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 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.
					Child	Ingestion, Dermal, Inhalation	Qual	
		Indoor Air (Vapor Intrusion)	Indoor Air (Vapor Intrusion)	Resident, Industrial Worker, Recreational Center User, Boxing Facility User	Adult	Inhalation	Quant	Residents could potentially be exposed to volatile chemicals in groundwater through inhalation of indoor air from soil vapor intrusion.
					Child	Inhalation	Quant	
					Adult/Child	Inhalation	Quant	
		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 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.
					Child	Inhalation	Qual	
		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 chemical concentrations are currently below MCLs, and PCE does not bioaccumulate in plants. Therefore, exposures are insignificant (ATSDR, 2005).
					Child	Ingestion	Qual	
		Groundwater	Tap Water, Process Water	Industrial/Commercial Worker	Adult	Ingestion, Dermal, Inhalation	Qual	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

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)
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 10^{-5} (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
ppbv = parts per billion by volume

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 10^{-5} (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
ppbv = parts per billion by volume

009876

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 10^{-5} (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
ppbv = parts per billion by volume

009877

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	12587-46-1	ALPHA, GROSS	2.2	21.1	pCi/L	CLC20	14 / 15	1 - 1	21.1	NA	15 MCL	NA	--	No	RAD
CLC Wells excluding CLC Wells	7440-61-1	URANIUM, TOTAL	1	132	UG/L	CLC24	65 / 66	1 - 1	132	NA	30 MCL	NA	--	No	RAD
blended in the UGRES and	127-18-4	TETRACHLOROETHYLENE (PCE)	0.67	3.2	UG/L	UGRES	46 / 62	0.5 - 0.5	3.2	NA	5 MCL	NA	--	No	BSL
CLC Wells 18 and 19).	79-01-6	TRICHLOROETHYLENE (TCE)	0.1 L,J	0.1 L,J	UG/L	CLC24	1 / 1	0.5 - 0.5	0.1	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

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

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
NA = Not available

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
NA = Not available

009879

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 (CLC Wells 10, 21, 29, 32, and 60)	12587-46-1	ALPHA, GROSS	2.4	5.6	pCi/L	CLC21	4 / 4	1 - 1	5.6	NA	15 MCL	NA	--	No	BSL, RAD
	7440-61-1	URANIUM, TOTAL	3	50	UG/L	CLC10	28 / 28	1 - 1	50	NA	30 MCL	NA	--	No	RAD
	1634-04-4	tert-BUTYL METHYL ETHER	0.38 L,J	0.38 L,J	UG/L	CLC21	1 / 5	0.5 - 0.5	0.38	NA	6.2 C/R6	NA	--	No	BSL
	127-18-4	TETRACHLOROETHYLENE (PCE)	1.61	4.9	UG/L	CLC21	28 / 36	0.5 - 0.5	4.9	NA	5 MCL	NA	--	No	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).
EPA Region 6 MSSL (Tap Water) (EPA R6, 2005).

(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
C = Carcinogenic
NA = Not available

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	ALPHA, GROSS	10.8	10.8	pCi/L	CLC19	1 / 1	1 - 1	10.8	NA	15 MCL	NA	--	No	BSL, RAD
	7440-61-1	URANIUM, TOTAL	51	54	UG/L	CLC19	2 / 2	1 - 1	54	NA	30 MCL	NA	--	No	RAD
	127-18-4	TETRACHLOROETHYLENE (PCE)	2	45	UG/L	CLC18	19 / 20	0.5 - 1.3	45	NA	5 MCL	NA	--	Yes	ASL
	79-01-6	TRICHLOROETHYLENE (TCE)	0.63 L,J	0.63 L,J	UG/L	CLC18	1 / 1	1.3 - 1.3	0.63	NA	5 MCL	NA	--	No	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
NA = Not available

