Technical Memorandum

PCE Treatment - Phase II
Conceptual Design

Prepared for

City of Las Cruces - Utilities Department

680 North Motel Boulevard
Las Cruces, New Mexico 88004

May 2007

CH2MHILL
445 Executive Center Boulevard, Suite 110
El Paso, Texas 79902-1003

Technical Memorandum

PCE Treatment - Phase II Conceptual Design

Submitted to

City of Las Cruces - Utilities Department

May 2007

CH2MHILL

PCE Treatment - Phase II Conceptual Design

PREPARED FOR: City of Las Cruces – Utilities Department

PREPARED BY: CH2M HILL

COPIES: Dan Santantonio
Gilbert Morales
File

DATE: May 1, 2007

PROJECT NUMBER: 340891.06.01

Purpose

The purpose of this technical memorandum (TM) is to prepare a conceptual design and recommendations for implementation of a new treatment facility for the City of Las Cruces (City). This treatment facility will target removal of tetrachloroethylene (PCE) from two existing groundwater wells (Wells No. 18 and 27), and a possible future well. This TM provides information on the treatment equipment, facility layout, opinion of construction cost, and implementation of the system.

Background

The Phase I evaluation entitled, "Uranium and PCE Treatment – Phase I Evaluation of Treatment Technologies" completed June 26, 2006, by CH2M HILL selected a treatment system (tray aeration) for the PCE occurring at the City's groundwater wells. This TM provides the next stages of costs and layout for this facility.

Implementation Phasing

The City plans to implement this project in selected phases. This phasing was developed in conjunction with a groundwater modeling effort showing how the contamination plume could be contained using this phasing. A review of this recommended project phasing with the City produced the following steps.

1. Phase I – Evaluation of Treatment Technologies: Completed June 2006.
2. Phase II – Conceptual Design: Described herein.
3. Phase III – Design and construction of a facility to treat PCE from Wells No. 18 and 27. Provide space for a future expansion of a third groundwater well.
4. Phase IV – Design and construction of a new groundwater well, piping, and third treatment unit in the existing facility.

Treatment Process

The selected treatment process, tray aeration, was developed by NEEP Systems™. There are three other manufacturers who produce similar systems: Carbonair, Carbtrol, and EPG Companies. There are minor differences in the manufacture and options of each equipment supplier. Appendix A presents basic manufacturer's literature from each of these suppliers.

Tray aeration operates by forcing counter-current air through horizontally extended trays to strip volatile organic carbon (VOC) compounds such as PCE from water. Tray aeration systems are designed to provide an adequate residence time for a given flow rate of water and a given contaminant. The size of the units and the number of aeration trays may vary for different contaminants and flow rates. Tray aeration systems designed for PCE removal are expected to achieve removal rates in excess of 95 percent. Figure 1 presents a process flow diagram of the tray aeration process.

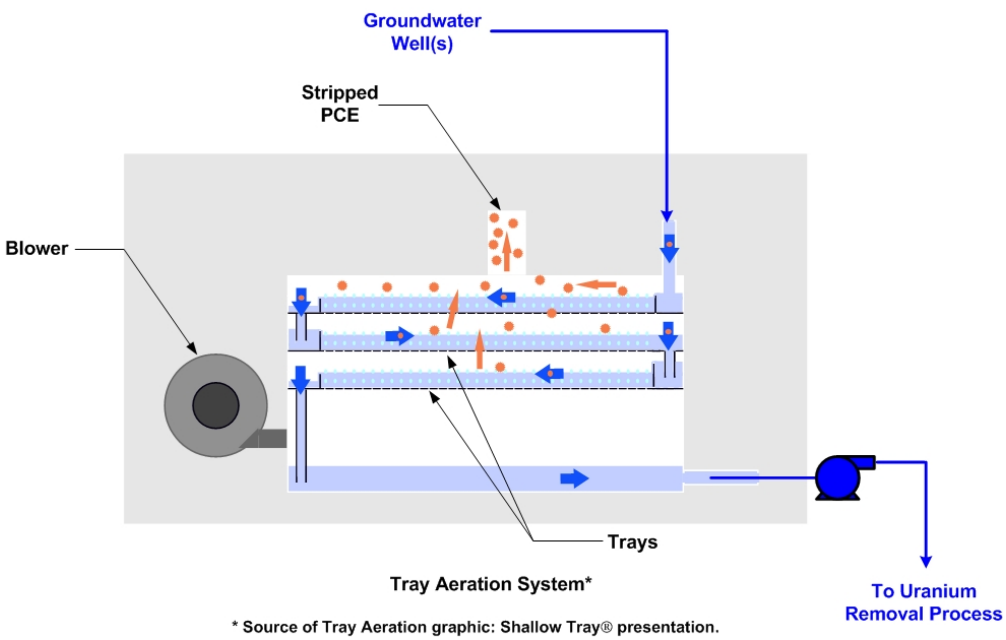


Figure 1- Tray Aeration Treatment

The groundwater from the well is pumped to an inlet chamber where it flows over distribution weirs and along the aeration trays. Filtered air from the outside is blown into the process with sufficient pressure to push it up through holes in the aeration trays. As the air flows upward through the water bubbles create a froth. This froth increases the surface area of the water which allows mass transfer, or volatization, of the PCE from the water to the air. The stripped gas and air continues upward and is blown out the top of the treatment unit for discharge to the atmosphere. Additional treatment can be added to collect the air and remove the PCE, but is not expected at this facility. The finished water flows down to the bottom of the treatment unit where it is collected and pumped to the distribution system.

Operation of the tray aeration system also may cause oxidation of metals and formation of scaling from hardness. The concentration of this depends on the groundwater supplied to the treatment system. Once formed, the metals formation and scaling eventually cause fouling of the trays and require periodic cleaning. Periodic cleaning of the trays is accomplished by accessing ports on the system with a washing wand or high-pressure washer. More thorough cleaning requires that the trays be removed completely. Spare trays can be provided to allow continued operation during cleaning.

A preliminary evaluation of the City's water shows that fouling should not be a significant concern. However, provisions have been included so that an automated chemical washing system could be installed in the future. This automated system consists of providing a chemical feed system, such as sulfuric acid, to the water before it flows into the tray aeration system. This acid continually cleans the trays and prevents formation of scaling.

Figure 2 presents a proposed process flow diagram for the PCE treatment system.

