**Development of Standardized Air-Blown Coal Gasifier/
Gas Turbine Concepts for Future Electric Power Systems
Volume V
Appendix D: Cost Support Information**

Final Report

**R.S. Sadowski
M.J. Brown
J.T. Harritz
E. Ostrowski**

January 1991

Work Performed Under Contract No.: DE-AC21-89MC26291

**For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia**

**By
CRS Serrine, Inc.
Power Division
Greenville, South Carolina**

MASTER

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Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880**

**By
CRS Sirrine, Inc.
Power Division
P.O. Box 5456
Greenville, South Carolina 29606-5456**

January 1991

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Construction Costs for 50 MW Cycle 443

Summary

The cost estimate provided for the DOE sponsored study of Air Blown Coal Gasification was developed from vendor quotes obtained directly for the equipment needed in the 50 MW, 100 MW, and 200 MW sized plants and from quotes from other jobs that have been referenced to apply to the particular cycle. Quotes were generally obtained for the 100 MW cycle and a scale up/down factor was used to generate the cost estimates for the 200 MW and 50 MW cycles, respectively. Information from GTPro (property of Thermoflow, Inc.) was used to estimate the cost of the 200 MW and 50 MW gas turbine, HRSG, and steam turbines. To validate the use of GTPro's estimated values for this equipment, a comparison was made between the quotes obtained for the 100 MW cycle (ABB GT 11N combustion turbine and a HSRG) against the estimated values by GTPro.

	<u>Vendor Quote</u>	<u>GTPro</u>	<u>% difference</u>
Comb Turbine	\$18 million	\$17.2 million	4.44%
HRSG	\$5.5 million	\$4.8 million	12.7%

The prices estimated by GTPro are well within the +/-30% cost estimate defined within the scope. In estimating the cost of the HGCU for the 200 MW and 50 MW cycles, the price was increased based on coal gas volume and H2S flow rate to the system.

100 MW Cycle

The main equipment in the 100 MW system is substantiated by vendor quotes found within this appendix. Explanation is given for the main equipment as to the source of the price and the overall cost. Auxiliary equipment priced and shown within the equipment list for each section is pooled from previous jobs that have similar size equipment.

200 MW Cycle

The costs associated for the 200 MW cycle were scaled from the 100 MW case based on the following ratio:

$$\text{Price ratio} = (200\text{MW}/100\text{MW})^{0.61} = 1.526$$

50 MW Cycle

The costs associated with the 50 MW cycle were scaled from the 100 MW case based on the following ratio:

$$\text{Price ratio} = (50\text{MW}/100\text{MW})^{0.61} = .655$$

**100 MW COMBINED CYCLE
BUDGET PRICES FOR
EQUIPMENT**

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0003
 AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0003- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-1.	RAIL UNLOADING BUILDING					20' X 80' L X 20' H	96,000		
03-2.	CAR SHAKER W/HOIST						49,500		
03-3.	CAR DUMP HOPPER (2)					10' X 20' X 6' DEEP	116,000		
03-4.	VIBRATING FEEDER (2)						53,000		
03-5.	DUST SUPPRESSION SYSTEM						48,000		
03-6.	UNLOADING BUILDING SUMP PUMP						7,000		
03-7.	VENT FAN						15,500		
03-8.	UNLOADING CONVEYOR BC-1					42" WIDE, APPROX 418' LG	335,000		
03-9.	SERVICE HOIST						11,000		
03-10.	TRANSFER CONVEYOR BC-2					42" WIDE, APPROX 120' LG	112,600		
03-11.	LOWERING TUBE (2)					10' DIA X 75' H	200,000		
03-12.	RECLAIM HOPPER (4)					8' X 8' X 5' DEEP	108,000		
03-13.	RACK & PINION GATE (4)						10,000		
03-14.	VIBRATING FEEDER (4)						54,000		

CRS SIRRINE EQUIPMENT LIST

RS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0003

AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0003- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-15.	RECLAIM TUNNEL VENT FAN						15,500		
03-16.	RECLAIM TUNNEL SUMP PUMP						7,000		
03-17.	DUST COLLECTOR						32,100		
03-18.	RECLAIM CONVEYORS BC-3					30" WIDE, APPROX 446' LG	213,000		
03-19.	CRUSHER/SCREENING BLDG					20' X 20' X 60' H	135,000		
03-20.	TRAMP IRON MAGNET						20,200		
03-21.	SCALPER GRIZZLEY						11,000		
03-22.	CRUSHER						20,000		
03-23.	SIZING SCREEN						25,000		
03-24.	DUST COLLECTOR @ CRUSHER BUILDING						32,100		
03-25.	CRUSHER BUILDING VENTILATION						15,500		
03-26.	SILo FEED CONVEYOR BC-4					30" WIDE, APPROX 430' LG	230,600		
03-27.	SILo TRANSFER CONVEYOR BC-5					30" WIDE, APPROX 40' LG	51,400		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0003

AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0003- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-28.	SERVICE HOIST						7,500		
03-29.	GASTIGHT VALVE (4)						60,000		
03-30.	SIL0 (4)					450 TON CAP	292,000		
03-31.	BIN VENT FILTER (4)						14,000		
03-32.	BIN ACTIVATOR (4)						60,000		
03-33.	RAIL SCALE						70,000		
03-34.	BULL DOZER (2)						800,000		
03-35.	FRONT END LOADER						300,000		
03-36.	FORKLIFT (2)						200,000		

Coal Handling System

Coal is received from a unit train (typically 90, 100-ton rail cars) through a below grade receiving hopper at 1200 ton per hour. The coal is delivered to a storage pile containing both live and dead storage. Live storage is a seven (7) day supply and dead storage is for approximately thirty (30) days and can be expanded if required.

The reclaim is handled by four (4) under pile, in-line reclaim hoppers. They use vibrating feeders that discharge to reclaim belt conveyor, conveying material to the screening and crushing tower at approximately 200 tons per hour.

In the screening and crushing tower, coal is reduced in size to 2" nominal and screened to remove all material less than 1/2" in size. The fines material is conveyed to the briquetting silo and the screened and sized coal is conveyed to the four (4) coal bunkers at the gasifiers.

D.O.E. STANDARD IGCC PLANT
FUEL SYSTEM
100 MW UNIT

**D.O.E. Standard IGCC Plant
Fuel Handling System
100 MW Unit**

Equipment:	\$2,583,100
Storage/Conveying and Reclaim	-
Erection:	\$902,100
Total:	\$3,485 200
Mobile Equipment	\$1,300,000
	-

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING

A. Coal System

- 1 Rail Unloading Building(appr. 20' x 80'L x 20'H), 32000 cu ft
  - o Use historical factor of \$3 / cu ft for this structure \$96,000
  - o Includes auxiliaries
- 2 Car Shaker w/ Hoist
  - o Use phone quote and add freight allowance
  - o $48500+1000=$ \$49,500
- 3 Car Dump Hoppers,2 (appr. 10'x 20'x 6' deep)
  - o Use 1/4" wall construction for appr. 25,000# A36
@\$1.50 and 5,000# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $(55,000+3000) \times 2 =$ \$116,000
- 4 Vibrating Feeder 1 & 2
  - o Use phone quote and factor up for increased capacity
  - o Add freight allowance
  - o $200>600\text{tph}, (13000 \times 2)+500=26,500\text{ea}$ \$53,000
- 5 Dust Suppression System
  - o Use quote and piping allowance
  - o Add freight allowance
  - o $41500+2500+4000=$ \$48,000
- 6 Unloading Building Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 7 Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 8 Unloading Conveyor BC-1(42" wide belt appr. 418' Lg.)
  - o Use price/ft historical factor of \$515/ft(incl. truss/no truss sect.)
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a diverter gate allowance
  - o Add a height allowance for add'l steel
  - o $215000+100000+5000+5000+10000=$ \$335,000
- 9 Service Hoist
  - o Use an allowance for hoist and monorail
  - o Add freight allowance
  - o $10000+500+500=$ \$11,000

- 10 Transfer Conveyor BC-2(42" wide belt appr. 120' Lg.)
  - o Use price/ft historical factor of \$580/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a height allowance for add'l steel
  - o $69600+30000+6500+6500=$ \$112,600
- 11 Lowering Tube 1&2 (10'dia. x 75'H)
  - o Use 1/4" wall construction for appr. 50,000# A36
@ \$1.50 historical fabrication factor.
  - o Add allowance for doors and misc. eq.
  - o $75000+25000=\$100,000$ ea. \$200,000
- 12 Reclaim Hopper 1,2,3,4(appr.8' x 8' x 5' Deep)
  - o Use 1/4" wall construction for appr. 5,200# A36
@ \$1.50 and 5,200# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $26000+1000=\$27,000$ ea. \$108,000
- 13 Rack & Pinion Gate 1,2,3,4
  - o Use allowance
  - o Add freight allowance
  - o $2000+500=2,500$ ea. \$10,000
- 14 Vibrating Feeder 3,4,5,6
  - o Use telephone quote
  - o Add freight allowance
  - o $13000+500=13,500$ ea. \$54,000
- 15 Reclaim Tunnel Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 16 Reclaim Tunnel Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 17 Dust Collector
  - o Use quote from AirTechniques including ductwork
  - o Add freight allowance
  - o $25100+5000+2000=$ \$32,100
- 18 Reclaim Conveyor BC-3 (30" belt appr. 446' Lg.)
  - o Use price/ft historical factor of \$409/ft(incl. truss/no truss sect.)
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o $183000+25000+5000=$ \$213,000
- 19 Crusher/Screening Building(appr. 20'x20'x60'h) 24,000 cuft
  - o Use historical factor of \$5/ cu ft for this structure
  - o Includes auxiliaries
  - o $120000+15000=$ \$135,000

- 20 Tramp Iron Magnet
- o Use telephone quote and add allowance for supports
  - o Add freight allowance
  - o $18700+1500=$ \$20,200
- 21 Scalper Grizzly
- o Use telephone quote and add allowance for supports
  - o Add freight allowance
  - o $9800+500+700=$ \$11,000
- 22 Crusher
- o Use telephone quote and add allowance for increased capacity.
  - o Add freight allowance
  - o $17600+900+1500=$ \$20,000
- 23 Sizing Screen(final)
- o Use an allowance including chutework
  - o Add freight allowance
  - o $20000+2500+2500=$ \$25,000
- 24 Dust Collector (at crusher bldg)
- o Use quote from AirTechniques including ductwork
  - o Add freight allowance
  - o $25100+5000+2000=$ \$32,100
- 25 Crusher Building Ventilation
- o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 26 Silo Feed Conveyor BC-4 (30" Belt appr. 430'Lg.)
- o Use price/ft historical factor of \$420/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a diverter gate allowance
  - o Add a height allowance for add'l steel
  - o $180600+25000+5000+5000+15000=$ \$230,600
- 27 Silo Transfer Conveyor BC-5 (30" Belt appr. 40' Lg.)
- o Use price/ft historical factor of \$285/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a tripper allowance
  - o $11400+5000+5000+30000=$ \$51,400
- 28 Service Hoist
- o Use an allowance including monorail
  - o Add freight allowance
  - o $6500+500+500=$ \$7,500
- 29 Gastight Valve 1,2,3,4
- o Use an allowance
  - o Add freight allowance
  - o $14000+1000=15,000\text{ea.}$ \$60,000

30 Silo 1,2,3,4 (450 ton cap.)	
o Use 3/8" wall construction for appr. 41,000# A36	
@\$1.50 and 2,500# AR @ \$3.50	
historical fabrication factor.	
o Add freight allowance	
o 70000+3000=73,000 ea.	\$292,000
31 Bin Vent Filters 1,2,3,4	
o Use Telephone quote	
o Add freight	
o 3000+500=3500ea	\$14,000
32 Bin Activator 1,2,3,4	
o Use an allowance plus supports	
o Add freight allowance	
o 13400+1000+2000=16,400ea	\$65,600
33 Rail Scale	
o Use telephone quote and add allowance misc. stl.	
o Add freight allowance	
o 65000+2500+2500=	\$70,000
33a Unlisted and Misc. (allowance)	\$50,000

Total Coal System Equipment Price:	\$2,583,100

Erection

Erection pricing for this system was obtained from factors based on historical data and similar jobs.

Coal System Erection is based on 35% of equipment price

Total Coal System Erection Price		\$904,085
	USE	\$902,100
Total Coal System Price		\$3,485,200

B Mobile Equipment

Mobile equipment pricing is based on historical factors

34 (2) Large dozers	
o Use allowance of \$400,000 each	\$800,000
35 (1) Frontend loader	
o Use allowance of \$300,000 each	\$300,000
36 (2) Forklift type units	
o Use allowance of \$100,000 each	\$200,000
Total Mobile Equipment allowance	\$1,300,000

Steve Phillips
@ Mac

913-284-2191

PH → 25-07-99512-9-205-967-7888-84064

Rep

John

Reinck

Material Dynamic Co. - Charlotte, NC
704/549-4419

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

TELE. NO. 205/967-7888
(AC-EXCH. NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Steve Phillips @ MAC
(Birmingham, AL) NO LONGER REPS MAC

OF MAC EQUIP. CO. (TEL. ENGR.) ON CRSS JOB NO. 99512

CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY.

COGENERATION FACILITY

SUBJECT: HVAC

RAIL UNLOADER BUILDING
MCC & CONTROL ROOM
VENTILATION

2 - REQ'D
SIZE 17" 270 CFM 2" S.P.

1 - VENT FAN 2 1/2 HP @ UNLOADER
SIZE 25" 13,000 CFM 2" S.P.

1 - CRUSHER BLD'G FAN
(SAME)

3 - BUNKER BIN VENTS w/screen
NO. 72 ST9 ST FILTER

→ \$3,000 ea

DISTRIBUTION OPTION

(List here, the person talked with)

MILL AREA NO.: COAL HANDLING

P.O. NO.:
(Use Inquiry No. prior to purchase)

17 MW \$2,800 ea.

Spark Proof
Aluma
42" wheel 570rpm
Radial Fan 8.2 php
\$12,500

\$12,500

+ 500
13,000
2500
15,500

Buffalo Forge Co.
Chris Bucker Inc - Sales Rep
704 E. Washington St. 242-0435

+ FR
12,500
500
13,000
5,000
18,000

CRS BIRINE

PH → 25-07-99512-9-788-1424-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-20-90TELE. NO. 803/788-1424
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Author LeonardOF HEWITT-ROBINS (COLUMBIA) ON CRS JOB NO. 99512CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT: _____

MILL AREA NO.: COAL HANDLINGCAR SHAKER W/HOIST (FIXED)

P.O. NO.: _____

3 HP HOIST20HP SHAKER1-REQ'DHEWITT-ROBINS HDV CAR SHAKEOUTSHAKER — \$22,947MTA — 920 + 250 EXP. PROOF (230/460)HOIST — 14,060 + 7,263 EXP. PROOF + 5,940V-Belt GUARD — \$726URETHANE PADS (REDUCE NOISE TO 60dBA) — \$2,275

\$22,947

1,170

21,323

726

2,275

\$48,441

GIVES 7% OFF ALSO

USE \$48,500

DISTRIBUTION

(List here, the person talked with)

CRSS BIRRAINE

271-1075 (Local)
 PH → 25-07-99512-9-476-7523-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-20-90PLACED _____ TELE. NO. 803/476-7523
(AC-EXCH.- NO.)

RECEIVED _____

will call
prices
tomorrow

LAYMON MITCHELL TALKED WITH LARRY FISHER
 OF JEFFREY / DRESSER (WOODRUFF SC) ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT:

VIBRATING FEEDERS 3HP3 - REQ'D 200 TPH30" W X 8 FT. LONGBRUTE FORCEHD 3008 5HPCONSTANT SPEED + FRMILL AREA NO.: COAL HANDLING

P.O. NO.:

(Use Inquiry
No. prior to
purchase)
$$\begin{array}{r} \$13,000 \times 3 = \$39,000 \\ \$1,500 \\ \hline \$13,500 \end{array}$$
GRIZZLEY FEEDER 3HP1 - REQ'D 300 TPH w/cont36" W X 7'-3" (33" grizzly included)

9,800

\$48,800

REF: FAX DATED 2-1-90

$$\begin{array}{r} FR. \quad 9800 \\ \quad 500 \\ \hline \$10,300 \end{array}$$

USE \$50,000

TOTAL

DISTRIBUTION OPTION

Adams Brothers (Eriez-Magnetic)
 Doug Norton

(List here, the person talked with)

CR3BIRRIINE

PH → 25-07-99512-9-508-685-5145-84064

Correspondence No. _____

NOTE:
RepCOMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-21-90TELE. 508
PLACED NO. 617/685-5145
(AC-EXCH. - NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Brian Power
(LAWRENCE, MA) ON CRSS JOB NO. 99512
OF Lawrence PumpCLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT:

UNLOADER BLD'G
SUMP PUMP 10 HP (EXP. PROOF)
1-REQ'D

P.O. NO.:

(Use Inquiry
No. prior to
purchase)

VERTICAL TYPE (carbon steel)

30 GPM

TOTAL DYNAMIL HEAD = 30'

3/8" COAL PARTICLES

6' pit

\$6,500

+ FR 600
7,000DISTRIBUTION

(List here, the person talked with)

1750 Eastwood Drive, Aurora, Illinois 60506 (708) 844-1300

May 24, 1990

CRS SIRRINE
200 Executive Center Drive
Barnwell Building
Greenville, S. C. 29615

Attn: Mr. Mike Voss

Subject: Equipment and Turnkey installation proposal for a BT-102
Foam Dust suppression System for a Rail Car Dumper and
Truck Dumper Operation

Dear Mike,

Benetech, Inc. is pleased to submit the following proposal for two separate BT-102 Foam dust suppression systems. The table of content includes material list and description of, installation, CRS Sirene responsibilities and detailed operating sequences.

Detailed in the pricing section is the cost for each individual system, and corresponding installation cost. I have also provided deducts should CRS Sirene elect to take them. For example you will see a deduct for using a common chemical storage tank for both the car and truck dump systems. I have also enclosed a corporate video, Benetech reference lists and a technical summary of why foam dust suppression should be considered over wet suppression.

Should you have any questions in regard to this proposal please contact me at your earliest convenience.

Respectfully submitted,

J. Pircon

JJP/dhd

Att.

CC: CRSS.CT
File 28C

TABLE OF CONTENTS

- I. ROTARY CAR DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE
- II. TRUCK DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE
- III. PRICING
- IV. CLARIFICATIONS
- V. CORPORATE LITERATURE/BROCHURES

I. Benetech BT-102F Rotary Car Dump Foam Dust Suppression System
CRS Sirrine.

A.) Material List

The Benetech BT-102F Foam Dust Suppression System for a
Rotary Car Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 7.5 HP, 3600 RPM, 3 phase, 23-/46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges, flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including manual isolation valve, filter, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to each side of the car dumper.
2	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to each side of the car dumper.

- 2   1-1/2" Compressed Air Pressure Regulators to be mounted with air solenoids to control pressure to each side of the car dumper.
- 12   Benetech Foamer Assembly including foamer, check valve, flow control valves, pressure gauges, chemical pressure regulator and required pipe and fittings.
- 1   6,000 gallon horizontal insulated steel chemical storage tank.
- 1   6,000 watt storage tank emmersion heater to be wired into equipment enclosure.
- 1   Chemical storage tank level indicator. . Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT   Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
- 2.) Install concrete slab-on-grade (maximum 7' x 7') to support equipment enclosure and set enclosure.
- 3.) Install piping to feed chemical from storage tank to equipment enclosure (maximum 25" run).
- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install twelve (12) Benetech foamer assemblies. Six (6) will be mounted on each side of the car dumper.
- 8.) Install twelve (12) foam spray manifolds along the perimeter of the car dump pit.

- 9.) Install Benetech Remote Control Center in Car Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigidgalvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
  - a.) Chemical feed from tank to enclosure.
  - b.) Water/Chemical line from enclosure to foamers.
  - c.) Benetech foamers and foam spray manifold.
- 14.) Install insulation and covering on heat traced pipe described in Section 13. Insulation shall be fiberglass type with 1-1/2" thick walls. Covering shall be .006" thick aluminum fastened with sheet metal screws or bands.
- 15.) Provide full installation supervision and start-up services.

C.) Field Installation Services Provided by Others -

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 120 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
- 3.) Provide 120 scfm/100 psi compressed air source to the equipment enclosure. All piping by others.

D.) Operations Sequence

All equipment required to transfer the fluid and control the flow rate will be housed in the Benetech equipment enclosure. The water/chemical flow rate is controlled using the needle valves and pressure regulators located at each foamer. In the equipment enclosure the chemical flow rate is controlled by a variable output metering pump which will proportion the chemical flow rate to the water flow rate. Air flow is controlled using regulators mounted in the field and needle valves installed.

The control sequence utilizes a Square D model 50 programmer and will allow the system to operate either automatically or manually. In addition a Remote Panel will be mounted in the ar Dump Operator's Control Center to provide remote operation.

In the Manual Mode the water pump and chemical pump will start and all solenoids will open to allow for a continual spray.

There will be two modes of operation from the remote panel. In the manual start cycle mode, a push button on the remote panel will start the spray cycle. The car dumper spray system has been broken into two zones front side and back side. Each side will be fitted with a "Delay On" and "Length on Spray" timer. The spray cycle will start on the front side as the rail car starts to rotate and dump coal into the pit. The foamers on the back side of the dump will start as coal is deposited in the pit and airborne coal dust is being forced through that area.

In the automatic start cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energized the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

SIMILAR
HOPPER

II

Benetech BT-102F Rotary Truck Dump Foam Dust Suppression System CRS Sirrine Engineers Inc.

A.) Material List

The Benetech BT-102F Foam Dust Suppression System for a Rotary Truck Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 5 HP, 3600 RPM, 3 phase, 23-/46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges, flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including solenoid operated isolation valve, manual isolation valve, filter, pressure regulator, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to the truck dump.
1	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to the truck dumper.

