor General Requirements \$ 485,299.26 18,957 \$ 485,299.26 \$ 24,265 18,772 \$ 24,265 18,772 \$ 34,578 18,772 \$ 25% of subcontractor General Requirements 18,957 \$ 485,299.26 \$ 34,578 18,772 \$ 25% of subcontractor General Requirements \$ 34,578 18,957 \$ 345,299.26 \$ 34,578 18,772 \$ 345,299.26 \$ 34,578 18,772 \$ 345,299.26 \$ 34,578 18,772 \$ 345,299.26 \$ 34,578 18,772 \$ 345,299.26 \$ 34,578 18,772						\$		
Subcontractor General Requirements 5% of \$ 379,140.05 \$ 18,957 Subtotal Year 1 Operations and Maintenance \$ 485,299 G&A 14% of \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325				Þ	,	\$	56,871	
Subtotal Year 1 Operations and Maintenance \$ 485,299 G&A 14% of \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325				Þ	,		40.057	
G&A 14% of \$ 485,299.26 \$ 67,942 Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325		5%	OT	Ъ	379,140.05	φ		
Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	Subtotal Year 1 Operations and Maintenance					Ф	465,299	
Overhead 5% of \$ 485,299.26 \$ 24,265 New Mexico Gross Receipts Tax 7.125% of \$ 485,299.26 \$ 34,578 Contingency 25% of \$ 485,299.26 \$ 121,325	G&A	14%	of	\$	485.299.26	\$	67.942	
<u>Contingency</u> 25% of \$ 485,299.26 \$ 121,325	Overhead				485,299.26	\$	24,265	
<u>Contingency</u> 25% of \$ 485,299.26 \$ 121,325	New Mexico Gross Receipts Tax	7.125%	of	\$	485,299.26	\$	34,578	
	Contingency	25%	of	\$	485,299.26	\$	121,325	
	Subtotal Year 1 Operations and Maintenance					\$	733,409	-

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring

4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= wells Ω

7. Assume that the duration of construction is 129 working days (includes 90 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is includes only new extraction well(s)

8%

10. The G&A rate is 11. The overhead rate is 5% 2%

12. The Bonding & Insurance rate is 13. The fee rate is

CAPITAL COST							
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
Bonding& Insurance	0%	of	\$	733,408.51	\$	-	Bonding only applies to Capital Costs
Fee	8%	of	\$	733,408.51	\$	58,673	
TOTAL YEAR 1 OPERATIONS AND MAINTENANCE COST					\$	792,081	
ANNUAL OPERATIONS AND MAINTENANCE COST	YEARS 2-5	(ANNU	IAL COS	ST)			
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments
Routine System O&M							
Labor - Technician	208 hr		\$	75.00		15,600	4 hours/week
Labor - Engineer	104 hr		\$	120.00		12,480	50% of the Tech time
Water Sample Analysis	29 sai		\$	150.00			monthly infl/effl sampling for permit, plus 20% extra for QA/QC
O&M Supplies	1 LS		\$	6,000.00		6,000	
Electricity	130,699 kw		\$	0.08			Assumes continuous operation of the tank effleunt pumps
HiPOx System O&M	1 LS		\$	39,776.00	\$	39,776	chemical and O3 generator electrical costs per vendor
							98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Annual Extraction Well and Distribution Operating Cost	568 MN	ИGal	\$	194.73			avg. for CLC 19, 21, 27)
Total Routine System O&M					\$	199,200	
Reporting (Annual Reports)							
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$	12,000	
Labor - Editor	50 hr		\$	85.00	\$	4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 2-5 Operations and Maintenance					\$	217,575	
Desirat Management	8%	- 6	•	047 575 05	\$	47.400	
Project Management	6% 15%	of	\$	217,575.05 217.575.05	\$	17,406	
Technical Support Construction Management	0%	of of	\$ \$	217,575.05		32,636	
Subcontractor General Requirements	5%	of	\$ \$	217,575.05	\$	10.879	
Subtotal Year 2-5 Operations and Maintenance	5%	OI	à	217,575.05	\$	278,496	
Subiotal Year 2-5 Operations and Maintenance					Þ	276,496	
G&A	14%	of	\$	278,496.06	\$	38,989	
Overhead	5%	of	\$	278,496.06	\$	13,925	
New Mexico Gross Receipts Tax	7.125%	of	\$	278,496.06	\$	19,843	
Contingency	25%	of	\$	278,496.06	\$	69,624	
Subtotal Year 2-5 Operations and Maintenance				·	\$	420,877	=
·						· · · · · ·	=

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.
 The number of new nested monitor wells required to be installed
 wells included under ground water monitoring

3. I he number of new nested monitor wells required to be installed = 1 wells

4. Number of new ground water extraction wells to be installed = 1 wells

5. Number of piezometers to be installed = 0 piezometers included under ground water monitoring

6. Number of reinjection wells to be installed = 0 wells

7. Assume that the duration of construction is 129 working days (includes 90 working days for treatment system construction and installation)

8. The number of wells to be sampled for VOCs is

0 wells per round included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

CAPITAL COST					
Item/Activity	Qty Uni	t	Unit Cost	Cost	Comments and References
Bonding& Insurance	0%	of	\$ 420,877.17	\$ -	Bonding only applies to Capital Costs
Fee	8%	of	\$ 420,877.17	\$ 33,670	
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND MA	INTENANCE C	os:		\$ 454,547	

TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND N	MAINTENANCE C	os ⁻			\$ 454,547	
ANNUAL OPERATIONS AND MAINTENANCE COST	T - YEARS 6-14	(ANNU	AL COS	T)		
Item/Activity	Qty Uni	t		Unit Cost	Cost	Comments
Routine System O&M						
Labor - Technician	208 hr		\$	75.00	\$ 15,600	4 hours/week
Labor - Engineer	104 hr		\$	120.00	\$ 12,480	50% of the Tech time
Water Sample Analysis	29 san	nple	\$	150.00	\$ 4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
O&M Supplies	1 LS		\$	6,000.00	\$ 6,000	
Electricity	130,699 kw-	hr	\$	0.08	\$ 10,456	Assumes continuous operation of the tank effleunt pumps
HiPOx System O&M	1 LS		\$	39,776.00	\$ 39,776	chemical and O3 generator electrical costs per vendor
·						98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Annual Extraction Well and Distribution Operating Cost	484 MM	Gal	\$	194.73	\$ 94,162	avg. for CLC 19, 21, 27)
Total Routine System O&M					\$ 182,824	
Reporting (Annual Reports)						
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$ 12,000	
Labor - Editor	50 hr		\$	85.00	\$ 4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$ 2,125	
Total Reporting					\$ 18,375	
Subtotal Year 6-14 Operations and Maintenance					\$ 201,199	
			_			
Project Management	8%	of	\$	217,575.05	17,406	
Technical Support	15%	of	\$	217,575.05	32,636	
Construction Management	0%	of	\$	217,575.05	-	
Subcontractor General Requirements	5%	of	\$	217,575.05	\$ 10,879	
Subtotal Year 6-14 Operations and Maintenance					\$ 262,120	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.
 The number of new nested monitor wells required to be installed

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed =
5. Number of piezometers to be installed =
6. Number of reinjection wells to be installed =
7. Number of reinjection wells to be installed =
8. Number of reinjection wells to be installed =
9. Diezometers
9. Wells
9. Included under ground water monitoring
9. Included under ground water monitoring
9. Included under ground water monitoring
9. Wells
9. Included under ground water moni

7. Assume that the duration of construction is
8. The number of wells to be sampled for VOCs is

wells per round

working days for treatment system construction and installation)

wells per round

included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

5%

2%

8%

10. The G&A rate is

11. The overhead rate is
12. The Bonding & Insurance rate is

13. The fee rate is

OADITAL GOOT							
CAPITAL COST							
Item/Activity	Qty Un			Unit Cost		Cost	Comments and References
G&A	14%	of	\$	262,120.04		36,697	
Overhead	5%	of	\$	262,120.04	\$	13,106	
New Mexico Gross Receipts Tax	7.125%	of	\$	262,120.04	\$	18,676	
Contingency	25%	of	\$	262,120.04	\$	65,530	_
Subtotal Year 6-14 Operations and Maintenance					\$	396,129	
Bonding& Insurance	0%	of	\$	396,128.92	\$	-	Bonding only applies to Capital Costs
Fee	8%	of	\$	396,128.92	\$	31,690	
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AND MA	AINTENANCE	COS.			\$	427,819	
POST CLOSURE COST				•			
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments
Closure Reporting							
Labor - Engineer/Hydrogeologist	100 hr			\$120.00	\$	12,000	
Labor - Editor	50 hr			\$85.00	\$	4,250	
Labor - CAD Technician	25 hr			\$85.00	\$	2,125	
Total Closure Reporting				,	\$	18,375	
Equipment Demobilization and Well Abandonment							
Well Abandonment	1 we		•	10 000 00	æ	10.000	now extraction wells only others included under ground water manifesing
Equipment Demobilization	1 LS		\$	10,000.00 150,000.00	э \$	150,000	new extraction wells only, others included under ground water monitoring
Subtotal Equipment Demobilization and Well Abandonment	1 L3		- Þ	150,000.00	\$	160,000	
Subtotal Equipment Demobilization and Well Abandonment					Ф	160,000	
Site Work Allowance	10%	of	\$	160.000.00	Φ	16.000	
Mechanical Allowance	0%	of	\$ \$	160,000.00		10,000	
Instrumentation and Controls Allowance	0%	of	\$ \$	160,000.00		-	
			Þ		Ф	0.000	
Electrical Allowance	5%	of	Þ	160,000.00	ф	8,000	
Miscellaneous Equipment Allowance	0%	of	\$	160,000.00	\$	404.000	
Subtotal Well Abandonment					\$	184,000	
Subtotal Post-Closure Cost					\$	202,375	_

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new posted monitor wells required to be installed.

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed =
5. Number of piezometers to be installed =
6. Number of reinjection wells to be installed =
7. Number of reinjection wells to be installed =
8. Number of reinjection wells to be installed =
9. Diezometers

8. The number of wells to be sampled for VOCs is

129 working days (includes 90 working days for treatment system construction and installation)

wells per round included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

2%

8%

10. The G&A rate is

11. The overhead rate is

12%

12. The Bonding & Insurance rate is 13. The fee rate is

CAPITAL COST					
Item/Activity	Qty Un	it	Unit Cost	Cost	Comments and References
Project Management	8%	of	\$ 202,375.00	\$ 16,190	
Technical Support	15%	of	\$ 202,375.00	\$ 30,356	
Construction Management	10%	of	\$ 202,375.00	\$ 20,238	
Subcontractor General Requirements	5%	of	\$ 202,375.00	\$ 10,119	
Subtotal Post-Closure Cost				\$ 279,278	
G&A	14%	of	\$ 279,277.50	\$ 39,099	
Overhead	5%	of	\$ 279,277.50	\$ 13,964	
New Mexico Gross Receipts Tax	7.125%	of	\$ 279,277.50	\$ 19,899	
Contingency	25%	of	\$ 279,277.50	\$ 69,819	
Subtotal Post-Closure Cost				\$ 422,058	- -
Bonding& Insurance	2%	of	\$ 422,058.12	\$ 8,441	
Fee	8%	of	\$ 422,058.12	\$ 33,765	
TOTAL POST CLOSURE COST				\$ 464,264	

Alternative 4 - Enhanced Ground Water Extraction with Treatment **PRESENT WORTH ANALYSIS**

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Chemcial/UV Oxidation

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. Real Discount Rate 3.00% Source: OMB Ciruclar No. A-94, Jan. 2007 version of Appendix C obtained from http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html