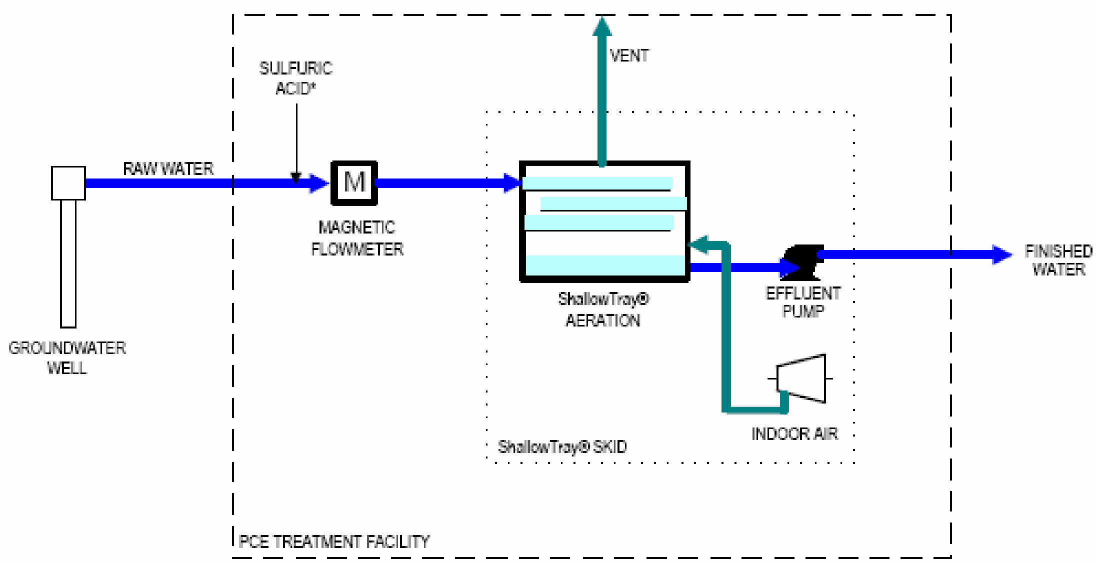


Figure 2 – Process Flow Diagram

Equipment Selection

CH2M HILL evaluated the flow from Wells No. 18 and 27 and selected treatment units as provided by NEEP Systems™. Table 1 presents the selection of the treatment units. Well No. 27 requires a slightly larger treatment unit. CH2M HILL recommends that both units be provided with the same size to provide interchangeable parts and operational redundancy.

TABLE 1
Equipment Selection – Las Cruces PCE Treatment

Well No.	Flow Rate (gpm)	Model Selection [1]	Comment
18	500	41241	
27	650	61221	
Both	650	61221	Provide two units of the same size.

[1] Selection based on NEEP Systems™.

An evaluation of the City's water supply indicates that the units should be constructed of stainless steel (SST 316L). The elevated levels of sulfides in the water indicate that some corrosion could occur over time. Provision of stainless steel will reduce this corrosion and provide for an easily cleanable system.

The treatment units would be provided with the following optional items:

- A pump to re-pressurize the treated water for discharge to the distribution system.
- Disconnect switches for the system
- Alarms for low air pressure and high water level
- Spare trays to provide continued operation and cleaning. Two for each unit.
- Controls to allow remote operation from the City's existing SCADA system.
- A flow meter to measure the discharge from the treatment unit.

Appendix B presents manufacturer's data sheets from NEEP Systems™ on these selected units.

Treatment Facility Layout

The treatment plant would be located in proximity to existing Well No. 18. This well is situated inside an existing repair facility near the intersection of Griggs Street and Hadley Avenue. Figure 3 shows an aerial photograph with the approximate facility location.

This facility would need 480 volt, 3 phase power, connection to natural gas, connection to a sanitary sewer and connection of potable water piping from Well No. 18 and Well No. 27. A pipeline of approximately 3,000 feet is needed to bring water from Well No. 27. Treated water can be discharged directly to the potable water distribution system.

A layout of the treatment facility provides space for three treatment units. The first two would be provided immediately and space left for a third. Access to the units would be from overhead roll-up doors for maintenance and personnel access would be provided separately.

Figure 3 – Site Layout

Included is an electrical room where the power and control system for the facility would be located. Heating, ventilation, and air conditioning should be provided and suspended in the treatment area.

A chemical room was sized to house up to 2 chemical totes (each of 300 gallons) and four chemical metering pumps. This configuration would allow a feed of 27 mg/L of sulfuric acid and provide 30 days worth of storage. This chemical room will be included in the initial construction; however, the equipment would only be added at a later phase if warranted.

Figure 4 shows the interior layout plan of the treatment facility.

Opinion of Costs

Costs for Phase III of the facility were developed and are described below. Capital costs for the project were developed using CH2M HILL's Parametric Cost Estimating System (CPES). Based on this conceptual development, the opinion of cost should be considered a Class 4 cost estimate as defined by the Association for the Advancement of Cost Engineering (AACE International).