- 6 Benetech Foamer Assembly Including foamer, check valve, flow control valves, pressure gauges, chemical pressure regulator and required pipe and fittings.
- 1 6,000 gallon horizontal insulated steel chemical storage tank.
- 1 6,000 watt storage tank emmersion heater to be wired into equipment enclosure.
- 1: Chemical storage tank level indicator. Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
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- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install six (6) Benetech foamer assemblies. Foamers will be mounted on the vibrating feeder elevation. Piping will be routed through the pit wall to each spray manifold.

- 8.) Install six (6) foam spray manifolds along the perimeter of the truck dump.
- 9.) Install Benetech Remote Control Center in Truck Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigid galvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
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- 15.) Provide full installation supervision and start-up services.

C.) Field Installation Services Provided by Others

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 60 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
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In the "Automatic Start" cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energize the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

PRICING

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PRICE</u>
1	One (1) BT-102 Foam Dust Suppression System per Section I, Part A	\$47,260 FOB Aurora, IL
2	Turnkey installation per per Section I, Part B	\$80,250
3	One (1) BT-102 Foam Dust Suppression per Section II, Part A	\$41,490 FOB Aurora, IL
4	Turnkey installation per Section II, Part B	\$70,625
5	Project Mgt., should CRS Sirene elect to install themselves but require Benetech supervision	\$350/day plus ex- penses
6	System start up engineer shold CRS Sirene purchase equipment only	\$350/day plus ex- penses
7	BT-102 Chemical T/L quantities	\$3.40/gal FOB Aurora, IL
8	Deducts 1. Common use of bulk storage tank for both systems - a. Equipment b. Installation	 \$8,500 \$4,000

INSTALLATION CONDITIONS

- a.) Work on both areas simultaneously
- b.) No winter protection
- c.) Pricing Base On
  - 1.) 8 hour work day
  - 2.) 5 day work week
- d.) Water, air, and electrical piped to enclosures as described in quotation.

AIR TECHNIQUES INC.

1724 Nekoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

TELECOPIER COVER LETTER

DATE: 5-18-90

TOTAL NUMBER OF PAGES (including cover letter): 3

TO: Mike Voss - CRS - SERRINE POWER DIVISION
Dust Collectors For Mechanical Coal
Handling Project

TELECOPIER NUMBER
 (or main number if no direct line): 803-281-3712
 (AREA CODE) NUMBER

BILL WAGNER

FROM: _____

Air Techniques, Inc.
 1724 Nekoma St.
 Marietta, GA 30067

If you have any difficulty receiving any of the transmission, call (404) 977-7090 and report any difficulty. We are transmitting from a Canon Faxphone 10 machine. If you wish to transmit any documents to this office, the direct line to our automatic receiving equipment is (404) 977-8109. After dialing the number, begin transmitting after the tone.

COMMENTS: Mike,
Attached is my hand written budget proposal
as per your request. Please let me know if you have
any questions or if you require a formal submittal.
Also keep in mind that these numbers are rough
approximations.

Regards,

Bill Wagner

AXED: ☐

DATE: _____

CRS-Sirrine-Mike Joss

- 1) 10,000 CFM - Reverse Pulse Dust Collector 2160
 cloth Area
 JA-240-DA, 4.62 to 1 A/C Ratio, 10' x 6'
 Basic Price \$17,080 includes pyramidal hopper
 Support Steel \$1,675
 Upper Walkway \$1,905
 Side Platform \$475
 Walk in Plenum \$860
 Explosion Venting \$SEE ATTACHED
 Rotary Tie Lock \$2,695

30484

+ 3459

- 2) 30,000 CFM - Reverse Pulse Dust Collector 6840
 cloth Area
 JA-760-CA, 4.39 to 1 A/C Ratio, 10' x 20.5'
 Basic Price \$46,310
 Support Steel \$3,700
 Upper Walkway \$2,090
 Side Platform \$1,575
 Walk in Plenum \$1,625
 Explosion Venting \$SEE ATTACHED
 Rotary Tie Lock \$2,630
 Screw Conveyor \$2,975(2)

+ 80430

- 3) 5,000 CFM - Reverse Pulse Dust Collector 1080
 cloth Area
 JA-120 SA, 4.62 to 1 A/C Ratio, 5' x 6'
 Basic Price \$9,655
 Support Steel \$1,265
 Upper Walkway \$1,805
 Side Platform \$340
 Walk in Plenum \$625
 Explosion Venting \$SEE ATTACHED
 Rotary Tie Lock \$2,235

22134

+ 2475

+ 109

QTY, 3 + 3 - Relief Doors	NEMA 9 Panels	NEMA 9 Solenoids	Lighted Bays	GROUND WIRES

30

704-364-8402
PH → 25-07-99512-9-414-672-7830-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____
TELE. NO. 414/672-7830
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH GARY
(MILWAUKEE, WI)
OF DINGS MAGNETIC ON CRSS JOB NO. 99512
CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY
COGENERATION FACILITY

SUBJECT:

TRAMP IRON MAGNET
7 1/2 HP
PERMANENT - SUSPENDED
SELF-CLEANING
1-REQ'D

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____
(Use Inquiry
No. prior to
purchase)

MOUNT OVER HD OF 48" B.W. CONV,
300 TPH ; 140 FPM

Model DSC 1542
7-8 WK delivery
Work thru 2 DINGS

\$18,700

Model DSC-1542

(Bob) Gerrard & Associates
Charlotte, NC

704/364-8402

Lynn Alexander - will call back

DISTRIBUTION OPTION

Adams Brothers (Eriez)

Doug Norton 704/365-4255

Eriez 6448 #18,419

(List here, the person talked with)

CR3 BIRRIINE

PH → 25-07-99512-9-404-448-2341-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-20-90PLACED _____ TELE. NO. 404/448-2341
(AC-EXCH.-NO.)

RECEIVED _____

will call
backLAYMON MITCHELL TALKED WITH BRIAN STINSON
OF AS-TECH (AMERICAN PULV) ON CRSS JOB NO. 99512CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT: _____

MILL AREA NO.: COAL HANDLINGCOAL CRUSHER (RING TYPE)
150 HP 1 1/2" PRODUCT
MOTOR 2" X 0 INPUT

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

150 TPH

American
WC30NF → w/ V-belt drive & base & guard & motor
75 HP

\$17,640

10-12 WK DEL.

DISTRIBUTION

(List here, the person talked with)

10:30
NOT IN 2-28-90
CALL BACK PM

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____ TELE. _____

PLACED _____ NO. 803/242-5885
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH EDDIE SEIGLER
(Greenville, SC)
OF Edgar B. Heape & Son - Toledo ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT: ..

COAL RAIL SCALE
CONTROLS
LOAD CELLS
PRINTER W/INDICATOR
2 - REQ'D

PIT - 8'W x 14'LG x 2'D.
(6.15' x 12.5' x 2'6") - Per Toledo

SCALE — \$21,500
PIT & APPROACH RAMPS — 40,300
61,800

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____
(Use Inquiry
No. prior to
purchase)

USE \$65,000
(for each scale)

DISTRIBUTION

(List here, the person talked with)

(Sum 2 axles)

4 Scales = \$260,000

- 2 scales = 130,000

130,000 Savings
+ ELECT.

P.O. Box 579
1005 W. Riverside Drive
Jeffersonville, IN 47130
FAX 812/288-4708
Executive Offices 812/288-4710
Sales and Accounting 812/288-4700

TELECOPIER COVER LETTER

DATE: May 2, 1990

TIME: 2:55

TO: NAME: Laymond Mitchell
FIRM: CRS Serrine
FAX NO: 803-281-3712

FROM: NAME: Robert L. Wolz

WE ARE TRANSMITTING 3 PAGE(S) (INCLUDING THIS COVER LETTER)

Reference: Carman File No. CHAR-90-4-1631

Dear Laymond,

In response to your telephone request yesterday, listed below please find some brief specifications and unit pricing for the bin dischargers you requested for this Pennsylvania project.

Item 1 will be a quantity of two Carman Model 12GBD Gyrted Bin Dischargers, carbon steel construction with number 11 gauge number 304 stainless steel internal liner. All material contact surfaces would be of solid or lined with stainless steel. This unit would be furnished with a 7.5 HP TENV vibratory motor, a quantity of twenty heavy duty hanger arms, flexible inlet and outlet socking connections.

List price each, \$24,022.00, OEM discount \$1,400.00, your net cost ~~\$22,622.00~~

Item 2 will be a quantity of one Carman Model 8GBD Gyrted Bin Discharger, carbon steel construction with number 11 gauge number 304 stainless steel liner. This unit would be furnished with a 3 HP explosion proof vibratory motor, six heavy duty hanger arms and flexible inlet and outlet socking connections.

List price, \$14,748.00, OEM discount \$869.00, your net cost ~~\$13,879.00~~

Item 3 will be a quantity of one Carman Model 6GBD Gyrted Bin Discharger. This unit would be furnished with a number 8 gauge number 304 stainless steel cone, no liner. This unit would be furnished with a 0.75 HP TENV vibratory motor, three standard duty hanger arms and flexible inlet and outlet socking connections.

List price, \$3,552.00, OEM discount \$300.00, your net cost ~~\$3,252.00~~

Laymond, each of these units has been quoted with a welded type adapter ring. Painting would be in accordance with the enclosed specification QA-860.1.

CRS BIRINE

CONVEYOR PRICE AUG'S FROM

(3) RECENT QUOTES: MONTAQUO, FMC, CRSS

MAR 87 CRSS 51

OTHER SIZES FACTORED

CALCULATION SHEET

CLIENT CRSS LOCATION _____ DATE 11/6/89 PREPARED BY MV JOB NO. _____
 SUBJECT _____ CHECKED BY _____
 DEPT _____

Conveyor Pricing24" belt conveyor
erected (mech) top & found

Conv. only	Walk-on	Enclosed
\$150/ft	\$320/ft	\$835/ft
\$195/ft	\$480/ft	\$1250/ft

30" belt conveyor
erected

\$285/ft	\$400/ft	\$920/ft
\$370/ft	\$600/ft	\$1455/ft

36" belt conveyor
erected

\$340/ft	\$480/ft	\$1025/ft
\$440/ft	\$720/ft	\$1540/ft

42" belt conveyor
erected

\$400/ft	\$560/ft	\$1085/ft
\$520/ft	\$840/ft	\$1620/ft

48" belt conveyor
erected

\$455/ft	\$660/ft	\$1140/ft
\$590/ft	\$990/ft	\$1710/ft

54" belt conveyor
erected

\$515/ft	\$740/ft	\$1200/ft
\$670/ft	\$1110/ft	\$1800/ft

• Cantilevered conveyor add to conveyor

100/ft

+ \$20/FT FOR HANDRAIL, GRATING OR GRIP STRUT

1200
- 515
\$685/ft
Turns

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0004
 AREA NAME: BRIQUETTING SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0004- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
04-1.	BRIQUETTING SYSTEM							4,949,000	
04-1.A	TRANSFER STORAGE EQUIP.								
04-1.B	DRYER								
04-1.C	SCREENING/SIZING EQUIP.								
04-1.D	BRIQUETTING EQUIPMENT								
04-1.E	AUXILIARIES								
04-1.F	ELECTRICAL CONTROLS								
04-1.G	BUILDING								
04-2.	FINES CONVEYOR BC-6					24" WIDE, APPROX 300' LG		126,000	
04-2.A	CHUTEWORK								
04-2.B	DIVERTER GATE								
04-3.	BRIQUET TRANSFER CONVEYOR BC-7					24" WIDE, APPROX 375' LG		136,500	
04-3.A	CHUTEWORK								
04-4.	CHAR & TAR RETURN CONVEYOR					PNEUMATIC SYSTEM, 550' LG		205,000	

Briquetting System

Fine coal is received from the coal reclaim system at less than 1/2" size containing approximately 12% maximum combined moisture and will be stored in a silo (8 hours storage) located at the briquetting plant or discharged to grade when the plant is not operational. Coal is reclaimed from the silo by a vibrating feeder that meters the flow to the briquetting system dryer at a rate of approximately 50 tons per hour. The fines are delivered from the silo by conveyor to the thermal dryer to remove excess moisture before briquetting. The material is screened and crushed to less than a No. 4 mesh size and conveyed to a surge hopper. Material is metered from the surge hopper through a vibrating feeder into a briquetting line. Coal can now be blended with a binder agent if necessary and transferred to the briquet machine. Char and tar fines from the gasifier cyclone will be conveyed to the briquetting area for use as a binder. After briquetting, material is screened again to remove fines generated during the process. They are transferred back to the blender by bucket elevator for recycling. The 1" nominal briquets are now transferred by a collecting conveyor to a common bed type dryer for curing before re-entry into the coal system at the coal bunkers.

D.O.E. STANDARD IGCC PLANT
BRIQUET SYSTEM
100 MW UNIT

D.O.E. Standard IGCC Plant
Briquetting System
100 MW Unit

Briquetting Equipment: Black Box Turnkey Supply	\$4,949,000

Erection:	<u>\$2,480,000</u>

Subtotal:	\$7,429,000

Balance of system: Conveyors and Misc.	\$467,500

Erection:	<u>\$163,600</u>

Subtotal:	\$631,100

Total:	\$8,060,100

D.O.E. Standard IGCC Plant
Briquetting System
100 MW Unit

Briquetting System

1 The briquetting system price is based on a blackbox vendor quote for a complete operating facility (See attached quote from PSI). The price includes: transfer/storage equipment, dryer, screening/sizing equipment, briquetting equipment, auxiliaries, electrical controls and buildings. Additional vendor data was obtained from individual equipment manufacturers such as briquettor and dryer suppliers (K.R.Komarik, Ludman Machine) to check major equipment suitability and prices.

\$4,949,000

Auxiliary Equipment

Additional equipment is required to transfer material from the fines screens to the briquetting plant and take the finished product back to the gasifier feed system.

2. Fines Conveyor BC-6 (24" Belt appr.300' Lg.)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o Add a diverter gate allowance
- o Add a height allowance for add'l steel
- o $102000+10000+4000+5000+5000=$

\$126,000

3. Briquet Transfer Conveyor BC-7 (24" Belt, appr. 375' Lg)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o $127500+5000+4000=$

\$136,500

4. Char & Tar Return Conveyor System(Assume pneumatic transfer system appr. 550' Lg.)

- o Use allowance of \$350/ft.
- o Add allowance for pipe supports
- o Add freight allowance
- o $192500+10000+2500=$

\$205,000

Total Auxiliary Equipment Price

\$467,500

Total Briquetting Equipment

\$5,416,500

Erection

Erection pricing for this system was obtained from the PSI vendor budget quote.

This price was checked against historical and industry data from previous jobs and factors for like installations.

1.Briquetting System (From Quote)	\$2,480,000
2.Auxiliary Equipment(Historical Allowance: 35% of Equip.)	\$163,625
Use	\$163,600
Total Equipment Erection Price	\$2,643,600
 Total Briquetting Equipment	 \$5,416,500
Total Equipment Erection Price	\$2,643,600
Briquetting System Total Price	\$8,060,100

PROCESS SYSTEMS, INC.

P.O. Box 1579, Ponte Vedra Beach, FL 32082 (904) 249-0002 FAX (904) 249-1166

DATE: 4/25/90

TIME: _____

PAGES: 65 (INCLUDING COVER SHEET)**FAX TRANSMISSION COVER SHEET**TO: CRS SIRRINE - POWER DIV.FAX NO. 803/281-3712ATTN: Mr. Mike VossFROM: PROCESS SYSTEMS INC. / for Gordon CoveyCOMMENTS: RE: REVISION BUDGET PROPOSAL - for coal handling, drying,
crushing, Briquetting, as
per attached.SHOULD THIS TRANSMISSION BE INCOMPLETE OR ILLEGIBLE, PLEASE CONTACT
US AT OUR TELEPHONE NUMBER - 904/249-0002 OR THROUGH OUR FAX MACHINE
NUMBER - 904/249-1166. THANK YOU.

PROCESS SYSTEMS, INC.

P.O. Box 1679, Ponte Vedra Beach, FL 32004 (904) 249-0002

FAX (904) 249-1166

April 25, 1990

CRS SIRRINE ENGINEERS INC.
Power Division
216 South Pleasantburg Drive
Greenville, S.C. 29606

Attn: Mr. Mike Voss

REFERENCE: Coal handling, drying, crushing, briquetting
Roberts & Schaefer Company - Eastern Operations
BUDGET PROPOSAL - REV. 1

Dear Mr. Voss:

We are pleased to offer a revised, downsized budget proposal for the coal handling, drying, crushing and briquetting system. The new proposal is based on the following design criteria:

Coal: Illinois No. 6 or coal with similar physical/
chemical characteristics.
Moisture content: 12% total
Size Consistency: ROM 6"x0 screened to produce
50 TPH of 1/2" x 0 (44 Dry TPH)
Ash %: 35%
Heating Value: 9000-12,000 BTU /lb.
Sulfur %: 2.5-4% total
Nitrogen%: 1.5%

A general list of the equipment required and the associated pricing is attached for your review. As before, we feel that the pricing is on the high side to protect your needs.

We thank you for your interest in our equipment, and system capabilities. We look forward to working together on this project.

Sincerely yours,

A. R. Przybylek
for Gordon W. Covey
ARP:CS
Encl.

Specializing in Complete Process Systems

ROBERTS & SCHAEFER COMPANY - EASTERN OPERATION
ENI ENGINEERING COMPANY
339 HAYMAKER ROAD
MONROEVILLE, PENNSYLVANIA 15146

120 MW
3 OF 5

Coal Preparation and
Thermal Drying Systems

March 28, 1990

Engineers and Contractors
Telephone (412) 373-8020
(412) 341-8228

TWX 710 797 3651 ENI ENG MOLE
TELECOPY (412) 373-7065

Revised 4/25/90

TO: Gordon Covey
FROM: D. C. Sisti
SUBJECT: Coal Handling, Drying, Crushing & Briquetting

Design Criteria 50 TPH as received Illinois No. 6 seam containing 12% TM.
Revision #1 ROM 6" x 0 will be screened to give 50 TPH 1/2" x 0 (maximum)
Ash 35%. BTU 9000-12000 BTU/# 2 1/2 - 4% Total S,
1.5% N₂ (68TPH Dried Product)

Equipment List:

Combustion System/Ash and Lime Handling Systems

Dryer Feed Bin

Dryer Proper Recirculation Type

Impactors

Internal Insulation

Dryer Dust Collector Cyclones 1st Stage

Dryer Dust Collector Cyclones 2nd Stage

Dryer Exhaust Fan

Briquetting Machines

Dryer Baghouse Damper

Dryer Recycle Damper

Dryer Dust Bag Collectors

Exhaust Stack

Product Blender

Natural Gas Train System

Dust Conveying System

Fugitive Dust Collector

External Insulation

120 MW
4 OF 5

Equipment List
Cont'd. (2)

Pumps

Dryer Cyclone Screw Conveyors 1st Stage

Dryer Cyclone Screw Conveyors 2nd Stage

Dried Product Conveyor Belt #1 Collecting

Dried Product Conveyor Belt #2 Collecting

Electrical Distribution

Transformers

Motors

Motor Control Center

Instrumentation

Air Compressors

Lighting and Fixtures

Heating, Ventilation, Pressurization and Air Conditioning

Auxiliary Electrical Equipment

Power and Light Wiring

Piping

Structural Steel

Platwork

Floors and Walkways

Doors and Windows

Roofing and Siding

Stairs, Lift Beams and Handrails

Trolleys and Hoists

Painting

Machinery Guards

Concrete Work and Foundations based on spread footings $4000\#/Ft^2$ at depth of 4'0

Noise Suppression

Engineering

Materials and Services Furnished by Contractor

Contractors Alternate "or equal" Defined

120 MW

5 OF 5

Freight \$ 56,250.00

Estimated Total Pricing Black Box Turnkey Basis. ....\$ 7,485,475.00

Erection Estimate (including foundations) \$ 2,480,000.00

Engineering, Materials and
Project Management \$ 4,949,225.00

D. G. Sisti

COAL DRYING & BRIQUETTING PROCESS MATERIAL HANDLING SYSTEM FLOWSHEET

ROBERTS & SCHAEFER COMPANY

6/23/90

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0005
 AREA NAME: ASH HANDLING SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0005- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
05-1.	PNEUMATIC AIR SYSTEM					CONVEYING DIST 300' LG		115,000	
05-2.	BIN VENT FILTER							35,000	
05-3.	ASH STORAGE SILO					24' DIA, 60' H		305,000	
05-4.	CONDITIONER							50,000	

Ash Handling System

Bottom ash is received by the handling system at the discharge lock hopper of the gasifiers and transferred via a pneumatic conveying system to the ash storage silos. The ash silo is a three (3) day storage structures equipped with either truck or rail loadout. Ash is discharged through an isolation gate and rotary feeder into an ash conditioner. After the ash is conditioned, it is discharged directly into truck or rail car.

D.O.E. STANDARD IGCC PLANT
ASH SYSTEM
100 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW

Ash Handling System

Equipment:
Storage/Conveying
and loadout

\$505,000

Erection:

\$176,750

Total:

Use

\$681,800 -

**D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW**

Ash Handling System

The ash handling system pricing was based on previous vendor quotes and jobs with similar equipment and system configuration.

Equipment

1. Pneumatic Air System(Conveying distance appr. 300')	
o Use historical factor of \$350/ft.	
o Add rotary feeder allowance	
o Add piping and fitting allowance	
o $\$105000+5000+5000=$	\$115,000
2. Bin Vent Filter	
o Use allowance	\$35,000
3. Ash Storage Silo(appr. size: 24'Dia. x 60', appr. 27,500 cuft)	
o Use concrete silo allowance of \$10/cuft	
o Add allowance for foundation	
o $275000+30000=$	\$305,000
4. Conditioner	
o Use allowance including freight	\$50,000
Total Ash System Equipment Price	\$505,000

1 Erection

Erection pricing for this system was obtained from similar jobs.

