EnviroKinetics
--- Keeping Pace With The World ---

9122 E. 101ST PLACE
TULSA, OK 74133
MIDWEST TEL: 918-249-8052
FAX: 918-254-0326
e-mail: Kent@EnviroKinetics.com

Anita Lindell
AirPermits.com
Tel: 206-634-3923, Fax: 509-355-2337
alindell@nswest.net

Re: EKI 11401
Date: August 13, 2001

Dear Anita

Since we provided you with a budget quote for four SCR systems via Steven Frasch at the Cinco Group, Steven asked me to provide a breakdown of the costs. Since we quoted "turn key" systems, below I've provided budgetary breakout costs for the catalyst alone, and the catalyst integrated into a complete system.

Unit	9 ppm NOx/CO comb. GE 7FA 77.8% Conv	GE 7FA 92% Conv	SW 501F 100% Load 92% Conv	SW 501F 60% Load 93.7% Conv
2 ppm CO Catalyst only	44% $480,000	$480,000	$848,000	$848,000
2 ppm SCR Catalyst only	56% $609,000	$1,218,000	$1,218,000	$1,218,000
Total Catalyst alone	$1,089,000	$1,698,000	$2,066,000	$2,066,000
Complete turn key System	$2,771,900	$2,873,700	$2,885,700	$3,202,700
	−1,089,000			
	1,682,900 aux. equipment			

If I can be of further help, please don't hesitate to ask.

Any questions, please call.

SCR: 1,682,900 + 609,000 = 2,291,900

Cocat: 1,682,900 + 480,000 = 2,162,900

Best regards,

Kent Crites

Kent Crites (In Tulsa)
Technical sales mgr.
Tel: 918-249-8052, Fax: 918-254-0326 (note new fax no.)
e-mail: Kent@EnviroKinetics.com

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9122 E. 101ST PLACE
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Cinco Group Inc.
Attn: Stephen Frasch
Industrial Products
P.O. Box 7272
Menlo Park, CA 94025-7272
Tel: 805-985-6646, Fax: 805-985-2127
cell: 818-519-8063
SFrasch@Earthlink.net

RE: your 2CG26801 / our EKI 11401
Date: July 20, 2001

SCR and CO system Budget Quotes

Dear Stephen

I received the process data supplied to you by Ms. Lindell at Air Permits.com. Attached I've prepared a budgetary proposal for a "turnkey" system for the SCR and CO portions. Based on the exhaust temperature of 650 deg F, I have assumed that the turbines are combined cycle and the SCR units will be installed between the superheater and the high pressure evaporator coils of the HRSG's. If this assumption is wrong, please let me know. We can supply the stack and other supporting equipment as well once we know the final turbine configuration.

The scope of these budget quotations includes the following:

1. SCR and CO Catalyst, and catalyst support structures in fabricated horizontal ductwork with internal insulation and stainless steel lining. The duct is built as a "spoolpiece" that is inserted between the boiler sections. (see drawing attached). Ladders and platforms for catalyst loading are included.
2. Ammonia Injection Grids (AIG), manifolds, valves, and sampling ports are included.
3. We have included the SCR control systems and all instrumentation. The instrumentation is installed on a skid with the ammonia vaporizer, control valves, regulators, and pressure indicators A PLC controlled NEMA 4 panel with all ladder logic is installed on the skid, pre-wired and tested. Local instruments that are mounted on the ductwork are also included.
4. Our scope includes engineering design, P&ID diagrams, General arrangement drawings, foundation loading diagrams, foundation design as well as catalyst and ductwork supply.
5. A tank for aqueous ammonia storage (10 days operating) and an ammonia transfer pump is included for each system.

The following is assumed to be by others:

1. Turbine equipment.
2. Site prep work, foundations, Motor control centers, installation.
3. Exhaust stack to atmosphere.

SCR Design Parameters:

Please see attached data sheets and drawings for clarification of scope and process conditions. The data sheet for the GE-1 only is attached.