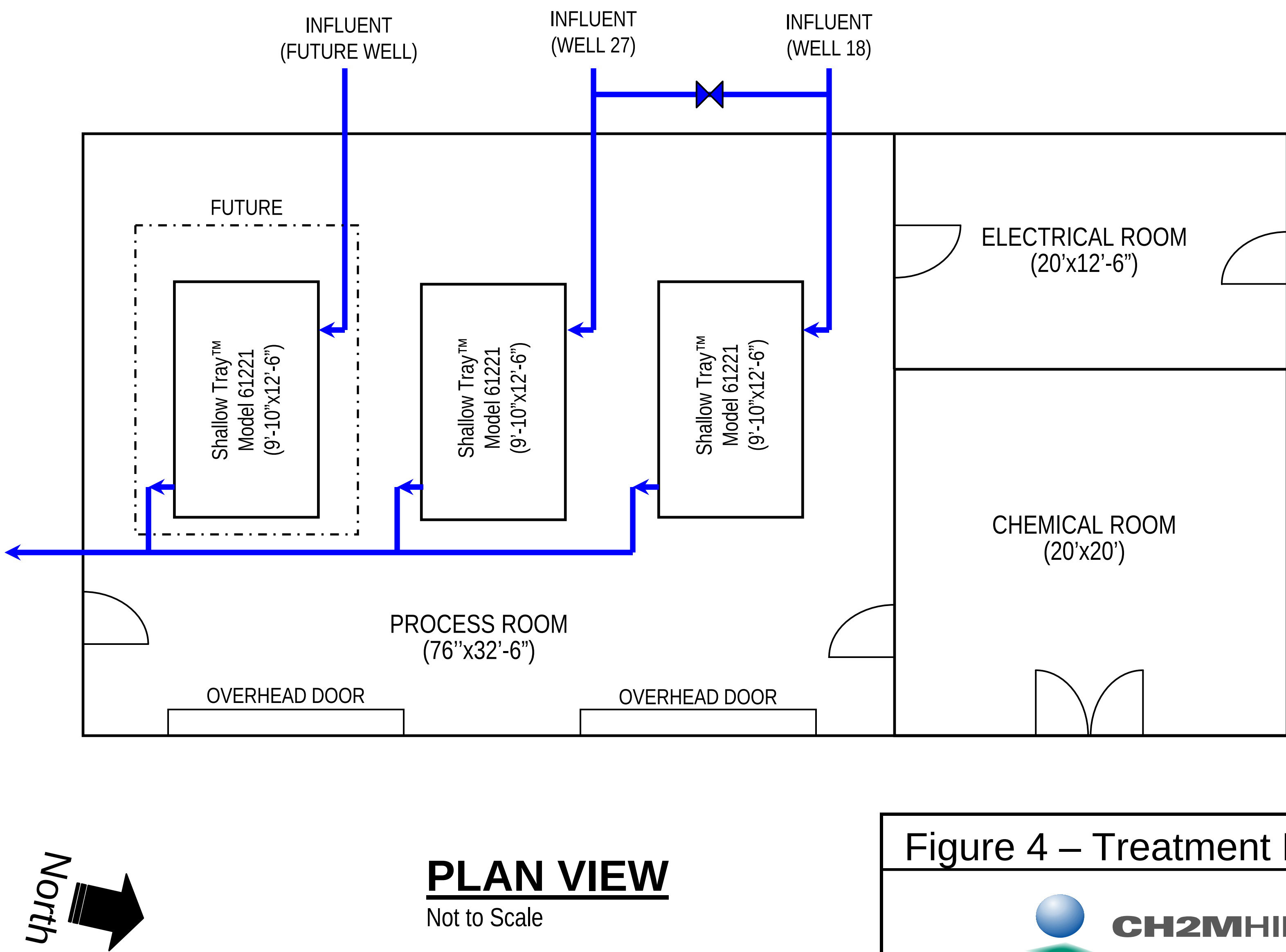
This opinion of cost was prepared based on the information where preliminary engineering is from 1 to 5 percent complete and detailed strategic planning, business development, project screening, alternative scheme analysis, confirmation of economic and/or technical feasibility and preliminary budgetary approval are necessary to proceed. Examples of estimating methods used to include equipment and/or system process factors, scale-up factors, and parametric and modeling techniques. The typical expected accuracy range for this class of estimate is minus 20 percent on the low side and plus 30 percent on the high side. The final costs of the project will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. Therefore, the final project costs will likely vary from the estimate presented.

Costs are presented in 2007 dollars (current to February 2007) for the proposed treatment project. Capital costs include construction, engineering, engineering services during construction, permitting, commissioning and startup, and legal services. Costs for raw water development and land purchase are not included in this estimate.

The estimate includes the following contractor markups and allowances:

- Mobilization, bonds, insurance 3%
- Contractor's overheads 10%
- Contractor's profit 7%

The estimate also includes a 30-percent contingency, which is appropriate for this level of project definition and completion. The estimated cost has been escalated to the approximate midpoint of construction, assumed as July 2008. Including all of these assumptions, the estimated construction cost for the PCE Treatment System project is presented in Table 2.



PLAN VIEW

Not to Scale

Figure 4 – Treatment Plant Plan

CH2MHILL

City of Las Cruces

TABLE 2
Capital Costs – Las Cruces PCE Treatment

Phase	Items	Construction Costs	Non-Construction Costs	Capital Costs	Comments
III	Treatment for Wells No. 18 and 27, complete, expandable for 3rd well.	$2,410,700	$650,900	$3,061,600	
III	Pipeline from Well No. 27 to the treatment plant (3,000 ft, 8” diameter).	$691,800	$186,800	$878,600	
IV	Additional treatment unit for future well. Assumes same model size required for existing wells.	$374,800	$101,200	$476,000	Excludes well costs.
Future	Chemical feed system, complete	$103,400	$27,900	$131,300	Completed if required.
		Grand Total		**$4,547,500**	

Appendix C presents a detailed breakdown of costs for these items.

Implementation – Contracting Processes

Listed above are four manufacturers of tray aeration systems. Each of these manufacturers can likely provide water treatment equipment that will meet the need of the City of Las Cruces. The project could be implemented using a typical contracting process consisting of design, bidding and construction process. This process has been previously used with success by the City of Las Cruces.

Qualifications Based Selection of Equipment

A second alternative to the contracting process that has been previously utilized consists of selection of equipment manufacturers using a request for proposal process. Design would be completed using a normal process. During the design the equipment selection could be completed using a qualifications based process. The selected equipment would then be incorporated into the construction contract to ensure that the facility is coordinated and constructed completely.

This qualifications based equipment selection process would proceed as follows:

1. Set preliminary design parameters for the equipment and develop advertisement and request for proposal. Develop a list of equipment suppliers.
2. Send advertisement to equipment suppliers requesting written proposal, an interview, a list of recent completed projects, and references. Other specific items can also be required.
3. Written proposals received and reviewed by a City selection committee.

4. Interviews completed by equipment suppliers. This is optional but allows interaction and questions for proposals that may be less complete in some areas. Also includes a way for the suppliers to bring equipment or demonstrations to the presentation.

5. Selection committee visits other installation or, at a minimum, calls the references of the equipment suppliers. Selection committee meets and picks the best-qualified equipment supplier.

6. Notification of short-listed status sent to the selected equipment supplier. Letter includes a request to provide costs for the installation. Design parameters are finalized and included to the equipment supplier at this time.

7. Costs received by the selection committee. The engineering consultant provides an evaluation of the costs based on engineering judgment and compared to previous projects awarded in the last 5 years.

8. If costs are acceptable, the contract is awarded to the selected equipment supplier. An agreement is completed that can be inserted into a construction contract. If costs are not acceptable the supplier can either adjust the costs to an agreed upon level or the selection committee can move to the second ranked equipment supplier and negotiate costs with this company.

9. The design of the system is finalized including bidding documents. The bidding documents include the agreement with the equipment supplier and the bid form includes a fixed cost listed as a line item for the equipment. The construction contractor adds a lump sum amount for work in addition to the supplied equipment.