Ash System Erection is based on 35% of equipment price

Total Ash System Erection Price	\$176,750
Total Ash System Price	\$681,750
Use	\$681,800

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0006

AREA NAME: ZINC FERRITE HANDLING SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0006- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
06-1.	PNEUMATIC AIR SYSTEM \					CONVEYING DISTANCE APPROX 250'		102,500	
06-2.	ZINC STORAGE BIN					12' DIA X 20' H		20,500	
06-3.	LOADOUT SCREW CONVEYOR					9" X 12' LG		12,000	
06-4.	BIN VENT FILTER							25,000	

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclone. The material is transferred by a pneumatic conveying system designed to transport the zinc ferrite fines to a seven (7) day holding silo. The loadout will be capable of loading trucks only. The loading will be achieved by discharging material through a rotary feeder into a screw conveyor. The screw conveyor will transfer the material to the outside of the structure into a truck parked alongside the silo.

D.O.E. STANDARD IGCC PLANT
ZINC FERRITE SYSTEM
100 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW

Zinc Ferrite Handling System

Equipment:
Storage/Conveying
and loadout

\$160,000

Erection:

\$56,000

Total:

\$216,000

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclone.

Equipment

1. Pneumatic Air System(Conveying distance appr. 250')	
o Use historical factor of \$350/ft.	
o Add rotary feeder allowance	
o Add piping and fitting allowance	
o $\$87500+5000+10000=$	\$102,500
2. Zinc Storage Bin(appr. size: 12'Dia. x 20', appr. 840 cuft)	
o Use 1/4" wall construction for appr. 10,000# A36	
o @\$1.50 historical fabrication factor.	
o Add allowance for rotary screw	
o Add freight allowance	
o $15000+2500+3000=$	\$20,500
3. Loadout Screw(appr. 9" x 12' Lg)	
o Use allowance including freight	\$12,000
4. Bin Vent Filter	
o Use allowance including freight	\$25,000
Total Zinc Ferrite Equipment Price	\$160,000

1 Erection

Erection pricing for this system was obtained from factors based on historical data and similar jobs.

Zinc Ferrite Erection is based on 35% of equipment price

Total Zinc Ferrite System Erection Price	\$56,000
Total Zinc Ferrite System Price	\$216,000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0007

AREA NAME: SORBENT AUXILIARIES

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0007- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
07-1.	SORBENT UNLOADING BUILDING					16' X 55' LG X 18' H		48,000	
07-2.	RAIL CAR PULLER							150,000	

Sorbent System Auxiliaries

The sorbent unloading/transfer and storage systems will be furnished by NaTec.

Additional items needed to complete the system include:

- Unloading Structure
- Rail Car Puller for Positioning

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW

Sorbent Auxilairies

Equipment:
Includes unloading building and car puller

\$198,000

Erection:

\$69,300

Total:

\$267,300

**D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 100MW**

Sorbent Auxilairies

The sorbent unloading/transfer and storage systems will be furnished by NaTec
(Listed in other areas) Additional items needed to complete the system include:
Unloading Structure and a rail car puller for positioning.

Equipment

1. Sorbent Unloading Building(Appr. 16' x 55'Lg. x 18'H), 15,800 cu ft.	
o Use historical factor of \$3 / cu ft for this building	
o Includes auxiliaries	\$48,000
2. Railcar Puller	
o Use allowance including freight	\$150,000
Total Equipment Price	\$198,000

Erection

Erection pricing for this system was obtained from factors based on historical
data and similar jobs.

Sorbent Auxiliaries Erection is based on 35% of equipment price

Total Sorbent Aux. Erection Price	\$69,300

Total Sorbent Auxiliaries Price	\$267,300

D.O.E. STANDARD IGCC PLANT
100 MW UNIT

PRELIMINARY UTILITIES REQUIREMENT

Coal Handling System

Electrical:

Total Connected HP	700
Motors over 200 HP	None

Water:

Service Water	-Washdown	120 GPM @40PSIG
	-Dust Supp.	120 GPM @40PSIG

Air:

Instrument	None
Service	60SCFM @90PSIG

Briquetting System

Electrical:

Total Connected HP	1250
Motors over 200 HP(incl'd)	2@400

Water:

Service Water	-Washdown	120GPM @40PSIG
	-Cooling Water	250GPM @40PSIG

Air:

Instrument	None
Service	50SCFM @90PSIG

Natural Gas:

14,000cf/hr @1050BTU/cf

Ash Handling System

Electrical:

Total Connected HP
Motors over 200 HP

138
None

Water:

Service Water

100GPM
@40PSIG

Air:

Instrument
Service

None
10SCFM
@90PSIG

Sorbent Handling System

Electrical:

Total Connected HP
Motors over 200 HP

80
None

Water:

Service Water

None

Air:

Instrument
Service

None
10SCFM
@90SCFM

Zinc Ferrite System

Electrical:

Total Connected HP
Motors over 200 HP

53
None

Water:

Service Water

None

Air:

Instrument
Service

None
10SCFM
@90PSIG

BRIQUET SYSTEM UTILITIES

240 MW SYSTEM

IMPORTANT MESSAGE

FOR MU

RE 4/2 TIME 2:35 A.M. P.M.

M Gordon Covey

OF _____

PHONE 904-249-0002

AREA CODE _____ NUMBER _____ EXTENSION _____

TELEPHONED	☒	PLEASE CALL	☐
CAME TO SEE YOU	☐	WILL CALL AGAIN	☐
WANTS TO SEE YOU	☐	RUSH	☐
RETURNED YOUR CALL	☐	SPECIAL ATTENTION	☐

MESSAGE ① Natural Gas Requirement
is 28,000 cf/hr. based
on 1050 Btu/cf
② Amount of Water - 500 gpm
③ Working on Roll compactors:
One roll compactor will do 50
SIGNED tons/hr. (over)

TOPS FORM 4005 LITHO IN U.S.A.

FOR 120 MW Units

GAS: $.5 \times 28000 = 14000 \text{ cf/hr}$

Water: $.5 \times 500 = 250 \text{ GPM}$

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0008
 AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0008- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-1.	COAL LOCKS (4)							981,340	
08-2.	ASH LOCKS (4)							1,213,000	
08-3.	COAL LOCK CONTROL SYSTEM (4)							251,600	
08-4.	ASH LOCK CONTROL SYSTEM (4)							251,600	
08-5.	COAL BUNKERS							653,400	
08-6.	COAL LOCK FEED CHUTES (4)							173,550	
08-7.	ASH LOCK DISPOSAL CHUTE (4)							54,000	
08-8.	GASIFIER (4)							4,295,900	
08-9.	GRATES (4)							2,200,000	
08-10.	GRATES, VARIABLE SPEED DRIVES (4)							236,200	
08-11.	COAL DISTRIBUTOR AND DRIVE (4)							112,570	
08-12.	WASTE HEAT EXCHANGER (4)							1,661,000	
08-13.	COAL LOCK EJECTORS (4)							17,820	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0008
 AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0008- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-14.	ASH LOCK EXP CONDENSER (4)							175,200	
08-15.	START-UP SCRUBBER							20,000	
08-16.	RAW GAS KNOCKOUT DRUM (4)							172,000	
08-17.	MIXING PIPES							95,000	
08-18.	HYDRAULIC AND LUBE SYSTEM							523,200	
08-19.	INSTRUMENTATION							1,792,700	
08-20.	CONTROL AND RELIEF VALVES							525,000	
08-21.	ELECTRICAL							2,800,000	
08-22.	PIPING							8,820,000	

Gasifier Cost Analysis Based on ANR Great Plains Gasification Project with 14 Lurgi Mark IV Gasifiers:
GASIFICATION, UNITY BASIS: (ITEM 1100)
 0.09 Scaling Factor for 14 TO 1 Gasifiers Escalated by 20% for 1990
 (=1/14*1.2)

Diameter Scaling Factor	Equipment	Installation	Lurgi Mark IV 12.63 ft ID 1 Total	PyGas Equivalent 12.63 ft ID 1 Total
FEEDERS: COAL LOCKS (1100.35600)	\$300,119	\$8,118	\$308,237	\$308,237
ASH LOCKS: (1100.35630)	\$360,439	\$5,724	\$366,163	\$366,163
COAL BUNKERS: (1100.35801)	\$118,350	\$45,000	\$163,350	\$163,350
COAL LOCK FEED CHUTES: (1100.35830)	\$34,945	\$8,442	\$43,387	\$43,387
ASH LOCK DISPOSAL CHUTE: (1100.35850)	\$292	\$13,217	\$13,509	\$13,509
GASIFIER: (1100.42400)	\$937,606	\$136,365	\$1,073,971	\$1,073,971
GRATES: (1100.42430)	\$549,834	\$0	\$549,834	\$549,834
GRATE, VAR SPEED DRIVES: (1100.42450)	\$59,049	\$0	\$59,049	\$59,049
COAL DISTRIBUTOR & DRIVE: (1100.42460)	\$28,143	\$0	\$28,143	\$0
WASTE HEAT EXCHANGER: (1100.43500)	\$402,865	\$12,303	\$415,168	\$0
COAL LOCK EJECTORS: (1100.43500)	\$3,375	\$1,080	\$4,455	\$0
ASH LOCK EXP CONDENSOR: (1100.44110)	\$40,771	\$3,024	\$43,795	\$43,795
RAW GAS KNOCKOUT DRUM: (1100.44110)	\$37,647	\$3,024	\$40,671	\$0
MIXING PIPES: (1100.44710)	\$23,192	\$552	\$23,744	\$23,744
HYDRAULIC & LUBE SYSTEM: (1100.46110)	\$126,288	\$4,518	\$130,806	\$130,806
PIPING: (1100.61000)	\$897,745	\$1,306,709	\$2,204,454	\$988,575
INSTRUMENTATION: (1100.51100)	\$189,738	\$69,480	\$259,218	\$259,218
CONTROL & RELIEF VALVES: (1100.51100)	\$131,229	\$0	\$131,229	\$131,229
ELECTRICAL: (1100.82000)	\$209,199	\$490,834	\$700,033	\$700,033
MISCELLANEOUS: (1100)	\$93,572	\$62,382	\$155,954	\$411,667
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL			\$6,715,170	\$5,266,567
by MAJOR GROUPS				
COAL LOCK SYSTEM	\$1,475,454	\$704,796	\$2,180,250	\$964,371
ASH LOCK SYSTEM	\$1,829,563	\$873,947	\$2,703,510	\$2,662,839
GASIFIERS	\$1,239,381	\$592,029	\$1,831,410	\$1,639,357
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
PYGAS EQUIVALENT COSTS				
COAL LOCK SYSTEM	\$652,625	\$311,746	\$964,371	\$964,371
ASH LOCK SYSTEM	\$1,802,039	\$860,800	\$2,662,839	\$2,662,839
GASIFIERS & COAL CRUSHING	\$1,109,412	\$529,945	\$1,639,357	\$1,639,357
TOTAL	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567
PYGAS EQUIVALENT COSTS	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0009
 AREA NAME: HOT GAS CLEANUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0009- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
09-1.	ABSORBER VESSEL								
							TOTAL SYS. : 9,415,000		
09-2.	REGENERATOR VESSEL								
09-3.	LOCK HOPPERS								
09-4.	VIBRATING SCREEN								
09-5.	SKIP HOIST								
09-6.	CRYOGENIC N2 SYSTEM								
09-7.	PRE-START HEATERS & CONTROLS								
09-8.	GAS RECIRCULATION BLOWERS								
09-9.	MAKE-UP AIR PRE-HEATER								
09-10.	GAS RECIRC HEAT EXCHANGER								
09-11.	HEAT RECOVERY EXCHANGER								
09-12.	DRY-AIR MAKEUP COMPRESSOR								
09-13.	SORBENT HANDLING SYSTEM								
09-14.	PIPING								

B. BASIS OF ESTIMATE

The scope of the HGCU estimate includes all equipment, piping, controls, etc. shown on the flow diagram and equipment list derived from the General Electric process definition. The scope begins at the outlet flange of coal gas cleanup cyclone and ends at the inlet flange of the HGCU cleanup cyclone. The SO₂ rich off-gas line will be taken to the battery limits of the HGCU. The battery limits of the HGCU will include the structure, foundations, associated skip hoists, a freight elevator and sorbent storage and handling systems.

The structure will be standard open steel construction with the only enclosed areas being a motor control room, local control room and toilet facilities. A metal roof will be provided on the top floor. Machinery floor areas and enclosed spaces will have poured concrete floors - all other floors will be steel grating. No fireproofing or fire protection is included.

Since the HGCU is part of an overall IGCC power plant, no allowance is made for basic utility systems, plant services, roads, central control rooms, etc. Utility systems within the battery limits are included in the estimate along with a local control room and operator services.

The estimate is based on the flow diagram and equipment list included in this section of the report. The following items are not included in this estimate:

- Site preparation & grading
- Laboratories
- Fire protection
- Process control room
- Roads and parking
- Gas cleaning cyclones
- Flare stack
- Main vent system
- Utility distribution equipment
- Sorbent and consumables
- Waste disposal
- Engineering design fees
- Operation and maintenance costs

Hot Gas Clean-Up System (HGCU)

The base price of \$10,124,000 is for a H₂S flow rate of 0.93 lb/sec. Prices for the 50 MW, 100 MW, and 200 MW cycles are based on this quote. It should be noted that the volumetric percentage of H₂S in the low-Btu gas is assumed constant so that H₂S flow rate may be used to scale from one size to another. The following chart shows the corresponding cost of the HGCU for the various sizes.

Size	Flow Rate	Cost Adjustment Rate	Budget Price
100MW	0.824 lb/sec	0.92	\$ 9,415,000
200MW	1.381 lb/sec	1.27	\$12,836,000
50MW	0.303 lb/sec	0.51	\$ 5,170,000

Hot Gas Clean-Up System Summary of Costs

Based on General Electric Company design basis for a full scale unit.

Equipment, linings & installation labor	\$ 5,250,000
Building steel/concrete/pilings & architecture	631,000
Piping - <u>including special valves</u> , refractory lined piping, hangers & fittings	1,622,600
Instrumentation - local places only	900,000
Electrical power & lighting	600,000
Insulation & painting process	<u>200,000</u>
	9,203,600
10% to cover omissions	<u>920,400</u>
	\$ 10,124,000

Exclusions:

Site prep. & finish grading
 Roads & parking
 Laboratories
 Flare stack & main vent system
 Fire protection
 Engineering & design fees
 Main process (plant) computer
 Gas cleaning cyclones
 Sorbent & consumables
 Waste disposal
 O&M Costs
 Land permits

Basis:

Battery limits of hot gas clean-up unit per preliminary PFDS.

BLOCK DIAGRAM FOR A 1270TPD ILLINOIS #6 COAL IGCC
(3% SULFUR, 0.3% Cl, FUEL GAS FROM LURGI GASIFIER 140 lbs/s)

HOT COAL GAS CLEANUP SYSTEM FOR PROCESS EVALUATION FACILITY

PPHNS CASE

1. CH. CORDON TIED.
2. W. PAIRLIPS TIED.
3. CH. CORDON TIED. REFRACTORY LACED

SECRET

4 HCU SYSTEM
G.E. Co.
ZINC FERRITE
PROCESS

THE
IGCC PROJECT

33 DOWLING ROAD
J-1538-001

IDENTIFYING NUMBER

D. EQUIPMENT LIST

J1538

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM

DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR
100-1	ABSORBER VESSEL NO. 1 W/ REFRACT. LINING	14' DIA x 28' OA CS, REFRACT. LINED		250,000	
100-2	ABSORBER VESSEL NO. 2 W/ REFRACT. LINING	14'D x 28'OA CS, REFRACT. LINED		250,000	
100-3	REGENERATOR VESSEL NO. 1 W/REFRACT. LINING	11' & 13'D x 24' OA CS REFRACT. LINED		250,000	
100-4	REGENERATOR VESSEL NO. 2 W/REFRACT. LINING	11' & 13'D x 24' OA CS, REFRACT. LINED		250,000	
100-5	LOCK HOPPER NO. 1 W/REFRACT. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-6	LOCK HOPPER NO. 2 W/REFRACT. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-7	LOCK HOPPER NO. 3 W/REFRACT. T. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-8	LOCK HOPPER NO. 4 W/REFRACT. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-9	LOCK HOPPER NO. 5 W/REFRACT. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-10	LOCK HOPPER NO. 6 W/REFRACT. LINING	7'D x 10'OA CS, REFRACT. LINED		73,000	
100-11	VIBRATING SCREEN NO. 1	6 MESH SCREEN 14' LONG 400#/MIN		70,000	
100-12	VIBRATING SCREEN NO. 1	6 MESH SCREEN 14' LONG 400#/MIN		70,000	

D. EQUIPMENT LIST

J1538

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM

DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR
100-13	SKIPHOIST NO. 1	100 CUBIC FEET	30	300,000	
100-14	SKIPHOIST NO. 2	100 CUBIC FEET	30	300,000	
100-15	CRYOGENIC N2 SYSTEM W/ STORAGE & VAPORIZER		10	BY GAS VENDOR, FURNISH FNDNS & ELECTRICAL ONLY	
100-16	PRE-START HEATERS & CONTROLS	4 EACH @ 44,000	1200KW	176,000	
100-17	GAS RECIRCULATION BLOWER/MOTOR NO. 1	CENTRIFUGAL COMPRESSOR 15,000 SCM, 40 PSI ΔP	700 HP	275,000	
100-18	GAS RECIRCULATION BLOWER/MOTOR NO. 2	CENTRIFUGAL COMPRESSOR 15,000 SCM, 40 PSI ΔP	700 HP	275,000	
100-19	GAS RECIRCULATION BLOWER/MOTOR SPARE	CENTRIFUGAL COMPRESSOR 15,000 SCM, 40 PSI ΔP	700 HP	275,000	
100-20	MAKE-UP AIR PRE-HEATER NO. 1	INCONEL TUBES CS SHELL 90 SQ. FT.		35,000	
100-21	MAKE-UP AIR PRE-HEATER NO. 2	INCONEL TUBES CS SHELL 90 SQ. FT.		35,000	
100-22	GAS RECIRC HEAT EXCHANGER NO. 1	INCONEL TUBES CS SHELL 1,086 SQ. FT.		150,000	
100-23	GAS RECIRC HEAT EXCHANGER NO. 2	INCONEL TUBES CS SHELL 1,086 SQ. FT.		150,000	
100-24	HEAT RECOVERY EXCHANGER NO. 1			150,000	
100-25	HEAT RECOVERY EXCHANGER NO. 2			150,000	

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM
DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR
100-26	DRY AIR MAKE-UP SYSTEM COMPRESSOR NO. 1 MOTOR	4-STAGE CENTRIFUGAL 6,000 SCFM	2000 HP	346,000	
100-27	DRY AIR MAKE-UP SYSTEM COMPRESSOR SPARE MOTOR DRYER RECEIVER	4-STAGE CENTRIFUGAL 6,000 SCFM DESICCANT TYPE 225 GAL	2000 HP	346,000 60,000 5,500	
100-28	SORBENT HANDLING & STORAGE SYSTEM	ALLOWANCE	50 HP	175,000	
SUBTOTAL				4,781,500	

101-00	LININGS & INSTALLATION LABOR	ALLOWANCE		468,500	
SUBTOTAL				468,500	

200-1	PIPING - COAL GAS FEED TO ABSORBERS	36" DIAM C.S. - .5" WALL 3" REFRACTORY LINING- 100 LF 24" DIAM. C.S. - .5" WALL 3" REFRACTORY LINING - 150 LF		75,300	
200--2	PIPING - CLEAN GAS FROM ABSORBERS	36" DIAM C.S. - .5" WALL 3" REFRACTORY LINING- 100 LF 24" DIAM. C.S. - .5" WALL 3" REFRACTORY LINING - 150 LF		75,300	
200-3	PIPING - GAS RECIRC TO REGENERATOR	10" CS WITH REFRACTORY LINING SCH 40 WALL		36,000	

D. EQUIPMENT LIST

J1538

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM
DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR
200-4	PIPING - GAS FROM REGEN TO HEAT EXCHANGERS	20" CS - 5" WALL WITH REFRACTORY LINING		40,000	
200-5	PIPING - MAKE-UP AIR TO REGENERATOR	4" DIAM. CS - SCH 40 - UNLINED		20,000	
200-6	PIPING - SO2 DISCHARGE	12" DIAM. - SCH 40 C.S. WITH REFRACTORY LINING		30,000	
200-7	PIPING - MISC REGENERATOR SYSTEM	S/S & C/S SCH 40 6" DIAM & SMALLER UNLINED		90,000	
200-8	PIPING - N 2 FEED SYSTEM	C/S - SCH 40 - UNLINED 6" DIAM & SMALLER		90,000	
200-9	PIPING - VESSEL VENT & PRESSURIZING	S/S SCH 40 UNLINED - 6" & SMALLER		100,000	
200-10	PIPING SUPPORTS, ANCHORS & GUIDES	ALLOWANCE		150,000	

SUBTOTAL 706,600

D. EQUIPMENT LIST

J1538

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM

DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR
300-1	INSTRUMENTATION ANALYZERS H2S, O2, NOX, SO2 TRANSMITTERS -PRESS, TEMP FLOW/ WEIGHT SWITCHES - PRESS, TEMP FLOW, LEVEL CONTROLLERS-PRESS, TEM FLOW INDICATORS RECORDERS MISC PNEUMATICS SOLENOID VALVES SAMPLING SYSTEM NUCLEAR LEVEL GAGES PANELS/CRTS			400,000	
300-2	CONTROL VALVES - AIR MAKE- UP, N2 GAS RECIRC, SO2 STREAM, WATER/STEAM	12" & SMALLER WITH PNEUMATIC ACTUATORS 30/TRAIN		500,000	
SUBTOTAL				900,000	
310-3	BALL VALVES - SORBENT CONTROL & GAS ISOLATION WITH S/S PIPE STOOLS			716,000	
310-4	KNIFE GATE - SORBENT FEED SYSTEMS WITH S/S PIPE STOOLS			INCLUDED W/310-3	
310-5	ISOLATION VALVES - ABS & REGEN VALVES	WATER TYPE - REFRACTORY LINED 24" DIAMETER		200,000	
310-6	CENTRAL CONTROL ROOM EQUIPMENT - PLC&I/O RACKS			INCLUDED W/310-3	

D. EQUIPMENT LIST

J1538

IGCC PROJECT - STANDARDIZED AIR BLOWN GASIFIER STUDY
HOT GAS CLEANUP SYSTEM - BASED UPON GE PILOT SYSTEM

DATE: 7/21/90

EQUIP NO.	EQUIPMENT NAME	DESCRIPTION	POWER REQUIREMENT - BHP/KW	ESTIMATED EQUIP COST	SOURCE/VENDOR

SUBTOTAL 916,000

400-1 4.16 KV SWITCHGEAR & MCC

400-2 480 V SWITCHGEAR & MCC

400-3 ELECTRICAL POWER &
LIGHTING

SUBTOTAL 600,000

500-1 BUILDING STEEL CONCRETE

SUBTOTAL 631,000

600-1 INSULATION & PAINTING

SUBTOTAL 200,000

TOTAL 9,203,600

VALVTECHNOLOGIES, INC.
5904 BINGLE ROAD
HOUSTON, TEXAS 77092

May 21, 1990

CRS SIRRINE
P. O. Box 5456
Greenville, S. C. 29606-5456

Attention: Mr. George Ritz

Dear George:

The following applications represent where GEESI used most of our products in the Schenectady, New York project.