Commercial:

Base quote total price SCR and CO reactors, ammonia injection grids, instrument skid, local instruments, ammonia storage, initial SCR and CO catalyst charges, F.O.B. factory (plus 5 days installation and startup assistance).	
GE-1	$2,771,900
GE-2	$2,873,700
SW-100	$2,885,700
SW-60	$3,202,700
Delivery date for ductwork and structures:	16 weeks after drawing approval
Delivery date for catalyst:	20 - 22 weeks after drawing approval

Shipping Weights and estimated freight (based on GE-1):

WEIGHTS	
DUCT WT TOTAL	142,890
SCR CAT WT	194,480
CO CAT WT	48,620
SKID	5,000
TANK WT, LBS	7,700
TOTAL	398,690
FREIGHT ESTIMATE	$89,705

Options:

Optional CEMs for NOx (per unit)	$99,000

Required payment terms: 10% with order 20% on drawings 50% on receipt of steel 20% on notice of readiness to ship	**Delivery Condition:** [ ] F.O.B. Exit Port [ ] Delivery to Job Site [x] Ex Works [ ] C.I.F.
Drawings: 3-4 weeks ARO	Delivery: see above

Best Regards,

Kent Crites (In Tulsa)

Technical sales mgr.
Tel: 918-249-8052, Fax: (918)-254-0326 (note new fax no.)
e-mail: kentcrites@aol.com

EnviroKinetics

SCR DATA SHEET

RFQ NO.:	EKI 11401
DATE:	7/10/01
BY:	KENT
SHEET:	1 OF 2
EQUIP. NO.:	

1	END USER:			CLIENT REF:	AIRPERMITS.COM	
2	STREET:			CONTACT:	ANITA LINDELL	
3	CITY:			PHONE:	(206) 634-3923	
4	STATE:			FAX:	(509) 355-2337	
5	UNIT TYPE:	GE-1		REQ'D SHIP DATE:	20-24 WEEKS	
6	HEAT RATE:	8,425		JOB SITE LOCATION:		
7	CAPACITY (MW):	130.5		NO. REQUIRED:	ONE	
8	EXHAUST CONDITIONS			CASE 1	CASE 2	CASE 3
9	CASE DESCRIPTION:			DESIGN		
10	FUEL TYPE:			NATURAL GAS		
11	OPERATING HOURS (HRS/YR):			8,760		
12	MASS FLOW RATE (WET BASIS, LBS/HR):			3,700,000 @ 650 F		
13	QUENCH AIR, LBS/HR:					
14	GAS TEMP @ CATALYST FACE, F:			650		
15	TEMPERATURE DISTRIBUTION, F:			(+/-) 20 F		
16	VELOCITY DISTRIBUTION, %:			(+/-) 15 %		
17	NH3 DISTRIBUTION, %:			(+/-) 5 %		
18	EXHAUST COMPOSITION (VOL%, WET BASIS):					
19	O2			13.1%		
20	N2			76.2%		
21	CO2			3.6%		
22	H2O			7.2%		
23	Ar			1.0%		
24	INLET NOx PPMVD @ 15 % O2:			9		
25	INLET CO PPMVD @ 15 % O2:			9		
26	PARTICULATE (LBS/HR):					
27	INLET SOx PPMVD @ 15 % O2:					
28	INLET SO2 PPMVD @ 15 % O2:					
29	INLET SO3 PPMVD @ 15 % O2:					
30	INLET VOC PPMVD @ 15 % O2:					
31	UHC (LBS/HR AS CH4):					
32	OTHER:					
33	OUTLET GUARANTEES:					
34	NOx PPMVD @ 15 % O2:			2.0 / 77.8 %		
35	CO PPMVD @ 15 % O2:			2.0 / 77.8 %		
36	VOC PPMVD @ 15 % O2:					
37	NH3 SLIP PPMVD @ 15 % O2 OR LBS/HR:			10		
38	CO CATALYST PRESSURE DROP, IN. W.C.*:			1.5" W.C.		
39	NOx CATALYST PRESSURE DROP, IN. W.C.*:			4.0" W.C.		
40	COMMENTS:					
41	EXHAUST FLOW DIRECTION:		HORIZONTAL			
42	DUCT CROSS SECTION, SQ FT:		1,416			
43	INLET GAS PATH DIMENSIONS, FT:		WIDTH: 37.6	HEIGHT: 37.6		
44	OUTLET GAS PATH DIMENSIONS, FT:		WIDTH: 37.6	HEIGHT: 37.6		
45	LENGTH, FT:		38	AREA, SQ FT: 5,815		
46	EXPANSION ALLOWED IN:		WIDTH, HEIGHT, LENGTH			
47	AMMONIA SOURCE:		AQUEOUS 19 % SOLUTION			
48	ELECTRICAL CLASSIFICATION:		UNCLASSIFIED			
49	ELECTRICAL ENCLOSURES:		NEMA 4			
50	SURFACE PREP:	PIPE	SP6			
51		STRUCTURE	SP6			
52	PAINT:	PRIMER	THICK: 3 MIL	TYPE: ZINC		
53		FINISH	THICK: NONE	TYPE:		
54	PIPE WELDING SPECS:			ANSI B31.3		
55	SYSTEM LOCATION:			OUTDOORS		
56	CONTROL METHOD:			LOCAL CONTROL PANEL / PLC*		
57	* PLC PREFERENCE, PLEASE INDICATE TYPE:					
58	(STANDARD IS ALLEN BRADLEY SLC500)					
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60						
61						
62						
63						
64						