10. Bidding is finalized using the City's normal procedure for construction contracts. Bids for the construction contract are awarded based on lowest responsive bid.

11. Construction of the system proceeds with the construction contractor contracted to the equipment supplier for the installation. The construction contractor provides needed manpower for the installation and startup of the system. The construction contract is completed using the City's standard procedures.

Design-Build

Finally, the construction duration could be shortened using a design-build process. There are many variations to this type of contracting process and a review of the best alternatives should be completed with firms regularly engaged in this type of work.

Temporary Treatment Unit

The installation of a temporary treatment unit was investigated to allow treatment of PCE to begin as soon as possible. The contacted firms do not have full sized equipment available for this purpose. Smaller units, typically used for pilot testing, with flow rates of up to 15 gpm are available immediately. Larger units would be available as soon as 6 weeks after submittal approval. This unit could be provided on a skid with local controls. The size of the unit prevents it from being installed on a trailer; a concrete pad would be required.

Concerns of using a temporary unit include damage to the unit by cold weather or by moving the unit a second time after construction is completed. Provision of a temporary unit adds construction costs for all temporary connections such as a concrete slab, electrical power connection and piping. These costs would likely be saved by implementing an alternative delivery process such as design-build rather than installing a specially built temporary treatment unit. Alternative delivery methods could allow construction of the unit in-place while the building could be constructed around the operating unit.

Appendix A - List of Manufacturers

Appendix A

List of Equipment Manufacturers

Equipment manufacturers for low profile air strippers.

1. Carbonair, Inc.
   4889 Hunter Road, Building 1-C
   San Marcos, Texas 78666
   Telephone: (800) 893-5937
   Web: www.carbonair.com

2. Carbtrol Corporation
   955 Connecticut Avenue, Suite 5202
   Bridgeport, Connecticut 06607
   Telephone: (800) 242-1150
   Web: www.carbtrol.com

3. EPG Companies
   19900 County Road 81
   Maple Grove, Minnesota 55311
   Telephone: (612) 424-2613
   Web www.epgco.com

4. North East Environmental Products, Inc. (NEEP)
   7 Commerce Avenue
   West Lebanon, New Hampshire 03784
   Telephone: (603) 298-7061
   Web: www.neepsystems.com

Nearby Installations of low profile air strippers.

1. Sandia National Laboratories
   White Sands Test Facility
   Contact: Don Minnick or Troy Wiebe
   Telephone: (505) 524-5202

2. City of Albuquerque
   Los Angeles Landfill
   Contact: Rhonda Methvin
   Telephone (505) 768-2833

Appendix B - Equipment Details

ShallowTray®
low profile air strippers

HIGH FLOW

System Performance Estimate

Client and Proposal Information:

CH2M: Jason Curl
City of Las Cruces, NM
#406914-2
Well #27 Treatment

Series chosen:	**61200**	
Water Flow Rate:	**650.0 gpm**	**147.7 m3/hr**
Air Flow Rate:	**3600 scfm**	**6120 m3/hr**
Water Temp:	**65 °F**	**18 °C**
Air Temp:	**40 °F**	**4 °C**
A/W Ratio:	**41**	**41**
Safety Factor:	**None**	

Contaminant	Untreated Influent Effluent Target	Model 61211 Effluent lbs/hr	PPMv	Model 61221 Effluent lbs/hr	PPMv	Model 61231 Effluent lbs/hr	PPMv	Model 61241 Effluent lbs/hr	PPMv	Model 61251 Effluent lbs/hr	PPMv
		%removal		%removal		%removal		%removal		%removal	
Tetrachloroethylene	**8 ppb**	**2 ppb**		**<1 ppb**		**<1 ppb**		**<1 ppb**		**<1 ppb**	
Solubility 150 ppm	**1 ppb**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**
Mwt 165.83		**73.6395%**		**93.0513%**		**98.1683%**		**99.5171%**		**99.8727%**	

This report has been generated by ShallowTray Modeler software version Ev2.2. This software is designed to assist a skilled operator in predicting the performance of a ShallowTray air stripping system. North East Environmental Products, Inc. (NEEP) is not responsible for incidental or consequential damages resulting from the improper operation of either the software or the air stripping equipment.

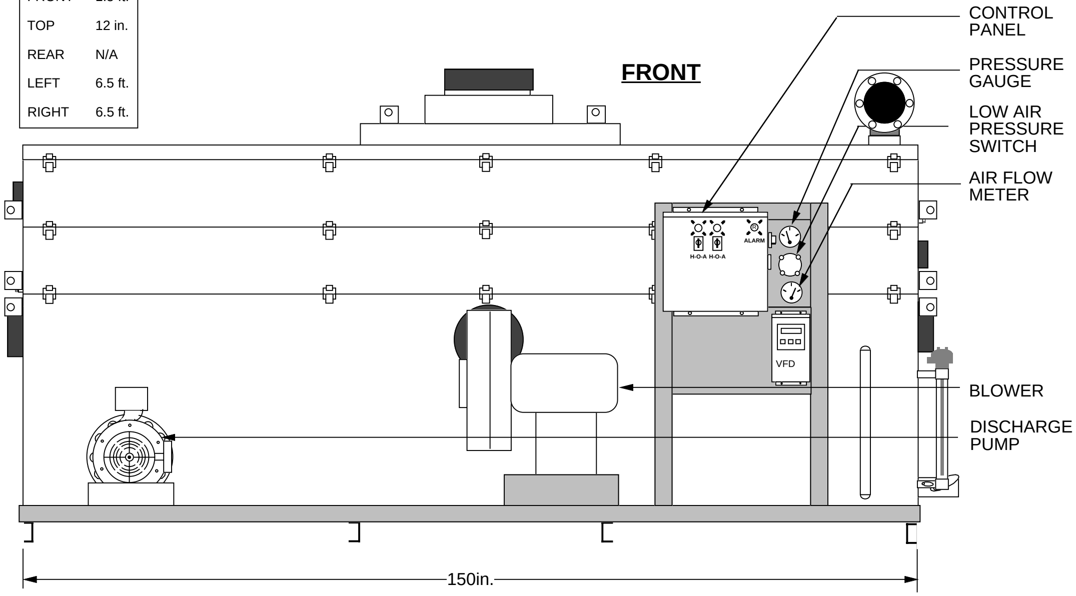
Report Generated: **1/16/07** **Modeler Ev2.3 ppmv**