LOCATION	MEDIA	PRESS/TEMP	VALVE SIZE
Cyclone Outlet	Coal Gas	300/1130 Deg.F	4" ANSI 600#
Pressure Block	Coal Gas	300/1130 Deg.F	1-1/2" ANSI 600#
Sorbent Sample	Sorbent	Atmos/1000 Deg.F	3" ANSI 300#
Outlet Block	Coal Gas	300/1050 Deg.F	4" ANSI 600#
By-Pass Block	Coal Gas	300/1130 Deg.F	4" ANSI 600#
Inlet Block	Coal Gas	300/1050 Deg. F	4" ANSI 600#
Inlet By-Pass	Coal Gas	300/1050 Deg. F	3/4" ANSI 600#
LH Pressure	Coal Gas	300/1130 Deg. F	1-1/2" ANSI 600#

LOCATION	MEDIA	PRESS/TEMP	VALVE SIZE
Solids Sample	Coal Gas	300/1050 Deg.F	2" ANSI 600#
Regen Outlet	Coal Gas	300/1050 Deg.F	6" ANSI 300#
Lockhopper Outlet	Coal Gas	300/1050 Deg.F	6" ANSI 300#
LH Inlet	Sorbent	300/1050 Deg.F	6" ANSI 600#
LH Purge	Nitrogen	300/1050 Deg.F	1-1/2" ANSI 600#
Ash Letdown	Coal Ash	300/650 Deg.F	10" ANSI 300#

Most valves had pneumatic actuators, limit switches, solenoids and speed control valves all assembled and tested by Valvtech. Sample drawings are attached.

As requested, I am including estimated prices - valves only.

SIZE	PRICE
6"	\$ 10,000.00
8"	\$ 16,000.00
10"	\$ 24,500.00
12"	\$ 33,800.00

CRS SIRRINE

CALCULATION SHEET

ITEM _____

CLIENT JGCL LOCATION _____ JOB NO J-1538
SUBJECT FOUNDATIONS & DATE 6/7/90 PREPARED BY hjk
DEPT CONCRETE WORK CHECKED BY _____

GE ZINC FERRITE
FULL SCALE PLANT

ASSUME 60' ^{PRECAST} CONCRETE PILES @ \$1,000 ea. \$12 PILES ea

CAP FOR 12 30T CONC PILES = \$1,000 ea

TOTAL PER FNDN.

PILES 12,000

CAP 1,000

13,000 ea $\times \frac{1}{2} =$ \$123,500 TOTAL Piling

FLOOR SLABS 8" THK

grade 24' x 72'

MISC OUTSIDE 12 x 24

1728
288
1016 $\text{ft}^2 \times 6$

UPPER LEVEL 24 x 24 x 3 = 1728 $\text{ft}^2 \times 9$

grade beams

6,096
15,552
\$21,648
20,000
\$1,648

83
EQUIPMENT FOUNDATIONS
100 cu. yd @ 200

\$20,000
\$1,000

TOTAL CONCR.

CRS SIRRINE

PAGE NO. 2
MAR 87 CRSS 55:

CALCULATION SHEET

CLIENT _____ LOCATION _____ ITEM _____
SUBJECT _____ DATE _____ PREPARED BY _____
DEPT _____ CHECKED BY _____

Architectural Work - CONTROL ROOM, ELECT. ROOM, ROOF

Concrete masonry walls

$$24' \times 4' \times 12'h = 1152 \text{ ft}^2/\text{bay}$$

$$1152' \times 3 \text{ bays} = 3456 \times \$7/\text{ft}^2 = \underline{\$24,192}$$

Doors, windows interior finish (control room)
floors, etc.

allowance

\$50,000

$$\text{ROOF } 24 \times 72 = 1728 \text{ ft}^2 \times \$7 = \underline{\$12,096}$$

$$\text{SIDING } 2,000 \text{ ft}^2 \quad \$10 \quad \underline{\underline{20,000}}$$

PAINTING & INSULATION ALL.

\$100,000

FREIGHT ELEVATOR ALL

\$150,000

HVAC ENCLOSED SPACES

\$50,000

U/G PIPING & DRAINS

50,000

CRS SIRRINE

PAGE NO. 3
MAR 87 CRSS 55

CALCULATION SHEET

CLIENT _____ LOCATION _____ ITEM _____
SUBJECT _____ DATE _____ PREPARED BY _____
DEPT _____ CHECKED BY _____

SUMMARY

PILES & CAPS

\$123,500

SLABS & grade beams

31,600

CONCRETE MASONRY

24,200

FREIGHT ELEVATOR

150,000

MISC ARCH.

182,000

HVAC

50,000

U/G PIPING & DRAINS

50,000

EQUIP. FNDNS.

20,000

631,300

CRS SIRRINE

CALCULATION SHEET

ITEM _____

CLIENT IGUCLOCATION GE PILOT PLANTJOB NO. J-1538SUBJECT PIPING

DATE _____

PREPARED BY LJR

DEPT _____

CHECKED BY _____

PROCESS PIPING ~~SPEC~~ SYSTEMSSORBENT HANDLING

BASIS: ONE TRAIN

VALVES

8" KNIFE GATES

5 ea @ \$36,000 \$180,000

8" BALL VALVES

6 ea @ \$22,000 \$132,000

8" Flanges SS

26 ea @ \$420 12,000

MISC PIPE

6 expansion joints 4 @ \$30,000

10,000

24,000

\$358,000

X 2

TOTAL 2 TRAINS \$716,000

Plus expansion joints 4 @ \$10.4

PIPING SYSTEM - FUEL GAS IN & OUT

36" lined to 30" CS \$160²/ft pipe 2.2 ft³ ref. = \$275.

Total = \$435/ft of pipe

24" lined to 18" CS \$120/ft plus 1.36 ft³ ref. = 102

Total = \$212/ft.

36" line

50' horiz.

11.5 vert

1.65 X 275 = 45,375

4,530

Plus charges

\$49,805

86

24" line

50' X 212 = 10,600

hangers

1,100

11,700

CRS SIRRINE

CALCULATION SHEET

ITEM _____

CLIENT _____ LOCATION _____ JOB NO _____
SUBJECT _____ DATE _____ PREPARED BY _____
DEPT _____ CHECKED BY _____

REGEN. GAS COOLING CYCLE (ONE SYSTEM)

20" CSL to 14"

20" line
refractory

\$89 / ft
\$85 / ft

Total

\$174 / ft

70' X 174 = 12,180
Hangers 1,200
Fittings 5,000
\$18,380

MISC C.S. + S.S. piping systems

795,900

500,000
1,295,900

Sub

TOTAL PIPING

\$1,296,000

OF SIRRINE

DESIGN SHEET

Job STRUCTURAL STEEL COST
 Structure GE HGU PILOT PLANT
 Live Load Per Square Foot

Job No. 1-1538 Date 6/5/90
 Computed By
 Working Stress

CONVERSATION W/ JOE CROOK

LOWER LEVELS - 35 PSF FOR FRMG

UPPER LEVELS ~~25~~ PSF
35

3 - FULL X 35 X 25 X 75

5 - 2 X ~~35~~ X 25 X 25

98
~~62.5~~

175 - 200 TONS

~~250 TONS~~
 250 TONS

\$1500 - 1700 / TON
 FAB & ERECTED

Heavy steel @ \$700/ton \$425,000
 Light wt @ \$2500/ton 62,500
 Total steel cost \$487,500

Misc. steel 10% by wt. of heavy

10% X 250 = 25 ton

RESISTANCE

DESIGN SHEET

Job _____
Structure _____
Live Load Per Square Foot _____

Job No. _____ Date _____
Computed By _____
Working Stress _____

ESTIMATE OF HEAVY MEMBERS
AT TYPICAL VESSEL DECK

35 # of steel / sq. ft.

NUMBER OF SHEETS: 1
(INCLUDING COVER SHEET)

DATE: 5/17/90

TELEFAX COVER SHEET

FROM: RAY PITTARD
APPLICATION ENGINEER
INGERSOLL-RAND COMPANY
AIR COMPRESSOR GROUP
SOUTHEAST REGION SALES & SERVICE
CHARLOTTE, NC
(704) 527-0500
(800) 247-4321
FAX NUMBER: (704) 521-2378

PROCESS AIR
COMPRESSOR

TO: GEORGE RITZ

FAX: 803-234-2449

SUBJECT: PROJ. J-1538 / IGCC
GE HGCU

185 psig DISCH.

how much can go to
4 stage
2 inch to 5 stage
about \$15,000

BUDGET PRICE FOR C70M4

185 ~~175~~ PSIG UNIT WITH MOTOR
(2.25 psig) NET EACH \$346,212 x2=

2,000 HP 4 stage @ 185 psig

BUDGET PRICE FOR 42HP225 Reciprocating

NET EACH \$5384

Regards

Ray

4 Fairfield Crescent
P.O. Box 1381
1st Caldwell, N.J. 07007-1381

Telephone: (201) 575-6577
FAX No.: (201) 575-6783
TELEX No.: 139021

CRS Sirrine, Inc.

June 8, 1990

P.O. Box 5456
Greenville, S.C. 29606-5456
ATTN: Mr. George Rite (803)234-2543

Proposal 006-0807

Subject: Essex Skip Hoist Cable Dumper

One Essex Skip Hoist Cable Dumper as shown in attached literature.
All dimensions subject to engineering confirmation.

GENERAL

Model No.—CD80-6060-2016-SPL
Capacity—8000#
Dumping angle—45 Deg.
Dumping height—168'-0" to inlet of feed chute, 156'-0" to discharge of feed chute.
Dumping reach—18" to inlet of feed chute, 12'-0" to discharge of feed chute.
Material to be dumped—Zinc Ferrite Pellets
Speed—80 FPM high speed, 27 FPM low speed
Duty—5 Cycles/hr.

DIMENSIONS

Skip—60"Wide x 60"Deep x 60"High inside dimensions
Frame—86"Wide x 72"Deep x 2224"High

ELECTRICAL FEATURES

Power—230-460/3/60 (115v Control)
Motor—30/10 HP. TENV, CRANE & HOIST DUTY, single speed, squirrel cage, with "Fail-safe", disc-type, magnetic brake.
Starter—Hi/Low speed and Up/Down magnetic contactors with overload projection.
Wiring—In rigid conduit per NEC spec. All control devices wired to a terminal box.
Limit Switches—Upper, lower, slack cable, upper/lower overtravel and butterfly valve Open/Closed for each gate.
Enclosures—NEMA 7, Class I, Div.II, Group D.

MECHANICAL FEATURES

Gear Reducer—Right angle worm DIRECT COUPLED TO MOTOR & DRUM.
Drum & Bearings—Double grooved with self aligning bearings
Reeving—REDUNDANT—Two separate cables (each capable of supporting the full load) are attached to the drum.
Wire Rope—7 x 19 aircraft cable.
Wheels & Bearings—Machined steel single flanged with sealed roller bearings
Tracks—Four carbon steel channels.
Frame—Welded ASTM 36 steel frame.
Skip—Welded double wall with 4" thick calcium silicate insulation in between. Inside and outside walls to be fabricated from 14"GA thick plate. Top of skip to be tapered to an 12" square opening with the opening with an air operated butterfly valve and adapter spool to interface with the feed chute. Skip also to have four caloritech strip heaters and thermacouple wired to a terminal box. Heater controls to include disconnect, on/off switch, power/heater/high limit on pilot lighters, door mounted electrical temperature controller, high limit controller and magnetic contactor. Skip will also have a Dillon Model SGMT tension load cell mounted in hoisting cross head to weigh skip and contents. Load cell wired back to terminal box. Dillon Model SG 1000P digital indicator with 4-20 MA output also supplied (see attached literature). Temperature controller and digital indicators shipped loose for mounting in a remote, non-hazardous area. Wire from dumper terminal box to these devices by others.

Feed Chute—A 12" diameter, 10 GA pipe discharge feed chute to direct the zinc Ferrite pellets from the skip to system valve. Feed chute will be supported from dumper frame.

Inlet Chute—A retractable 10" square chute designed to attach to the fines separator through a flexible connection and feed the skip. Retracting means to be by pneumatic cylinders.

Material Contact Surfaces—All surfaces in contact with the zinc Ferrite pellets to be type 34 stainless steel with standard mill or 2B finish.

Finish—All carbon steel surfaces to be sandblasted to SSPL-SP-6, prime coat 2.5-3.5 mil (DFT) carbonic II, finish coat 1.5-2.0 mils (DFT) carboline 132.
Enclosure—Expanded metal enclosures on four sides of the frame to 7'-0" high at the mezzanine levels the dumper is next to.

PRICE, FOB West Caldwell, N.J.(FULLY WIED AND ASSEMBLED)if field conditions permit).....\$252,110.0 EACH (Firm for 60 days)

NOTE:The above specifications and pricing are preliminary only and may change after further engineering.

CRS Sirrine

Page # 3
June 8, 1990
Proposal 006-0807

TERMS—10% with order, 40% with approved drawings, 50%—1%10n30 on shipment. All material will be invoiced (f.o.b. shipping points unless otherwise stated) on date of shipment or when ready for shipment, whether partial or complete.

SHIPMENT—14 to 16 weeks after receipt of approved drawings.

CANCELLATION—May not be cancelled without approval of Essex Conveyors, Inc. Cancellation charge based on material and labor completed on contract at date of cancellation with a minimum charge of 10% of total contract.

WARRANTY—Equipment to be free from material and manufacturing defects under recommended use and service for one year from shipment day. Equipment returned f.o.b. West Caldwell, N.J. and judged by us to be defective will be replaced f.o.b. West Caldwell, N.J.

ACCEPTANCE—All orders subject to acceptance and approval at our West Caldwell, N.J. office.

Very truly yours,
ESSEX CONVEYORS, INC.

Jack L. Sumner—President

Roller & Bearing Assembly

Aircraft Type Wire Rope

Frame—All Welded ASTM A36 Steel

Skip—ASTM 36 Welded Steel. Designed to receive customer's container or loose material.

Push Button Control Station - Constant pressure, momentary contact for automatic cycle, timed cycle, etc.

Cable Dead End - May be equipped with adjustable overtension limit switch to prevent operation over rated capacity.

Upper Limit Switch

Slack Cable Limit Switch - Stops motor and sets brake if skip lowering motion is obstructed in shaftway.

Mechanical Installation - Requires only shimming for level and bolting to your floor.

Electrical Installation - Attach only three power wires and one ground wire to building electrical system.

Drive - Totally enclosed, single speed, Squirrel Cage Motor with fail safe disc type magnetic brake direct coupled to single grooved drum.

Lower Limit Switch

OPTION - Expanded metal enclosure with vertically rising counter-weighted shaftway door with mechanical and electrical interlock to prevent skip travel when door is open or opening door when skip is not in proper position.

LOAD SIDE

DUMP SIDE

RIGHT SIDE

THERMAL CERAMICS
P.O. BOX 923
AUGUSTA, GEORGIA 30903
TEL: 543423
FAX: 404-796-4328

234-2449

FAX NO. 803- ~~248-6280~~		DATE: 6/4/90
TO: CRS Sirmine Greenville, SC ATTN: George Ritz		REF. NO.:
		FROM: Steve Chernack
RE: Coal Gas Desulfurizer		NO. PAGES TO FOLLOW 4

Please find attached heat flows & recommendations

Any questions, please advise

Sorry we didn't include installation rates but some of
areas require special installations i.e.

- ① Dome - laying & supporting
- ② Cast vibrating a line

③ special cast of a heat exchanger tubesheet
It would really be best (even if it is budget price only) to
consult our contractors.

ROUGH Installation costs to follow by lunch.
See attached

CRS SIRRINE

6/4/90

REV 1 6/7/90 Δ REGENERATOR + ABSORBER

Recommend a fired shape with a high purity to resist chemical attack -

Thermal Ceramics 80 Firebrick

6" thick

See heat flows attached

price /sf (estimated)

Approximately \$30/sf
material only

Approximate Installation Cost = \$45/sf

= \$75 / ft²

LINES

Small diameter lines with 3" of refractory lining
use Kaocrete HPM-45

It has extremely low porosity because it has almost no cement
very chemically resistant material

material Price = 60.00 / ft³

\$30 / Ton matl.

Installation Price $\approx$ \$65 / ft³

= \$125 / ft³

HEAT EXCHANGER TUBESHEET

KAOTAB 95 - High Purity, High Alumina Castable

material Price = \$140 / ft³

\$165 / Ton matl.

Installation Price $\approx$ \$150 / ft³

= \$290 / ft³

ABSORBER

**THERMAL CERAMICS HEAT FLOW SYSTEMS
STEADY STATE HEAT FLOW ANALYSIS**

CONDITIONS : WALL
AMBIENT TEMP: 80 F.

ATMOSPHERE : STANDARD
EMISSIVITY : 0.95

VELOCITY : 0 FPS

TEST ID	THICKNESS	PRODUCT NAME	PRODUCT MANUFACTURER	INTERFACE TEMPERATURE
1	6.00 IN	80 FB	THERMAL CERAMICS	HF 1200 F.

COLD FACE	512 F.
HEAT LOSS	1832 BTU/SF/HR
HEAT STORAGE ...	12178 BTU/SF

REGENERATOR

THERMAL CERAMICS HEAT FLOW SYSTEMS STEADY STATE HEAT FLOW ANALYSIS

CONDITIONS : WALL   ATMOSPHERE : STANDARD
INLET TEMP: 80 F.   EMISSIVITY : 0.95   VELOCITY : 0 FPS

WALL THICKNESS	PRODUCT NAME	PRODUCT MANUFACTURER	INTERFACE TEMPERATURE
6.00 IN	80 FB	THERMAL CERAMICS	HF 1500 F.

COLD FACE	584 F.
HEAT LOSS	2430 BTU/SF/HR
HEAT STORAGE ...	15564 BTU/SF

LINES

THERMAL CERAMICS HEAT FLOW SYSTEMS
STEADY STATE HEAT FLOW ANALYSIS

CONDITIONS : WALL   ATMOSPHERE : STANDARD
AMBIENT TEMP: 80 F.   EMISSIVITY : 0.95   VELOCITY : 0 FPS

1AT.   PRODUCT   PRODUCT   INTERFACE
CORE THICKNESS   NAME   MANUFACTURER   TEMPERATURE

2 3.00 IN KAOCRETE HPM 45 THERMAL CERAMICS HF 1500 F.

COLD FACE ..... 646 F.
HEAT LOSS ..... 3017 BTU/SF/HR
HEAT STORAGE ... 8183 BTU/SF

CBI

CBI Services, Inc.

TELECOPY

St. George Road
Bourbonnais, IL 60914-9799

815 933 4440

DATE: JUNE 13, 1990
TO: GEORGE RITZ
CRS SIRRINE, INC.
(803) 298-6288

FROM: STEVE KNOTT
CBI

WE ARE TRANSMITTING 1 LETTER SIZE PAGES INCLUDING THIS COVER SHEET.

IF ANY PROBLEMS ARISE, PLEASE CALL (815) 933-2200.

WE ARE TRANSMITTING ON AN ADLER ROYAL FX 945 GROUP 3 MACHINE.

OUR TELECOPY NUMBER IS (815) 933-6722, TELECOPY OPERATOR SHARON HOWARD

ADDITIONAL COMMENTS:

RE: (2) 13' ϕ X 11' ϕ X 26' REGEN.
(2) 14' ϕ X 30' ABSORBER
(GE HGU)

(SKIP)

MR. J.D. PERRYMAN OF OUR OFFICE REQUESTED
WE CONTACT YOU WITH BUDGET PRICING
REGARDING THE (4) VESSELS REFERENCED
ABOVE.

REGENERATOR(S)

A) SHIP PART BU WITH FINISHING VESSELS IN FIELD
\$439,000 (2)

B) SHIP 100% BU (NO FIELD ERECT OR SETTING)
\$335,000 2 vessels ship. fab \$167,500 ea.

ABSORBERS

A) SHIP PART BU WITH FINISHING VESSELS IN FIELD
\$520,000

B) SHIP 100% BU (NO FIELD ERECT OR SETTING)
\$385,000 2 vessels ship fab \$192,500 ea

PLEASE BE ADVISED THAT WE DID NOT CHECK
SHIPPING CLEARANCES TO FLORIDA FOR THE (B) OPTIONS.

Steve Knott

RIGGINS

COMPANY, INC.

410 Rotary St. Hampton, Virginia 23661

804-826-0525

(804) 826 0525

REQUEST FOR BID

Since 1960

DATE: _____

TO: CRS Sicrine

RIGGINS BID NO: 90-04-049

ATTN: George Rita

SUBJECT: Pressure Vessels

ENCLOSED PLEASE FIND THE FOLLOWING:

Budgetary Estimates

PLEASE SUBMIT PRICE NO LATER THAN: _____

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT US.

NOTES: Regenerator \$80,416.00 ea.
Absorber 84,574.00 ea.
Lockhoppers 34,996.00 ea.

PRICE: _____

SIGNED: Ray B...