2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

3. Escalation factor is 3.00%

Present Worth Analysis

		E	Α		В		C=A+B		A*E		B*E		C*E		
									Total PV						
		Discount						С	apital Costs	То	tal PV O&M		Total PV	E	Balance of Interest Bearing
Elapsed Time	Year	Factor at 3%	Capital Cost	(O&M Cost	7	Total Cost		at 3%	С	osts at 3%	C	osts at 3%		Account at 3%
0	2007	1.000	\$ 4,193,197			\$	4,193,197	\$	4,193,197	\$	-	\$	4,193,197	\$	7,132,655
1	2008	0.971		\$	815,844	\$	815,844	\$	-	\$	792,081	\$	792,081	\$	6,506,316
2	2009	0.943		\$	482,229	\$	482,229	\$	-	\$	454,547	\$	454,547	\$	6,204,809
3	2010	0.915		\$	496,696	\$	496,696	\$	-	\$	454,547	\$	454,547	\$	5,879,356
4	2011	0.888		\$	511,597	\$	511,597	\$	-	\$	454,547	\$	454,547	\$	5,528,792
5	2012	0.863		\$	526,945	\$	526,945	\$	-	\$	454,547	\$	454,547	\$	5,151,902
6	2013	0.837		\$	510,839	\$	510,839	\$	-	\$	427,819	\$	427,819	\$	4,780,296
7	2014	0.813		\$	526,164	\$	526,164	\$	-	\$	427,819	\$	427,819	\$	4,381,756
8	2015	0.789		\$	541,949	\$	541,949	\$	-	\$	427,819	\$	427,819	\$	3,955,001
9	2016	0.766		\$	558,207	\$	558,207	\$	_	\$	427,819	\$	427,819	\$	3,498,698
10	2017	0.744		\$	574,953	\$	574,953	\$	-	\$	427,819	\$	427,819	\$	3,011,457
11	2018	0.722		\$	592,202	\$	592,202	\$	-	\$	427,819	\$	427,819	\$	2,491,833
12	2019	0.701		\$	609,968	\$	609,968	\$	-	\$	427,819	\$	427,819	\$	1,938,321
13	2020	0.681		\$	628,267	\$	628,267	\$	-	\$	427,819	\$	427,819	\$	1,349,356
14	2021	0.661	\$ 702,241	\$	647,115	\$	1,349,356	\$	464,264	\$	427,819	\$	892,083	\$	0
Total Alternative 4 E	nhanced G	Fround Water Ex	\$ 4,895,438	\$	8,022,974	\$	12,918,412	\$	4,657,461	\$	6,460,644	\$	11,118,104		

COST ESTIMATE SUMMARY²

Griggs and Walnut Superfund Site Feasibility Study Griggs and Walnut Superfund Site - Las Cruces, New Mexico PROJECT: SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: PREPARED BY: Ground Water Extraction and Treatment with GAC

L.Colella, T.Palaia 346535.FS.01 PROJECT NUMBER:

Project Management	Capital Cost	
Design	Construction	\$ 1,498,996
Construction Management \$ 224,84 SBA \$ 300,09 Overhead \$ 107,17 Tax \$ 152,72 Contingency \$ 158,78 Bondingk Insurance \$ 64,78 Fee \$ 259,15 Fee \$ 259,15 Fortal Capital Cost \$ 3,583,40 Year 1 Operations and Maintenance \$ 17,20 System Startup \$ 17,20 Routine System O&M \$ 182,02 Reporting (Annual Report and Construction Completion Report) \$ 73,50 Professional Services \$ 62,72 Subcontractor General Requirements \$ 13,33 SIA \$ 48,87 Tax \$ 17,45 Tax \$ 24,87 Contingency \$ 87,27 Bondingk Insurance \$ 17,45 Fee \$ 42,20 Contingency \$ 589,76 Annual Operations and Maintenance Cost: Years 2-5 S 69,76 Annual Operations and Maintenance Cost: Years 2-5 \$ 18,37 Routine System O&M \$ 18,37 Routine System O&M <td>Project Management</td> <td>\$ 119,920</td>	Project Management	\$ 119,920
Subcontractor General Requirements \$ 74,95 SAA \$ 300,09 Overhead \$ 107,17 Tax \$ 152,72 Contingency \$ 535,89 Bonding& Insurance \$ 47,79 Fee \$ 259,15 Fotal Capital Cost \$ 3,553,40 Year 1 Operations and Maintenance \$ 17,20 System Startup \$ 17,20 Routine System O&M \$ 182,02 Reporting (Annual Report and Construction Completion Report) \$ 73,50 Professional Services 1 \$ 62,72 Subcontractor General Requirements \$ 13,83 GAA \$ 48,87 Overhead \$ 17,45 Isa \$ 24,87 Continigency \$ 72,27 Bondingk insurance \$ 22,07 Fee \$ 2,20 Total Year 1 Operations and Maintenance Cost: Years 2-5 \$ 18,37 Routine System O&M \$ 16,38 Professional Services 1 \$ 41,48 Routine System O&M \$ 18,37 Reporting (Annual Reports) \$ 18,37 <t< td=""><td>Design</td><td>\$ 224,849</td></t<>	Design	\$ 224,849
GAA \$ 300,00 Overhead \$ 107,17 Tax \$ 152,72 Contingency \$ 535,89 Bending& Insurance \$ 289,15 Fee \$ 289,15 Total Capital Cost \$ 3,563,40 Year 1 Operations and Maintenance \$ 17,20 System Startup \$ 182,02 Reporting (Annual Report and Construction Completion Report) \$ 73,50 Professional Services \$ 182,02 Reporting (Annual Report and Construction Completion Report) \$ 73,50 Professional Services \$ 62,72 Subcontractor General Requirements \$ 13,63 Subcontractor General Requirements \$ 14,88 Subcontractor General Requirements \$ 24,20 Contingency \$ 87,27 Bonding& Insurance \$ 597,67 Fee \$ 42,20 Total Year 1 Operations and Maintenance Cost: Years 2-5 \$ 87,27 Routine System O&M \$ 16,38 Reporting (Annual Reports) \$ 18,37 Professional Services \$ 14,48 Subcontractor General Requirements \$ 16,4	Construction Management	\$ 224,849
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Total Year 1 Operations and Maintenance \$ 569,76		
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Section Sect		,-
Annual Operations and Maintenance Cost: Years 2-5 \$ 376,79		27,911
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Professional Services 1 \$ 41,48 Subcontractor General Requirements \$ 9,01 G&A \$ 10,42 New Mexico Gross Receipts Tax \$ 14,85 Contingency \$ 52,10 Bending& Insurance \$ Fee \$ 25,20 Total Annual Operations and Maintenance Cost: Years 6-14 \$ 340,19 Post Closure Cost * Closure Reporting \$ 18,37 Well Abandonment and Equipment Demobilization \$ 126,50 Professional Services 1 \$ 47,80 Subcontractor General Requirements \$ 7,24 G&A \$ 27,99 Overhead \$ 9,99 New Mexico Gross Receipts Tax \$ 14,24 Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35		
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G&A \$ 27,99 Overhead \$ 9,99 New Mexico Gross Receipts Tax \$ 14,24 Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35	Professional Services ¹	\$ 47,809
G&A \$ 27,99 Overhead \$ 9,99 New Mexico Gross Receipts Tax \$ 14,24 Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35	Subcontractor General Requirements	\$ 7,244
Overhead \$ 9,99 New Mexico Gross Receipts Tax \$ 14,24 Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35		\$ 27,990
New Mexico Gross Receipts Tax \$ 14,24 Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35		9,996
Contingency \$ 49,98 Bonding& Insurance \$ 6,04 Fee \$ 24,17 Total Post Closure Cost \$ 332,35		
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Fee \$ 24,17 Total Post Closure Cost \$ 332,35		
Total Post Closure Cost \$ 332,35	Donainga maaranee	
TOTAL PRESENT WORTH \$ 9.034.49	Fee	
	Fee	332,354

^{1 -} Professional Services includes Project Management, Design/Technical Support, and Construction Management.
2 - The cost estimates provided are to an accuracy of +50 percent to -30 percent and are prepared for the sole purpose of alternative comparison. The alternative cost estimates are in 2006 dollars and are based on conceptual design from information available at the time of this study. The actual cost of the project would depend on the final scope and design of the selected remedial action, the schedule of implementation, competitive market conditions, and other variables.

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with GAC

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Site Background Data

Elevation of Site = 4100 ft amsl or 12.68 psia Volume of Contaminated Ground Water greater than 5 ug/L= 7,350 acre-ft based on JSAI model Volume of Contaminated Ground Water greater than 1 ug/L= 25,700 acre-ft based on JSAI model

PCE Concentrations in wells sampled December 2005.

PCE (µg/L) Sample Location MW-SF1 11 MW-SF10 17 GWMW01 Port 2 21 GWMW01 Port 6 6

μg/L, average concentration 14

Pumping Rates for Plume Containment and Remediation <20 Years (per JSAI modeling)

460 gpm 620 CLC-27

New Well #1 to replace operation of CLC-18 after 5 years per JSAI modeling 300

Total Annual: Years 1-5 568 MMgal Total Annual: Years 6-14 484 MMgal

Mass Estimate

based on JSAI model - JSAI estimate based on an effective porosity of 20% Mass of PCE above MCL in ground water = 150 kg of PCE and does not address potential PCE mass in additional pore space

Conceptual Design

Pumping System Design Parameters

Estimated Number of Pumping Wells = Estimated pumping rate from CLC-18 =

460 gpm (based on JSAI modeling results) Estimated pumping rate from CLC-27 = 620 gpm (based on JSAI modeling results)

Estimated pumping rate from New Well = 300 gpm (to replace operation of CLC-18 after 5 years)

Total Pumping Rate in Years 1-5= 1,080 gpm (assumes CLC-18 and 27 only) Total Pumping Rate in Years 6-14= 920 gpm (assumes CLC-27 and new well only)

Depth of new pumping wells = 450 ft bgs

System Construction Time

Estimated drilling rate = 125 If/day based on invoice Total linear footage drilling = 900 If

Estimated duration of drilling = 7.2 days or 8 days (rounded up)

Estimated linear footage of field piping per pumping well = 1500 ft per well average of piping required for all wells

Total linear footage of connection piping = 500 If assumed 500 lf to stub up to treatment system and reconnect to existing CLC-27 line to UGR connection of CLC-18 to CLC -27 connection to Upper Griggs Reservoir; CLC estimated 1000 If new piping needed in addition to the approximate length of 500 If of existing

Total linear footage of effluent field piping= 1.000 If pipina. Total linear footage of effluent field piping= estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir 750 If Estimated field piping placing rate = 75 If/day

Estimated duration of field piping = 30.0 days or 30 days (rounded up) Total construction timeframe = 38 days

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: 4 Elimaticed Glound Water Extraction with Treatment with GAC

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Granular Activated Carbon (GAC) Conceptual Design Parameters

All organic contaminants found are adsorbable with GAC.