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	75-35-4	1,1-DICHLOROETHENE	0.1 L,J	0.1 L,J	UG/L	GWMW06	1 / 79	0.0749 - 2.5	0.1	NA	7 MCL	NA	--	No	FOD, BSL
	95-63-6	1,2,4-TRIMETHYLBENZENE	0.12 J	0.27 J	UG/L	GWMW11	2 / 2	0.0461 - 0.0461	0.27	NA	12 N/R6	NA	--	No	BSL
	107-06-2	1,2-DICHLOROETHANE	0.1 L,J	1.7	UG/L	MW-1	3 / 79	0.0866 - 2.5	1.7	NA	5 MCL	NA	--	No	FOD, BSL
	108-67-8	1,3,5-TRIMETHYLBENZENE (MESITYLENE)	0.06 J	0.06 J	UG/L	GWMW11	1 / 2	0.0595 - 0.0595	0.06	NA	12 N/R6	NA	--	No	BSL
	67-64-1	ACETONE	1.49	48 B	UG/L	GWMW06	3 / 79	0.471 - 25	48	NA	5,475 N/R6	NA	--	No	FOD, BSL
	71-43-2	BENZENE	0.12 L,J	22 J	UG/L	MW-1	44 / 79	0.0622 - 2.5	22	NA	5 MCL	NA	--	Yes	ASL
	75-25-2	BROMOFORM	0.59	23 J,v	UG/L	GWMW04	42 / 79	0.0832 - 2.5	23	NA	80 MCL	NA	--	No	BSL
	7440-70-2	CALCIUM	12.7	194	mg/L	MW-SF1	11 / 11	0.2 - 0.2	194	NA	NA	NA	--	No	NUT
	75-15-0	CARBON DISULFIDE	0.24 L,J	0.44 L,J	UG/L	GWMW09	2 / 77	0.5 - 2.5	0.44	NA	1,043 N/R6	NA	--	No	FOD, BSL
	67-66-3	CHLOROFORM	0.87 J	11 J,v	UG/L	GWMW03	16 / 79	0.0871 - 2.5	11	NA	80 MCL	NA	--	No	BSL
	74-87-3	CHLOROMETHANE	0.15 L,J	0.15 L,J	UG/L	GWMW11	1 / 79	0.0406 - 2.5	0.15	NA	2.1 C/R6	NA	--	No	FOD, BSL
	156-59-2	cis-1,2-DICHLOROETHYLENE	0.1 L,J	0.21 L,J	UG/L	GWMW01	3 / 79	0.0575 - 2.5	0.21	NA	70 MCL	NA	--	No	FOD, BSL
	10061-01-5	cis-1,3-DICHLOROPROPENE	0.41 L,J	0.41 L,J	UG/L	GWMW03	1 / 79	0.0703 - 2.5	0.41	NA	0.40 C/R6	NA	--	No	FOD
	110-82-7	CYCLOHEXANE	0.11 L,J	0.59	UG/L	MW-1	13 / 77	0.5 - 2.5	0.59	NA	12,514 N/R6	NA	--	No	BSL
	75-71-8	DICHLORODIFLUOROMETHANE	0.1 L,J	1.5 J	UG/L	MW-SF10	9 / 79	0.0536 - 2.5	1.5	NA	395 N/R6	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	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	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

(1) 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 Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/NP/G)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							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.

ppbv = parts per billion by volume

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 Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/NP/G)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							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.

ppbv = parts per billion by volume

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
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	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.
ρ_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).
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^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	cm^3/cm^3	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

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
θ_{ws}^{C}	Stratum C Soil Water-filled porosity	Used with total porosity to calculate air-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	$g/cm\text{-}s^2$	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 Height		244	cm	Indoor ceiling is assumed to be 8 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 estimate produces a $Q_{soil}/Q_{building}$ 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.

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	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.
ρ_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^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	cm^3/cm^3	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

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
$\theta_{w\backslash}{}^{C}$	Stratum C Soil Water-filled porosity	Used with total porosity to calculate air-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	$g/cm\text{-}s^2$	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.

Table A1-3 - Supplement C
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Griggs and Walnut Groundwater Plume Site
Las Cruces, NM

Exposure Point Concentration (RME) - Maximum					
Exposure Point	PCE in Soil Gas (ppbv)	PCE in Soil Gas (ug/L)	PCE in Soil Gas (ug/m^3)	Modeled Indoor Air Concentration (ug/m^3)	Modeled Indoor Air Concentration (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 Concentration (CTE) - Average					
Exposure Point	PCE in Soil Gas (ppbv)	PCE in Soil Gas (ug/L)	PCE in Soil Gas (ug/m^3)	Modeled Indoor Air Concentration (ug/m^3)	Modeled Indoor Air Concentration (mg/m^3)
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

Table A1-3 - Supplement D
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Griggs and Walnut Groundwater Plume Site
Las Cruces, NM

Exposure Point Concentration (RME) - Maximum					
Exposure Point	PCE in Soil Gas (ppbv)	PCE in Soil Gas (ug/L)	PCE in Soil Gas (ug/m^3)	Modeled Indoor Air Concentration (ug/m^3)	Modeled Indoor Air Concentration (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

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 (Vapor Intrusion)	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m^3	See Table 3.1.RME	CDI (mg/kg-day) = CA x IN x EF x ED x 1/BW x 1/AT
				IN	Inhalation Rate	20	m^3/day	EPA, 1991	
				EF	Exposure Frequency	350	days/year	EPA, 1991	CA calculated using Johnson and Ettinger Model based on measured soil vapor concentrations.
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Indoor Air (Vapor Intrusion)	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m^3	See Table 3.1.RME	CDI (mg/kg-day) = CA x IN x EF x ED x 1/BW x 1/AT
				IN	Inhalation Rate	10	m^3/day	EPA R6 (1)	
				EF	Exposure Frequency	350	days/year	EPA, 1991	CA calculated using Johnson and Ettinger Model based on measured soil vapor concentrations.
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Indoor Air (Vapor Intrusion)	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m^3	See Table 3.1.RME	CDI (mg/kg-day) = CA x IN-Adj x EF x 1/AT
				IN-A	Inhalation Rate, Adult	20	m^3/day	EPA, 1991	
				IN-C	Inhalation Rate, Child	10	m^3/day	EPA R6 (1)	CA calculated using Johnson and Ettinger Model based on measured soil vapor concentrations.
				IN-Adj	Inhalation Rate, Age-adjusted	10.9	m^3/hour	calculated	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	IN-Adj (m^3-year/kg-day) = (ED-C x IN-C / BW-C) + (ED-A x IN-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				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 (cont.)	Industrial Worker (PAL Boxing Facility)	Adult	Indoor Air (Vapor Intrusion)	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m^3	See Table 3.1.RME	CDI (mg/kg-day) =
				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 (PAL Boxing Facility)	Adolescent	Indoor Air (Vapor Intrusion)	CA	Chemical Concentration in Air	See Table 3.1.RME	mg/m^3	See Table 3.1.RME	CDI (mg/kg-day) =
				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 Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value	Units			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, Supplemetnal 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