SIGNED: _____

TITLE: _____

TITLE: _____

DATE: 6-7-90

DATE: _____

PROPOSAL

HAHN & CLAY

MACHINISTS & FABRICATORS — SHOP & FIELD REPAIRS
5100 CLINTON DRIVE • P.O. BOX 15521 • HOUSTON, TEXAS 77220
(713) 672-1671 • TWX 910 881-1559 HAHN CLAY HOU.
FAX: 713/672-0420

DATE: JUNE 5, 1990

CRS SIKRINE, INC.
P.O. BOX 5456
GREENVILLE, SOUTH CAROLINA 29606

OUR PROPOSAL NO. #32813

YOUR REFERENCE NO. XXXXXXXXXX

ATTN: GEORGE J. RITZ

DIRECT INQUIRIES ON THIS PROPOSAL TO: BEVERLY MAGUIR

(803) 234-2543

GENTLEMEN: THE FOLLOWING IS OUR PROPOSAL ON YOUR INQUIRY:

FURNISH LABOR AND MATERIAL TO FABRICATE THE FOLLOWING VESSELS
PER DATA SPECIFICATIONS, 4 PAGES.

TWO (2) REGENERATORS — 13' X 11' DIA X 26' OAL.

BUDGET PRICE.....\$185,000.00 EACH X 2 = 370,000 \$3.10/lb
APPROXIMATE WEIGHT..... 25 TONS

TWO (2) ABSORBERS 14' ID X 30' OAL

BUDGET PRICE.....\$290,000.00 EACH X 2 = 580,000 \$2.90/lb
APPROXIMATE WEIGHT.....50 TONS
\$950,000

P.O.B. POINT: HAHN & CLAY

TERMS: NET 15 DAYS

DELIVERY:

ESTIMATED SHIPPING WEIGHT:

This proposal is subject
to terms and conditions set forth on the back hereof
or as amplified in this Proposal.

ACCEPTED BY: _____ 102

Per _____

Date _____

HAHN & CLAY

Per

GENE WOODRUFF
VICE PRESIDENT
PRICING & QUOTATIONS

THE ABOVE PROPOSAL SHALL BE EFFECTIVE FOR 60 DAYS FROM DATE HEREOF.

HAHN & CLAY

MACHINISTS & FABRICATORS — SHOP & FIELD REPAIRS
5100 CLINTON DRIVE • P.O. BOX 15521 • HOUSTON, TEXAS 77220
(713) 672-1671 • TWX 910 881-1559 HAHN CLAY HOU.
FAX: 713/672-9420

DATE: JUNE 11, 1990

CRS SIRRINE, INC.
O. BOX 5456
GREENVILLE, S.C. 29606

OUR PROPOSAL NO. #32814

YOUR REFERENCE NO. ~~██████████~~

DIRECT INQUIRIES ON THIS
PROPOSAL TO:

BEVERLY MAGUIRE

GEORGE J. RITZ

(803) 234-2543

ITEM: THE FOLLOWING IS OUR PROPOSAL ON YOUR INQUIRY:

FURNISH LABOR AND MATERIAL TO FABRICATE TWO (2) REGENERATOR.
LOCKHOPPEKS 7' I.D. X 6' SHELL LENGTH. SA-516-70 MATERIAL.
ASME VIII, DIVISION 1.

BUDGET PRICE EACH.....\$35,000.00

NOTES:

- TERMS: 10% UPON SUBMITTAL OF DRAWINGS,
40% UPON RECEIPT OF MAJOR MATERIAL,
BALANCE AT SHIPMENT
- PRICE DOES NOT INCLUDE REFRACTORY OR INSULATION.

POINT: HAHN & CLAY

SEE NOTE #1
EVERY: 6 MONTHS
MATED SHIPPING WEIGHT: 15,000 LBS.

This proposal is subject
to terms and conditions set forth on the back hereof
or as amplified in this Proposal.

ED BY: _____ 103

Per _____

Date _____

HAHN & CLAY

Per
GENE WOODRUFF, VICE PRESIDENT
PRICING & QUOTATIONS

THE ABOVE PROPOSAL SHALL BE EFFECTIVE FOR 60 DAYS FROM DATE HEREOF.

*****
* SOUTHERN HEAT EXCHANGER CORP. *
* P.O. BOX 030008 *
* TUSCALOOSA, AL. 35403 *
* Fax. # (205) 345-0009 *
* Tel. # (205) 345-5335 *
*****

=====
* Facsimile Transmission Document *
=====

To: CRSS Date: 6-18-90

Greenville, SC

Attention: Mr. G. J. Ritz

Fax. no.: 1-803-234-2449

RE: Your Project J-1558 as revised per fax of 6-18-90
The following documents are being sent to you:

No. of pages (including cover): 1

Comments: Process Gas Heater: one (1) 23-144 BEM

Heat exchanger, Inconel 625 Tubeside, 304SS shell, Tubeside
design temp changed to 1150°F, Refractory lining not

included in price, 1086 SQ FT SURFACE area.

BUDGET PRICE: \$140,000.

Air Preheater: one (1) 12-48 BEM, Inconel 625 tubeside,

carbon shell, 90 SQ FT surface area

From: Pat Tedesco

104

Budget Price: 35,000

Lead time could be 30-36
weeks depending on tubing delivery at

If you do not receive all pages, or experience transmission
problems, please call Kathy as soon as possible at the tel. time of
order.

5901B Peachtree-Dunwoody Rd., N.E., Suite 500 • Atlanta, GA 30328 • 404/394-4587

FAX NO. 404/395-0380

DATE: 6-8-90

TELECOPY TO:

MR GSO RITZ
CPS SIBLINE
GREENVILLE, SC

TELECOPIER NO:

803/234-2449

FROM:

P.E. JOHNSON
A-C COMPRESSOR CORPORATION - ATLANTA

SUBJECT:

RG UP INQ for 3 Blowers
SO₂/AIR Power Plant

We EST \$275,000 Net Each for
1-MODEL D8HSR INCL
GEAR, lube Sys, 700 HP
MOTOR

CONDITIONS: $Q_1 = 2147$ ACFM

$P_1 = 140$ PSIA

$P_2 = 185$ PSIA

INL TEMP = 250° F.

DEL: 34 WKS ARO

NOTE: IF U CAN ARRANGE for

250° F INL TEMP we

PERFER TO USE THIS INL

AIR TEM. 105

MORE INFORMATION will follow

NO. OF PAGES
INCL. THIS PAGE

1

FOR ANY PROBLEMS WITH TRANSACTION, PLEASE CALL 404/393-1579.

P.O. Box 579
1005 W. Riverside Drive
Jeffersonville, IN 47130
FAX 812/288-4708
Executive Offices 812/288-4710
Sales and Accounting 812/288-4700

June 5, 1990

CRS Serrine
P. O. Box 5456
Greenville, SC 29606-5456

Attention: Mr. George Ritz

SUBJECT: High Temperature Feeder/Screen
General Electric Environmental Services

Dear George:

Enclosed are copies of drawings 25D-9972-A and 25D-9972-B. These detail the feeder recently furnished to General Electric Environmental Services Incorporated. Design capacity was 1 to 12 TPH when handling materials having normal temperatures of 850 to 900° F. Maximum temperature was 1000° F. Overall dimensions of the feeder are noted on these drawings.

For your case we understand a feeder approximately 4' longer is required. With all of the same accessories we would estimate a price of \$65,000 to \$70,000 for each of the two feeders that are required for this new installation.

Please let us know if you have any questions or require additional information at this time. We are here to serve you.

Very truly yours,

CARMAN INDUSTRIES, INC.

Carl L. Porter/mh

Carl L. Porter
General Sales Manager

CLP:mh

Enclosures: Drawings

DESCRIPTION	ABSORBER	REGENERATOR	REGEN SYSTEM	SOLIDS TRANSF	UTILITIES	BUILD. SERV	COAL GAS	UNIT PRICE	TOTAL PRICE	Remarks
Flow Element (Hot Gas)	10	6	1	1				1000	18000	
Flow Switch	7	1		1				720	8480	
Flow Transmitter	2	3	1					1200	7200	
Pressure Indicator	1		6		3			300	3000	
Pressure Switch					1			1050	1050	
Pressure Transmitter	4	3	3					1200	12000	
Thermowell/Thermocouple (regular)	2	4	10		1			350	5950	
Thermowell/Thermocouple (heavy duty, spec)	8	9					1	450	8100	
Temperature Indicator	1				1			200	400	
Temperature Transmitter	2	8	10		1			550	11550	
								1700	5100	
Level Switch	1	1		1				5000	15000	
Level Transmitter (Nuclear)	1	1		1				2500	5000	
Gas Analyzer - H2S c/w sampling probe	1	1						1200	8400	
Sampling Probe (only)	1	3	1				2	10000	10000	
Gas Analyzer - O2 (averaging c/w 3 probes)		1						2200	2200	
Leak Detector, qty 1								1000	2000	
Speed Transmitter (c/w pick-up gear)	1	1		1				2000	2000	
Weight Transmitter								300	1800	
Solenoid Valve	6				1			2000	2000	
Pressure Control Valve (PRV)								3000	66000	
Modulating CV c/w pneum. actuator (2-3")	12	6	4				1	6000	6000	
Modulating CV c/w pneum. actuator (4-6")								3000	9000	
Local Pneum. Controller c/w actuator	1	1	1					2500	2500	
On-Off Valve c/w pneum cylinder (2-3")	1		2	3				7000	35000	
On-Off Valve c/w pneum cylinder (4-6")										
Position Switch	1			4				400	2000	
Control System (hardware, config, CRT, total I/O count: AI-100, AO - 26, DI - 75, DO - 64)									200000	
Panel Annunciator (20 points)								2000	10000	
Panel 3-pen Recorder, qty 5										
TOTAL									480730	480730

400,000 - instruments
 180,000 - control cabinets / I/O
 500,000 - control valves 12" & smaller
 MAY 6/21/90

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0010

AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0010- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-1.	HUMIDIFYING TOWER							4,350,560	
10-1.A	HUMIDIFYING TOWER PUMP TANK								
10-1.B	HUMIDIFYING TOWER PUMPS								
10-1.1	MOTORS					E 200 HP RPM			
10-2.	WASHING TOWER							W/10-1	
10-2.A	WASHING TOWER PUMPS								
10-2.1	MOTORS					E 175 HP RPM			
10-3.	WEAK ACID STRIPPER							W/10-1	
10-4.	DRYING TOWER							W/10-1	
10-4.A	DRYING TOWER PUMP								
10-4.1	MOTOR					E 40 HP RPM			
10-4.B	DRYING TOWER PUMP TANK								
10-5.	ACID STRIPPING							W/10-1	
10-6.	ABSORPTION TOWER (2)							W/10-1	
10-6.A	ABSORPTION PUMP								
10-6.1	MOTOR					E 40 HP RPM			
10-7.	COLD HE (2)							W/10-1	
10-8.	HOT HE (2)							W/10-1	
10-9.	DRYING TOWER COOLER							W/10-1	
10-10.	ABSORBER COOLER (2)							W/10-1	
10-11.	WEAK ACID COOLER (2)							W/10-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0010- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-12.	PREHEATER							W/10-1	
10-13.	PRODUCT ACID COOLER							W/10-1	
10-14.	SEAL POT							W/10-1	
10-15.	NEUTRALIZATION PIT							W/10-1	
10-16.	SULPHUR HOLDING PIT							W/10-1	
10-17.	REACTOR CONVERTER							W/10-1	
10-18.	GAS LIQUID SEPARATOR							W/10-1	
10-19.	ELECTROSTATIC PRE- CIPITATOR							W/10-1	
10-20.	DRYING TOWER DEMISTER							W/10-1	
10-21.	ABSORBER DEMISTER (2)							W/10-1	
10-22.	NEUTRALIZATION TANK (2)							W/10-1	
10-22.1	MIXER MOTOR					8 10 HP RPM			
10-23.	PREHEATER AND SULPHUR FURNACE							W/10-1	
10-24.	PRODUCT AND DRAIN PUMPS (2)							W/10-1	
10-24.1	MOTORS (2)					8 7.5 HP RPM			

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0010- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-25.	FUEL OIL PUMPS (2)							W/10-1	
10-25.1	MOTORS					E .5 HP RPM			
10-26.	SLURRY PUMPS (3)							W/10-1	
10-26.1	MOTORS					E 10 HP RPM			
10-27.	MAIN GAS BLOWER							W/10-1	
10-27.1	MOTOR					E 1250 HP RPM			
10-28.	START-UP BLOWER							W/10-1	
10-28.1	MOTOR					E 50 HP RPM			
10-29.	ATOMIZING AIR BLOWER							W/10-1	
10-29.1	MOTOR					E 30 HP RPM			
10-30.	STACK					150' HIGH X 4'DIAM		W/10-1	
10-31.	INSTRUMENTS							W/10-1	
10-32.	CONTROL VALVES							W/10-1	

DOE IGCC Project Estimate

Equipment Area: 0010

Description: Sulfuric Acid Plant

Estimate: \$ 4,350,560

Comment:

Tim J. Browder Co. prepared a "Conceptual Design Report for Sulphuric Acid Production from Coal Gasification/Hot Gas Cleanup Island" (DE-F21-89MC26019). Mr. Tim Browder was contacted to discuss the effect on cost estimates for utilizing a more highly concentrated SO₂ stream. He estimated a capital cost of \$8,000,000 for a sulphuric acid plant consuming 15,000 lb/hr of SO₂ @ 12% vol. The 100MW Combined Cycle produces 5,526 lb/hr of SO₂ @ 11.74% vol. Using the above quote, the above capital costs associated with this size plant is obtained from multiplying the estimate by a scaling factor. The scaling factor is found by raising the ratio of the SO₂ flow rates to the 0.61 power.

Thus,

$$\begin{aligned}\text{cost of 100MW Cycle} &= \$8,000,000 * (5,526/15,000)^{0.61} \\ &= \$4,350,560.\end{aligned}$$

The sulphuric acid plant will consume 450 kW.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

PRINT DATE: Jan 30 1991

JOB NAME: STANDARDIZED COAL/GAS IGCC

AREA NO.: 0011

DATA DATE: Jan 30 1991

JOB LOCATION: 100 NW

AREA NAME: BOOSTER COMPRESSOR

- PAGE 0011- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
11-1.	BOOSTER COMPRESSOR							800,000	

DOE IGCC Project Estimate

Equipment Area: 0011

Description: Booster Compressor

Estimate: \$ 800,000

Comment:

Elliott Compressor and A-C Compressor, were contacted with respect to the 100 MW Combined Cycle conditions of boosting 233,635 lb/hr of 184 psia air to 350 psia. The air is bled off of the gas turbine compressor at 681 F and is cooled to an inlet temperature to the booster compressor of 400 F by water spray. A-C Compressors responded by quoting a price of \$800,000 for these conditions.

Contact at A-C Compressors is Paul Johnson.

DOE IGCC PROJECT ESTIMATE
100 MW Plant

EQUIPMENT NO:

DESCRIPTION: Construction and Start-up

ESTIMATE: \$16,760,000

COMMENT:

The attached construction estimate from Metric Constructors for a single ABB GT11N in North Carolina reflects a similar project to the CC portion of the DOE project. Using the Metric quote as a reference the total estimate for the DOE project is developed as follows:

o Site Preparation	\$ 360,000
o Civil/Structural	\$7,700,000
o Mechanical	\$3,900,000
o Electrical	\$3,200,000
o Misc	\$ 500,000
o Startup/Test	\$1,100,000
 TOTAL	 \$16,760,000

Two South Executive Park
6185 Park Road
Charlotte, NC 28210-3294
704/654-1416
FAX: 704/651-1299

VIA FAX MACHINE

November 29, 1989

CRS Serrina, Inc.
216 South Pleasantburg Drive
Post Office Box 5456
Greenville, South Carolina 29606-5456

Metric Constructors, Inc. is pleased to submit our proposal for the construction of a 146 MW cogeneration facility in Eastern North Carolina. Our price for performing the work per our discussions and the attached documents is \$14,500,000. This price is exclusive of sales taxes, performance bond, quantity contingency and other items as stated in our proposal qualifications. We suggest including a quantity contingency of \$ 750,000.

Attached please find the following:

1. Division of Responsibility;
2. Qualifications;
3. Quantity List; and
4. Concrete by Structure.

Please note the target quantities are approximately five percent (5%) less than the original Energy Initiative's quantities and the site construction duration is 15 months.

If you should have any questions, please let us know.

Very truly yours,

METRIC CONSTRUCTORS, INC.

James M. Walker / by GAS

James M. Walker
Vice President

JMW:GAS:lam

Attachments

WESTERN VIRGINIA PROJECT

CRSS/METRIC General Division of Responsibilities

Description	CRSS	METRIC
Overall Project Management	X	
Conceptual Design/Scope Definition	X	
Detail Design & Specifications	X	
Equipment Selection	X	
Technical Procurement	X	
Site Management & Supervision		X
Construction Labor		X
Construction Equipment		X
Site Technical Assistance	X	
Material Quantities *		X
Design Schedule	X	
Equipment Deliveries F.O.B. Jobsite	X	
Construction Schedule		X
Subcontract Coordination		X
Material Warranty	X	X
Performance Guarantees	X	
Escalation	X	X
Contingency - Performance	X	
Contingency - Scope	X	
Contingency - Productivity		X
Contingency - Price	X	X
Contingency - Quantities	X	X

* - NOTE: For the control of quantities from estimate through completion, both parties should have an incentive. Metric will develop quantities from its records and from CRSS provided documentation in order to develop its bid price. CRSS will review and agree to validity. A contingency fund will be set up that will be available to Metric for quantity increases and with proper documentation Metric's price will be increased. If all of the fund is not used at completion of the job then the remainder will be split between CRSS and Metric - 25% and 75% respectively. If the fund is depleted then the over runs will be paid for on a 50/50 basis.

EASTERN NORTH CAROLINA PROJECT

METRIC's Qualifications to the Proposal

1. Metric's price does not include any sales tax, building permit or performance bond. If a bond is required for our portion of the work, please ADD \$95,920 to our price.
2. We have not included any costs associated with handling or disposing of unforeseen underground conditions, obstructions, hazardous materials, toxic materials or asbestos.
3. Our price includes escalation in the amount of \$350,000. In addition, we propose that CRSS include a joint contingency of \$ 750,000 for quantity growth as referenced in the attached "Division of Responsibilities".
4. CRSS is to provide all engineered items. These items include but are not limited to all engineered hangers, engineered pipe supports, all control valves, all valves greater than 2" in diameter, all mechanical equipment, all electrical equipment excluding lights, the stack, the cooling tower and HRSG's fully erected.
5. We have not included the stack foundations, firewater intake or start-up assistance. Start-up and commissioning should be included at \$25/MH for all crafts (straight time only).
6. We have not included the pre-engineered buildings for the auxiliary boiler, the water treatment building, guard house or the emergency generator. We suggest including at least \$10/SF for these structures.
7. We have anticipated a 21-month overall project schedule commencing April, 1990. Our projected construction duration from ground breaking to mechanical completion is 13 months.
8. Our price is based upon the attached quantities.
9. We have assumed that the project will drain naturally after finish grading is complete.
10. Our proposal assumes the same site conditions as the Energy Initiatives project.

11/30/89

EASTERN NORTH CAROLINA PROJECT

MEIRIC's Quantities List

<u>Description</u>	<u>Quantity</u>
Site Grading	18,000 CY
Site Borrow	24,000 CY
Allowance for Unsuitable Material	3,000 CY
Sheet Piling	300 LF
Pre-Cast Piling (12" x 35')	400 EA
Asphalt Paving	6,000 SY
Fencing	4,000 LF
Site Stone Inside the Loop Road	5,600 Tons
Total Concrete	5,471 CY *
Structural Steel	900 Tons
Siding	40,000 SF
Total Piping (Above & Below Ground)	45,000 LF
High Voltage Cable	15,000 LF
600 Volt Cable	110,000 LF
Tray Cable	80,000 LF
Control Cable	110,000 LF
Cable Tray	3,300 LF
Conduit	40,000 LF
Light Fixtures	325 EA

* - Breakdown by structure is attached.

11/30/89

EASTERN NORTH CAROLINA PROJECT

METRIC's Concrete by Structure Breakdown

<u>Description</u>	<u>Quantity</u>
Auxiliary Boiler	221 CY
Cooling Cooling Tower Basin	320 CY
Cooling Tower Pumphouse	375 CY
Cooling Tower Intake for Make-Up	150 CY
Demin. Tank Foundation	45 CY
Diesel Generator	65 CY
Control Building	150 CY
Fuel Oil Containment	450 CY
Fuel Oil Tank Foundations	133 CY
Fuel Unloading	125 CY
Gas Turbine Building	717 CY
Guard House	7 CY
HRSG Foundations	142 CY
Lab/Dosing Skids	25 CY
Main Transformer Foundations	250 CY
Neutralization Tank	24 CY
Oil Separator	142 CY
Pipe Racks	250 CY
Raw Water Tank	10 CY
Steam Turbine Building & Pedestal	1,300 CY
Maintenance	170 CY
Water Treatment Building	<u>400</u> CY
 TOTAL Cast-In-Place Concrete:	 5,471 CY

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-1.	NO. 1 COMBUSTION GAS TURBINE GENERATOR (CGTG)						22,400,000		
12-2.	NO. 1 T-G INLET AIR SYSTEM						W/12-1		
12-2.A	FILTER					TWO STAGE	INCL		
12-2.B	SILENCER					SYSTEM	INCL		
12-2.C	DUCT						INCL		
12-3.	NO. 1 T-G GAS FUEL SYSTEM						W/12-1		
12-4.	TURBINE T-G LUBE OIL SYSTEM						W/12-1		
12-5.	NO. 1 GENERATOR						W/12-1		
12-6.	NO.1 T-G FIRE PROTECTION SYSTEM						W/12-1		
12-7.	NO. 1 T-G CONTROL MODULE						W/12-1		
12-8.	NO. 1 T-G GENERATOR BREAKER MODULE						W/12-1		
12-9.	GENERATOR NON SEGREGATED						W/12-1		
12-9.A	BUS. DUCT GENERATOR TO BREAKER								
12-10.	HEAT RECOVERY STEAM GENERATOR (ERECTED)						5,500,000		
12-11.	SCR						3,000,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0012

AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0012- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-12.	STACK						825,000		
12-12.A	PLATFORMS & LADDERS						INCL		
12-13.	NO. 1 CGTG/HRSG EMISSION MONITORING SYSTEM						110,000		
12-14.	STEAM TURBINE EXTRACTION/CONDENSING						6,668,000		
12-15.	GENERATOR						W/12-14		
12-16.	T-G GLAND STEAM SYSTEM						W/12-15		
12-16.A	GLAND STEAM CONDENSER								
12-17.	T-G LUBE OIL SYSTEM						W/12-15		
12-17.A	RESERVOIR AND PUMPS								
12-18.	GENERATOR BREAKER MODULE						250,000		
12-19.	GENERATOR NON SEGREGATED						322,000		
12-19.A	BUS DUCT								
12-20.	STEAM TURBINE CONTROL MODULE						W/12-15		
12-21.	ST BRIDGE CRANE						175,000		

DOE IGCC Project Estimate

Equipment No: 12-1

Description: Combustion Turbine

Estimate: \$ 22,400,000

Comment:

This estimate includes all equipment and interfaces for a standard nominal 80 MW gas fired combustion turbine power plant used for an outdoor combined cycle application.