GAC treatment system design flowrate is 1,080 gpm

Governing contaminant PCE at 14 µg/L

GAC usage rate for PCE only 0.99 lbs GAC/hr or 23.7 lbs GAC/day or 8,640 lbs GAC/yr based on GAC vendor modeling

Assuming a multiplier of 1.00 for additional organic contaminants that will also adsorb and use carbon (vendor modeling includes other contaminants)

Assuming a carbon cost of \$1.75 per lb GAC for supply and changeout --> \$15.120 per GAC changeout per year per vendor quote

Required changeout period of 0.2 times per year based on GAC vendor modeling
Assume a carbon vessel size of 10,000 lb and we need 4 vessels in parallel

Assume a carbon vessel size of 10,000 lb and we need 350 gpm

GAC Unit: QED Model CWS10000, rated for up to 350 gpm

Assuming a 10,000 lb vessel costs \$18,000 with GAC, total cost = \$72,000 for vessels and GAC only per vendor quote

In addition, there would be an annual recurring cost of \$15,120 per GAC changeout per year

COST ESTIMATE DETAILS

Griggs and Walnut Superfund Site Feasibility Study PROJECT: Griggs and Walnut Superfund Site - Las Cruces, New Mexico SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment DESCRIPTION: Ground Water Extraction and Treatment with GAC PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

13. The fee rate is

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = piezometers included under ground water monitoring

6. Number of reinjection wells to be installed= wells 108 7. Assume that the duration of construction is working days (includes 70 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring 0

9. The number of wells on-site to be abandoned for post-closure is includes only new extraction well(s) 10. The G&A rate is 14% 11. The overhead rate is 5% 12. The Bonding & Insurance rate is 2% 8%

CAPITAL COST							
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
Construction							
Underground Piping from CLC-18 to CLC-27							estimated LF from CLC: cost includes 10-inch pipe, trenching,
connection to Upper Griggs Reservoir	1,000 ft		\$	100.17	\$	100,170	backfill, compacting, asphalt repaying (RS Means)
Underground Piping from new extraction well to CLC-	•						
27 connection to Upper Griggs Reservoir	750 ft		\$	100.17	\$	75,128	10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Piping Connection to Treatment System	500 If		\$	100.17	\$		10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Pumping Well Modifications	2 ea		\$	25,000.00	\$	50,000	JSP Memo 7/8/06
Ground Water Extraction Well Installation	1 we	I	\$	200,000.00	\$	200,000	JSP Memo 7/8/06
Ground Water Extraction Pumps	3 ea		\$	10,000.00	\$	30,000	assume new + replace city pumps, vendor quote; 100gpm, 15 hp, 3-phase, 230V, 6 inch
Influent Equalization Tank	21,600 gal		\$	1.00	\$	21,600	provides 20-minutes of storage
Tank Effluent Pump	2 ea		\$	4,000.00	\$	8,000	Assumes 10 hp units - one pump will supply 2 GAC units (Pump with motor controls for 540 GPM @ 50'TDH
Influent and Effluent Bag Filters	2 LS		\$	7,500.00	\$	15,000	0 gpm size filter
GAC Treatment system	4 ves	sel	\$	72,000.00	\$	288,000	QED Model CWS10000, rated for up to 350 gpm
Protective Enclosure	1 ea		\$	150,000.00	\$	150,000	Assume 30'x25' building at \$200/sf, includes overhead crane, pre-fab metal
Repair discharge line on CLC-27	1 LS		\$	300.00	\$	300	
Well Permits	1 ea		\$	30.00	\$	30	new extraction well
Equipment Rental	22 wk		\$	200.00	\$	4,400	MultiRAE
Subtotal Capital Cost					\$	992,713	
Site Work Allowance	7%	of	\$	992.712.50	•	69.490	
Mechanical Allowance	15%	of	\$	992,712.50		148.907	
Instrumentation and Controls Allowance	12%	of	φ.	992,712.50			including SCADA system
Electrical Allowance	12%	of	\$	992,712.50		119,126	including GOADA system
Miscellaneous Equipment Allowance	5%	of	\$	992,712.50		49.636	
Subtotal Capital Cost	0,0			002,112.00	_	1,498,996	
·							
Project Management	8%	of	\$	1,498,995.88	\$	119,920	
Design	15%	of		1,498,995.88		224,849	
Construction Management	15%	of	\$	1,498,995.88	\$	224,849	
Subcontractor General Requirements	5%	of	\$	1,498,995.88	\$	74,950	
Subtotal Capital Cost				•	\$	2,143,564	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pa
PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

1. The accuracy of the cost estimate is +50%/-30%

4. Number of new ground water extraction wells to be installed = 1 wells

5. Number of piezometers to be installed = 0 piezometers

6. Number of reinjection wells to be installed = 0 wells

7. Assume that the duration of construction is 108 working days (includes 70 working days for treatment system construction and installation)

8. The number of wells to be sampled for VOCs is 0 wells per round included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

CAPITAL COST					
Item/Activity	Qty Un	it	Unit Cost	Cost	Comments and References
G&A	14%	of	\$ 2,143,564.10	\$ 300,099	
Overhead	5%	of	\$ 2,143,564.10	\$ 107,178	
New Mexico Gross Receipts Tax	7.125%	of	\$ 2,143,564.10	\$ 152,729	
Contingency	25%	of	\$ 2,143,564.10	\$ 535,891	
Subtotal Capital Cost				\$ 3,239,461	- -
Bonding& Insurance	2%	of	\$ 3,239,461.25	\$ 64,789	
Fee	8%	of	\$ 3,239,461.25	\$ 259,157	
TOTAL CAPITAL COST				\$ 3,563,407	

YEAR 1 OPERATIONS AND MAINTENANCE					
Item/Activity	Qty Unit	- (Unit Cost	Cost	Comments
System Startup					
Labor - Technician	100 hr	\$	75.00	\$ 7,500	Assume 10 days for startup, 10 hrs/day
Labor - Engineer	70 hr	\$	120.00	\$ 8,400	Assume 7 days for startup, 10 hrs/day
Water Sample Analysis	6 sample	\$	150.00	\$ 900	3 sets, VOC analysis for infl/effl, incl data valid.
Air Sample Analysis	0 sample	\$	150.00	\$ -	no air emissions with GAC
Startup Equipment Rental	2 week	\$	200.00	\$ 400	
Total System Startup				\$ 17,200	
Routine System O&M					
Labor - Technician	208 hr	\$	75.00	\$ 15,600	4 hours/week
Labor - Engineer	208 hr	\$	120.00	\$ 24,960	100% of the Tech time for first year
Water Sample Analysis	29 sample	\$	150.00	\$ 4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0 sample	\$	-	\$ -	no air emissions with GAC
O&M Supplies	1 LS	\$	1,000.00	\$ 1,000	
GAC Replacement	1 LS	\$	15,120.00	\$ 15,120	
Electricity	130,699 kw-hr	\$	0.08	\$ 10,456	Assumes continuous operation of the tank effluent pumps
					98-99 avg costs provided by City, 3% inflation factor added per
					year for 2006 values (used avg. for CLC 19, 21, 27). Assumes
Annual Extraction Well and Distribution Operating Cost	568 MMGal	\$	194.73	\$ 110,538	O&M costs for new well will be the same as for CLC-18.
Total Routine System O&M				\$ 182,024	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PROJECT NUMBER: L.Colella, 1.Pa

<u>Assumptions</u>

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = piezometers included under ground water monitoring 6. Number of reinjection wells to be installed= wells 108 7. Assume that the duration of construction is working days (includes 70 working days for treatment system construction and installation) wells per round 8. The number of wells to be sampled for VOCs is included under ground water monitoring 0

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

	A						
Item/Activity	Qty Uni	t		Unit Cost		Cost	Comments and References
Reporting (Annual Report and Construction Completion Report)							
Labor - Engineer/Hydrogeologist	400 hr		\$	120.00	\$	48,000	
Labor - Editor	200 hr		\$	85.00	\$	17,000	
Labor - CAD Technician	100 hr		\$	85.00	\$	8,500	
Total Annual Reporting					\$	73,500	
Subtotal Year 1 Operations and Maintenance					\$	272,724	
Desirat Management	8%	of	•	272.724.05	•	04.040	
Project Management			Þ	,		21,818	
Technical Support	15%	of	\$	272,724.05		40,909	
Construction Management	0%	of	\$	272,724.05	\$	-	
Subcontractor General Requirements	5%	of	\$	272,724.05	\$	13,636	
Subtotal Year 1 Operations and Maintenance					\$	349,087	
G&A	14%	of	\$	349.086.78	\$	48,872	
Overhead	5%	of	\$	349,086.78	\$	17,454	
New Mexico Gross Receipts Tax	7.125%	of	\$	349,086.78	\$	24,872	
Contingency	25%	of	\$	349,086.78	\$	87,272	
Subtotal Year 1 Operations and Maintenance					\$	527,557	- -
Bonding& Insurance	0%	of	•	527,557.40	¢		Bonding only applies to Capital Costs
Fee	8%	of	ų ¢	527,557.40		42,205	
TOTAL YEAR 1 OPERATIONS AND MAINTENANCE COST	0 70	UI	Ą	321,331.40	\$	569,762	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = piezometers included under ground water monitoring 6. Number of reinjection wells to be installed= wells 108 7. Assume that the duration of construction is working days (includes 70 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is included under ground water monitoring wells per round 0 includes only new extraction well(s)

9. The number of wells on-site to be abandoned for post-closure is

10. The G&A rate is

11. The overhead rate is

12. The Bonding & Insurance rate is

2%

13. The fee rate is

8%

CAPITAL COST Item/Activity	Qty Ur	it		Unit Cost		Cost	Comments and References
RemitActivity	Qty 01			Onit Cost		COSt	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE CO	ST - YEARS 2	-5 (ANN	UAL (COST)			
Item/Activity	Qty Ur	nit		Unit Cost		Cost	Comments
Routine System O&M							
Labor - Technician	208 hr		\$	75.00	\$	15,600	4 hours/week
Labor - Engineer	104 hr		\$	120.00	\$	12,480	50% of the Tech time
Water Sample Analysis	29 sa	mple	\$	150.00	\$		monthly infl/effl sampling for permit, plus 20% extra for QA/QC
O&M Supplies	1 LS	;	\$	1,000.00	\$	1,000	
GAC Replacement	1 LS	;	\$	7,560.00	\$	7,560	assumes GAC usage rate drops 50% from initial rate
Electricity	130,699 kw	-hr	\$	0.08	\$	10,456	Assumes continuous operation of the tank effluent pumps
							98-99 avg costs provided by City, 3% inflation factor added pe
Annual Extraction Well and Distribution Operating Cost	568 MI	ИGal	\$	194.73	\$	110,538	year for 2006 values (used avg. for CLC 19, 21, 27)
Total Routine System O&M					\$	161,984	
Reporting (Annual Reports)							
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$	12,000	
Labor - Editor	50 hr		\$	85.00	\$	4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 2-5 Operations and Maintenance					\$	180,359	
Decided Management	20/		•	400 050 05	•	44.400	
Project Management	8%	of	\$	180,359.05	\$	14,429	
Technical Support	15%	of	\$	180,359.05	\$	27,054	
Construction Management	0%	of	\$	180,359.05		- 0.040	
Subcontractor General Requirements	5%	of	\$	180,359.05	_	9,018	
Subtotal Year 2-5 Operations and Maintenance					\$	230,860	
G&A	14%	of	\$	230.859.58	\$	32,320	
Overhead	5%	of	\$	230,859,58	\$	11,543	
New Mexico Gross Receipts Tax	7.125%	of	\$	230,859,58		16,449	
Contingency	25%	of	\$	230,859.58		57,715	
Subtotal Year 2-5 Operations and Maintenance				,	\$	348,887	<u>-</u> -
Dan dia 20 January	00/		_	040,000,54	_		Describes and appellants Operital Opera
Bonding& Insurance	0% 8%	of	\$	348,886.54		- 27.044	Bonding only applies to Capital Costs
Fee		of	\$	348,886.54	\$	27,911	
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND	MAINTENANC	E COST			\$	376,797	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pa
PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = piezometers included under ground water monitoring 6. Number of reinjection wells to be installed= wells 108 7. Assume that the duration of construction is working days (includes 70 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring 0 9. The number of wells on-site to be abandoned for post-closure is includes only new extraction well(s)

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

 13. The fee rate is
 8%

Item/Activity	Qty Un	it		Unit Cost	Cost	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE COS	ST - YEARS 6	10 (ANI	NUAL	COST)		
Item/Activity	Qty Un	it		Unit Cost	Cost	Comments
Routine System O&M						
Labor - Technician	208 hr		\$	75.00	\$ 15,600	4 hours/week
Labor - Engineer	104 hr		\$	120.00	\$ 12,480	50% of the Tech time
Water Sample Analysis	29 sai	nple	\$	150.00	\$ 4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
O&M Supplies	1 LS		\$	1,000.00	\$ 1,000	
GAC Replacement	1 LS		\$	1,512.00	\$ 1,512	assumes GAC usage rate drops 90% from initial rate
Electricity	130,699 kw	-hr	\$	0.08	\$ 10,456	Assumes continuous operation of the tank effluent pumps
						98-99 avg costs provided by City, 3% inflation factor added per
Annual Extraction Well and Distribution Operating Cost	484 MN	/IGal	\$	194.73	\$ 94,162	year for 2006 values (used avg. for CLC 19, 21, 27)
Total Routine System O&M					\$ 139,560	
Reporting (Annual Reports)						
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$ 12,000	
Labor - Editor	50 hr		\$	85.00	\$ 4.250	
Labor - CAD Technician	25 hr		\$	85.00	\$ 2.125	
Total Reporting					\$ 18,375	
Subtotal Year 6-10 Operations and Maintenance					\$ 157,935	
Project Management	8%	of	\$	180,359.05	\$ 14,429	
Technical Support	15%	of	\$	180,359.05	\$ 27,054	
Construction Management	0%	of	\$	180,359.05	\$ -	
Subcontractor General Requirements	5%	of	\$	180,359.05	\$ 9,018	
Subtotal Year 6-10 Operations and Maintenance					\$ 208,436	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pa
PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed

4. Number of new ground water extraction wells to be installed = 0 wells

5. Number of piezometers to be installed = 0 piezometers

6. Number of reinjection wells to be installed = 0 wells

wells

included under ground water monitoring

included under ground water monitoring

wells

8. The number of wells to be sampled for VOCs is

108 working days (includes 70 working days for treatment system construction and installation)

108 working days (includes 70 working days for treatment system construction and installation)

108 working days (includes 70 working days for treatment system construction and installation)

108 working days (includes 70 working days for treatment system construction and installation)

108 working days (includes 70 working days for treatment system construction and installation)

109 wells per round

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

9. The number of wells on-site to be abandoned for post-closure is
10. The G&A rate is
11. The overhead rate is
12. The Bonding & Insurance rate is
2%
13. The fee rate is
8%

Item/Activity	Qty Ur	it		Unit Cost		Cost	Comments and References
G&A	14%	of	\$	208,435.56	\$	29,181	
Overhead	5%	of	\$	208,435.56	\$	10,422	
New Mexico Gross Receipts Tax	7.125%	of	\$	208,435.56	\$	14,851	
Contingency	25%	of	\$	208,435.56	\$	52,109	
Subtotal Year 6-10 Operations and Maintenance					\$	314,998	- -
Bonding& Insurance	0%	of	\$	314,998.25	\$	_	Bonding only applies to Capital Costs
Fee	8%	of	\$	314,998.25	\$	25,200	
TOTAL ANNUAL COST: YEARS 6-10 OPERATIONS AND N	IAINTENANO	E COST			\$	340,198	
POST CLOSURE COST							
Item/Activity	Qty Ur	it		Unit Cost		Cost	Comments
Closure Reporting	Qty Oi	iit.		Offic Cost		0031	Comments
Labor - Engineer/Hydrogeologist	100 hr			\$120.00	\$	12,000	
Labor - Editor	50 hr			\$85.00	\$	4.250	
Labor - CAD Technician	25 hr			\$85.00	\$	2.125	
Total Closure Reporting	20 111			ψ00.00	\$	18,375	
Well Abandonment and Equipment Demobilization							
Well Abandonment	1 we	·II	\$	10,000.00	\$	10,000	
Equipment Demobilization	1 LS		\$	100,000.00	\$	100,000	
Subtotal Well Abandonment and Equipment Demobilization					\$	110,000	
Site Work Allowance	10%	of	¢	110.000.00	¢	11.000	
Mechanical Allowance	0%	of	φ	110,000.00		11,000	
Instrumentation and Controls Allowance	0%	of	φ	110,000.00		-	
Electrical Allowance	5%	of	φ	110,000.00		5,500	
Miscellaneous Equipment Allowance	0%	of	φ	110,000.00		3,300	
Subtotal Equipment Demobilization and Well Abandonment	076	UI	φ	1 10,000.00	\$	126,500	
Subtotal Post-Closure Cost					\$	144,875	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with GAC
PREPARED BY: L.Colella, T. Palaia

PREPARED BY: L.Colella, T.Pa
PROJECT NUMBER: 346535.FS.01

<u>Assumptions</u>

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

2. See "Conceptual Design" spreadsheer for pasts or cost estimate assumptions.

3. The number of new nested monitor wells required to be installed = 1 wells

4. Number of new ground water extraction wells to be installed = 1 wells

5. Number of piezometers to be installed = 0 piezometers

6. Number of reinjection wells to be installed = 0 wells

7. Assume that the duration of construction is 108 working days (includes 70 working days for treatment system construction and installation)

8. The number of wells to be sampled for VOCs is 0 wells per round 9. The number of wells on-site to be abandoned for post-closure is 1 wells includes only new extraction well(s)

9. The number of wells on-site to be abandoned for post-closure is
10. The G&A rate is
11. The overhead rate is
12. The Bonding & Insurance rate is
2%
13. The fee rate is
8%

CAPITAL COST						
Item/Activity	Qty Unit			Unit Cost	Cost	Comments and References
Project Management	8%	of	\$	144,875.00	\$ 11,590	
Technical Support	15%	of	\$	144,875.00	\$ 21,731	
Construction Management	10%	of	\$	144,875.00	\$ 14,488	
Subcontractor General Requirements	5%	of	\$	144,875.00	\$ 7,244	
Subtotal Post-Closure Cost					\$ 199,928	
G&A	14%	of	\$	199.927.50	\$ 27,990	
Overhead	5%	of	\$	199,927.50	\$ 9,996	
New Mexico Gross Receipts Tax	7.125%	of	\$	199,927.50	\$ 14,245	
Contingency	25%	of	\$	199,927.50	\$ 49,982	
Subtotal Post-Closure Cost					\$ 302,140	- -
Bonding& Insurance	2%	of	\$	302,140.43	\$ 6,043	Bonding only applies to Capital Costs
Fee	8%	of	\$	302,140.43	\$ 24,171	· · · · · · · · · · · · · · · · · · ·
TOTAL POST CLOSURE COST					\$ 332,354	

Alternative 4 - Enhanced Ground Water Extraction with Treatment **PRESENT WORTH ANALYSIS**

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with GAC

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. Real Discount Rate 3.00% Source: OMB Ciruclar No. A-94, Jan. 2007 version of Appendix C obtained from http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html

2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

3. Escalation factor is 3.00%

Present Worth Analysis

		E	Α		В	C=A+B			A*E		B*E		C*E	
									Total PV					
		Discount						С	apital Costs	To	otal PV O&M		Total PV	Balance of Interest Bearing
Elapsed Time	Year	Factor at 3%	Capital Cost	(O&M Cost	٦	Total Cost		at 3%	C	Costs at 3%	С	osts at 3%	Account at 3%
0	2007	1.000	\$ 3,563,407			\$	3,563,407	\$	3,563,407	\$	-	\$	3,563,407	\$ 5,635,222
1	2008	0.971		\$	586,855	\$	586,855	\$	-	\$	569,762	\$	569,762	\$ 5,199,818
2	2009	0.943		\$	399,744	\$	399,744	\$	-	\$	376,797	\$	376,797	\$ 4,944,076
3	2010	0.915		\$	411,737	\$	411,737	\$	-	\$	376,797	\$	376,797	\$ 4,668,309
4	2011	0.888		\$	424,089	\$	424,089	\$	-	\$	376,797	\$	376,797	\$ 4,371,547
5	2012	0.863		\$	436,812	\$	436,812	\$	-	\$	376,797	\$	376,797	\$ 4,052,778
6	2013	0.837		\$	406,214	\$	406,214	\$	-	\$	340,198	\$	340,198	\$ 3,755,960
7	2014	0.813		\$	418,401	\$	418,401	\$	-	\$	340,198	\$	340,198	\$ 3,437,686
8	2015	0.789		\$	430,953	\$	430,953	\$	-	\$	340,198	\$	340,198	\$ 3,096,935
9	2016	0.766		\$	443,881	\$	443,881	\$	-	\$	340,198	\$	340,198	\$ 2,732,646
10	2017	0.744		\$	457,198	\$	457,198	\$	-	\$	340,198	\$	340,198	\$ 2,343,711
11	2018	0.722		\$	470,914	\$	470,914	\$	-	\$	340,198	\$	340,198	\$ 1,928,981
12	2019	0.701		\$	485,041	\$	485,041	\$	-	\$	340,198	\$	340,198	\$ 1,487,259
13	2020	0.681		\$	499,592	\$	499,592	\$	-	\$	340,198	\$	340,198	1,017,296
14	2021	0.661	\$ 502,716	\$	514,580	\$	1,017,296	\$	332,354	\$	340,198	\$	672,553	\$ 0
Total Alternative 4 E	nhanced C	Fround Water Ex	\$ 4,066,123	\$	6,386,011	\$	10,452,134	\$	3,895,762	\$	5,138,735	\$	9,034,497	

COST ESTIMATE SUMMARY²

Griggs and Walnut Superfund Site Feasibility Study Griggs and Walnut Superfund Site - Las Cruces, New Mexico PROJECT: SITE: ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: PREPARED BY: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

L.Colella, T.Palaia 346535.FS.01 PROJECT NUMBER:

Capital Cost		
Construction	\$	1,264,040
Project Management	\$	101,123
Design	\$	189,606
Construction Management	\$	189,606
Subcontractor General Requirements	\$	63,202
G&A	\$	253,061
Overhead	\$	90,379
Tax	\$	128,790
Contingency	\$	451,894
Bonding& Insurance	\$	54,634
Fee	\$	218,536
Total Capital Cost	\$	3,004,871
Year 1 Operations and Maintenance		
System Startup	\$	19,700
Routine System O&M	φ \$	
	э \$	206,500
Reporting (Annual Report and Construction Completion Report)		73,500
Professional Services ¹	\$	68,931
Subcontractor General Requirements	\$	14,985
G&A	\$	53,706
Overhead	\$	19,181
Tax	\$	27,333
Contingency	\$	95,904
Bonding& Insurance	\$	-
Fee	\$	46,379
Total Year 1 Operations and Maintenance	\$	626,118
Annual Operations and Maintenance Cost: Years 2-5		
Routine System O&M	\$	194,020
Reporting (Annual Reports)	\$	18,375
Professional Services ¹	\$	48,851
Subcontractor General Requirements	\$	10,620
G&A	\$	38,061
Overhead	\$	13,593
New Mexico Gross Receipts Tax	\$	19,370
	\$	67,966
Contingency	э \$	07,900
Bonding& Insurance	\$ \$	22.000
Fee Total Annual Operations and Maintenance Cost: Years 2-5	\$	32,869 443,725
Total Allitual Operations and Maintenance Cost. Tears 2-3	Ψ.	443,723
Annual Operations and Maintenance Cost: Years 6-14		
Routine System O&M	\$	177,644
Reporting (Annual Reports)	\$	18,375
Professional Services ¹	\$	48,851
Subcontractor General Requirements	\$	10,620
G&A	\$	35,769
Overhead	\$	12,774
	\$	
		18,204
New Mexico Gross Receipts Tax	•	63,872
Contingency	\$	
Contingency Bonding& Insurance	\$	-
Contingency Bonding& Insurance Fee	\$	30,889
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14	\$	30,889 416,997
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost	\$ \$ \$	416,997
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting	\$ \$	416,997 18,375
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost	\$ \$ \$	416,997
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹	\$ \$ \$	18,375 126,500 47,809
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment	\$ \$ \$	18,375 126,500
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹	\$ \$ \$	18,375 126,500 47,809
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements	\$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244 27,990 9,996
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services 1 Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244 27,990 9,996 14,245
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax Contingency	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244 27,990 9,996 14,245 49,982
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax Contingency Bonding& Insurance	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244 27,990 9,996 14,245 49,982 6,043
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax Contingency Bonding& Insurance Fee	***	18,375 126,500 47,809 7,244 27,990 9,996 14,245 49,982 6,043 24,171
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax Contingency Bonding& Insurance	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18,375 126,500 47,809 7,244 27,990 9,996 14,245 49,982 6,043
Contingency Bonding& Insurance Fee Total Annual Operations and Maintenance Cost: Years 6-14 Post Closure Cost Closure Reporting Equipment Demobilization and Well Abandonment Professional Services ¹ Subcontractor General Requirements G&A Overhead New Mexico Gross Receipts Tax Contingency Bonding& Insurance Fee	***	18,375 126,500 47,809 7,244 27,990 9,996 14,245 49,982 6,043 24,171

^{1 -} Professional Services includes Project Management, Design/Technical Support, and Construction Management.
2 - The cost estimates provided are to an accuracy of +50 percent to -30 percent and are prepared for the sole purpose of alternative comparison. The alternative cost estimates are in 2006 dollars and are based on conceptual design from information available at the time of this study. The actual cost of the project would depend on the final scope and design of the selected remedial action, the schedule of implementation, competitive market conditions, and other variables.