Table A1-5.2
NON-CANCER TOXICITY DATA -- INHALATION
Griggs and Walnut Ground Water Plume Site

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Benzene	Chronic	3.0E-02	mg/m^3	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 m^3/day, as follows:

RfD [mg/kg/day] = RfC [mg/m3] x 20 [m3/day] / 70 [kg]

Definitions: IRIS = Integrated Risk Information System

NA = Not Available

NCEA = National Center for Environmental Assessment

Table A1-6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
Griggs and Walnut Ground Water Plume Site

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Benzene	5.5E-02	$(mg/kg\text{-}day)^{-1}$	1	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	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	$(mg/kg\text{-}day)^{-1}$	1	5.4E-01	$(mg/kg\text{-}day)^{-1}$	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 Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Benzene	7.8E-06	$(\mu g/m^3)^{-1}$	2.7E-02	$(mg/kg\text{-}day)^{-1}$	A	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	$(\mu g/m^3)^{-1}$	2.1E-02	$(mg/kg\text{-}day)^{-1}$	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 Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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	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											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
			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										0.0E+00					1.1E-02
Ground Water and Total											0.0E+00					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											0.0E+00					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											0.0E+00					1.0E-02

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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: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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
	Exposure Medium Total										0.0E+00					4.9E-02
Ground Waterand Total											0.0E+00					4.9E-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	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
	Exposure Medium Total										0.0E+00					6.8E-02
Ground Waterand Total											0.0E+00					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										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/m^3	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											0.0E+00					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
		Exposure Point Total									0.0E+00					2.6E-02
	Exposure Medium Total										0.0E+00					2.6E-02
Ground Waterand Total											0.0E+00					2.6E-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	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										0.0E+00					4.4E-02
Ground Waterand Total											0.0E+00					4.4E-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	2.7E-03	mg/kg/day	1.1E-01	mg/kg/day	2.4E-02
			Exp. Route Total								0.0E+00					2.4E-02
		Exposure Point Total									0.0E+00					2.4E-02
	Exposure Medium Total										0.0E+00					2.4E-02
Ground Waterand Total											0.0E+00					2.4E-02

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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 Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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
			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											2.6E-05					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											3.6E-05					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/m^3	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/m^3	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											1.4E-05					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/m^3	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					0.0E+00

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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 Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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											8.8E-06					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property B)	Inhalation	TETRACHLOROETHYLENE (PCE)	4.3E-03	mg/m^3	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											1.3E-05					0.0E+00
Ground Water	Indoor Air	Indoor Air (Property C)	Inhalation	TETRACHLOROETHYLENE (PCE)	5.7E-03	mg/m^3	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								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/m^3	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/m^3	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											9.4E-06					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/m^3	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										9.7E-06					0.0E+00
Ground Waterand Total											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 Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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 Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure 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 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	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				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				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				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

009903

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 Medium	Exposure Point	Chemical 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	NA	NA	NA	Liver	NA	4.9E-02	NA	4.9E-02
		Chemical Total		NA	NA	NA	0.0E+00		NA	4.9E-02	NA	4.9E-02
	Exposure Medium Total			NA	NA	NA	0.0E+00		NA	4.9E-02	NA	4.9E-02
Ground Waterand Total				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				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

009904

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 Point	Chemical 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	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			NA	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			NA	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
		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			NA	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	Exposure Medium	Exposure Point	Chemical 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	8.8E-06	NA	8.8E-06	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
		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			NA	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
		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
		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				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 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 (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 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 (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

APPENDIX B

Cost Tables

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	Ground Water Extraction and Treatment with Air Stripper
PREPARED BY:	L.Colella, T.Palaia
PROJECT NUMBER:	346535.FS.01

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	**$**	**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		
Routine System O&M	$	287,711
Reporting (Annual Reports)	$	18,375
Professional Services [1]	$	74,166
Subcontractor General Requirements	$	16,123
G&A	$	55,493
Overhead	$	19,819
New Mexico Gross Receipts Tax	$	28,242
Contingency	$	99,094
Bonding& Insurance	$	-
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	$	33,765
Total Post Closure Cost	**$**	**464,264**
TOTAL PRESENT WORTH	**$**	**14,132,838**

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 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.

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: 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
	14 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 gpm

Total Annual: Years 1-5 568 MMgal
Total Annual: Years 6-14 484 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 = 3 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 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 lf 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 lf new piping needed in addition to the approximate length of 500 lf of existing piping.
Total linear footage of effluent field piping= 1,000 lf
Total linear footage of effluent field piping= 750 lf estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir
Estimated field piping placing rate = 75 lf/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 10 °C and using STRIPR Model data (CH2M HILL, 1991)
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/m^3 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/m^3 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

		1 (influent water)	2 (estimate of parameters within the stripper)
Flow	gpm	1080	1080
Temperature	Deg . F	60	77
Alkalinity, Total	mg/l $CaCO_3$	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.