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SCR DATA SHEET		
	RFQ NO.:	EKI 11401
	DATE:	7/10/01
	BY:	KENT
	SHEET:	2 OF 2
	EQUIP. NO.:	

65	SCOPE OF SUPPLY:	
66	AMMONIA FLOW CONTROL UNIT (AFCU)	
67	AMMONIA VAPORIZATION METHOD	EXHAUST GAS ATOMIZATION
68	UTILITY AIR CONSUMPTION, SCFM:	280
69	AMMONIA INJECTION MANIFOLD ARRANGEMENT	HORIZONTAL
70	AMMONIA INJECTION GRID MATERIAL (AIG)	A-36 CS
71	AMMONIA INJECTION GRID FEED	FROM ONE SIDE
72	PUMP SKID (AQUEOUS SYSTEMS)	AMMONIA TRANSFER PUMP
73	VAPORIZER SKID (ANHYDROUS SYSTEMS)	NA
74	AMMONIA CONSUMPTION, LBS/HR AS NH3	37.6
75	19 % AQ. AMMONIA USAGE, GPM	0.40
76	AMMONIA TRUCK UNLOADING SKID (AQUEOUS OR ANHYDROUS)	NOT OFFERED
77	AMMONIA STORAGE	
78	STORAGE TANK	10 DAYS CAPACITY
79	TANK CAPACITY, GALS:	8,000 HT: 15.0 DIA: 9.0
80	STORAGE TANK MATERIAL	A-36 CS CODE: API CORR ALLOW: 1/8 IN.
81	TANK INSTRUMENTATION	LEVEL GAUGE, LEVEL TRANSMITTER, PSV
82	CATALYST	
83	CATALYST (IF CERTAIN TYPE REQUIRED, PLEASE SPECIFY)	HONEYCOMB
84	CATALYST LIFE GUARANTEE	SCR: 3 YRS @ 8760 HPY CO: 3 YRS @ 8760 HPY
85	CATALYST SUPPORT STRUCTURE	INTERNAL CSS AND SEALS
86	MATERIAL	A-36 CS
87	SCR CATALYST VOLUME (EST), CU FT:	2,832
88	DUCTWORK	
89	SCR REACTOR INSULATION	CERAMIC FIBER, INTERNAL
90	SCR REQ'D COLD FACE TEMPERATURE	175 - 225
91	SCR FLOOR LINER:	10 GA. 304 SS
92	SCR ROOF AND SIDES LINER:	12 GA. 304 SS
93	CASING MATERIAL:	3/16" A-36
94	CATALYST HOIST AND MONORAIL:	MANUAL
95	INLET TRANSITION DUCTING	TO MEET INLET GAS PATH ONLY
96	OUTLET TRANSITION DUCTING	TO MEET OUTLET GAS PATH ONLY
97	MANWAYS	UPSTREAM AND DOWNSTREAM OF CATALYST BEDS
98	MANWAYS	36 X 36
99	STACK	
100	STACK DIAMETER, FT:	
101	STACK HEIGHT, FT:	
102	STACK EXIT VELOCITY:	
103	STACK SILENCER FOR:	
104	COOLING FAN:	
105	SITE CONDITIONS	
106	ASCE WIND SPEED:	70
107	UBC SEISMIC ZONE:	4
108	DAS:	OFFERED AS OPTION
109	CFD MODELING:	OFFERED AS OPTION
110	CEMS:	OFFERED AS OPTION
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EmeraChem

Proposal to:

BP AMOCO

Proposal #BP-AMOCO-GTHT-7FA-010726R2

Gas Turbine Installation

of

The SCONOx™ Catalytic Absorption System

September 6, 2001

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Price and Payment Schedule

Pricing Basis

The project is based upon the "Scope of Supply" as defined within this proposal for the SCONOx system, equipment, and services.

Price

Pricing is provided for two options: complete system purchase and mechanical system / catalyst purchase or catalyst lease.