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Site Background Data

Elevation of Site = 4100 | ft amsl or 12.68 psia

Volume of Contaminated Ground Water greater than 5 ug/L= 7,350 | acre-ft based on JSAI model

Volume of Contaminated Ground Water greater than 1 ug/L= 25,700 | acre-ft based on JSAI model

μg/L, average concentration

PCE Concentrations in wells sampled December 2005.

 Sample Location
 PCE (μg/L)

 MW-SF1
 11

 MW-SF10
 17

 GWMW01 Port 2
 21

 GWMW01 Port 6
 6

Pumping Rates for Plume Containment and Remediation: 14 Years (per JSAI modeling)

CLC-18 460 gpm CLC-27 620 gpm

New Well #1 to replace operation of CLC-18 after 5 years per JSAI modeling 300 gp.

 Total Annual: Years 1-5
 568
 MMgal

 Total Annual: Years 6-14
 484
 MMgal

Mass Estimate

based on JSAI model - JSAI estimate based on an effective porosity of 20%

Mass of PCE above MCL in ground water = 150 kg of PCE and does not address potential PCE mass in additional pore space

Conceptual Design

Pumping System Design Parameters
Estimated Number of Pumping Wells =

Estimated pumping rate from CLC-18 = 460 gpm (based on JSAI modeling results)
Estimated pumping rate from CLC-27 = 620 gpm (based on JSAI modeling results)

Estimated pumping rate from New Well = 300 gpm (to replace operation of CLC-18 after 5 years)

1,000 If

750 If

75 If/day

30.0 days or

Total Pumping Rate in Years 1-5= 1,080 gpm (assumes CLC-18 and 27 only)
Total Pumping Rate in Years 6-14= 920 gpm (assumes CLC-27 and new well only)

Depth of new pumping well = 450 ft bgs

Total linear footage of effluent field piping=

Total linear footage of effluent field piping=

Estimated field piping placing rate =

Estimated duration of field piping =

Total construction timeframe =

System Construction Time

Estimated drilling rate = 125 lf/day based on invoice
Total linear footage drilling = 900 lf

Estimated duration of drilling = 7.2 days or 8 days (rounded up)

Estimated linear footage of field piping per pumping well = 1500 | ft per well average of piping required for all wells

Total linear footage of connection piping = 500 | ft per well assumed 500 | ft to stub up to treatment system and reconnect to existing CLC-27 line to UGR

connection of CLC-18 to CLC -27 connection to Upper Griggs Reservoir; CLC estimated 1000 If new piping needed in addition to the approximate length of 500 If of existing

piping.
estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir

30 days (rounded up)

38 days

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Air Stripper Design Parameters

Stripper design flowrate 1,080 gpm

Unit flow rate 540 gpm (NEEP Model 41251 Tray Air stripper) 2 units in series needed for treatment

Governing contaminant \overline{PCE} at $14 \mu g/L$

Governing contaminant is based on consideration of a combination of low Henry's Constant and highest concentration versus MCL

Influent temperature 50 °F

Unit Size: 12.5 ft x 7.3 ft NEEP Model 41251 Tray Air stripper

The Henry's Law Constant for PCE (25°C) = 176.5 atm Converting the Henry's Constant for an actual temperature of

Converting the Henry's Constant for an actual temperature of Actual Henry's Constant is 224 atm which is greater than the 10 atm threshold for effective air stripping.

Assume 100% of PCE is stripped and discharged untreated to the atmosphere. PCE is the controlling contaminant for air stripper design.

Vendor modeling indicates the Tray Air stripper uses a blower airflow rate of

2,400 scfm

PCE emissions 0.007 lbs/hr or 0.18 lbs/day or 65.2 lbs/yr

Average PCE emissions concentration is 0.8 mg/m³ or 0.2 ppmv

PCE is a hazardous air pollutant and therefore is a regulated air pollutant

The NIOSH PEL (10-hr TWA) for PCE is 25 ppmv or 136.5 mg/m³ or at 68°F and 1 atm THEREFORE, NO OFFGAS EMISSIONS CONTROL WILL BE REQUIRED SINCE MASS EMISSIONS IS VERY LOW AND

THE CONCENTRATION IS TWO ORDERS OF MAGNITUDE LOWER THAN THE NIOSH STANDARD WITHOUT CONSIDERING ATMOSPHERIC DISPERSION.

Pretreatment Design Parameters - Langlier Index and Ryznar Stability Index for CaCO3 Scaling Potential

2 (estimate of parameters water) within the

			stripper)
Flow	gpm	1080	1080
Temperature	Deg . F	60	77
Alkalinity, Total	mg/I CaCO ₃	211	211
pH	Std. Units	7.39	8.00
TDS	mg/l	919	919
Calcium	mg/l CaCO ₃	305	305
Magnesium	mg/l CaCO ₃	124	123.6
Sulfate	mg/l SO ₄ 2-	243	243
Chloride	mg/l Cl ⁻	165	165
LSI		0.170	0.936
RSI		7.05	6.13

LSI greater than 1 indicates potential for scaling RSI less than 6 indicates potential for scaling

The LSI is close to the level indicating potential for scaling

The RSI, which is more commonly used, is close to the level that indicates that there is a potential for scaling once the stripping process begins. Slight changes in parameters affect the results of these calculations.

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed

included under ground water monitoring 4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= wells Ω 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring 9. The number of wells on-site to be abandoned for post-closure is includes new extraction wells only

10. The G&A rate is

11. The overhead rate is 5% 12. The Bonding & Insurance rate is 2% 13. The fee rate is 8%

CAPITAL COST						
Item/Activity	Qty Unit		Unit Cost		Cost	Comments and References
<u>Construction</u>						
Underground Piping from CLC-18 to CLC-27 connection						estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting,
to Upper Griggs Reservoir	1,000 ft	\$	100.17	\$	100,170	asphalt repaving (RS Means)
Underground Piping from new extraction well to CLC-27						
connection to Upper Griggs Reservoir	750 ft	\$	100.17	\$	75,128	10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Piping Connection to Treatment System	500 If	\$	100.17	\$	50,085	10-inch pipe, trenching, backfill, compacting, asphalt repaving (RS Means)
Pumping Well Modifications	2 ea	\$	25,000.00	\$		JSP Memo 7/8/06
Ground Water Extraction Well Installation	1 well	\$	200,000.00	\$	200,000	JSP Memo 7/8/06
Ground Water Extraction Pumps	3 ea	\$	10,000.00	\$	30,000	assume new + replace city pumps, vendor quote; 100gpm, 15 hp, 3-phase, 230V, 6 inch
Influent Equalization Tank	21,600 gal	\$	1.00	\$	21,600	provides 20-minutes of storage
Tank Effluent Pump	0 ea	\$	4,000.00	\$	-	included with air stripper
Influent and Effluent Bag Filters	2 LS	\$	7,500.00	\$	15,000	1080 gpm size filter
						Assume 540 gpm NEEP Model 41251 Tray Air stripper (controls, piping, skid, blower,
Low-Profile Tray Air Stripper Package	2 LS	\$	70,000.00	\$	140,000	influent and effleunt pumps)
Protective Enclosure	1 ea	\$	150,000.00	\$	150,000	Assume 30'x25' building at \$200/sf, includes overhead crane, pre-fab metal
Repair discharge line on CLC-27	1 LS	\$	300.00	\$	300	
Sulfuric Acid Bulk Storage Tank - Pretreatment Unit	0 LS	\$	65,663.20	\$	-	5,000 gal tank. 1 month supply, prorated costs for similar system, 1,000 gal unit at Fruit
						Ave, Albuquerque
Dessicant Dryer Unit - Pretreatment Unit	0 LS	\$	39,397.92	\$	-	5,000 gal unit. prorated costs for similar system, 1,000 gal unit at Fruit Ave, Albuquerque
Acid Feed Pump System - Pretreatment Unit	0 LS	\$	83.384.29	œ.		Prorated costs for similar system, 100 gpm system at Fruit Ave. Albuquerque.
Acid Feed System Piping - Pretreatment Unit	0 LS	\$	44.923.64			Prorated costs based on facility size for similar system, 100 gpm at Fruit Ave,
Add reed System riping - rietteathent Onit	0 L3	Φ	44,923.04	Φ	-	Albuquerque
Health and Safety Provisions - Pretreatment Unit	0 LS	\$	8,000.00	\$	-	Prorated costs for similar system, 100 gpm at Fruit Ave, Albuquerque
Acid Storage Facility - Pretreatment Unit	0 LS	\$	89,847.27	\$	-	Assume 35'x35' for 5,000 gal tank incl. canopy, 2° concrete containment, and fencing.
						Prorated costs for similar system, 1,000 gal tank system at Fruit Ave, Albuquerque
Well Permits	1 ea	\$	30.00	\$	30	new extraction well
Equipment Rental	24 wk	\$	200.00	\$	4,800	MultiRAE
Subtotal Capital Cost				\$	837,113	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed

included under ground water monitoring 4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= Ω wells 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is included under ground water monitoring

wells per round 9. The number of wells on-site to be abandoned for post-closure is

10. The G&A rate is

11. The overhead rate is 5% 12. The Bonding & Insurance rate is 2% 13. The fee rate is 8%

Detailed Capital and Operations and Maintenance Costs

Item/Activity	Qty Un	ıit .		Unit Cost		Cost	Comments and References
Site Work Allowance	7%	of	\$	837,112.50	\$	58,598	
Mechanical Allowance	15%	of	φ	837,112.50		125,567	
Instrumentation and Controls Allowance	12%	of	\$	837,112.50			including SCADA system
Electrical Allowance	12%	of	\$	837,112.50		100,454	including GOADA system
Miscellaneous Equipment Allowance	5%	of	\$	837,112.50		41,856	
Subtotal Capital Cost	370	UI UI	φ	037,112.30		1,264,040	
Oubtotal Gupital Goot					Ψ	1,204,040	
Project Management	8%	of	\$	1,264,039.88	\$	101,123	
Design	15%	of	\$	1,264,039.88		189,606	
Construction Management	15%	of				189,606	
Subcontractor General Requirements	5%	of	\$	1,264,039.88	\$	63,202	
Subtotal Capital Cost					\$	1,807,577	
G&A	14%	of	\$	1,807,577.02	\$	253,061	
Overhead	5%	of	\$	1,807,577.02	\$	90,379	
New Mexico Gross Receipts Tax	7.125%	of	\$	1,807,577.02	\$	128,790	
Contingency	25%	of	\$	1,807,577.02	\$	451,894	_
Subtotal Capital Cost					\$	2,731,701	_
Bonding& Insurance	2%	of	2	2,731,700.77	•	54,634	
Fee	8%	of		2,731,700.77	φ Q	218,536	
TOTAL CAPITAL COST	0 70	UI	φ	2,731,700.77	¢	3,004,871	

includes new extraction wells only

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

2%

8%

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= wells Ω 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring 9. The number of wells on-site to be abandoned for post-closure is includes new extraction wells only 10. The G&A rate is 11. The overhead rate is 5%