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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 new extraction wells only
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%

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 connection to Upper Griggs Reservoir	1,000	ft	$ 100.17	$ 100,170	estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting, 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	lf	$ 100.17	$ 50,085	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	$ 50,000	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
Low-Profile Tray Air Stripper Package	2	LS	$ 70,000.00	$ 140,000	Assume 540 gpm NEEP Model 41251 Tray Air stripper (controls, piping, skid, blower, 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
Well Permits	1	ea	$ 30.00	$ 30	new extraction well
Equipment Rental	26	wk	$ 200.00	$ 5,200	MultiRAE
Subtotal Capital Cost				$ 1,168,729	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	$ 76,277	
Fee	8%	of	$	3,813,845.09	$ 305,108	
TOTAL CAPITAL COST					**$ 4,195,230**	

YEAR 1 OPERATIONS AND MAINTENANCE

Item/Activity	Qty	Unit	Unit 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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	sample	$	150.00	$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0	sample	$	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	$	47,052	Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$	194.73	$	110,538	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used avg. for CLC 19, 21, 27)
Total *Routine System O&M*					$	357,127	
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					$	457,677	
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	$	457,677.09	$	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					**$**	**956,157**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 2-5 (ANNUAL COST)

Item/Activity	Qty	Unit		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	sample	$	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	$	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
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$	194.73	$	110,538	(used avg. for CLC 19, 21, 27)
Total *Routine System O&M*					$	304,087	
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					$	322,462	
Project Management	8%	of	$	322,462.09	$	25,797	
Technical Support	15%	of	$	322,462.09	$	48,369	
Construction Management	0%	of	$	322,462.09	$	-	
Subcontractor General Requirements	5%	of	$	322,462.09	$	16,123	
Subtotal Year 2-5 Operations and Maintenance					$	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	
Subtotal Year 2-5 Operations and Maintenance					$	623,771	
Bonding& Insurance	0%	of	$	623,770.67	$	-	Bonding only applies to Capital Costs
Fee	8%	of	$	623,770.67	$	49,902	
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND MAINTENANCE COST					**$**	**673,672**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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 new extraction wells only
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%			

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 6-14 (ANNUAL COST)

Item/Activity	Qty	Unit		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	sample	$	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	$	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
Annual Extraction Well and Distribution Operating Cost	484	MMGal	$	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	$	322,462.09	$	48,369	
Construction Management	0%	of	$	322,462.09	$	-	
Subcontractor General Requirements	5%	of	$	322,462.09	$	16,123	
Subtotal Year 6-14 Operations and Maintenance					$	396,375	
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	$	-	Bonding only applies to Capital Costs
Fee	8%	of	$	599,022.41	$	47,922	
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AND MAINTENANCE COST					**$**	**646,944**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	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
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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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References
POST CLOSURE COST							
Item/Activity	Qty	Unit		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	well		$ 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	
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 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	A	B	C=A+B	A*E	B*E	C*E	
Elapsed Time	**Year**	**Discount Factor at 3%**	**Capital Cost**	**O&M Cost**	**Total Cost**	**Total PV Capital Costs at 3%**	**Total PV O&M Costs at 3%**	**Total PV Costs at 3%**	**Balance of Interest Bearing 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 Enhanced Ground Water E			**$ 4,897,470**	**$ 11,822,635**	**$ 16,720,105**	**$ 4,659,494**	**$ 9,473,344**	**$ 14,132,838**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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: Ground Water Extraction and Treatment with Chemcial/UV Oxidation
PREPARED BY: L.Colella, T.Palaia
PROJECT NUMBER: 346535.FS.01

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	$	58,673
Total Year 1 Operations and Maintenance	**$**	**792,081**
Annual Operations and Maintenance Cost: Years 2-5		
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	$	33,765
Total Post Closure Cost	**$**	**464,264**
TOTAL PRESENT WORTH	**$**	**11,118,104**

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 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.

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:	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 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
	14 µg/L, average concentration

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

CLC-18	460	gpm
CLC-27	620	gpm

Alternative 4 - Enhanced Ground Water Extraction with Treatment

SITE DATA AND ALTERNATIVE CONCEPTUAL DESIGN

PROJECT: Griggs and Walnut Superfund Site Feasibility Study
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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	MMgal
Total Annual: Years 6-14	484	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 =	3	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=	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	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	lf	assumed 500 lf to stub up to treatment system and reconnect to existing CLC-27 line to UGR	
Total linear footage of effluent field piping=	1,000	lf	connection of CLC-18 to CLC -27 connection to Upper Griggs Reservoir; CLC estimated 1000 lf new piping needed in addition to the approximate length of 500 lf of existing piping.	
Total linear footage of effluent field piping=	750	lf	estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir	
Estimated field piping placing rate =	75	lf/day		
Estimated duration of field piping =	30.0	days or	30	days (rounded up)
Total construction timeframe =	38	days		

HiPOx Treatment System Components (1080 gpm system)

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

Alternative 4 - Enhanced Ground Water Extraction with Treatment

COST ESTIMATE DETAILS

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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%