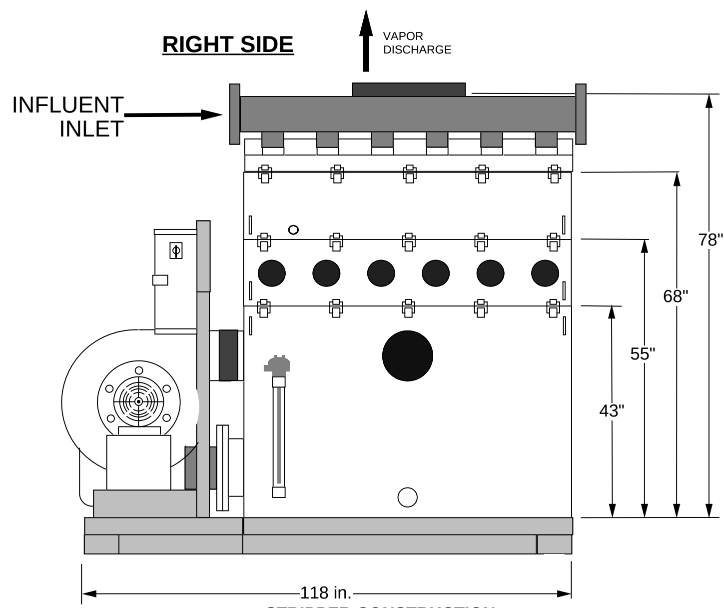
To: Jason Curl
CH2M
E: jason.curl@ch2m.com
from: Don Shearouse
NEEP

One (1) 316L SS Model 61221 ShallowTray, with controls, skid, 20 HP pump, VFD w/logic, & 40 HP 3600 scfm blower
Budgetary Price: $98,000
Two (2) shelf-spare 316L SS trays: $30,000

MINIMUM CLEARANCE

FRONT	1.5 ft.
TOP	12 in.
REAR	N/A
LEFT	6.5 ft.
RIGHT	6.5 ft.





OPTIONAL ITEMS:

- ✓ SKID & STANCHION
- ✓ AIR PRESSURE GAUGE
- ___ GRAVITY DISCHARGE PIPING
- ✓ DISCHARGE PUMP
- ___ FEED PUMP
- ___ ADDITIONAL BLOWER
- ___ EXPLOSION-PROOF MOTORS
- ___ LOCAL DISCONNECT NEMA 7
- ✓ CONTROL PANEL
- ✓ MAIN DISCONNECT SWITCH
- ___ I.S. COMPONENTS/REMOTE MOUNT
- ✓ INTERMITTENT OPERATION
- ___ STROBE LIGHT
- ___ ALARM HORN
- ___ POWER LAPSE INDICATOR
- ✓ LOW AIR PRESSURE ALARM SWITCH(ES)
- ✓ HIGH WATER LEVEL ALARM SWITCH
- ✓ DISCHARGE PUMP LEVEL SWITCH
- ___ WATER PRESSURE GAUGE(S)
- ___ DIGITAL WATER FLOW INDICATOR
- ✓ AIR FLOW METER
- ___ TEMPERATURE GAUGE(S)
- ___ LINE SAMPLING PORT(S)
- ___ AIR BLOWER SILENCER
- ✓ WASHER WAND
- ___ AUTO DIALER

BASIC SYSTEM

- ✓ SUMP TANK
- ✓ STRIPPER TRAYS
- ✓ BLOWER
- ✓ MIST ELIMINATOR
- ✓ PIPING
- ✓ SPRAY NOZZLE
- ✓ WATER LEVEL SIGHT TUBE
- ✓ GASKETS
- ✓ LATCHES

NOTE: THIS DRAWING IS REPRESENTATIVE OF A STANDARD SHALLOWTRAY CONFIGURATION, AND IS NOT INTENDED FOR ENGINEERING DESIGN OR LAYOUT. ACTUAL ARRANGEMENT AND DIMENSIONS MAY VARY DEPENDING ON BLOWER SELECTION OR OTHER ACCESSORIES. PLEASE CONTACT NEEP FOR DETAILED DESIGN INFORMATION.

CONNECTION INFORMATION

ITEM	SIZE
GRAVITY DISCHARGE	12"Ø FLANGED
DISCHARGE PUMP	8"Ø FLANGED
WATER INLET	8"Ø FLANGED
AIR EXHAUST NOZZLE	18"Ø STUB w/18" CPLG

STRIPPER CONSTRUCTION:
316L STAINLESS STEEL

POWER: 3Ø, 460 volt, 3 WIRE + GROUND, 60 Hz

*CONSULT N.E.E.P. FOR AMPACITIES AND OTHER VOLTAGE OPTIONS

NORTH EAST ENVIRONMENTAL PRODUCTS, INC.
7 COMMERCE AVENUE
WEST LEBANON, NEW HAMPSHIRE 03784
PHONE: 603-298-7061 FAX: 603-298-7063
http://www.neepsystems.com

TOLERANCES UNLESS OTHERWISE SPECIFIED: ± 1 INCH

DRAWING NAME: ShallowTray® Model 61221

DRAWING #: Proposal #406914-2

DRAWN: DCS

CUSTOMER: CH2M: Well #27, Las Cruces, NM

DATE: 01/16/07

SCALE: NTS | SIZE: A | SHEET : 1 OF : 1

ShallowTray®
low profile air strippers

HIGH FLOW

System Performance Estimate

Client and Proposal Information:

CH2M: Jason Curl
City of Las Cruces, NM
#406914-2
Well #18 Treatment

Series chosen:	**41200**			
Water Flow Rate:	**500.0**	**gpm**	**113.6**	**m3/hr**
Air Flow Rate:	**2400**	**scfm**	**4080**	**m3/hr**
Water Temp:	**65**	**°F**	**18**	**°C**
Air Temp:	**40**	**°F**	**4**	**°C**
A/W Ratio:	**36**		**36**	
Safety Factor:	**None**			

Contaminant	Untreated Influent / Effluent Target	Model 41211 Effluent lbs/hr	PPMv	Model 41221 Effluent lbs/hr	PPMv	Model 41231 Effluent lbs/hr	PPMv	Model 41241 Effluent lbs/hr	PPMv	Model 41251 Effluent lbs/hr	PPMv
		%removal		%removal		%removal		%removal		%removal	
Tetrachloroethylene	**51 ppb**	**19 ppb**		**7 ppb**		**2 ppb**		**<1 ppb**		**<1 ppb**	
Solubility 150 ppm	**1 ppb**	**0.01**	**0.1**	**0.01**	**0.2**	**0.01**	**0.2**	**0.01**	**0.2**	**0.01**	**0.2**
Mwt 165.83		**63.4669%**		**86.6533%**		**95.1240%**		**98.2187%**		**99.3492%**	