12. The Bonding & Insurance rate is

13. The fee rate is

CAPITAL COST							
Item/Activity	Qty Uni	t		Unit Cost		Cost	Comments and References
YEAR 1 OPERATIONS AND MAINTENANCE							
Item/Activity	Qty Uni	t		Unit Cost		Cost	Comments
System Startup	-						
Labor - Technician	100 hr		\$	75.00	\$	7,500	Assume 10 days for startup, 10 hrs/day
Labor - Engineer	70 hr		\$	120.00	\$	8,400	Assume 7 days for startup, 10 hrs/day
Air Sample Analysis	6 san	nple	\$	150.00	\$	900	quarterly sampling to prove de minimis VOC emissions, plus 2 QA/QC
Water Sample Analysis	6 san	ple	\$	150.00	\$	900	3 sets, VOC analysis for infl/effl, incl data valid.
Startup Equipment Rental	2 wee	k	\$	1,000.00	\$	2,000	water quality monitoring for pretreatment effectiveness
Total System Startup					\$	19,700	
Routine System O&M							
Labor - Technician	208 hr		\$	75.00	\$	15,600	4 hours/week
Labor - Engineer	208 hr		\$	120.00	\$	24,960	100% of the Tech time for first year
Water Sample Analysis	29 san	nple	\$	150.00	\$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0 san	iple	\$	100.00	\$	-	none needed after startup
Acid Supply - Pretreatment Unit	0 LS		\$	110,067.27	\$	_	Prorated from 100 gpm system at Fruit Ave.
O&M Supplies and Cleaning Subcontractor	1 LS		\$	4,000.00	\$	4,000	Annual air stripper tray cleaning by subcontractor
Electricity	588,146 kw-	hr	\$	0.08	\$	47,052	Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
							98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Annual Extraction Well and Distribution Operating Cost	568 MM	Gal	\$	194.73	\$	110,538	avg. for CLC 19, 21, 27)
Total Routine System O&M					\$	206,500	
Reporting (Annual Report and Construction Completion Report)							
Labor - Engineer/Hydrogeologist	400 hr		\$	120.00	\$	48,000	
Labor - Editor	200 hr		\$	85.00	\$	17,000	
Labor - CAD Technician	100 hr		\$	85.00	\$	8,500	
Total Annual Reporting					\$	73,500	
Subtotal Year 1 Operations and Maintenance					\$	299,700	
Project Management	8%	of	\$	299.699.82	æ	23,976	
Technical Support	6% 15%	of	\$ \$	299,699.82		44,955	
Construction Management	0%	of	ō.	299,699.82		44,955	
	0% 5%		\$ \$	299,699.82		14.005	
Subcontractor General Requirements Subtotal Year 1 Operations and Maintenance	5%	of	Þ	299,099.82	\$	14,985 383,616	
Subtotal Teal T Operations and Maintenance					Ф	303,016	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.
 The number of new nested monitor wells required to be installed
 wells included under ground water

3. The number of new nested monitor wells required to be installed
4. Number of new ground water extraction wells to be installed = 1 wells
5. Number of piezometers to be installed = 0 piezometers included under ground water monitoring

6. Number of reinjection wells to be installed=
7. Assume that the duration of construction is
8. The number of wells to be sampled for VOCs is

0 wells
working days (includes 80 working days for treatment system construction and installation)
included under ground water monitoring

9. The number of wells on-site to be abandoned for post-closure is 1 wells includes new extraction wells only

8%

 10. The G&A rate is
 14%

 11. The overhead rate is
 5%

 12. The Bonding & Insurance rate is
 2%

12. The Bonding & Insurance rate is 13. The fee rate is

Item/Activity	Qty Un	it		Unit Cost	Cost	Comments and References
G&A	14%	of	\$	383,615.77	\$ 53,706	
Overhead	5%	of	\$	383,615.77	\$ 19,181	
New Mexico Gross Receipts Tax	7.125%	of	\$	383,615.77	\$ 27,333	
Contingency	25%	of	\$	383,615.77	\$ 95,904	
Subtotal Year 1 Operations and Maintenance			•		\$ 579,739	- -
Bonding& Insurance	0%	of	\$	579,739.34	\$ -	Bonding only applies to Capital Costs
Fee	8%	of	\$	579,739.34	\$ 46,379	
TOTAL YEAR 1 OPERATIONS AND MAINTENANCE COST					\$ 626,118	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

2%

8%

PREPARED BY:

L.Colella, T.Palaia

PREPARED BY: L.Colella, T.Pala PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= wells Ω 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is included under ground water monitoring wells per round 9. The number of wells on-site to be abandoned for post-closure is includes new extraction wells only

10. The G&A rate is 14%
11. The overhead rate is 5%

12. The Bonding & Insurance rate is 13. The fee rate is

Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE COS			AL CO			COSI	Comments and References
Item/Activity	Qty Un		AL CO.	Unit Cost		Cost	Comments
Routine System O&M	Qty Un	ii.		Unit Cost		COSI	Comments
Labor - Technician	208 hr		•	75.00	•	15 600	4 hours/week
Labor - Engineer	104 hr		φ	120.00		.,	50% of the Tech time
Water Sample Analysis	29 sai	mnlo	φ	150.00		,	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Acid Supply - Pretreatment Unit	0 LS		φ	110.067.27			Prorated from 100 qpm system at Fruit Ave.
O&M Supplies and Cleaning Subcontractor	1 LS		φ.	4,000.00			Annual air stripper tray cleaning by subcontractor
Electricity	588.146 kw		\$ \$	4,000.00			Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
Electricity	300, 140 KW	-111	Ф	0.06	φ	47,032	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Annual Extraction Well and Distribution Operating Cost	568 MM	1Cal	\$	194.73	•	110 520	avg. for CLC 19, 21, 27)
Total Routine System O&M	ODO IVIIV	/IGai	Þ	194.73	\$ \$	194,020	avg. 101 GLG 19, 21, 21)
Total Routine System Oaw					φ	194,020	
Reporting (Annual Reports)							
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00	\$	12,000	
Labor - Editor	50 hr		\$	85.00	\$	4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 2-5 Operations and Maintenance					\$	212,395	
Project Management	8%	of	e	212.394.82	e	16.992	
Technical Support	15%	of	э \$	212,394.82		31.859	
Construction Management	0%	of	\$	212,394.82		31,039	
Subcontractor General Requirements	5%	of	\$ \$	212,394.82		10,620	
Subtotal Year 2-5 Operations and Maintenance	370	UI	Ą	212,394.02	φ \$	271.865	
Subtotal Year 2-5 Operations and Maintenance					ф	271,000	
G&A	14%	of	\$	271.865.37	\$	38.061	
Overhead	5%	of	\$	271,865.37	\$	13,593	
New Mexico Gross Receipts Tax	7.125%	of	\$	271,865.37	\$	19,370	
Contingency	25%	of	\$	271.865.37	\$	67,966	
Subtotal Year 2-5 Operations and Maintenance	2070	J.	<u> </u>	,500.01	\$	410,857	-
Danding Lagurance	001			440 056 55	•		Banding only applies to Capital Costs
Bonding& Insurance	0%	of	\$	410,856.55			Bonding only applies to Capital Costs
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND	8%	of	\$	410,856.55	\$ \$	32,869 443.725	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

8%

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

13. The fee rate is

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= wells Ω 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is included under ground water monitoring wells per round 9. The number of wells on-site to be abandoned for post-closure is includes new extraction wells only 10. The G&A rate is 11. The overhead rate is 5% 12. The Bonding & Insurance rate is 2%

Item/Activity	Qtv Ur	it		Unit Cost		Cost	Comments and References
ANNUAL OPERATIONS AND MAINTENANCE CO			AL CC			000.	
Item/Activity	Qty Un	, -		Unit Cost		Cost	Comments
Routine System O&M							
Labor - Technician	208 hr		\$	75.00	\$	15.600	4 hours/week
Labor - Engineer	104 hr		\$	120.00	\$	12,480	50% of the Tech time
Water Sample Analysis	29 sa	mple	\$	150.00	\$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Acid Supply - Pretreatment Unit	0 LS	•	\$	110,067.27	\$		Prorated from 100 gpm system at Fruit Ave.
O&M Supplies and Cleaning Subcontractor	1 LS		\$	4,000.00	\$	4,000	Annual air stripper tray cleaning by subcontractor
Electricity	588,146 kw	-hr	\$	0.08	\$		Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
							98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used
Annual Extraction Well and Distribution Operating Cost	484 MM	/IGal	\$	194.73	\$	94,162	avg. for CLC 19, 21, 27)
Total Routine System O&M					\$	177,644	
Reporting (Annual Reports)							
Labor - Engineer/Hydrogeologist	100 hr		\$	120.00		12,000	
Labor - Editor	50 hr		\$	85.00	\$	4,250	
Labor - CAD Technician	25 hr		\$	85.00	\$	2,125	
Total Reporting					\$	18,375	
Subtotal Year 6-14 Operations and Maintenance					\$	196,019	
Project Management	8%	of	\$	212,394.82	\$	16,992	
Technical Support	15%	of	\$	212,394.82	\$	31,859	
Construction Management	0%	of	\$	212,394.82	\$	-	
Subcontractor General Requirements	5%	of	\$	212,394.82	\$	10,620	
Subtotal Year 6-14 Operations and Maintenance					\$	255,489	
G&A	14%	of	\$	255,489.36	\$	35.769	
Overhead	5%	of	\$	255.489.36	-	12.774	
New Mexico Gross Receipts Tax	7.125%	of	\$	255,489.36		18,204	
Contingency	25%	of	\$	255,489.36	\$	63,872	
Subtotal Year 6-14 Operations and Maintenance	2070	J1	Ÿ	200,400.00	\$	386,108	
Bonding& Insurance	0%	of	\$	386,108.29	•		Bonding only applies to Capital Costs
Fee	0% 8%	of	\$	386.108.29	\$	30,889	boliumy only applies to Capital Costs
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AN			φ	300,100.29	\$	416.997	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested monitor wells required to be installed included under ground water monitoring 4. Number of new ground water extraction wells to be installed = wells 5. Number of piezometers to be installed = included under ground water monitoring piezometers 6. Number of reinjection wells to be installed= Ω wells 7. Assume that the duration of construction is 119 working days (includes 80 working days for treatment system construction and installation) 8. The number of wells to be sampled for VOCs is wells per round included under ground water monitoring includes new extraction wells only

9. The number of wells on-site to be abandoned for post-closure is

10. The G&A rate is 11. The overhead rate is 5% 12. The Bonding & Insurance rate is 2%

13. The fee rate is

8%

CAPITAL COST							
Item/Activity	Qty Un	it		Unit Cost		Cost	Comments and References
POST CLOSURE COST							
Item/Activity	Qty Un	t		Unit Cost		Cost	Comments
Closure Reporting							
Labor - Engineer/Hydrogeologist	100 hr			\$120.00	\$	12,000	
Labor - Editor	50 hr			\$85.00	\$	4,250	
Labor - CAD Technician	25 hr			\$85.00	\$	2,125	
Total Closure Reporting					\$	18,375	
Equipment Demobilization and Well Abandonment							
Well Abandonment	1 we	I	\$	10,000.00	\$	10,000	new extraction wells only, others included under ground water monitoring
Equipment Demobilization	1 LS		\$	100,000.00	\$	100,000	
Subtotal Equipment Demobilization and Well Abandonment					\$	110,000	
Site Work Allowance	10%	- 6	•	440 000 00	•	44.000	
Site Work Allowance Mechanical Allowance		of	\$	110,000.00	\$	11,000	
nstrumentation and Controls Allowance	0% 0%	of of	\$ \$	110,000.00 110,000.00		-	
Electrical Allowance	5%	of	\$ \$	110,000.00		F F00	
	0%		\$ \$	110,000.00	\$ \$	5,500	
Miscellaneous Equipment Allowance Total Equipment Demobilization and Well Abandonment	0%	of	- Þ	110,000.00	\$	126,500	
Subtotal Post-Closure Cost					\$	144,875	
Subtotal F Ost-Glosule Cost					Ψ	144,073	
Project Management	8%	of	\$	144,875.00	\$	11,590	
Technical Support	15%	of	\$	144,875.00	\$	21,731	
Construction Management	10%	of	\$	144,875.00	\$	14,488	
Subcontractor General Requirements	5%	of	\$	144,875.00	\$	7,244	
Subtotal Post-Closure Cost					\$	199,928	
G&A	14%	of	¢	199,927.50	\$	27,990	
Overhead	5%	of	\$	199,927.50	-	9,996	
New Mexico Gross Receipts Tax	7.125%	of	\$	199,927.50		14,245	
Contingency	25%	of	э \$	199,927.50	\$	49,982	
Subtotal Post-Closure Cost	ZJ /0	UI	φ	133,321.30	\$	302,140	
		_					-
Bonding& Insurance	2%	of	\$	302,140.43		6,043	
Fee	8%	of	\$	302,140.43	_	24,171	
TOTAL POST CLOSURE COST					\$	332,354	