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 connection to Upper Griggs Reservoir	1,000	ft	$	100.17	$	100,170	estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting, 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	lf	$	100.17	$	50,085	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	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
HiPOx Treatment System	1	LS	$	531,250.00	$	531,250	Equipment is skid mounted, pre-assembled, pre-tested, and fully automated. Equipment includes reactor, instruments, controls, H2O2 storage, O3 generator/chiller, and on-site O2 generation system
HiPOx Bench Test	1	LS	$	3,000.00	$	3,000	1-time bench test to accurately determine dosing requirements and equipment sizing
Protective Enclosure	1	ea	$	100,000.00	$	100,000	Vendor quote: 8' x 40' climate-controlled enclosure
Repair discharge line on CLC-27	1	LS	$	300.00	$	300	
Well Permits	1	ea	$	30.00	$	30	new extraction well
Equipment Rental	26	wk	$	200.00	$	5,200	MultiRAE
Subtotal Capital Cost					$	1,168,163	
Site Work Allowance	7%	of	$	1,168,162.50	$	81,771	
Mechanical Allowance	15%	of	$	1,168,162.50	$	175,224	
Instrumentation and Controls Allowance	12%	of	$	1,168,162.50	$	140,180	including SCADA system
Electrical Allowance	12%	of	$	1,168,162.50	$	140,180	
Miscellaneous Equipment Allowance	5%	of	$	1,168,162.50	$	58,408	
Subtotal Capital Cost					$	1,763,925	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

COST ESTIMATE DETAILS

PROJECT:	Griggs and Walnut Superfund Site Feasibility Study
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1. The accuracy of the cost estimate is +50%/-30%
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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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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						
Labor - Technician	300	hr	$	75.00	$ 22,500	Assume 30 days for startup, 10 hrs/day
Labor - Engineer	200	hr	$	120.00	$ 24,000	Assume 20 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 from HiPOx
Startup Equipment Rental	6	week	$	1,000.00	$ 6,000	intensive water quality monitoring
Total *System Startup*					$ 53,400	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	sample	$	150.00	$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0	sample	$	100.00	$	-	no air emissions from HiPOx
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
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$	194.73	$	110,538	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used avg. for CLC 19, 21, 27)
Total *Routine System O&M*					$	252,240	
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					$	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	
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	
Subtotal Year 1 Operations and Maintenance					$	733,409	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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 (ANNUAL COST)

Item/Activity	Qty	Unit		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	sample	$	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
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$	194.73	$	110,538	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used 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	
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 2-5 Operations and Maintenance					$	278,496	
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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

COST ESTIMATE DETAILS

PROJECT:	Griggs and Walnut Superfund Site Feasibility Study
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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

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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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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 MAINTENANCE COS					**$**	**454,547**	

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 6-14 (ANNUAL COST)

Item/Activity	Qty	Unit		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	sample	$	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
Annual Extraction Well and Distribution Operating Cost	484	MMGal	$	194.73	$	94,162	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used 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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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 MAINTENANCE COS					**$**	**427,819**	

POST CLOSURE COST

Item/Activity	Qty	Unit	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	well	$ 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	$	-	
Subtotal Well Abandonment				$	184,000	
Subtotal Post-Closure Cost				$	202,375	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	A	B	C=A+B	A*E	B*E	C*E	
Elapsed Time	Year	Discount Factor at 3%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3%	Total PV O&M Costs at 3%	Total PV Costs at 3%	Balance of Interest Bearing 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 Enhanced Ground Water E			**$ 4,895,438**	**$ 8,022,974**	**$ 12,918,412**	**$ 4,657,461**	**$ 6,460,644**	**$ 11,118,104**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	Ground Water Extraction and Treatment with GAC
PREPARED BY:	L.Colella, T.Palaia
PROJECT NUMBER:	346535.FS.01

Capital Cost		
Construction	$	1,498,996
Project Management	$	119,920
Design	$	224,849
Construction Management	$	224,849
Subcontractor General Requirements	$	74,950
G&A	$	300,099
Overhead	$	107,178
Tax	$	152,729
Contingency	$	535,891
Bonding& Insurance	$	64,789
Fee	$	259,157
Total Capital Cost	**$**	**3,563,407**
Year 1 Operations and Maintenance		
System Startup	$	17,200
Routine System O&M	$	182,024
Reporting (Annual Report and Construction Completion Report)	$	73,500
Professional Services [1]	$	62,727
Subcontractor General Requirements	$	13,636
G&A	$	48,872
Overhead	$	17,454
Tax	$	24,872
Contingency	$	87,272
Bonding& Insurance	$	-
Fee	$	42,205
Total Year 1 Operations and Maintenance	**$**	**569,762**
Annual Operations and Maintenance Cost: Years 2-5		
Routine System O&M	$	161,984
Reporting (Annual Reports)	$	18,375
Professional Services [1]	$	41,483
Subcontractor General Requirements	$	9,018
G&A	$	32,320
Overhead	$	11,543
New Mexico Gross Receipts Tax	$	16,449
Contingency	$	57,715
Bonding& Insurance	$	-
Fee	$	27,911
Total Annual Operations and Maintenance Cost: Years 2-5	**$**	**376,797**
Annual Operations and Maintenance Cost: Years 6-14		
Routine System O&M	$	139,560
Reporting (Annual Reports)	$	18,375
Professional Services [1]	$	41,483
Subcontractor General Requirements	$	9,018
G&A	$	29,181
Overhead	$	10,422
New Mexico Gross Receipts Tax	$	14,851
Contingency	$	52,109
Bonding& Insurance	$	-
Fee	$	25,200
Total Annual Operations and Maintenance Cost: Years 6-14	**$**	**340,198**
Post Closure Cost		
Closure Reporting	$	18,375
Well Abandonment and Equipment Demobilization	$	126,500
Professional Services [1]	$	47,809
Subcontractor General Requirements	$	7,244
G&A	$	27,990
Overhead	$	9,996
New Mexico Gross Receipts Tax	$	14,245
Contingency	$	49,982
Bonding& Insurance	$	6,043
Fee	$	24,171
Total Post Closure Cost	**$**	**332,354**
TOTAL PRESENT WORTH	**$**	**9,034,497**

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 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.