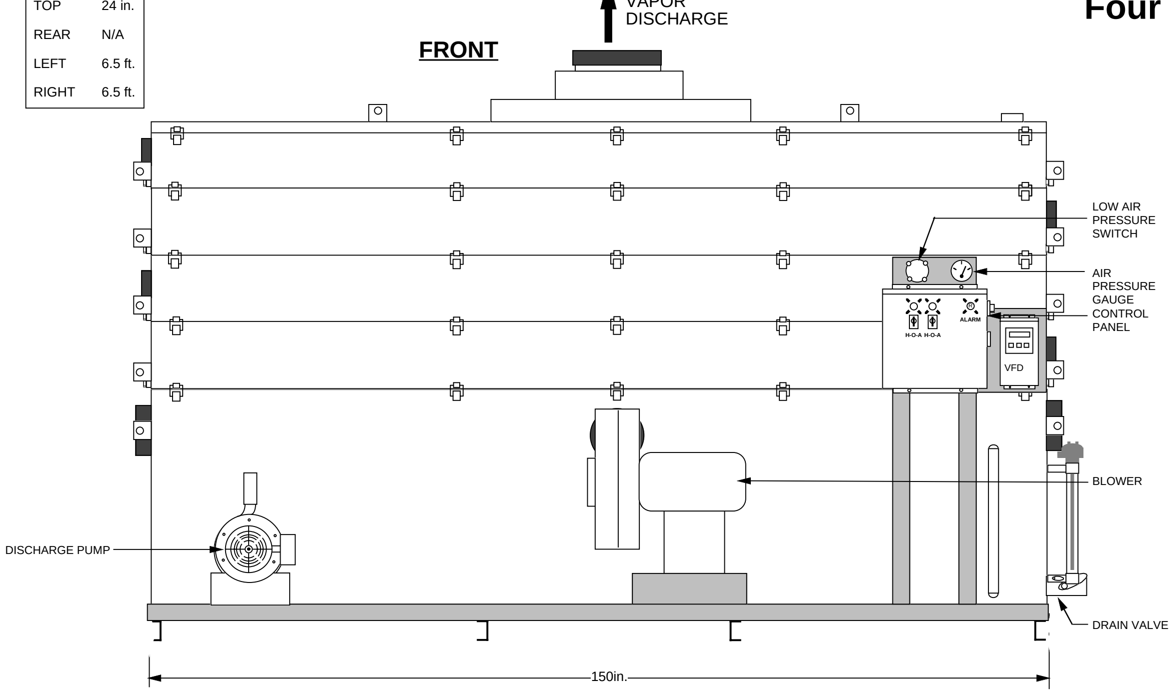
Report Generated: **1/16/07** **Modeler Ev2.3 ppmv**

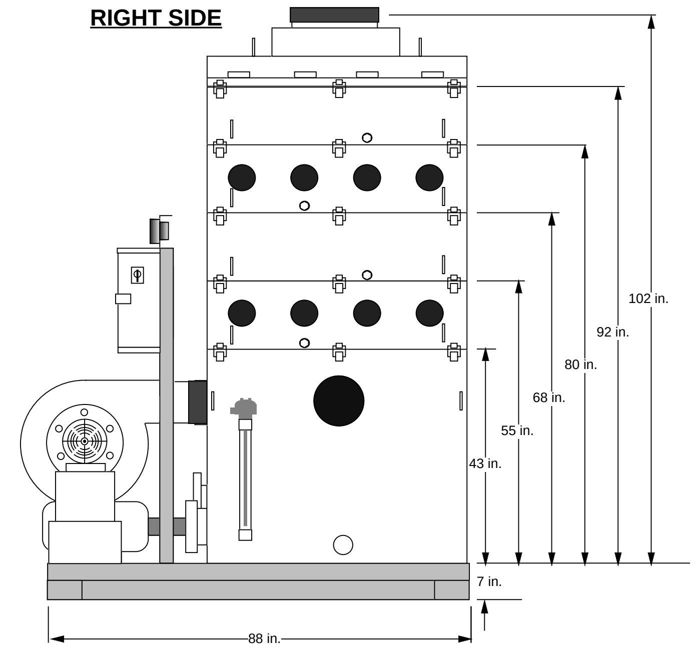
To: Jason Curl
CH2M
E: jason.curl@ch2m.com
from: Don Shearouse
NEEP

One (1) 316L SS Model 41241 ShallowTray, with controls, skid, 15 HP pump, VFD w/logic, & 25 HP 2400 scfm blower
Budgetary Price: $62,000
Four (4) shelf-spare 316L SS trays: $36,000

MINIMUM CLEARANCE

FRONT	1.5 ft.
TOP	24 in.
REAR	N/A
LEFT	6.5 ft.
RIGHT	6.5 ft.





BASIC SYSTEM

- ✓ SUMP TANK
- ✓ STRIPPER TRAYS
- ✓ BLOWER
- ✓ MIST ELIMINATOR
- ✓ PIPING
- ✓ SPRAY NOZZLE
- ✓ WATER LEVEL SIGHT TUBE
- ✓ GASKETS
- ✓ LATCHES

OPTIONAL ITEMS

- ✓ SKID & STANCHION
- ✓ AIR PRESSURE GAUGE
- ___ GRAVITY DISCHARGE PIPING
- ✓ DISCHARGE PUMP
- ___ FEED PUMP
- ___ ADDITIONAL BLOWER
- ___ EXPLOSION-PROOF MOTOR(S)
- ___ LOCAL DISCONNECT NEMA 7
- ✓ CONTROL PANEL
- ✓ MAIN DISCONNECT SWITCH
- ___ I.S. COMPONENTS/REMOTE MOUNT
- ✓ INTERMITTENT OPERATION
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- ___ ALARM HORN
- ___ POWER LOSS INDICATOR
- ✓ LOW AIR PRESSURE ALARM SWITCH(ES)
- ✓ HIGH WATER LEVEL ALARM SWITCH
- ✓ DISCHARGE PUMP LEVEL SWITCH
- ___ WATER PRESSURE GAUGE(S)
- ___ DIGITAL WATER FLOW INDICATOR
- ___ AIR FLOW METER
- ___ TEMPERATURE GAUGE(S)
- ___ LINE SAMPLING PORT(S)
- ___ AIR BLOWER SILENCER
- ✓ WASHER WAND
- ___ AUTO DIALER

NOTE: THIS DRAWING IS REPRESENTATIVE OF A STANDARD SHALLOWTRAY CONFIGURATION, AND IS NOT INTENDED FOR ENGINEERING DESIGN OR LAYOUT. ACTUAL ARRANGEMENT AND DIMENSIONS MAY VARY DEPENDING ON BLOWER SELECTION OR OTHER ACCESSORIES. PLEASE CONTACT NEEP FOR DETAILED DESIGN INFORMATION.