Alternative 4 - Enhanced Ground Water Extraction with Treatment **PRESENT WORTH ANALYSIS**

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico

ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. Real Discount Rate 3.00% Source: OMB Ciruclar No. A-94, Jan. 2007 version of Appendix C obtained from http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html

2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

3. Escalation factor is 3.00%

Present Worth Analysis

		E	Α		В		C=A+B		A*E		B*E		C*E	
									Total PV					
		Discount						Ca	apital Costs	То	tal PV O&M		Total PV	Balance of Interest Bearing
Elapsed Time	Year	Factor at 3%	Capital C	ost	O&M Cost	Т	otal Cost		at 3%	С	osts at 3%	С	osts at 3%	Account at 3%
0	2007	1.000	\$ 3,004,	371		\$	3,004,871	\$	3,004,871	\$	-	\$	3,004,871	\$ 6,680,936
1	2008	0.971			\$ 644,902	\$	644,902	\$	-	\$	626,118	\$	626,118	\$ 6,217,115
2	2009	0.943			\$ 470,748	\$	470,748	\$	-	\$	443,725	\$	443,725	\$ 5,918,758
3	2010	0.915			\$ 484,870	\$	484,870	\$	-	\$	443,725	\$	443,725	\$ 5,596,905
4	2011	0.888			\$ 499,416	\$	499,416	\$	-	\$	443,725	\$	443,725	\$ 5,250,413
5	2012	0.863			\$ 514,399	\$	514,399	\$	-	\$	443,725	\$	443,725	\$ 4,878,094
6	2013	0.837			\$ 497,916	\$	497,916	\$	-	\$	416,997	\$	416,997	\$ 4,511,583
7	2014	0.813			\$ 512,854	\$	512,854	\$	-	\$	416,997	\$	416,997	\$ 4,118,692
8	2015	0.789			528,239	\$	528,239	\$	-	\$	416,997	\$	416,997	\$ 3,698,166
9	2016	0.766			\$ 544,086	\$	544,086	\$	-	\$	416,997	\$	416,997	\$ 3,248,702
10	2017	0.744			\$ 560,409	\$	560,409	\$	-	\$	416,997	\$	416,997	\$ 2,768,942
11	2018	0.722			\$ 577,221	\$	577,221	\$	-	\$	416,997	\$	416,997	\$ 2,257,472
12	2019	0.701			\$ 594,538	\$	594,538	\$	-	\$	416,997	\$	416,997	\$ 1,712,822
13	2020	0.681			\$ 612,374	\$	612,374	\$	-	\$	416,997	\$	416,997	\$ 1,133,461
14	2021	0.661	\$ 502,	716	\$ 630,745	\$	1,133,461	\$	332,354	\$	416,997	\$	749,351	\$ 0
Total Alternative 4 E	nhanced G	Fround Water Ex	\$ 3,507,	587	7,672,719	\$ 1	11,180,306	\$	3,337,225	\$	6,153,991	\$	9,491,217	

COST ESTIMATE SUMMARY ²

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment
DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia
PROJECT NUMBER: 346535.FS.01

Capital Cost		
Construction	\$	1,002,005
Project Management	\$	80,160
Design	\$	50,100
Construction Management	\$	100,201
Subcontractor General Requirements	\$	50,100
G&A	\$	179,559
Overhead	\$	64,128
New Mexico Gross Receipts Tax	\$	91,383
Contingency	\$	320,642
Bonding& Insurance	\$	38,766
Fee	\$	155,062
Administrative/Legal Fees for IC	\$	15,000
Total Capital Cost	\$	2,147,107
Annual Operations and Maintenance Cost: Years 1-5	•	
Monthly Water Level Measurements (Piezometers)	\$	13,750
Annual Ground Water Sampling (Monitor Wells)	\$	77,850
Professional Services 1	\$	
		21,068
Subcontractor General Requirements	\$	4,580
G&A Overhead	\$ \$	16,415
Overhead New Maying Cross Respirts Tax		5,862
New Mexico Gross Receipts Tax	\$	8,354
Contingency	\$	29,312
Bonding& Insurance	\$	3,544
Fee Total Annual Operations and Maintenance Cost: Years 1-5	\$ \$	14,175 194,910
	4	134,310
Annual Operations and Maintenance Cost: Years 6-14		10.750
Once Every Two Years Ground Water Sampling	\$	43,750
Professional Services ¹	\$	10,063
Subcontractor General Requirements	\$	2,188
G&A	\$	7,840
Overhead	\$	2,800
New Mexico Gross Receipts Tax	\$	3,990
Contingency	\$	14,000
Bonding& Insurance	\$	1,693
Total Annual Operations and Maintenance Cost: Years 6-14	\$ \$	6,770 93,093
Total Allitual Operations and Maintenance Cost. Tears 0-14	Ψ	33,033
Five Year Review Cost Per Report		
5-year Review Report	\$	25,000
Professional Services ¹	\$	-
Subcontractor General Requirements	\$	-
G&A	\$	3,500
Overhead	\$	1,250
New Mexico Gross Receipts Tax	\$	1,781
Contingency	\$	6,250
Bonding& Insurance	\$	-
Fee	\$	3,023
Total Five Year Review Cost Per Report	\$	40,804
Post Closure Cost		
Well Abandonment	\$	104,280
Professional Services ¹	\$	39,626
Subcontractor General Requirements	\$	5,214
G&A	\$	20,877
Overhead	\$	7,456
New Mexico Gross Receipts Tax	\$	10,625
Contingency	\$	37,280
Bonding& Insurance	\$	4,507
Fee	\$	18,029
Total Post Closure Cost	\$	247,894
TOTAL PRESENT WORTH	\$	4,288,996
		_

NOTES:

^{1 -} Professional Services includes Project Management, Design/Technical Support, and Construction Management.

^{2 -} The cost estimates provided are to an accuracy of +50 percent to -30 percent and are prepared for the sole purpose of alternative comparison. The alternative cost estimates are based on conceptual design from information available at the time of this study. The actual cost of the project would depend on the final scope and design of the selected remedial action, the schedule of implementation, competitive market conditions, and other variables.

Alternative 4 - Enhanced Ground Water Extraction with Treatment SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

NO DESIGN ACTIVITY FOR INSTITUTIONAL CONTROLS AND MONITORING PORTION OF THIS ALTERNATIVE. REFER TO COST DETAILS SHEET COST BASIS.

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested MWs to be installed
4. The number of new single-screen piezometers required to be installed
5. The number of wells to be sampled for NAIPs is
6. The number of wells to be sampled for VOCs only is
7. The number of wells on-site to be abandoned for post-closure is
8. The number of wells to be sampled for PAH is
9. The GRA rate is
1. The number of wells to be sampled for PAH is
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1. The number of wells to be sampled for PAH is
1. The number of wells to be sampled for PAH is
1. The number of new isingle-screen piezometers for a total of the number of wells in the num

9. The G&A rate is 14%

10. The overhead rate is 5%

11. The Bonding & Insurance rate is 2%

12. The fee rate is 8%

Item/Activity	Qty Ur	it	Unit Cost	Cost	Comments and References
Construction	-				
Nested Ground Water Monitor Well Installation	3 we	ell	\$ 129,409.00	\$ 388,227	per recent MW installation invoice
Piezometer Installation	10 pie	zometer	\$ 56,469.38	\$ 564,694	Assume 600' deep, with same per-foot cost as nest MWs.
Fencing (Institutional Control)	0 ft		\$ 10.00	\$ -	No treatment unit to protect
Well Permits	19 ea		\$ 30.00	\$ 570	For 3 screen nested wells and 10 piezometers
Equipment Rental	4 wk		\$ 200.00	\$ 800	MultiRAE
Subtotal Capital Cost				\$ 954,291	
Site Work Allowance	5%	of	\$ 954,290.82	\$ 47,715	
Mechanical Allowance	0%	of	\$ 954,290.82	\$ -	
Instrumentation and Controls Allowance	0%	of	\$ 954,290.82	\$ -	
Electrical Allowance	0%	of	\$ 954,290.82	\$ -	
Miscellaneous Equipment Allowance	0%	of	\$ 954,290.82	\$ 	
Subtotal Capital Cost				\$ 1,002,005	
Project Management	8%	of	\$ 1,002,005.36	\$ 80,160	
Design	5%	of	\$ 1,002,005.36	\$ 50,100	
Construction Management	10%	of	\$ 1,002,005.36	\$ 100,201	
Subcontractor General Requirements	5%	of	\$ 1,002,005.36	\$ 50,100	
Subtotal Capital Cost				\$ 1,282,567	
G&A	14%	of	\$ 1,282,566.86	\$ 179,559	
Overhead	5%	of	\$ 1,282,566.86	\$ 64,128	
New Mexico Gross Receipts Tax	7.125%	of	\$ 1,282,566.86	\$ 91,383	
Contingency	25%	of	\$ 1,282,566.86	\$ 320,642	
Subtotal Capital Cost				\$ 1,938,279	
Bonding& Insurance	2%	of	\$ 1,938,279.17	\$ 38,766	
Fee	8%	of	\$ 1,938,279.17	\$ 155,062	
Administrative/Legal Fees for IC	1	LS	\$ 15,000.00	\$ 15,000	
TOTAL CAPITAL COST				\$ 2,147,107	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

L.Colella, T.Palaia PREPARED BY: PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30%

2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions. 3. The number of new nested MWs to be installed with 3 screens for a total of 4125 4. The number of new single-screen piezometers required to be installed piezometers

5. The number of wells to be sampled for NAIPs is

wells not necessary for entire plume treatment 6. The number of wells to be sampled for VOCs only is 84 wells (includes all existing MWs in ground water sampling program plus new monitor wells)

7. The number of wells on-site to be abandoned for post-closure is 94 wells

8. The number of wells to be sampled for PAH is

9. The G&A rate is 14% 10. The overhead rate is 5%

11. The Bonding & Insurance rate is

12. The fee rate is

CAPITAL COST							
Item/Activity	Qty Un	it		Cost	Comments and References		
ANNUAL OPERATIONS AND MAINTENANCE COST	- YEARS 1-5 (A	AUNUA	L COST)			
Item/Activity	Qty Un	it	Unit Cost			Cost	Comments
Monthly Water Level Measurements (Piezometers)							
Labor - Technician	180 hr		\$	75.00			30 piezometers per event, 2 people, 4 piezometers per hour
Water Level Measurement Equipment Rental	1 LS		\$	250.00	\$ \$	250	
Total Water Level Measurement						13,750	
Annual Ground Water Sampling (Monitor Wells)							
							5 multiport wells: based on Dec 2005 invoice (4 days including
Subcontractor costs for mulitport wells	1 LS		\$	15,200.00			mobe/demobe, materials, equipment, labor, per diem)
Labor - Technician	632 hr		\$	75.00	\$		4 hrs/well, 2 people, not including 5 multiport wells
Ground Water Sample Analysis - VOC only	97 sai		\$	150.00	\$		Includes all wells plus 15% (on average #) QA/QC samples
Ground Water Sample Analysis - NAIP	0 sai		\$	600.00			Includes 15% (on average #) QA/QC samples
Sampling Supplies	1 rou		\$	200.00	\$	200	
GW Sampling Equipment Rental	1 rou	ınd	\$	500.00	\$	500	
Total Annual Ground Water Sampling					\$	77,850	
Subtotal Years 1-5 Operations and Maintenance					\$	91,600	
Project Management	8%	of	\$	91,600.00	\$	7,328	
Technical Support	15%	of	\$	91,600.00	\$	13,740	
Construction Management	0%	of	\$	91,600.00	\$	-	
Subcontractor General Requirements	5%	of	\$	91,600.00	\$	4,580	
Subtotal Years 1-5 Operations and Maintenance					\$	117,248	
004	4.40/	- 6	•	447.040.00	•	40 445	
G&A Overhead	14% 5%	of	\$ \$	117,248.00	\$	16,415	
	- , -	of	-	117,248.00	\$	5,862	
New Mexico Gross Receipts Tax	7.125%	of	\$	117,248.00	\$	8,354	
Contingency	25%	of	\$	117,248.00	\$	29,312	
Subtotal Years 1-5 Operations and Maintenance					\$	177,191	
Bonding& Insurance	2%	of	\$	177.191.04	\$	3.544	
Fee	8%	of	\$	177,191.04	\$	14.175	
TOTAL ANNUAL COST: YEARS 1-5 OPERATIONS AND M.			Ψ	.77,101.04	\$	194,910	
		-			<u> </u>	,	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