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: 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.

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

Pumping Rates for Plume Containment and Remediation <20 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 gpm

Total Annual: Years 1-5 568 MMgal
Total Annual: Years 6-14 484 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 = 3 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 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 lf 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 lf new piping needed in addition to the approximate length of 500 lf of existing piping.
Total linear footage of effluent field piping= 1,000 lf
Total linear footage of effluent field piping= 750 lf estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir
Estimated field piping placing rate = 75 lf/day
Estimated duration of field piping = 30.0 days or 30 days (rounded up)
Total construction timeframe = 38 days

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:	Ground Water Extraction and 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)							
The total GAC usage rate =	1.0	lbs GAC/hr or	23.7	lbs GAC/day or	8,640	lbs GAC/yr			
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					
	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			

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

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 connection to Upper Griggs Reservoir	1,000	ft		$ 100.17	$ 100,170	estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting, 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	lf		$ 100.17	$ 50,085	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	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	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	vessel		$ 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	$ 992,712.50	$ 119,126	including SCADA system
Electrical Allowance	12%		of	$ 992,712.50	$ 119,126	
Miscellaneous Equipment Allowance	5%		of	$ 992,712.50	$ 49,636	
Subtotal Capital Cost					$ 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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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	
Project Management	8%	of	$	272,724.05	$ 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	$	527,557.40	$ 42,205	
TOTAL YEAR 1 OPERATIONS AND MAINTENANCE COST					**$ 569,762**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit	Unit Cost	Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 2-5 (ANNUAL COST)

Item/Activity	Qty	Unit	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	sample	$ 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	$ 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
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$ 194.73	$ 110,538	98-99 avg costs provided by City, 3% inflation factor added per 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	
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 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	
Bonding& Insurance	0%	of	$ 348,886.54	$ -	Bonding only applies to Capital Costs
Fee	8%	of	$ 348,886.54	$ 27,911	
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND MAINTENANCE COST				**$ 376,797**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit	Unit Cost	Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 6-10 (ANNUAL COST)

Item/Activity	Qty	Unit	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	sample	$ 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
Annual Extraction Well and Distribution Operating Cost	484	MMGal	$ 194.73	$ 94,162	98-99 avg costs provided by City, 3% inflation factor added per 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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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 MAINTENANCE COST					**$ 340,198**	

POST CLOSURE COST

Item/Activity	Qty	Unit		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	
Well Abandonment and Equipment Demobilization						
Well Abandonment	1	well	$	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	$	110,000.00	$ -	
Instrumentation and Controls Allowance	0%	of	$	110,000.00	$ -	
Electrical Allowance	5%	of	$	110,000.00	$ 5,500	
Miscellaneous Equipment Allowance	0%	of	$	110,000.00	$ -	
Subtotal Equipment Demobilization and Well Abandonment					$ 126,500	
Subtotal Post-Closure Cost					$ 144,875	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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 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%

Detailed Capital and Operations and Maintenance Costs

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	A	B	C=A+B	A*E	B*E	C*E	
Elapsed Time	Year	Discount Factor at 3%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3%	Total PV O&M Costs at 3%	Total PV Costs at 3%	Balance of Interest Bearing 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 Enhanced Ground Water E			**$ 4,066,123**	**$ 6,386,011**	**$ 10,452,134**	**$ 3,895,762**	**$ 5,138,735**	**$ 9,034,497**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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:	Ground Water Extraction and Treatment with Air Stripper without Acid Pretreatment
PREPARED BY:	L.Colella, T.Palaia
PROJECT NUMBER:	346535.FS.01

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	$	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
Contingency	$	67,966
Bonding& Insurance	$	-
Fee	$	32,869
Total Annual Operations and Maintenance Cost: Years 2-5	**$**	**443,725**
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
New Mexico Gross Receipts Tax	$	18,204
Contingency	$	63,872
Bonding& Insurance	$	-
Fee	$	30,889
Total Annual Operations and Maintenance Cost: Years 6-14	**$**	**416,997**
Post Closure Cost		
Closure Reporting	$	18,375
Equipment Demobilization and Well Abandonment	$	126,500
Professional Services [1]	$	47,809
Subcontractor General Requirements	$	7,244
G&A	$	27,990
Overhead	$	9,996
New Mexico Gross Receipts Tax	$	14,245
Contingency	$	49,982
Bonding& Insurance	$	6,043
Fee	$	24,171
Total Post Closure Cost	**$**	**332,354**
TOTAL PRESENT WORTH	**$**	**9,491,217**

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 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.