6.2.1. *Complete SCONOx™ System Purchase (including catalyst)*

Base Design Proposal – Complete SCONOx system purchase (including catalyst). The work and equipment delivery scope encompasses the engineering, design, procurement, fabrication, catalyst, start-up, testing and turnover of three SCONOx™ NOx Emission Control Systems.

COMPLETE SYSTEM PURCHASE (U.S. Dollars)	
Base Design	Option 1
$ 30,444,193	$ 32,193,249

1.1.2. *Purchase and Catalyst Lease Options*

This section provides breakout pricing for the mechanical system purchase and the catalyst purchase (or an estimated catalyst lease). The benefit of these options is that the Buyer may choose to procure the mechanical systems from another vendor, and procure the proprietary catalyst directly from EmeraChem without additional mark-ups.

Mechanical System Purchase Option (in conjunction with the catalyst lease or separate catalyst purchase):

The mechanical system purchase scope includes the engineering, design, procurement, fabrication, start-up, testing and turnover of three SCONOx™ mechanical systems (total net).

MECHANICAL SYSTEM PURCHASE (U.S. Dollars)	
Base Design	Option 1
$ 17,539,003	$ 17,653,415

6.2.3 *SCONOx™ Catalyst Purchase Option:*

The SCONOx™ catalyst purchase price for three SCONOx systems (total net)

CATALYST PURCHASE (U.S. Dollars)	
Base Design	Option 1
$ 12,905,190	$ 14,539,834

6.2.4 *Estimated SCONOx™ Catalyst Lease:*

As a lease example, the Buyer purchases the mechanical system separately. The SCONOx™ catalyst is leased for a ten (10) year period (other lease periods are available). The monthly price includes the initial catalyst charge and all required catalyst replacements during the term for three units.

ESTIMATED CATALYST LEASE (U.S. Dollars)†	
Base Design	Option 1
$ 237,105 per month	$ 250,566 per month

† Estimated interest rate is 7% for this example. Actual interest rate is dependent upon Buyer's credit rating and monetary market conditions at time of order. Lease funding would be provided by a third party.

6.2.5 *Pricing Notes*

6.2.5.1. Delivery is FOB Mfg. This proposal incorporates the attached terms and conditions.

6.2.5.2 The prices in this proposal are valid for a period of 30 days from the date of this proposal. After 30 days, prices are subject to change without notice.

6.2.5.3 These prices are based on the current industrial value of Platinum (Pt) as of the date of this proposal. If the price of platinum changes by the time of purchase, the catalyst price will be adjusted to compensate for the change in platinum price. The platinum price is the "Industrial Price" as stated in the Wall Street Journal on the day the purchase order is provided.

6.3 ***Catalyst Maintenance Services***

A comprehensive catalyst maintenance program designed to provide complete catalyst service for operation and maintenance on the SCONOx™ system, in conjunction with the provision for technical support, field service and operator training can be provided. An important benefit of this program is that the catalyst will be maintained to a condition, which optimizes its performance, reliability, and on-line availability thus maximizing the catalyst life. A maintenance proposal can be provided, if desired.

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anniklinn@hotmail.com

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From : KentCrites@aol.com
To : anniklinn@hotmail.com
CC : sfrasch@earthlink.net
Subject : Fwd: VOC removal by oxidation catalyst
Date : Tue, 23 Oct 2001 11:52:29 EDT

Reply Reply All Forward Delete Put in Folder...

Printer Friendly Version

Anita
It depends on the VOC that is present. Methane, ethane, and propane are the hardest compounds to convert. On the other hand, methane is not considered to be a VOC, but it is the primary component of natural gas and it is the most likely hydrocarbon to be found in turbine exhaust gases. So, the CO catalyst would convert 70% of the VOC if it were made up of alcohols or other light solvents, but it probably will only convert 30% of methane, ethane and propane.

Kent Crites
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EnviroKinetics: engineered solutions for environmental control

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From : "Anita Lindell" <anniklinn@hotmail.com>
To : sfrasch@earthlink.net
CC : kent@envirokinetics.com
Subject : VOC removal by oxidation catalyst
Date : Mon, 22 Oct 2001 14:22:12 -0700

Stephen and Kent,

I just wanted to see what type of VOC removal that can be expected by the CO oxidation catalyst? I have seen numbers from around 30% to as high as 70%. I would like to add this as a benefit to the CO oxidation catalyst in my air permitting analysis. Thanks in advance.

Anita Lindell
AirPermits.com
206-634-3923

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