CONNECTION INFORMATION

ITEM	SIZE
GRAVITY DISCHARGE	10"Ø SOCKET, PVC80
DISCHARGE PUMP	4"Ø FNPT
WATER INLET	6"Ø FNPT
AIR EXHAUST NOZZLE	18"Ø STUB W/18" CPLG

POWER: 3Ø, 460 Volt, 3 WIRE + GROUND, 60 Hz

*CONSULT N.E.E.P. FOR AMPACITIES AND OTHER VOLTAGE OPTIONS

STRIPPER CONSTRUCTION:

316L STAINLESS STEEL

NORTH EAST ENVIRONMENTAL PRODUCTS, INC.
7 COMMERCE AVENUE
WEST LEBANON, NEW HAMPSHIRE 03784
PHONE: 603-298-7061 FAX: 603-298-7063
http://www.neepsystems.com

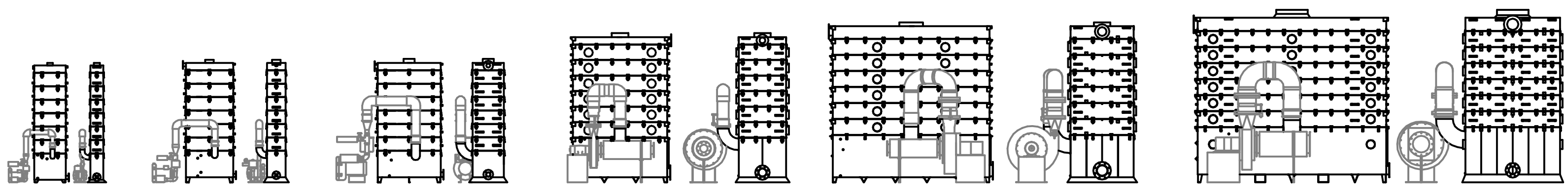
TOLERANCES UNLESS OTHERWISE SPECIFIED: ± 1 INCH	DRAWING NAME: ShallowTray® Model 41241 (© 2002 NEEP)
	DRAWING #: Proposal #406914-2
DRAWN: DCS	CUSTOMER: CH2M: Well #18; Las Cruces, NM
DATE: 01/16/07	SCALE: NTS — SIZE: A — SHEET: 1 OF: 1

STAT® Series
Low Profile Air Strippers

CARBONAIR
www.carbonair.com

Carbonair's exclusive STAT series represents the best choice in low profile air strippers, combining high performance, flexibility, and design simplicity. Carbonair's STAT units are available with a number of tray configurations, blowers and controls, and can achieve a removal efficiency of up to 99.99 % for a long list of volatile organic compounds.

Specifications[1]



Model	STAT 15	STAT 30	STAT 80	STAT 180	STAT 400	STAT 720
Liquid Flow Range (gpm)	0.5 - 12	1 - 35	5 - 80	10 - 200	20 - 400	40 - 1000
Minimum Airflow (cfm)	60	100	300	650	1800	3000
Maximum Airflow (cfm)	80	150	350	900	2100	4000
Blower HP [2]	1.0, 1.5	2, 3	5, 7.5, 10	10	20, 25	40, 50
Tray Dimensions (LxWxH, in)	24x10x10	36x14x10	48x24x10	72x36x11 5/8	120x48x12	144x72x12
Assembly Height (Approx.) [3]	7'-7 1/4"	7'-9 3/4"	7'-10 1/4"	9'-6"	10'-2 1/4"	10'-11 3/4"
Optional Skid Footprint (LxWxH, in)	47x29x4	64x34x6	66x60x6	88x86x6	138x102x6	--
Empty Tray Weight, Each (lb)	20	40	65	150	350	550
Assembly Weight (lb) [4]	360	560	1000	2040	4110	6820
Assembly Operating Weight (lb) [4]	610	940	2230	5550	11,820	21,850
Sump Holding Capacity (gal)	16	30	60	225	500	1000
Influent Connection (NPS) [5]	1.5" FPT	2"	3"	4"	6"	8"
Effluent Connection (NPS) [5]	2"	3"	3"	6"	8"	10"
Off-Gas Discharge OD	4 3/8"	6 3/8"	8 1/2"	12 19/32"	18"	24"

Design Features

- 304 stainless steel welded construction
- Gasoline-resistant neoprene gaskets
- Anti-bypass valve (no priming required)
- Polypropylene demister (99.5% removal efficiency 10 microns and larger)
- Direct coupled blowers
- Clean-out ports (STAT 180-720)

Options

- ☐ Pump-down capability with discharge pump
- ☐ Pressure gauges and switches
- ☐ Water/air flow and temperature monitoring
- ☐ Explosion-proof controls and motors
- ☐ Off-gas carbon filtration
- ☐ Sample taps
- ☐ Control panel packages
- ☐ 316 SS construction
- ☐ Skid Mounted

Service Centers

FLORIDA
4710 Dignan Street
Jacksonville, FL 32254
800.241.7833
904.387.4465
904.387.5058 Fax

MINNESOTA
2731 Nevada Ave. No.
New Hope, MN 55427
800.526.4999
763.544.2154
763.544.2151 Fax

TEXAS
4889 Hunter Rd. Bldg 1-C
San Marcos, TX 78666
800.893.5937
512.392.0085
512.392.0066 Fax

VIRGINIA
4328 West Main Street
Salem, VA 24153
800.204.0324
540.380.5913
540.380.5920 Fax

1. Specifications subject to change without notice
2. Blower HP depends on flow requirements. Single phase motors available up to 5 HP.
3. 6-tray unit without optional skid.
4. Includes approximate blower and ducting weight.
5. 150# flange pattern, unless noted. Effluent size is for gravity drain sumps.

Dwg # 217355

Low - Profile

Air Strippers

EPG offers low-profile tray air strippers for removal of volatile organic compounds (VOCs) from liquids. They are used effectively for treatment of contaminated groundwater and process water.