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: 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

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
	14 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 gpm

Total Annual: Years 1-5 568 MMgal
Total Annual: Years 6-14 484 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 = 3 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 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 lf 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 lf new piping needed in addition to the approximate length of 500 lf of existing piping.
Total linear footage of effluent field piping= 1,000 lf
Total linear footage of effluent field piping= 750 lf estimated connection of new well to CLC -27 connection to Upper Griggs Reservoir
Estimated field piping placing rate = 75 lf/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 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 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 10 °C and using STRIPR Model data (CH2M HILL, 1991)
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/m^3 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/m^3 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

		1 (influent water)	2 (estimate of parameters within the stripper)
Flow	gpm	1080	1080
Temperature	Deg . F	60	77
Alkalinity, Total	mg/l $CaCO_3$	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.

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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 = 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 119 working days (includes 80 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 new extraction wells only
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%

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 connection to Upper Griggs Reservoir	1,000	ft	$ 100.17	$ 100,170	estimated LF from CLC: cost includes 10-inch pipe, trenching, backfill, compacting, 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	lf	$ 100.17	$ 50,085	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	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
Low-Profile Tray Air Stripper Package	2	LS	$ 70,000.00	$ 140,000	Assume 540 gpm NEEP Model 41251 Tray Air stripper (controls, piping, skid, blower, 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	$ -	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, 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	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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 = 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 119 working days (includes 80 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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost	Cost	Comments and References
Site Work Allowance	7%	of	$	837,112.50	$ 58,598	
Mechanical Allowance	15%	of	$	837,112.50	$ 125,567	
Instrumentation and Controls Allowance	12%	of	$	837,112.50	$ 100,454	including SCADA system
Electrical Allowance	12%	of	$	837,112.50	$ 100,454	
Miscellaneous Equipment Allowance	5%	of	$	837,112.50	$ 41,856	
Subtotal Capital Cost					$ 1,264,040	
Project Management	8%	of	$	1,264,039.88	$ 101,123	
Design	15%	of	$	1,264,039.88	$ 189,606	
Construction Management	15%	of	$	1,264,039.88	$ 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	$	2,731,700.77	$ 54,634	
Fee	8%	of	$	2,731,700.77	$ 218,536	
TOTAL CAPITAL COST					**$ 3,004,871**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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		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	119	working days (includes 80 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 new extraction wells only
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%			

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

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
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*					$	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	sample	$	150.00	$	4,350	monthly infl/effl sampling for permit, plus 20% extra for QA/QC
Air Sample Analysis	0	sample	$	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
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$	194.73	$	110,538	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used 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	$	23,976	
Technical Support	15%	of	$	299,699.82	$	44,955	
Construction Management	0%	of	$	299,699.82	$	-	
Subcontractor General Requirements	5%	of	$	299,699.82	$	14,985	
Subtotal Year 1 Operations and Maintenance					$	383,616	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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 = 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 119 working days (includes 80 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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		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**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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		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	119	working days (includes 80 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 new extraction wells only
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%			

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST					
Item/Activity	**Qty**	**Unit**	**Unit Cost**	**Cost**	**Comments and References**
ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 2-5 (ANNUAL COST)					
Item/Activity	**Qty**	**Unit**	**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	sample	$ 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	$ 47,052	Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
Annual Extraction Well and Distribution Operating Cost	568	MMGal	$ 194.73	$ 110,538	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used avg. for CLC 19, 21, 27)
Total *Routine System O&M*				$ 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	$ 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 2-5 Operations and Maintenance				$ 271,865	
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				$ 410,857	
Bonding& Insurance	0%	of	$ 410,856.55	$ -	Bonding only applies to Capital Costs
Fee	8%	of	$ 410,856.55	$ 32,869	
TOTAL ANNUAL COST: YEARS 2-5 OPERATIONS AND MAINTENANCE COS				**$ 443,725**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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 = 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 119 working days (includes 80 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 new extraction wells only
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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 6-14 (ANNUAL COST)

Item/Activity	Qty	Unit		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	sample	$	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	$	47,052	Air Stripper: 25 hp blowers + (2) 10 hp pumps per unit, full-time operations
Annual Extraction Well and Distribution Operating Cost	484	MMGal	$	194.73	$	94,162	98-99 avg costs provided by City, 3% inflation factor added per year for 2006 values (used 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					$	386,108	
Bonding& Insurance	0%	of	$	386,108.29	$	-	Bonding only applies to Capital Costs
Fee	8%	of	$	386,108.29	$	30,889	
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AND MAINTENANCE COS					**$**	**416,997**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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		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	119	working days (includes 80 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 new extraction wells only
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%			

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST					
Item/Activity	**Qty**	**Unit**	**Unit Cost**	**Cost**	**Comments and References**
POST CLOSURE COST					
Item/Activity	Qty	Unit	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	well	$ 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%	of	$ 110,000.00	$ 11,000	
Mechanical Allowance	0%	of	$ 110,000.00	$ -	
Instrumentation and Controls Allowance	0%	of	$ 110,000.00	$ -	
Electrical Allowance	5%	of	$ 110,000.00	$ 5,500	
Miscellaneous Equipment Allowance	0%	of	$ 110,000.00	$ -	
Total *Equipment Demobilization and Well Abandonment*				$ 126,500	
Subtotal Post-Closure Cost				$ 144,875	
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	
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	A	B	C=A+B	A*E	B*E	C*E	
Elapsed Time	Year	Discount Factor at 3%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3%	Total PV O&M Costs at 3%	Total PV Costs at 3%	Balance of Interest Bearing Account at 3%
0	2007	1.000	$ 3,004,871		$ 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 Enhanced Ground Water E			**$ 3,507,587**	**$ 7,672,719**	**$ 11,180,306**	**$ 3,337,225**	**$ 6,153,991**	**$ 9,491,217**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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	$	16,415
Overhead	$	5,862
New Mexico Gross Receipts Tax	$	8,354
Contingency	$	29,312
Bonding& Insurance	$	3,544
Fee	$	14,175
Total Annual Operations and Maintenance Cost: Years 1-5	**$**	**194,910**
Annual Operations and Maintenance Cost: Years 6-14		
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
Fee	$	6,770
Total Annual Operations and Maintenance Cost: Years 6-14	**$**	**93,093**
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.