Refer to the attached budget quote references for the GE frame 7 and the ABB GT 11N. The GE quotation of \$34MM is for the complete power block. The breakout for the gas turbine package is comparable to the ABB quote for the Gas Turbine package. Serrine experience is that the \$18 MM is a reasonable market estimate for this scope of equipment. The additional \$4.4 MM is for combustion modifications for firing low-Btu fuel.

GENERAL ELECTRIC

**INDUSTRIAL MARKETING OPERATION
UTILITY MARKETING OPERATION
Schenectady, New York**

RAPICOM TRANSMITTAL SHEET Date 4/23/90To Mr. Mike FeeneyLocation Greenville, SCPhone (803) 281-3768FAX - (803) 281-3712From Greg StarheimLocation Schenectady, NYPhone (518) 385-9107

No. of pages to follow _____

Attached please find my
8/14/90 estimate for a
STAG 107EA for your
request.

cc: J.C. Hester

T. Van Norstrand

c/o S. Stark, (803) 241-3

Rapicom No. 8*235-9237

**GE Industrial &
Power Systems**

Unit & Industrial Services
General Electric Company
1000 North 17th Street, Waco, TX 76787

**Bldg. #273-400
(518) 385-9807**

August 14, 1989

**CRS Surrine, Inc.
216 South Pleasantburg Drive
Greenville, SC**

Subject: Budgetary Proposal

In support of your efforts to develop an Integrated Gasification Combined Cycle Demonstration Plant as part of the Department of Energy's Clean Coal Technology Program Cycle III, GE is pleased to provide this budgetary proposal to CRS Surrine, Inc. for a typical Engineered Equipment Package.

SCOPE OF SUPPLY

- . One (1) PG7111EA, base mounted, single shaft gas turbine.
- . One (1) 3600 rpm, single-flow, non-reheat steam turbine.
- . Two (2) Totally enclosed water-to-air cooled generators.
- . One (1) Natural circulation heat recovery steam generator.
- . Associated instrumentation and controls.

Further definition of the proposal equipment is provided in the enclosed typical GE Equipment and Services Proposal for One (1) STAG 107EA Combined Cycle Power Plant.

The above equipment shall be designed to operate in a combined cycle configuration on natural gas fuel.

In order to operate the above Equipment Package on low Btu coal gas fuel, the following additional scope of equipment and associated engineering is planned:

- . Air extraction control skid
- . Off-base fuel gas control skid
- . Combustion modifications for low Btu gas

August 14, 1989
Page 2

PRICING

The Engineered Equipment Package, less the necessary scope for operation on low Btu gas, is commercially available for approximately thirty four million dollars (\$34,000,000.00).

The necessary engineering and additional equipment planned for operation on low Btu gas is commercially available for approximately four million four hundred thousand dollars (\$4,400,000.00).

PRICE BASIS

The above prices are based on shipment of equipment occurring January 1991. For shipments beyond this date, prices would be subject to the escalation provisions of Price Adjustment in the accompanying typical proposal.

Prices presented herein are FOB factory, with freight allowed to existing rail siding nearest the Purchaser's plant site.

GE shall retain the risk of loss or damage to each component until delivery at the existing rail siding nearest the Purchaser's plant site.

CONDITIONS OF SALE

This budgetary proposal is in accordance with GE Power Generation Conditions of Sale as presented in the accompanying typical proposal document.

GENERAL

A Hot Gas Control Valve development program is required in order to use the gas turbine equipment specified herein but has not been included in the scope of this budgetary proposal. GE has also not included any other special provisions for interfacing with the proposed hot gas clean up and gasifier system.

August 14, 1989
Page 3

The gas turbine business of the GE Power Generation is a commercial enterprise, with financial routines and operating procedures not established in accordance with the FAR's or CAS, and therefore is not in a position to support the submission of certified cost or pricing data.

This proposal has been prepared in accordance with GE Power Generation's commercial pricing routines and not as a cost based government contract.

Exemption from the submission of certified cost or pricing data in accordance with FAR 15.804-3 and the "General Provisions for Cost Sharing Cooperative Agreement", is required and is the basis for this proposal.

If there are any questions or comments, please do not hesitate to call. We look forward to discussing the contents of this proposal with you in the future.

Sincerely,

Gregory J. Starheim
Sales Manager

GJS:bjr
GJS89002

ABB BROWN BOVERI

1440 LIVINGSTON AVE
NORTH BRUNSWICK, NJ 08902

DATE: Apr. 20, 90
PAGES INCLUDING
COVER SHEET 1

FAX TRANSMISSION COVER SHEET

TO: <i>Mr. T. Cipriani</i>	FAX # <i>281 3712</i>	COMPANY <i>CRS - Greenville</i>	LOCATION
FROM: <i>T. Anderson</i>	FAX # <i>201-932-6173</i>	COMPANY <i>ABB Energy Services Inc.</i>	LOCATION <i>No. Brunswick, N.J.</i>

SUBJECT: ABB GT11N for coal gasification.

Dear Tony,

As a follow up to our discussions,
budgetary information for your DOE
GT11N coal gasification program,
ABB's today's price is \$18.0
million for the combustion turbine
and \$2.0 million for the coal
gas burner provision.

We shall follow-up next week
with a more conceptual & detailed
proposal letter for your review.
- Best Regards
Tom

CRS SIRRINE

COMBUSTION TURBINE COST ADDER FOR LOW BTW GAS FIRING PROVISIONS

Base upon information provided by ABB regarding GT-11N and GE regarding a Frame 7 the cost applicable for the nominal 100MW plant is \$4,400,000

The information from both suppliers is included in the cogeneration island information section.

DOE IGCC Project Estimate

Equipment No: 12-10 & 12-11

Description: Heat Recovery Steam Generator (HRSG) & SCR

Estimate: \$8,500,000

Comment:

The attached reference HRSG budget quotation from Deltak of \$4.25MM is for a recent ABB GT 11N application with steaming conditions that represent a standard combined cycle application for the size CT frame.

In addition, the erection quotation and freight dollars are representative of reasonable budget dollars for this application. The total has been rounded to \$5.5 MM.

The SCR budget quote has been increased \$500,000 over the \$2.5 MM to add for the ammonia skid and expected catalyst surface increase above a standard application based on the potential thermal NOx produced from the low btu gas process.

2905 Northwest Blvd.
Minneapolis, Minnesota 55441
Phone: 612/544-3371
Fax: 612/557-4700 ok

March 7, 1990

CRS Sirrinc, Inc.
216 South Pleasantburg Drive
Greenville, SC 29606

ATTN: Mr. Michael T. Feeney
Power Engineer
Power Division

RE: CRS Sirrinc, ABB
Type 11 Turbine,
HRSG Budget Proposal
Deltak Proposal No. B11328

Dear Mr. Feeney:

We are proposing to furnish One (1) "Dino 3396 Heat Recovery Steam Generator" to be connected to the exhaust of one (1) ABB Type 11 Gas Turbine as described in Deltak Proposal No. B11328 dated February 19, 1990 for the BUDGET base selling price Case A of \$4,250,000.00.

(Four Million Two Hundred Fifty Thousand Dollars)

F.O.B. Point of Manufacture.

Total estimated shipping weight: 1,850,000 lbs.

Options (ADDS):

1. Freight to New Jersey Jobsite,
Cars Nearest Railsiding .....ADD \$ 185,000.00
2. SCR of 80% Reduction with 2" WC, AIG,
Ammonia Injection Skid, Analyzers
By Others .....ADD \$2,500,000.00

Options (DEDUCTS):

1. Case B .....DEDUCT <\$ 425,000.00>

The prices quoted are firm through shipment provided acceptance within 60 days of proposal date.

*Can - you provide
- Erection cost - Budget
- 1991 - 1st quarter
- Monday - latest
ready for trim*

CONFIRMING

\$150,000 FOR HRSG

*FT. 35,000.00
~~2,500,000.00~~*

March 7, 1990
CRS Sirrine, Inc.
Mr. Michael T. Feeney
Page 2

Terms:

- 5% Upon receipt of purchase order number or thirty (30) days from engineering release, whichever comes first.
- 10% Upon issuance of main submittal drawing package for approval. Main submittal package is defined as general arrangement, foundation layout, process & instrumentation diagram, individual module assembly drawings, and trim bill of materials.
- 45% Upon receipt of "major materials" at point of manufacture prorated to the individual "heat recovery modules". "Major materials" are defined as only tubes, headers, and drum plate. "Heat recovery modules" are defined as only those modules with tube bundles.
- 20% Upon completion of shop hydrostatic test of each heat recovery module, prorated to each individual heat recovery module as a percent of the total number of heat recovery modules.
- 20% Upon readiness for shipment (at point of manufacture) of each individual heat recovery module, prorated to each module as a percent of the total number of heat recovery modules.

Terms are net cash 30 days from date of invoice.

All payments in arrears are subject to a finance charge of 1% per month on outstanding balance.

Taxes:

The prices given above do not include any taxes. All applicable taxes shall be assumed and paid by Purchaser, unless by applicable law such taxes must be collected or remitted by Deltak, in which event, the amount of such taxes shall be added to the price of the equipment. A copy of the Purchaser's tax exemption certificate will be required with receipt of purchase order.

Drawings:

Assembly drawings for your approval will be submitted within 10 weeks after receipt of purchase order.

2905 Northwest Blvd.
Minneapolis, Minnesota 55441
Phone: 612/544-3371
Fax: 612/557-4700

March 26, 1990

CRS Sirrine, Inc.
216 South Pleasantburg Drive
Greenville, SC 29606

ATTN: Mr. Michael T. Feeney
Power Engineer
Power Division

Erection Quote

Dear Mr. Feeney:

Per your request, Deltak is proposing to erect the equipment described in our proposal number B11328 dated February 19, 1990 for the budget price of \$1,150,000.00.

(One Million One Hundred Fifty Thousand Dollars)

This quote is based on the following assumptions:

1. Site has no obstruction or limitations.
2. Lay down area is prepared and available.
3. Foundations are by others.
4. Rail spur is within 1000 ft of site.
5. Haul roads are adequate for equipment supplied.
6. S:

This quote has the following scope:

1. Erection of Deltak supplied equipment.
2. Chemical cleaning.

March 26, 1990.
CRS Serrine, Inc.
Mr. Michael T. Feeney
Page 2

The following is not included:

1. Finish paint.
2. Insulation and lagging of remote drums, D.A. and IC piping.
3. Field wiring.
4. Field pneumatic.
5. Calibration of instruments.

The above quote can be firmed up after a site visit.

If you have any questions, please feel free to call.

Best regards,

James C. Ramsey
Sales Staff Engineer
Deltak Corporation

cc: Bob Constantine - Power Tech
Ed Stec - Deltak Corporation

JCR/amv

DOE IGCC Project Estimate

Equipment No: 12-12

Description: HRSG flue gas stack

Estimate: \$825,000

Comment:

Reference the attached budgetary quotation for two steel stacks at 175 ft elevation. These quotes are for 2 ABB GT 11N 80MW units for cogeneration application.

For the DOE application, the budgeted CT stack will be a single 150 ft outer steel shell with two flues. This is to allow the HGPU exhaust flue gas to be directed to the same main stack structure.

The budgeted estimate of \$825,000 was based on factoring the two single stack dollars to a combined stack of 20 ft OD with two steel flues. One of 13ft ID and the second of 5 ft ID.

Stack outer shell	\$472,000
Two Flues	\$ 88,000
Platforms	\$ 80,000
Freight	\$ 30,000
Erection	\$125,000
Lighting	\$ 30,000
TOTAL	\$825,000

. BUDGET PRICING
WIND LOADS PER 12/12/89 FAX

JANUARY 11, 1990

FOR 100MW DOE -
Stacks \$60,000
Platforms 80,000
T 30,000
Erection 125,000
Lighting 30,000
\$255,000

150	1. Two (2) 175'x13' I.D./14' O.D. HRSG Stacks	\$660,000.00
	2. One (1) Auxiliary Boiler Stack	140,000.00
	3. Three (3) Galvanized Test Platforms including Ladder and SAF-T-Climb to Platform Elevation with Specified Electrical	120,000.00
	4. Truck Freight to Jobsite	50,000.00
	5. Erection	<u>150,000.00</u>
	TOTAL	\$1,120,000.00

OPTIONS:

A. Top 20' HRSG Flues 316L SS	Add	\$38,000.00
B. Top 20' Auxiliary Boiler Flue 316L SS	Add	7,000.00
C. Externally Insulated HRSG Stacks		--
D. Externally Insulated Auxiliary Boiler Stack		--
E. Second Coat of Paint on HRSG Stacks in Shop		Included
F. Second Coat of Paint on Auxiliary Boiler Stack		Included
G. FAA Lighting and Access	Add	69,000.00
H. Stack Dampers for HRSG Stacks	Add	18,000.00
I. For 1/4" Minimum Thick Outer Shell in Lieu of 5/16" Min. on (2) HRSG Stacks	Deduct	(24,000.00)
J. For 1/4" Minimum Thick Outer Shell in Lieu of 5/16" Min. on Auxiliary Boiler Stack	Deduct	(5,000.00)

Continued...

Notes:

1. Prices based on average size breeching inlet openings.
2. Stainless steel is 3/16" 316L plate.
3. Inner shell plate is minimum 1/4" on all stacks.

ALL PRICES PER TERMS AND CONDITIONS ATTACHED

Drawings: 2 - 4 Weeks After Receipt of Order
Material: 2 - 3 Months After Order
Delivery: 3 - 4 Months After Drawing Approval and Receipt of
Material
Installation: 5 - 6 Weeks After Arrival at Jobsite

WARREN ENVIRONMENT, INC. / 5075 ROSWELL ROAD / ATLANTA, GEORGIA 30342 / 404 • 843 • 8333

January 11, 1990

FAX: 803 281 3712

c/o CRS Sirrine, Inc.
P.O. Box 5456
Greenville, SC 29606

Street Address: 216 South Pleasantburg Dr.
Greenville, SC 29607

Attn: Mr. Michael T. Feeney

Gentlemen:

In accordance with your request, Warren Environment, Inc. is pleased to offer the attached close budget proposal on two larger dual wall stacks along with the one auxiliary boiler stack.

At your given design flow rate of 2,650,000 #/hr of gas, and further based on a flue gas temperature of 227°F, the velocity of the gases in a 13' I.D. stack would be 5,750 feet per minute. This is not excessive stack velocity for gas turbine exhaust.

At the above gas flow rate the stack would produce an available draft of approximately 0.4 iwg while having a combined entrance friction and exit draft loss of some 2.1 iwg; thereby having a back pressure on the system at the duct entering the stack of 1.7 iwg. By flairing the inner flue at the top of the stack to 14' I.D., the back pressure can be reduced by approximately .5 iwg.

We trust this information will suffice for your current needs. We thank you for the continued opportunity to serve.

Very truly yours,
WARREN ENVIRONMENT, INC.

Raymond M. Warren, Jr., P.E.
President

:pg

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DOE IGCC Project Estimate

Equipment No: 12-13

Description: Stack Emission Monitoring Equipment

Estimate: \$110,000

Comment:

The attached budget quotation from Horiba, excluding the certification testing and data acquisition system, totals \$114,728. The above systems equipment estimate of \$110,000 is within acceptable margin.

HORIBA**HORIBA INSTRUMENTS INCORPORATED**

1021 Duryea Avenue, Irvine, California 92714
Phone: 1 (800) 4 HORIBA, TELEX: 472-0213
In California phone (714) 250-4811

QUOTATION

TO: CRS Sirrine Engineers, Inc.
216 S. Pleasantburg Drive
Greenville, South Carolina 29607-5456

DATE: 3/6/90

QUOTATION NO: B-ICA-003002
(Please reference quotation number in
all correspondence)

ATTENTION: Mr. Don L. Howard, Purchasing Agent

CUSTOMER INQUIRY: GO86-024

ITEM	QTY.		UNIT PRICE	NET PRICE
03		<u>Stack Outlet Continuous Emissions Monitoring Requirement</u>		
	1	Horiba shall supply the Model ENDA-1420 continuous emission monitoring system to measure NO_x, CO and O₂ and the Model ENDA-1130 to measure continuously SO₂. Horiba shall integrate into the SO₂ system an LSI Model 1100M Opacity Monitor. Horiba ENDA-1420 C.E.M. System The ENDA-1420 system consists of analyzers for the continuous measurement of three parameters and a complete sample conditioning system prewired and preplumbed in a cubicle ready for field installation. The ENDA 1420 system includes NO_x, CO, plus O₂ <u>System Specifications:</u> Measured Components: NO_x, CO and O₂ Measurement Principles: O₂ - Magnetopneumatic (Paramagnetic) NO_x - Cross Flow NDIR Measurement Range: NO_x - 0-100 ppm and 0-200 ppm CO - 0-100 ppm and 0-200 ppm O₂ - 0-10%, 0-25% Repeatability: ±1.0% of F.S. Linearity: ±1.0% of F.S. Response Time: 1 min. (90% at system inlet) Sample Probe: 304 S.S. electrically heated external filter with 2" 150 lb. ASA flange connection Outputs: 4-20 maDC isolated, and 0-1V simultaneous outputs. <u>With:</u> Automatic Calibration Feature Recorder, 3 pen packaged in ENDA-1400 series Calibration valve installed at the sampling probe NO_x/O₂ Correction module		

HORIBA
HORIBA INSTRUMENTS INCORPORATED

1021 Duryea Avenue, Irvine, California 92714
 Phone: 1 (800) 4 HORIBA, TELEX: 472-0213
 In California phone (714) 250-4811

QUOTATION

TO: CRS Serrine Engineers, Inc.
 216 S. Pleasantburg Drive
 Greenville, South Carolina 29607-5456

DATE: 3/6/90

QUOTATION NO: B-JCA-003002
 (Please reference quotation number in all correspondence)

ATTENTION: Mr. Don L. Howard, Purchasing Agent

CUSTOMER INQUIRY: GO86-024

ITEM	QTY.		UNIT PRICE	NET PRICE
		Horiba Model ENDA-1130 SO₂ C.E.M. System <u>Specifications:</u> Measuring Principle: NDIR Measuring Range: 0 - 100/200 ppm Repeatability: ±1% of Full Scale Linearity: ±1% of Full Scale Response Time: 4 minutes (90% at system inlet) Sample Probe: 304 S.S. electrically heated external filter with 2" 150 lb. ASA flange connection Output: 4-20 maDC isolated, and 0-1V simultaneous outputs. All systems are provided with recommended consumable spare parts for one year continuous operation. <u>With:</u> Automatic calibration feature Recorder, 1 pen, packaged in ENDA-1130 Calibration valve installed at the sampling probe Sample Pre-Conditioner for high water applications The total cost of the stack outlet monitor is		
03A	LOT	Heat traced sample line estimated 400 ft. @ \$30./ft.	\$89,413.00	
BB	LOT	Horiba shall supply zero and span gases for NO _x , CO, O ₂ and SO ₂ in "A" size cylinders with appropriate two-stage regulators.	\$12,000.00	
		NOTE: All Horiba analyzer systems provide isolated 4-20 maDC signals for each parameter plus alarm contact closures. Each of these signals may be directed to the customer's distributed control system.	\$5,815.00	
	LOT	Horiba recommends 2 days of installation assistance and training per system (6 days) at \$680./per day plus per diem and travel expenses. Horiba estimates approximately \$1,000. expenses.	\$5,000.00	
	LOT	Horiba can subcontract on-site certification testing for the emission stack continuous emission monitoring parameters. On-site certification testing will be required for NO _x , CO, O ₂ and SO ₂	\$20,000.00	

TO: CRS Sirmine Engineers, Inc.
216 S. Pleasantburg Drive
Greenville, South Carolina 29607-5456

QUOTATION NO: B-ICA-003002
(Please reference quotation number in all correspondence)

CUSTOMER INQUIRY: GO86-024

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DOE IGCC Project Estimate

Equipment No: 12-14

Description: Steam Turbine Equipment

Estimate: \$6,668,000

Comment:

The attached steam turbine generator and auxiliaries quotation is for a 40 MW ABB VAX, double casing extraction condensing unit. This quotation is representative of an appropriately sized unit for the DOE IGCC application. Adjustments for steaming conditions are estimated to add approximately 15-20% to this estimate.

The budget estimate of \$6,668,000 was developed as follows:

Steam Turbine Generator	\$5,114,000
Foundation Design	\$ 75,000
Control Options	\$ 65,560
Start-up spares	\$ 26,000
Supervisor st'up & erection	\$ 111,400
Escalation 6%	\$ 323,517
Steam Conditions upgrade	\$ 952,523
TOTAL	\$6,668,000

August 25, 1989
Page 1 (4)

EQUIPMENT AND SERVICES

	<u>PRICE USD</u>
Total firm price for one turbine generator having a delivery schedule of 14 months, after full release (subject to intermediate sales).	HT16/LT25 \$5,114,000.00 With a <u>45,100 MVA Generator</u>

The above price is valid for the Scope of Supply as listed under Divider #5 of this proposal. Transport costs and insurance costs for delivery f.o.b. jobsite are included. Federal customs duty is included at the rate announced valid for one consolidated shipment as of the date of this letter.