L.Colella, T.Palaia PREPARED BY: PROJECT NUMBER: 346535.FS.01

Assumptions

1. The accuracy of the cost estimate is +50%/-30% 2. See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new nested MWs to be installed with 3 screens for a total of 4125 4. The number of new single-screen piezometers required to be installed piezometers 5. The number of wells to be sampled for NAIPs is wells not necessary for entire plume treatment 6. The number of wells to be sampled for VOCs only is 84 wells (includes all existing MWs in ground water sampling program plus new monitor wells)

7. The number of wells on-site to be abandoned for post-closure is 94 wells

8. The number of wells to be sampled for PAH is

9. The G&A rate is 14% 10. The overhead rate is 5% 11. The Bonding & Insurance rate is 12. The fee rate is

CAPITAL COST							
Item/Activity	Qty Unit			Unit Cost			Comments and References
ANNUAL OPERATIONS AND MAINTENANCE COST			AL COS	T)			
Item/Activity	Qty Unit		Unit Cost			Cost	Comments
Quarterly Water Level Measurements	-						
Labor - Technician	60 hr		\$	75.00	\$	4,500	30 piezometers per event, 2 people, 4 piezometers per hour
Water Level Measurement Equipment Rental	1 LS		\$	\$ 250.00		250	
Total Water Level Measurement						4,750	
Once Every Two Years Ground Water Sampling							
							5 multiport wells: based on Dec 2005 invoice (4 days [biennial]
Subcontractor costs for mulitport wells	1 LS		\$	7,600.00	\$	7,600	including mobe/demobe, materials, equipment, labor, per diem)
Labor - Technician	316 hr		\$	75.00	\$		4 hrs/well, 2 people, not including 5 multiport wells
Ground Water Sample Analysis - VOC only	49 sai	mple	\$	150.00	\$	7,350	Includes all wells plus 15% (on average #) QA/QC samples
Sampling Supplies	0.5 rou	0.5 round		200.00	\$	100	
GW Sampling Equipment Rental	0.5 round		\$	500.00	\$	250	
Total Semiannual Ground Water Sampling					\$	39,000	
Subtotal Years 6-14 Operations and Maintenance					\$	43,750	
Project Management	8%	of	\$	43.750.00	\$	3.500	
Technical Support	15%	of	\$	43,750.00	\$	6.563	
Construction Management	0%	of	\$	43,750.00	\$	-,	
Subcontractor General Requirements	5%	of	\$	43,750.00	\$	2.188	
Subtotal Years 6-14 Operations and Maintenance	0,0	0.	Ψ	10,1 00.00	\$	56,000	
G&A	14%	of	\$	56,000.00	\$	7,840	
Overhead	5%	of	\$	56,000.00	\$	2,800	
New Mexico Gross Receipts Tax	7.125%	of	\$	56,000.00	\$	3,990	
Contingency	25%	of	\$	56,000.00	\$	14,000	
Subtotal Years 6-14 Operations and Maintenance					\$	84,630	
Bonding& Insurance	2%	of	\$	84.630.00	\$	1.693	
Fee	2% 8%	of	э \$	84.630.00	\$	6.770	
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AND			φ	04,030.00	\$	93.093	
TOTAL ANNUAL COST. TEARS 0-14 OPERATIONS AND	WIAIN I ENANCE C	US			Ð	93,093	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

3. The number of new single-screen piezometers required to be installed
4. The number of new single-screen piezometers required to be installed
5. The number of wells to be sampled for NAIPs is

with 3 screens for a total of
10 piezometers

not necessary for entire plume treatment

6. The number of wells to be sampled for VOCs only is wells (includes all existing MWs in ground water sampling program plus new monitor wells)

7. The number of wells on-site to be abandoned for post-closure is 94 wells

 8. The number of wells to be sampled for PAH is
 0

 9. The G&A rate is
 14%

 10. The overhead rate is
 5%

 11. The Bonding & Insurance rate is
 2%

 12. The fee rate is
 8%

CAPITAL COST			-				
Item/Activity	Qty Unit			Unit Cost		Cost	Comments and References
FIVE YEAR REVIEW COST - PER REPORT							
Item/Activity	Qty Unit			Unit Cost			Comments
5-year Review Report							
5-year Review Report	1 LS	1 LS		25,000.00	\$	25,000	
Subtotal Five Year Review Cost					\$	25,000	
Project Management	0%	of	\$	25,000.00	\$	-	
Technical Support	0%	of	\$	25,000.00	\$	-	
Construction Management	0%	of	\$	25,000.00	\$	-	
Subcontractor General Requirements	0%	of	\$	25,000.00	\$	-	
Subtotal Five Year Review Cost					\$	25,000	
G&A	14%	of	\$	25,000.00	\$	3,500	
Overhead	5%	of	\$	25,000.00	\$	1,250	
New Mexico Gross Receipts Tax	7.125%	of	\$	25,000.00	\$	1,781	
Contingency	25%	of	\$	25,000.00	\$	6,250	
Subtotal Five Year Review Cost					\$	37,781	
Bonding& Insurance	0%	of	\$	37,781.25	\$	_	
Fee	8%	of	\$	37,781.25		3,023	
TOTAL FIVE YEAR REVIEW COST - PER REPORT					\$	40,804	

COST ESTIMATE DETAILS

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico
ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

12. The fee rate is

The accuracy of the cost estimate is +50%/-30%
 See "Conceptual Design" spreadsheet for basis of cost estimate assumptions.

2. See Conceptual Design spreadsheet for basis of cost estimate assumptions.

3. The number of new nested MWs to be installed

4. The number of new single-screen piezometers required to be installed

5. The number of wells to be sampled for NAIPs is

0 wells

not necessary for entire plume treatment

6. The number of wells to be sampled for VOCs only is wells (includes all existing MWs in ground water sampling program plus new monitor wells)

7. The number of wells on-site to be abandoned for post-closure is 94 wells

 8. The number of wells to be sampled for PAH is
 0

 9. The G&A rate is
 14%

 10. The overhead rate is
 5%

 11. The Bonding & Insurance rate is
 2%

tem/Activity	Qty Unit			Unit Cost		Cost	Comments and References
POST CLOSURE COST	Qty on	<u> </u>		J 3031			
tem/Activity	Qty Un	it		Unit Cost		Cost	Comments
Well Abandonment	Qty On			OTHE COSE		0001	Commente
Well Abandonment	94 we	II	\$	1,000.00	\$	94 000	Assume abandon 5 wells/day
Equipment Rental	4 wk		\$	200.00	\$		MultiRAE
Total Well Abandonment	7 111		Ψ	ψ 200.00		94,800	Mataro C
						- 1,000	
Site Work Allowance	10%	of	\$	94,800.00	\$	9,480	
Mechanical Allowance	0%	of	\$	94,800.00	\$	-	
Instrumentation and Controls Allowance	0%	of	\$	94,800.00	\$	-	
Electrical Allowance	0%	of	\$	94,800.00	\$	-	
Miscellaneous Equipment Allowance	0%	of	\$	94,800.00	\$	-	
Total Well Abandonment				•	\$	104,280	
Subtotal Post-Closure Cost					\$	104,280	
Project Management	8%	of	\$	104,280.00	\$	8,342	
Technical Support	15%	of	\$	104,280.00	\$	15,642	
Construction Management	15%	of	\$	104,280.00	\$	15,642	
Subcontractor General Requirements	5%	of	\$	104,280.00	\$	5,214	
Subtotal Post-Closure Cost					\$	149,120	
G&A	14%	of		3149,120.40	\$	20,877	
Overhead	5%	of		3149,120.40	\$	7,456	
New Mexico Gross Receipts Tax	7.125%	of		3149,120.40	\$	10,625	
Contingency	25%	of	\$	3149,120.40	\$	37,280	
Subtotal Post-Closure Cost					\$	225,358	
_ ,, _ ,			_		_		
Bonding& Insurance	2%	of		225,358.20	\$	4,507	
Fee	8%	of	\$	3225,358.20	\$	18,029	
TOTAL POST CLOSURE COST					\$	247,894	
IOTAL POST GLOSUKE GOST					Φ	247,094	

Alternative 4 - Enhanced Ground Water Extraction with Treatment **PRESENT WORTH ANALYSIS**

PROJECT: Griggs and Walnut Superfund Site Feasibility Study

SITE: Griggs and Walnut Superfund Site - Las Cruces, New Mexico ALTERNATIVE: 4 Enhanced Ground Water Extraction with Treatment

DESCRIPTION: Institutional Controls and Monitoring

PREPARED BY: L.Colella, T.Palaia PROJECT NUMBER: 346535.FS.01

Assumptions

1. Real Discount Rate 3.00% Source: OMB Ciruclar No. A-94, Jan. 2007 version of Appendix C obtained from http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html

2. Assumes Total PV earns interest for an entire year (12 months), compound annually.

3. Escalation factor is 3.00%

Present Worth Analysis

		E	Α		В		C=A+B	A*E		B*E		C*E			
									Total PV					Ba	ance of Interest
		Discount						С	apital Costs	To	tal PV O&M		Total PV	Bea	ring Account at
Elapsed Time	Year	Factor at 3%	Capital Cost	(D&M Cost	٦	Total Cost		at 3%	C	osts at 3%	С	osts at 3%		3%
0	2007	1.000	\$ 2,147,107			\$	2,147,107	\$	2,147,107	\$	-	\$	2,147,107	\$	2,206,146
1	2008	0.971		\$	200,757	\$	200,757	\$	-	\$	194,910	\$	194,910	\$	2,065,550
2	2009	0.943		\$	206,780	\$	206,780	\$	-	\$	194,910	\$	194,910	\$	1,914,533
3	2010	0.915		\$	212,984	\$	212,984	\$	-	\$	194,910	\$	194,910	\$	1,752,596
4	2011	0.888		\$	219,373	\$	219,373	\$	-	\$	194,910	\$	194,910	\$	1,579,220
5	2012	0.863		\$	273,257	\$	273,257	\$	-	\$	235,714	\$	235,714	\$	1,345,141
6	2013	0.837		\$	111,158	\$	111,158	\$	-	\$	93,093	\$	93,093	\$	1,271,003
7	2014	0.813		\$	114,493	\$	114,493	\$	-	\$	93,093	\$	93,093	\$	1,191,206
8	2015	0.789		\$	117,927	\$	117,927	\$	-	\$	93,093	\$	93,093	\$	1,105,477
9	2016	0.766		\$	121,465	\$	121,465	\$	-	\$	93,093	\$	93,093	\$	1,013,532
10	2017	0.744		\$	179,946	\$	179,946	\$	-	\$	133,897	\$	133,897	\$	858,593
11	2018	0.722		\$	128,862	\$	128,862	\$	-	\$	93,093	\$	93,093	\$	751,623
12	2019	0.701		\$	132,728	\$	132,728	\$	-	\$	93,093	\$	93,093	\$	637,461
13	2020	0.681		\$	136,710	\$	136,710	\$	-	\$	93,093	\$	93,093	\$	515,773
14	2021	0.661	\$ 374,962	\$	140,812	\$	515,773	\$	247,894	\$	93,093	\$	340,987	\$	-
Total Alternative 4 E	nhanced G	Fround Water Ex	\$ 2,522,069	\$	2,297,253	\$	4,819,322	\$	2,395,001	\$	1,893,995	\$	4,288,996		