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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: 3 with 3 screens for a total of 4125 ft
4. The number of new single-screen piezometers required to be installed: 10 piezometers
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: 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: 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References
Construction							
Nested Ground Water Monitor Well Installation	3	well	$	129,409.00	$	388,227	per recent MW installation invoice
Piezometer Installation	10	piezometer	$	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**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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: 3 with 3 screens for a total of 4125 ft
4. The number of new single-screen piezometers required to be installed: 10 piezometers
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: 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: 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 1-5 (ANNUAL COST)

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments
Monthly Water Level Measurements (Piezometers)							
Labor - Technician	180	hr	$	75.00	$	13,500	30 piezometers per event, 2 people, 4 piezometers per hour
Water Level Measurement Equipment Rental	1	LS	$	250.00	$	250	
Total *Water Level Measurement*					$	13,750	
Annual Ground Water Sampling (Monitor Wells)							
Subcontractor costs for mulitport wells	1	LS	$	15,200.00	$	15,200	5 multiport wells: based on Dec 2005 invoice (4 days including mobe/demobe, materials, equipment, labor, per diem)
Labor - Technician	632	hr	$	75.00	$	47,400	4 hrs/well, 2 people, not including 5 multiport wells
Ground Water Sample Analysis - VOC only	97	sample	$	150.00	$	14,550	Includes all wells plus 15% (on average #) QA/QC samples
Ground Water Sample Analysis - NAIP	0	sample	$	600.00	$	-	Includes 15% (on average #) QA/QC samples
Sampling Supplies	1	round	$	200.00	$	200	
GW Sampling Equipment Rental	1	round	$	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	
G&A	14%	of	$	117,248.00	$	16,415	
Overhead	5%	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 MAINTENANCE COS					**$**	**194,910**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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: 3 with 3 screens for a total of 4125 ft
4. The number of new single-screen piezometers required to be installed: 10 piezometers
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: 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: 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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost		Cost	Comments and References

ANNUAL OPERATIONS AND MAINTENANCE COST - YEARS 6-14 (ANNUAL COST)

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							
Subcontractor costs for mulitport wells	1	LS	$	7,600.00	$	7,600	5 multiport wells: based on Dec 2005 invoice (4 days [biennial] including mobe/demobe, materials, equipment, labor, per diem)
Labor - Technician	316	hr	$	75.00	$	23,700	4 hrs/well, 2 people, not including 5 multiport wells
Ground Water Sample Analysis - VOC only	49	sample	$	150.00	$	7,350	Includes all wells plus 15% (on average #) QA/QC samples
Sampling Supplies	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					$	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	8%	of	$	84,630.00	$	6,770	
TOTAL ANNUAL COST: YEARS 6-14 OPERATIONS AND MAINTENANCE COS					**$**	**93,093**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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: 3 with 3 screens for a total of 4125 ft
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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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost	Cost	Comments and References

FIVE YEAR REVIEW COST - PER REPORT

Item/Activity	Qty	Unit		Unit Cost	Cost	Comments
5-year Review Report						
5-year Review Report	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**	

Alternative 4 - Enhanced Ground Water Extraction with Treatment

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

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: 3 with 3 screens for a total of 4125 ft
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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%

Detailed Capital and Operations and Maintenance Costs

CAPITAL COST

Item/Activity	Qty	Unit		Unit Cost	Cost	Comments and References
POST CLOSURE COST						
Item/Activity	Qty	Unit		Unit Cost	Cost	Comments
Well Abandonment						
Well Abandonment	94	well		$ 1,000.00	$ 94,000	Assume abandon 5 wells/day
Equipment Rental	4	wk		$ 200.00	$ 800	MultiRAE
Total *Well Abandonment*					$ 94,800	
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	$149,120.40	$ 20,877	
Overhead	5%		of	$149,120.40	$ 7,456	
New Mexico Gross Receipts Tax	7.125%		of	$149,120.40	$ 10,625	
Contingency	25%		of	$149,120.40	$ 37,280	
Subtotal Post-Closure Cost					$ 225,358	
Bonding& Insurance	2%		of	$225,358.20	$ 4,507	
Fee	8%		of	$225,358.20	$ 18,029	
TOTAL POST CLOSURE COST					**$ 247,894**	

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	A	B	C=A+B	A*E	B*E	C*E	
Elapsed Time	Year	Discount Factor at 3%	Capital Cost	O&M Cost	Total Cost	Total PV Capital Costs at 3%	Total PV O&M Costs at 3%	Total PV Costs at 3%	Balance of Interest Bearing Account at 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 Enhanced Ground Water E			**$ 2,522,069**	**$ 2,297,253**	**$ 4,819,322**	**$ 2,395,001**	**$ 1,893,995**	**$ 4,288,996**	