- 304L stainless steel construction
- Compact size
- Flow rates up to 350 gpm
- Removal efficiencies up to 99.99%
- Integrated UL listed control panels, influent/effluent pumps, and other accessories available
- Skid mounted

Manufacturer of Industrial and Environmental Solutions

EPG COMPANIES

Sold By:

Mailing Address
P.O. Box 427
Rogers, MN 55374

Corporate Offices
19900 Co. Road 81
Maple Grove, MN 55311
www.epgco.com

(612) 424-2613 ♦ (800) 443-7426 ♦ FAX: (612) 493-4812

Appendix C - Opinion of Costs Detail

Estimate of Probable Capital Costs

PCE Treatment - Phase II Conceptual Design

City of Las Cruces

PROJECT SCOPE

Treatment for Well No. 18 and 27, complete. Expandable for 3rd well.

PROJECT ITEMS			COST
Construction Costs			
Treatment Equipment			
Tray Aeration, 2 units		$	235,200
Spare Trays, 4 trays		$	60,000
Magnetic flow meter, 2 units		$	14,400
Miscellaneous items		$	15,680
Equipment Delivery to Las Cruces		$	4,000
Treatment Building			
Building, 2320 square feet		$	459,457
Process Piping		$	62,543
Finishes		$	34,332
Instrumentation and Controls		$	42,915
Mechanical Systems (HVAC & Plumbing)		$	85,830
Electrical Systems		$	42,915
Site Work			
Site Civil (earthwork)		$	107,116
Plant Computer (RTU and Controls)		$	83,793
Site Electrical (Service)		$	65,162
Yard Piping		$	89,263
Contractor Markups			
Overhead	10.0%	$	140,261
Profit	7.0%	$	108,001
Mobilization/Bonds/Insurance	3.0%		49,526
Adjustments			
Contingency	30%		510,118
Escalation (to Mid-Point of Construction)	18.45%	$	407,839
Location Adjustment Factor (Las Cruces) Deduct	83.70%	$	(426,791)
Market Adjustment Factor	10%	$	219,156
CONSTRUCTION COSTS - SUBTOTAL		$	2,410,715
Non-Construction Costs			
Permitting			
Engineering			
Engineering Services During Construction			
Commissioning and Startup			
Legal and Administrative			
Subtotal	27%	$	650,893
NON-CONSTRUCTION COSTS - SUBTOTAL		$	650,893
CAPITAL COSTS - TOTAL		$	3,061,609

Estimate of Probable Capital Costs
PCE Treatment - Phase II Conceptual Design
City of Las Cruces

PROJECT SCOPE
Pipeline from Well No. 27 to the treatment plant, (3,000 feet, 8 inch diameter).

PROJECT ITEMS			COST
Construction Costs			
Pipeline			
3000 feet, 8 inch diameter		$	344,300
Miscellaneous items		$	58,200
Contractor Markups			
Overhead	10.0%	$	40,250
Profit	7.0%	$	30,993
Mobilization/Bonds/Insurance	3.0%		14,212
Adjustments			
Contingency	30%		146,386
Escalation (to Mid-Point of Construction)	18.45%	$	117,036
Location Adjustment Factor (Las Cruces) Deduct	83.70%	$	(122,474)
Market Adjustment Factor	10%	$	62,890
CONSTRUCTION COSTS - SUBTOTAL		$	691,793
Non-Construction Costs			
Permitting			
Engineering			
Engineering Services During Construction			
Commissioning and Startup			
Legal and Administrative			
Subtotal	27%	$	186,784
NON-CONSTRUCTION COSTS - SUBTOTAL		$	186,784
CAPITAL COSTS - TOTAL		$	878,577

Estimate of Probable Capital Costs
PCE Treatment - Phase II Conceptual Design
City of Las Cruces

PROJECT SCOPE
Additional treatment for future well. Assumes same model size required for existing wells.

PROJECT ITEMS			COST
Construction Costs			
Treatment Equipment			
Tray Aeration, 1 unit		$	117,600
Spare Trays, 2 trays		$	30,000
Magnetic flow meter, 1 unit		$	7,200
Miscellaneous items		$	7,840
Equipment Delivery to Las Cruces		$	2,000
Treatment Building Additions			
Process Piping		$	23,775
Instrumentation and Controls		$	19,239
Electrical Systems		$	10,383
Contractor Markups			
Overhead	10.0%	$	21,804
Profit	7.0%	$	16,789
Mobilization/Bonds/Insurance	3.0%		7,699
Adjustments			
Contingency	30%		79,299
Escalation (to Mid-Point of Construction)	18.45%	$	63,399
Location Adjustment Factor (Las Cruces) Deduct	83.70%	$	(66,345)
Market Adjustment Factor	10%	$	34,068
CONSTRUCTION COSTS - SUBTOTAL		$	374,749
Non-Construction Costs			
Permitting			
Engineering			
Engineering Services During Construction			
Commissioning and Startup			
Legal and Administrative			
Subtotal	27%	$	101,182
NON-CONSTRUCTION COSTS - SUBTOTAL		$	101,182
CAPITAL COSTS - TOTAL		$	475,931

Estimate of Probable Capital Costs

PCE Treatment - Phase II Conceptual Design

City of Las Cruces

PROJECT SCOPE

Chemical feed system, complete. Added to existing building.

PROJECT ITEMS			COST
Construction Costs			
Treatment Equipment			
Chemical metering pumps, 4 pumps		$	29,620
Miscellaneous items		$	13,016
Treatment Building Additions			
Process Piping		$	5,491
Instrumentation and Controls		$	6,822
Electrical Systems		$	5,200
Contractor Markups			
Overhead	10.0%	$	6,015
Profit	7.0%	$	4,631
Mobilization/Bonds/Insurance	3.0%		2,124
Adjustments			
Contingency	30%		21,876
Escalation (to Mid-Point of Construction)	18.45%	$	17,490
Location Adjustment Factor (Las Cruces) Deduct	83.70%	$	(18,302)
Market Adjustment Factor	10%	$	9,398
CONSTRUCTION COSTS - SUBTOTAL		$	103,381
Non-Construction Costs			
Permitting			
Engineering			
Engineering Services During Construction			
Commissioning and Startup			
Legal and Administrative			
Subtotal	27%	$	27,913
NON-CONSTRUCTION COSTS - SUBTOTAL		$	27,913
CAPITAL COSTS - TOTAL		$	131,293