Any and all other Federal, State and Local Taxes, Fees, Duties and similar costs are not included in the price.

ABB TURBINE, INC. reserves the right to review the pricing due to international variations in the exchange rate.

ERECTION/COMMISSIONING ADVISORS AND OPERATOR TRAINING

	<u>Lump Sum</u>	<u>Daily Rates</u>	
<i>mechanical</i> Erection	<u>15 weeks \$64,800*</u>	Please see enclosed	"B"
Supervisor **)		Preliminary Standard Rates.	
<i>elect</i> Start-Up	<u>9 weeks \$46,600*</u>	Please see enclosed	"A"
Supervisor		Preliminary Standard Rates.	

*) Travel, transportation and accommodation billed at cost.

**) The erection supervisor remains at site after completed erection as mechanical start-up supervisor.

August 25, 1989
Page 2 (4)

TRAINING

Besides the practical training and education which will be given during start-up and commissioning, we recommend 2-3 days classroom training at the site. Additional cost for the training course materials and people is 16,000 USD. The training course is held by the commissioning engineer assisted by the senior design engineer.

OPTIONS

(Prices valid when ordered together with the main order.)

Deletion of Oil Conditioner Unit ^{NEED THIS} (\$17,500.00) ^{FILTER MEDIA}
Addition for 50 MVA, P.F. 0.8 Generator \$68,000.00 ^{ok}
Additional Price for Foundation Design \$35,500.00 ^{ok}

*) A1a.	Synchoscope, Double Volt Meter, Double Frequency Meters	\$ 2,300.00	ok
*) A1d.	MUNDUS Event Recorder, 128 Channels	\$ 4,750.00	NO
*) A1j.	Signal Interface System. 84 binary functions, 27 Analog 4-20 mA	\$26,530.00	23,000 keep
	- Additional Cubicle Section For Interface	\$ 5,650.00	ok
*) A1m.	Automatic Synchronizing System QAVA 102	\$20,000.00	ok
	Synchronizing Check Relay RASA	\$ 3,080.00	
*) B1j.	Extra Automatic Voltage Regulator	\$16,230.00	NO
	- Additional Cubicle Section for Extra AVR	\$15,950.00	
*) Id.	Lightning Arrestors and Capacitors	\$ 8,000.00	ok
*) Td.	Generator Rotor Withdrawal Tool	\$15,100.00	open
*) Ua.	Control & Supervisory Equipment Spares	\$41,150.00	open
*) Ub.	Generator & Exciter Spares	\$77,000.00	open
*) Uc.	Voltage Regulator Spares	\$16,230.00	open
50MVA up		23,293 + 3	ok

*) Refer to Electrical Scope of Supply under Divider 5.

August 25, 1989
Page 3 (4)

OPTIONS...cont'd

**)	Spare Parts for Turbine System 20	\$134,637.00
**)	Spare Parts for Systems 31,32,33	\$ 12,371.00
-	(Spare Parts for System 41 - 44	SEE ELECTRICAL ABOVE)
**)	Spare Parts for System 51-52	\$ 19,014.00
**)	(Price for 1 year of Consumables	\$ 3,096.00)

**)

Refer to "RECOMMENDED SPARE PARTS" under Divider 2.

TERMS OF PAYMENT

- 6% of the contract price upon placement of order;
- 24% of the contract price twelve (12) months prior to the schedule delivery date to site;
- 30% of the contract price six (6) months prior to the scheduled delivery to site;
- 30% of the contract price thirty (30) days after shipment; of, if delivery is delayed by Purchaser, ABB TURBINE, INC.'s notification of readiness to ship; and
- The balance of the contract price on the date of Initial Synchronization of the Equipment, but in no event later than 120 days after shipment.

A revised payment schedule based upon specific milestones can be negotiated, however, the overall progress payment schedule closely follows actual expenditure.

Due to our high internal interest evaluation, we are pleased to advise that it is possible to achieve a significant price reduction by increasing the early payment percentages from those listed above.

August 25, 1989
Page 4 (4)

VALIDITY

This bid is valid for contract by September 1 and Material Release by October 1, 1989.

A later release will increase the price with 1% per month. Please also keep in mind that the cancellation costs will be adversely affected with a later release, due to various commitments we must make at the time of the contract.

MIKE BURGESS, VICE PRESIDENT

If you have any questions, please contact:

Commercial --

Michael L. Bugg
Area Manager, Southeast Region
Telephone # 201-932-6262

Technical --

Sven Erlandsson
Manager, Application Department
Telephone # 201-932-6406

P (PSIA)	T (DEGREE F)
M (LBS/HR)	H (BTU/LB)

② GLAND STEAM LEAKAGE
1746 M
1261.4 H

ABB STAL		HEAT BALANCE		CASE 1 - GAS F.	
STEAM TURBINE DIVISION		M. JOHANSSON		O - EXPORT	
		PTIR 87 26			

DOE IGCC Project Estimate

Equipment No: 12-21

Description: STG Bridge Crane

Estimate: \$175,000

Comment:

Reference the attached budget quote for a 40 ton unit provided for a similar application.
The final estimate is based on adders for structural steel for crane rails, freight, installation
service, and escalation.

Shepard Niles
Crane & Hoist Corporation
A Subsidiary of Vulcan, Inc.
Montour Falls, N.Y. 14865

PROPOSAL NO. _____

INQUIRY NO. _____

DATE _____, 19____

TO: CRS SIKANE / Mike Voss

CMAA CLASS D (HEAVY DUTY), DOUBLE GIRDER, DUAL DRIVE A4
FLOOR OPERATED, PUSH BUTTON PENDANT FROM HOIST.
HOIST AND TROLLEY CONTROLS ON HOIST, BRIDGE CONTROLS ON BRIDGE.

Capacity Main Hoist	40	Tons	Capacity Aux. Hoist	10	Tons	Net Weight	49,900	Lbs. Each	CRANE
Max Single Wheel Load	53100	Lbs	Wheel Base (WB)	13'-0"		Runway Rail	80	Lbs	
A	4'-6"		B	3'-3 1/4"		C	3'-2 1/2"		
D	1'-1"		E	7 1/2"		F	50'-0"		
H	7'-0"		I	3'-0"		L	8'-0"		
M	8'-0"		N	149		X	6'-8 3/4"		
Y	35'-0"		Z	35'-0"					

FOB NY: \$149,750 EST FRT \$2000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-1.	CONDENSER					TWO PASS	847,000		
13-1.1	HOTWELL						INCL		
13-1.2	EXPANSION JOINT						INCL		
13-2.	CONDENSATE PUMP NO 1 & 2 (110%)						28,000		
13-2.1	MOTOR						INCL		
13-3.	ATMOSPHERE DRAIN TANK					4' DIA X 4' S.S.	2,500		
13-4.	ATMOSPHERE DRAIN TANK PUMP NO. 1						3,000		
13-4.1	MOTOR						INCL		
13-4.A	INSULATION						INCL		
13-5.	CONDENSATE DRIP TANK PUMP NO. 1						3,000		
13-5.1	MOTOR						INCL		
13-5.A	INSULATION						INCL		
13-6.	CBD FLASH TANK						7,000		
13-6.A	INSULATION						INCL		
13-7.	CBD HEAT EXCHANGER						4,000		
13-7.A	FREIGHT						INCL		
13-8.	DEAERATOR HRSG (COMBINED)						110,000		
13-8.A	INSULATION						INCL		
13-9.	DEAERATOR OVERFLOW FLASH TANK						5,000		
13-9.A	FREIGHT						INCL		
13-9.B	INSULATION						INCL		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

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PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0013- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-10.	HRSG HP/IP BOILER FEEDWATER PUMPS (50%) (3)							450,000	
13-10.A	FREIGHT							INCL	
13-10.1	MOTOR							INCL	
13-10.B	ARC VALVE							INCL	
13-10.C	WARM UP ORIFICE							INCL	
13-10.D	START UP STRAINER							INCL	
13-10.E	INSULATION							INCL	
13-11.	BLOWOFF TANK (2)							7,000	
13-12.	DESUPERHEATER PUMP NO. 1 & 2 (110%)							25,000	
13-12.1	MOTOR								

DOE IGCC Project Estimate

Equipment No: 13-1

Description: Steam Turbine Condenser & Auxiliaries

Estimate: \$847,000

Comment:

The attached budget quotation from Holtec International is for a steam turbine of similar load rating but lower temperature and pressure steaming conditions. It is expected that changes due to back end turbine design, full load bypass dump conditions, and cooling tower design parameters will cause for pricing increases. These changes are reflected in the estimate indicated above.

Factoring the given quotation and adding for installation and start-up service, the totalized estimate is as follows:

Base Quote	\$576,017
Freight	\$ 15,000
Supervisory	\$ 25,000
Exp Joint	\$ 50,000
Escalation	\$ 40,000
Design Change	\$140,983
TOTAL	\$847,000

HOLTEC INTERNATIONAL

139 A. Galther Drive, Mount Laurel, N.J. 08054-1713 • (609) 234-8668
 Telex 910-240-6663
 Telecopy 609-234-1491

December 4, 1989

CRS Surrine, Inc.
 216 South Pleasantburg Drive
 P. O. Box 5456
 Greenville, SC 29606

Attention: Don L. Howard

Gentlemen:

Persuant to your inquiry on the above noted heat transfer equipment we are pleased to provide the following:

1. We would like to bring to your attention that Holtec International has received a letter of intent from CNG Services Company for supplying the above noted heat transfer equipment. A copy of the letter of intent, Holtec letter, dated March 17, 1988, and Holtec proposal dated January 19, 1988 is included for your reference.
2. A review of the CRS Surrine, Inc. specifications reveals that there have been additions/deletions to the design requirements for the main condenser as compared to the CNG Services Company Letter of Intent.
3. As a result, we are providing revised prices to account for escalation (selling price of \$529,465.00 in the Letter of Intent was for order placement by August 1, 1988) and changes in design requirements.
4. Revised Price:

One (1) Steam Surface Condenser with 304 s/s tubes, 304 s/s tubesheet, seal welded tube to tubesheet joints and auxiliaries	\$576,017.00 FOB Jobsite
5. The increase in the condenser price (as compared to that in the Letter of Intent) is due to the following:
  - a. Escalation in material/manufacturing cost (Add)
  - b. Replacing (1) 100% capacity vacuum pump with one (1) 100% steam jet air ejector system (Deduct)

For 100MW DOE
 5-76,017
 10,000 FT
 20,000 CH. W/TW S-P.
 5000 SMT. UP
 611,017
 50,000 OFF. JOINT
 661,017
 700,678
 840-850
 SEEMS TO
 LOW USE
 EXTRA
 water Turb

HOLTEC INTERNATIONAL

- c. Increasing hotwell capacity from three minute storage time to five minute storage time (Add)
  - d. Including steam dump arrangement (Add)
  - e. Increasing condenser heat transfer surface area from 47132 feet² to 48196 feet² (Add)
  - f. Including six(6) automatic air release valves (Add)
  - g. Including 1/2% spare condenser tubes (to be shipped loose)
6. Selling price in item 4 includes the following auxiliaries:
- a. One (1) 100% capacity vacuum pump
  - b. One (1) 100% capacity steam jet air ejector
  - c. One (1) rupture disc
  - d. Six (6) automatic air release valves
7. Selling price is valid for 60 days from the date of proposal.
8. Selling price does not include any taxes.
9. Selling price includes freight charges of \$10,000.00 for condenser and hotwell.
10. Selling price is based on the following progress payments:
- a. 10% upon submittal of general arrangement drawings
  - b. 40% upon receipt of tubes
  - c. Balance upon shipment

All payments are net 30 days.

DOE IGCC Project Estimate

Equipment No: 13-2 & 13-12

Description: Condensate & Desuperheat Pumps

Estimate: \$28,000 & \$25,000

Comment:

The attached Byron Jackson pump quotation from Brown & Morrison is for condensate pumps of a similar design but lower flow conditions then will be used for the DOE project. Factoring from this quote the estimate for the condensate pumps is \$28,000 for two 110% pumps.

The desuperheat pumps are also "can" type pumps with a similar flow to the reference quote but a higher head is required. The factored estimate is given as \$25,000 for two 110% pumps.

BROWN & MORRISON

Manufacturers Representative
Phone 704 554-8570

P.O. Box 240827
Charlotte, NC 28224-0827
4101 Denmark Rd.

January 15, 1990

Jones/CRSS Lakewood
Post Office Box 5456
Greenville, South Carolina 29606

Attention Mr. Don L. Howard
Purchasing

Subject

Gentlemen

We are pleased to respond to the above inquiry inviting our proposal on three (3) Byron Jackson vertical pumps for condensate service.

We understand the design conditions are as follows:

Number of Units	Three (3)
Type Pump	Vertical
Location	Indoors
Fluid	Condensate
Flow	380 gpm
NPSH Available	10 ft
Developed Head	205 ft.
Discharge Head	215 ft.
Temperature	59 - 180°F
Length Pump Column	as required for NPSH

How low for Dot

Based upon the above, we are pleased to offer the following:

Manufacturer	Byron Jackson
Number of Units	Three (3)
Model	VLT
Size	700
Stages	Three (3)
Curve	Attached
Efficiency	72%
Speed	3550 rpm

Brake Horsepower	27
Shutoff Horsepower	24
Runout Horsepower	27
Runout Flow	515 gpm
<u>NPSH Required</u>	
Design Flow	10 ft.
Runout	13 ft
Impeller Specific Speed	2642 rpm
Lubrication	Self Lube
Impeller Type	Enclosed
<u>Materials</u>	
Casing	A48-Class 30)
Impellers	A48 (Class 30)
Shaft	A582 416 stainless steel
Wear Rings	A743 Gr. CA15
Discharge Column	A53 fabricated steel
Suction Can Length	5.6 ft.
Discharge Pipe	5 in.
<u>Coupling</u>	
Manufacturer	Byron Jackson
Type Adjustable Spacer	
Lifting Heights Required	6 ft.
<u>Motor</u>	
Manufacturer	U.S. Electric
Type	VSS
Enclosure	TEFC
Frame Number	286VP
HP Rating	30
Electrical	460/3/60
Service Factor	1.15
Insulation	Class F
Speed	3600
<u>Weights</u>	
Pump	940 lbs. each
Motor	329 lbs.
Total	1,260 lbs. each
Pump less Barrel	634 lbs. each
PRICE	\$11,360 each
F.o.B. Tulsa, Oklahoma	
Freight	Not Included

We have the following additional comments to make:

- (1) Included is Type ES stuffing box for packing
- (b) Plant 13 with pressure switch included
- (c) Coupling with recessed bolts and nuts included

For 100MW
DOE

FT 11,360
2000
13,360
+ 2
26,720
26,720
1,069
27,789
25000

- (d) Hydrotest all parts (bowls, head and barrel) included
- (3) Borg Warner QBS-SAYN mechanical seal included
- (f) Keyed impellers included
- (g) Case wear rings - 50 Brinnell difference included
- (h) Performance test - one (1) pump with vibration readings noted included
- (i) Three (3) ft. spoolpiece for NPSHA included

Shipment: 120 days after receipt of order or after approval if required

We take the following exceptions to your specifications:

- 5.9 Exception to shoulders and lock nuts. Impellers to be ring and key mounted.
- 5.10 Exception to keyed shaft sleeve. We will supply set screwed sleeve and seal.
- 5.11 Stuffing box will have a mechanical seal.
- 5.14 Exception to splitter ribs - Byron Jackson standard design in this size pump is adequate to safety limit any suction turbulence
- 5.15 Exception to support rings or gussets. Byron Jackson design in this "short set" application is adequately stabilized.
- 5.16.1 Impellers will be cast iron. Bearings will be Graphalloy type.
- 6.1 We will dye penetrant test the nozzle welds and ultrasonic test shaft only (dye penetrant test of impellers will add cost and time because impellers will have to be specifically ordered. (Advise if adder is required.)

We are enclosing the following:

- (a) Performance Curve
- (b) Sirrine Data Sheets
- (c) Bulletin 2.171
- (d) Page 2-171-1 Material Specifications

Page 4

- (e) Page 2-171-4 Keyed Impellers
(Vent valve not included)
- (f) Page 2-171-7 Sectional Drawing
- (g) Page 2-171-9 Outline Dimensions
(with one [1] spool piece)

We appreciate quoting.

Yours very truly,

BROWN & MORRISON, Representing
BW/IP INTERNATIONAL

W. C. Morrison
W. C. Morrison

WCM;jb

DOE IGCC Project Estimate

Equipment No: 13-8

Description: Deaerator

Estimate: \$110,000

Comment:

The attached deaerator quote from Sterling is very similar to the size requirement expected for the DOE application. Providing for escalation, field supervision and freight the total estimate is \$110,000.

Sterling Deaerator Company

8250 Niceman Road ■ Lenexa, Kansas 66214 ■ (913) 888-6969 ■ FAX (913) 888-8611

September 22, 1989

TO: C R S - SIRRINE

Attn: Rusty Prince

RE: Sterling Proposal #989-419B

SUBJ: Deaerator/Storage Tank

Listed below is the budget price and information for equipment per your verbal request to Mr. Joel Carter:

Model: 120VHT-8237-1113 (ASME Sec. VIII, Div. 1)

Operating Criteria: 50 PSIG @ 298 deg. F.

Capacity: 500,000#/HR / 75 PSIG Internal Pressure @ 320 deg. F.

Storage Capacity: 10 min. from below overflow

Material: SA-516-70 // Corrosion Allowance: 1/16"

Heater: 10'0" Dia. x 4'6" Str. Length
 Shell: 5/8" thk. Heads: 9/16" thk.

Storage: 11'0" Dia. x 13'0" Str. Length
 Shell: 11/16" thk. Heads: 5/8" thk.

Shipment: 18 - 22 weeks ARO approved drawings

Price: \$95,000.00

F.O.B.: Shipping Point // Shipping Weight: 43,200 LBS.

Sincerely,
 STERLING DEAERATOR COMPANY

Scott D. Ross
 Chief Engineer

cc: AS-Tech Engineering/J. Carter

Spray - Tech. Type I - yes

Shipping - \$1,000

Where use - Sect I - design

43,055
 - locked in

Shielded

95,000
 4,000 Freight
 99,000
 1,060 ESC

105,000
 5,000 ADD FIELD SUPER.
 110,000

DOE IGCC Project Estimate

Equipment No: 13-10

Description: HP/IP Boiler Feedwater Pumps

Estimate: \$450,000

Comment:

The attached quotation from Byron Jackson, through Brown & Morrison, represents a base estimate for the pumps required for the DOE application. Adding for testing, service hours, escalation and freight, the total estimate would be as follows:

Base Pumps HP	\$103,887 x 3 =	\$311,631
Base Pumps LP	\$ 21,880 x 3 =	\$ 65,640
Testing		\$ 5,093
Service		\$ 35,000
Escalation		\$ 22,636
Freight		\$ 10,000
TOTAL		\$450,000

BROWN & MORRISON

Manufacturers Representative
Phone: 704 554 8570P.O. Box 240827
Charlotte, NC 28224-0827
8101 Denmark Rd. (20217)

FAX #704-552-9448

TELEFAX MESSAGE

To: CRS-SIRRIEDate AUG 4, 1989Attn: MARK KUNKEL

Page (s) follow this page

From: Bill Morrison

803-291-3712

Subject: BYRON JACKSON PUMPS→ CONDENSATE PUMPS

NUMBER	TWO ( )
CAPACITY	2000 GPM EACH
HEAD	350 FEET
TEMPERATURE	121°F
TYPE	CAN TYPE VERTICAL
MODEL	1500 VLT
SIZE	~~10x12x24~~ 10x12x24
SPEED	1800 RPM
STAGES	FOUR (4)
MOTOR	250HP, WPI 3/60/460/460
PRICE	\$21629 EACH
ADD FOR API	\$4870 EACH
WEIGHT	7000 LB EACH
EST. FREIGHT	\$1400 EACH

$$\frac{150 \text{ psi}}{\times 2.31} = \text{TOK}$$

Bill Morrison

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0014
 AREA NAME: COOLING TOWER CIRC. WTR SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0014- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
14-1.	COOLING TOWER							921,000	
14-1.A	FREIGHT								
14-1.B	PERFORMANCE TEST								
14-1.C	ERECTION								
14-2.	COOLING TOWER WATER TREATMENT SYSTEM							INCL	
14-2.A	INHIBITOR BULK TANK								
14-2.B	INHIBITOR PUMP								
14-2.1	MOTOR								
14-2.C	HYPOCHLORITE BULK TANK								
14-2.D	HYPOCHLORITE PUMP								
14-2.1	MOTOR								
14-2.C	HYPOCHLORITE BULK TANK								
14-2.D	HYPOCHLORITE PUMP								
14-2.2	MOTOR								
14-2.E	CAUSTIC PUMP								
14-2.3	MOTOR								
14-3.	CIRCULATING WATER PUMP							282,000	
14-3.1	MOTOR								

DOE IGCC Project Estimate

Equipment No: 14-1

Description: Cooling Tower

Estimate: \$921,000

Comment:

The attached erected cooling tower estimate from Marley for \$1,490,000 is for a cogeneration plant cooling tower with a steam turbine rated at 80 MW. Factoring this bid for a 40 MW steam turbine and reviewing other smaller tower quotes gives the following estimate:

Base Tower	$\$1,490,000 \times 0.6 =$	\$894,000
Escalation		\$ 26,820
TOTAL		\$921,000

CR3 SIRRINE - GREENVILLE, S.C.

AX TO: ALEX GEORGE / MIKE FEENEY

DATE: JAN. 10, 1990

FROM: OTTO OVERCASH

PAGE 1 of 2

BUDGET SELECTION FOR:

P

70,013 GPM

104' OHW

85' OCW

78' OWB

Model: 478-4.0-06

BHP/fan 192

Approx. Pumphead

23'

Fill Type MC67 PVC

Fill Height

4.0'

Eliminator Type TU10C (6.001%)

Air Inlet Height

11.0

ft.

Fan HUDSON AP-28H-8

Fan Stack Height

18

ft.

Motor Size 200 HP - 1800 RPM

Tower Dimension

42

ft. W x

288

ft. L x

31'-4"

ft. H*

*Top of curb to fan deck.

Basin Dimension

48

ft. W x

294

ft. L

Budget Price D & E not including basin, piping, wiring, etc.\$ 1,490,000⁰⁰USING PREVIOUS BID
AS GUIDE FOR SELECTION
AND BUDGET PRICING.

100 MW DOE

1,490,000 x .6 = 894,000

OSC + 3% = 26,820

920,820

\$ 921,500

E. V. "OTTO" OVERCASH

PROCESS & AIR CONDITIONING EQUIPMENT, INC.

166

ACE

CHARLOTTE, N.C.

FAX 704-376-8435

DOE IGCC Project Estimate

Equipment No: 14-3

Description: Circulating Water Pumps (Cooling Tower)

Estimate: \$282,000

Comment:

The attached budget quotation reference is from Byron Jackson through Brown & Morrison. This quote is for circulating water pumps for a similar sized condenser - cooling tower system. The budget will include three pumps, each sized for 50% service. The total estimate is developed as follows:

Base Pumps	\$ 80,656 x 3 =	\$241,968
Freight		\$ 8,400
Start-up & Install		\$ 8,000
Design Changes		\$ 10,632
Escalation		\$ 13,000
TOTAL		\$282,000

BROWN & MORRISON

M. Farny

January 24, 1990

CRS Serrine, Inc.
Post Office Box 5456
Greenville, South Carolina 29606

Attention Mr. Don L. Howard
Purchasing Agent

Subject

.. 30307

Gentlemen

We are pleased to respond to your request for a quotation on three (3) Byron Jackson circulating water pumps.

We understand that the design criteria are as follows:

Location	Outdoors
Fluid	Water
Number of Pumps	Three (3)
Flow	17,500 gpm (each)
TDH	71 ft. (water)
Minimum Water Level above Sump Floor	9.6 ft. (water)
Temperature	59 - 85°F
Length Pump Column	11' 7"

Alternate Bid

Flow	17,500 gpm (each)
Head	60 ft.

Based upon the above we are pleased to offer the following:

Manufacturer	Byron Jackson
Number of Units	Three (3)
Type	VCT
Size	33 WX
Stages	One (1)
Speed	880 rpm
Column	24"

Head	24" steel
Soleplate	Included
Case Wear Ring	Included
Base to Bell	11' 10"
Coupling	Included
Guard	Included
Non-Witnessed Test	Included
Freight for Motor to Test	Included
Weight	6,610 lbs. each
Price	\$43,252.00 each
F.O.B.	Fresno, California
Estimated Freight to Jobsite	\$1,300.00 each

Motor

Manufacturer	General Electric
Size	400 hp
Speed	900 rpm
Electrical	3/60/4160
Enclosures	TEFC
Price	\$37,404.00 each
Estimated Freight to jobsite	\$1,500.00 each
Deduction Per Unit to eliminate non-witnessed performance test	\$2,628.00 each
Adder for keyed and split ring shaft coupling	\$1,582.00 each

Alternate Bid

Manufacturer	Byron Jackson
Number of Units	Three (3)
Type	VCT
Size	30 HXH
Stages	One (1)
Speed	880 rpm
Column	24"
Head	24" steel
Soleplate	Included
Case Wear Ring	Included
Base to Bell	11' 10"
Coupling	Included
Guard	Included
Non-Witnessed Test	Included
Freight Motor to Test	Included
Weight	6,720 lbs. each
Price	\$37,253.00 each
F.O.B.	Fresno, California
Estimated freight to Jobsite	\$1,340.00 each

FOR 100 MW - DOE

85,038
x 3

255,114

20,000
275,114

USE 282,000

plus sharing
with inst. supervision

<u>Motor</u>	
Manufacturer	General Electric
Size	350 hp
Speed	900 rpm
Electrical	3/60/4160
Enclosure	TEFC
Price	\$33,660.00 each
Estimated Freight to Jobsite	\$1,500.00 each

Deduction per Unit   \$2,628.00 each
to eliminate non-witnessed
performance test
Adder for keyed and split \$1,582.00 each
ring shaft coupling

We have the following comments and clarifications to your "Standard Conditions of Equipment Purchases":

Standard Conditions of Equipment Purchases

Article 2 - Replace "essence" with "importance".

Article 5.1 - Replace "commercial operation, or December 31, 1992" with "initial operation, or until December 31, 1992".

Article 5.c.2 - Replace this sentence with "Seller shall promptly correct such nonconformity by repair or replacement FOB factory. The conditions of any subsequent test by the Purchaser shall be mutually agreed upon and Seller shall be notified of and may be represented at all tests that may be made. Seller shall not be responsible for any in-and-out charges or incidental or special damages. NO EXPRESSED OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE (OTHER THAN SPECIFIED PURPOSE) SHALL APPLY. Seller is not liable for consequential damages, arising out of the purchase or the use, operation or maintenance of the equipment. Seller is not responsible for repairs or alterations made by others. Accessories supplied by Seller, but manufactured by others, carry whatever warranty the manufacturers have conveyed to Seller and which can be passed on to the Purchaser".

Article 7 - Replace "\$5,000,000" with \$1,000,000" throughout.

Article 9 - Replace "acts or omissions to act" with "negligence or willful default". Delete "or arising out of defects in the design equipment, materials or other items supplied by Seller".

Article 13 - Insert "major" before "materials" throughout.

Instructions to Bidders

Par. 2.4 - Service rates for installation and start-up supervision will be per the enclosed pages 1-135-1/2.

par. 13 - Packaging, cleaning and preparation for shipment will be per BW/IP standards for domestic shipments.

Vendor Data Requirements

Doc Cat. #20 - Noise levels are not expected to exceed 90 dBA at 3 feet. No noise testing for any equipment is included.

Specification J-1532-040-018

Par. 4.8 - As with all pumps of this specific speed, the shutoff head exceeds design head by more than 35%.

Par. 5.1 - The pumps offered are not pullout type. Pullout pumps are normally not practical for pumps of this size.

Par. 5.3 - We have assumed that the discharge piping will be tied down and that tie bolts will be provided by the purchaser at the expansion joint between the pump and the piping. This prevents the imposition of excessive overturning forces on the pump discharge head.

Par. 5.7 - Threaded shaft couplings are standard for shafts of this diameter. We are offering keyed and split ring couplings as an option.

Par. 5.8 - Shaft sleeves will be provided under the pump packing only.

We are enclosing your proposal data sheets (4 pages) filled in as requested.

We are also enclosing the following:

Curve PC-56681-BB	Base Bid
Curve PC-56681-AB	Alternate Bid

Finally we are enclosing:

SK-01 Dimensions	Base Bid
SK-02 Dimensions	Alternate Bid

Additional literature is also enclosed. We appreciate quoting.

Yours very truly,
BROWN & MORRISON, Representing
BW/IP INTERNATIONAL

W. C. Morrison

W. C. Morrison
WCM;jb
Enclosures
Sent in six copies

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0015

AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0015- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-1.	RAW & FIRE WATER STORAGE TANK					1,300,000 GALLONS		340,000	
15-1.A	FREIGHT							INCL	
15-1.B	ERECTION							INCL	
15-2.	RAW WATER PUMPS (3) (100%)					700 GPM @ 150 FL		32,000	
15-2.A	FREIGHT							INCL	
15-2.1	MOTOR							INCL	
15-3.	DEMINERALIZED WATER MAKEUP SYSTEM							975,000	
15-3.A	FREIGHT							INCL	
15-3.B	STARTUP SUPERVISION							INCL	
15-4.	NEUTRALIZATION TANK					37,000 GAL 20' DIA X 16' H 304 S.S OR LINED		110,000	
15-4.A	FREIGHT							INCL	
15-4.B	ERECTION							INCL	
15-5.	DEMINERALIZED WATER STORAGE TANK					200,000 GAL 24' DIA X 20' H 304 S.S. OR LINED		260,000	
15-5.A	FREIGHT							INCL	
15-5.B	ERECTION							INCL	
15-6.	DEMINERALIZED WATER TRANSFER PUMP 1, 2 & 3					300 GPM @ 250 FT.		24,000	
15-6.A	FREIGHT							INCL	
15-6.1	MOTOR					E 40 HP 3600 RPM		INCL	
15-7.	NEUTRALIZING TANK					37,000 GALLON		W/15-3	
15-7.A	AGITATOR								
15-7.1	MOTOR					E 10 HP 1800 RPM			
15-8.	SAMPLE CONDITIONING RACK					FLOOR MOUNTED 7'H X 10'L X 14" DP		36,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0015

AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0015- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-9.	SILICA ANALYZERING						20,000		
15-10.	SODIUM ANALYZER						12,000		
15-11.	MISC. ANALYZERS COND. PH ETC. OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC.					CONDUCTIVITY & PH OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC	42,500		
15-12.	INTERNAL BOILER WATER TREATMENT						48,000		
15-13. 15-13.1	PHOSPHATE PUMPS MOTORS					METERING FWE E .77 HP 1800 RPM	W/15-12		
15-14. 15-14.A	AUXILIARY COOLING WATER HEAD TANK FREIGHT					10' DIA X 8' H	9,500 INCL		
15-15. 15-15.A	AUXILIARY COOLING WATER HEAT EXCHANGER FREIGHT						40,000 INCL		
15-16. 15-16.A 15-16.1	AUXILIARY COOLING WATER PUMP NO. 1 (110%) FREIGHT MOTOR						15,000 INCL INCL		
15-17. 15-17.A 15-17.B	AUXILIARY COOLING WATER PUMP NO. 2 (110%) FREIGHT MOTOR						15,000 INCL INCL		
15-18.	WATER LAB FURNITURE						15,000		

CRS SIRRIE EQUIPMENT LIST

S SIRRIE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

B LOCATION: 100 MW

AREA NO.: 0015

AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0015- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-19.	CLOSED COOLING WATER PUMP NO. 1 (110%)						8,000		
-19.A	FREIGHT						INCL		
15-19.1	MOTOR						INCL		
-20.	CLOSED COOLING WATER PUMP NO. 2 (110%)						8,000		
15-20.A	FREIGHT						INCL		
-20.B	MOTOR						INCL		

DOE IGCC Project Estimate

Equipment No: 15-1

Description: Raw and Fire Water Storage Tank

Estimate: \$340,000

Comment:

The attached budget quotations for erected steel tanks represents estimates for tanks ranging in size from approximately 2.5 million gallons to 5.8 million gallons. The estimated cost for a 1.3 million gallon water service tank is factored from the larger tanks, and is estimated to be \$340,000.

RECO Constructors

RECO Constructors, Inc.
Box 25189, Richmond, Virginia 23260-5189
1500 N. 17th Street
804-644-2611

December 11, 1989

CRS Sirrine Company
216 South Pleasantburg Drive
P.O. Box 5456
Greenville, SC 29606

Attention: Mr. D. D. Wangerin

Reference:

Gentlemen:

We are pleased to submit the following budget prices for use on the Linden Cogeneration Project at Linden, NJ.

~~CONDENSATE STR~~
One (1) 75'-0" dia. x 75'-0" high Ground Level Storage Tank, budget price 2.6
\$850,000.00.

One (1) 100'-0" dia. x 100'-0" high Ground Level Storage Tank, budget price
\$1,750,000.00.

One (1) 85'-0" dia. x 85'-0" high Ground Level Storage Tank, budget price
\$1,060,000.00.

Budget prices as indicated above are based on tank foundation being furnished by others in a clear and accessible area without any overhead obstruction.

Budget prices as indicated above do include interior of tanks receiving Plasite 7155 and exterior receiving Carbozinc 11 Primer followed by one (1) coat of High-build Epoxy.

We hope that the above information meets your requirements.

If there are any questions regarding the above, please do not hesitate to contact the writer.

Very truly yours,

A. J. Molloy
Estimator

AJM/lld

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DOE IGCC Project Estimate

Equipment No: 15-3

Description: Demineralized Water System

Estimate: \$975,000

Comment:

The demineralized water system for the DOE application is estimated to require approximately 550 GPM of treated make-up. Quality requirements for the high pressure HRSG will designate a separate Cation-decarbonator-Anion system. The reference quotation is for a similar design that will be adjusted for escalation, service, and expected design changes. The total budget is developed as follows:

Base system	\$752,000
Design changes	\$125,000
Service	\$ 20,000
Escalation	\$ 60,000
Freight	\$ 18,000
TOTAL	\$975,000

Glegg Water Conditioning, Inc.

29 Royal Road
Guelph, Ontario
Canada N1H 1G2
Tel: (519) 836-0500--
Telex: 06-956562
Facs: (519) 837-3067

June 1, 1989

Lucien J. Luckel and Associates,
725 Airport Road,
Lakewood, NJ 08701

Attn: Mr. Lucien Luckel

Re:

Gentlemen:

Enclosed are three (3) copies of our revised proposal per your request.

The proposed equipment includes many features unique to a Glegg Water Conditioning system, some of which are listed in the Special Features section of our proposal. In addition, every system we build incorporates Glegg's reputation for quality equipment, on-time deliveries, and after shipment service.

The system design is based on your requirements and the feed water analysis listed on page 56 of this proposal. Other design criteria are listed on page 11.

We trust that this proposal is to your satisfaction. We will be most pleased to meet with you, at your convenience, to discuss our proposal and answer any questions you may have.

Yours truly,

Gregory A. Osen,
Marketing and Sales Manager

/jj
Encls.

cc: High Purity Services, Inc.,
7 Everts Street,
Londonderry, NH 03053
Attn: Mr. S. Gagnon

Glegg Water Conditioning, Inc.
Attn: Mr. M. Huehnergard

205
FUR DOE - 100MW

752,000
85,000
3600

840,600
80,000

900MY SUP.

920,600
+ 1,060

MSC

975,836

975,000

Proposal

2-Train System

PRICE SCHEDULE

1/ BASE SYSTEM

Glegg Water Conditioning, Inc., will design, fabricate, and deliver a complete water treatment system, as described herein, for a firm price of ..... \$ 752,000. Lot

(SEVEN HUNDRED FIFTY-TWO THOUSAND DOLLARS)

2/ EXPANDED SYSTEM

The expanded system (ie., base system plus third bag filter, fourth decarbonator pump, and fourth mixed bed unit) can be provided, in lieu of the base system, for a firm price extra of ..... \$ 85,000. Lot

3/ LARGER BAG FILTERS

2' - 0" diameter x 5' - 8" high bag filters can be provided, complete with six (6) filter bags/housing, in lieu of 1' - 10" diameter units, for a firm price extra as follows:

Base System (two filters) ..... \$ 2,400. Lot

Expanded System (three filters) ..... \$ 3,600. Lot

Proposal ..

PRICING NOTESNOTES

- a/ All prices quoted are in U.S. Funds, with U.S. duty included and paid by Glegg Water Conditioning, Inc.
- b/ Any applicable Local, State or Federal taxes are extra.
- c/ Shipment will be made F.O.B. jobsite, with offloading and transfer at the site by others. Freight is prepaid and added to the invoice.
- d/ All prices quoted are valid for acceptance by June 30, 1989 based of a letter of intent contingent on project go ahead. All prices are based on an authorization to proceed not later than October 1, 1989.

e/ Equipment Delivery:

Unless otherwise negotiated, shipment of equipment will be made 26 - 30 weeks from receipt of an authorization to proceed, based on a two (2) week approval drawing turnaround.

f/ Drawing Submittal:

Floor loading plan - - - - -	3 - 6 weeks ARO
P & I Diagrams - - - - -	3 - 6 weeks ARO
Equipment arrangements - - - - -	6 - 8 weeks ARO -
Electrical hardware drawings - - - - -	8 -10 weeks ARO
Control Philosophy - - - - -	10-12 weeks ARO
Documented software program - - - - -	Upon Shipment

- g/ The prices quoted are based on the following terms of payment. Other terms are available upon request.

25%, on major drawing submittal by Glegg Water Conditioning
 25%, on receipt of pressure vessel components by pressure vessel fabricator
 25%, on completion of pressure vessel fabrication
 25%, on shipment to site

h/ Start-Up:

If required, we will provide a qualified service engineer to inspect the installation, commission the equipment, and instruct the customer's operating personnel. The charge for this will be \$850. per normal 8 hour working day, plus all travel and living expenses.

DOE IGCC Project Estimate

Equipment No: 15-4 & 15-5

Description: Neutralization & Demineralized Water Tanks

Estimate: \$110,000 & 260,000

Comment:

Refer to the previous tank estimate from IMS Services. The neutralization tank estimated to be similar to the 18' Dia. x 20' Ht 304 S/S tank indicated in item b. of the IMS quote. This can be rounded to be \$110,000.

The demineralized storage tank for the DOE application will be sized to store approximately 200,000 gallons for reserve. The estimated budget price is factored up from the neutralization tank pricing. The estimate is \$260,000.

INDUSTRIAL MECHANICAL SERVICES, INC.

BOILERS
Sales, Service, Rentals, Repairs
Fuel Conversions
STORAGE TANKS
Fabrication & Erection
METAL FABRICATION
Certified Welders
Special Finishing

POST OFFICE BOX 885
 HILDEBRAN, N.C. 28637
 (704) 397-3231
 (704) 397-8074

10100 IRON BRIDGE ROAD
 CHESTERFIELD, VA. 23832
 (804) 796-1968

XXXXXXXXXXXXXXXXXXXX

FAX COVER SHEET

1-804-796-9826

DATE: JANUARY 2, 1990

TIME: 4:15 PM

cc: D. Howard 9086

Dan Smith 1085

TO: DON HOWARD / DAN SMITH

COMPANY CRS SIRRINE, INC.

FAX NO: 1-803-298-6254

REFERENCE: COGEN TECH. LINDEN, N.J.

FROM: MAX R. BARNES

NO OF PAGES INCLUDING COVER SHEET: 3

COMMENTS:

INDUSTRIAL MECHANICAL SERVICES, INC.

BOILERS

Sales, Service, Rentals, Repairs

Fuel Conversions

STORAGE TANKS

Fabrication & Erection

METAL FABRICATION

Certified Welders

Special Finishing

POST OFFICE BOX 585
HILDEBRAN, N.C. 28637
(704) 397-3231
(704) 397-8074

10100 IRON BRIDGE ROAD
CHESTERFIELD, VA. 23832
(804) 796-1968

JANUARY 2, 1990

CRS SIRRINE, S.C.
216 SOUTH PLEASANTBURG ROAD
GREENVILLE, S.C. 29607

ATTN: DON HOWARD P.A.

REF:

DEAR SIR,

INDUSTRIAL MECHANICAL SERVICES, INC. IS PLEASED TO BID BUDGET PRICES FOR THE TANKS ON THE ABOVE REFERENCED JOB FOR YOUR USE. OUR PRICES INCLUDE ALL MATERIAL, SHOP FABRICATION, FREIGHT, TAXES, TOLLS, RENTAL EQUIPMENT AND FIELD LABOR TO ERECT AND PAINT THE REFERENCED TANKS ON FOUNDATIONS BY OTHERS IN LINDEN, N.J.

A. DEMIN. WATER STORAGE TANK 24' DIA. X 20' HT. A-36 CARBON STEEL W/ PLASITE LINING	\$51,832.00 EACH	72,000
ALT. FOR THE ABOVE FABRICATED FROM 304 S/S	135,000.00 "	
B. NEUTRALIZATION TANK 18' DIA. X 20' HT. 304 S/S	111,180.00 "	40,000
C. RAW WATER / FIRE PROTECTION TANK 66' DIA. X 40' HT. A-36 CARBON STEEL	215,000.00 "	1 mm gal
D. FUEL OIL STORAGE TANK 65' DIA. X 40' HT. A-36 CARBON STEEL	185,000.00 "	1 mm gal

THE ABOVE TANKS INCLUDE STANDARD FITTINGS, MANHOLES, LADDERS AND SAFETY CAGES.

IF IMS CAN HELP YOU FURTHER IN ANY WAY PLEASE DO NOT HESITATE TO CALL ON US.

SINCERELY,

MAX R. BARNES

INDUSTRIAL MECHANICAL SERVICES, INC.

BOILERS
Sales, Service, Rentals, Repairs
Fuel Conversions
STORAGE TANKS
Fabrication & Erection
METAL FABRICATION
Certified Welders
Special Finishing

POST OFFICE BOX 585
 HILDEBRAN, N.C. 28637
 (704) 397-3231
 (704) 397-6074

10100 IRON BRIDGE ROAD
 CHESTERFIELD, VA. 23832
 (804) 796-1968

JANUARY 2, 1990

CRS SYRRINE, INC.
 216 SOUTH PLEASANTBURG ROAD
 GREENVILLE, S.C. 29607

ATTN: DAN SMITH

SUBJ.: BUDGET FIELD ERECTED TANK PRICES.

DEAR SIR,

INDUSTRIAL MECHANICAL SERVICES, INC. IS PLEASED TO BID BUDGET TANK PRICES FOR THE TANKS ON THE ABOVE REFERENCED JOB FOR YOUR USE. OUR PRICE INCLUDES ALL MATERIAL, SHOP LABOR, FREIGHT, TAXES, TOOLS, RENTAL EQUIPMENT AND FIELD LABOR TO ERECT AND PAINT THE THE ABOVE REFERENCED ON FOUNDATIONS BY OTHERS IN LINDEN, N.J.

A. 140' DIA. X 48' HT. A-36 c/s	\$997,195.00 EACH	5.4 mm
B. 110' DIA. X 48' HT. "	640,631.00 "	3.6 mm
C. 95' DIA. X 48' HT. "	454,197.00 "	2.7 mm

THE ABOVE TANKS INCLUDE STANDARD FITTINGS, MANHOLOES, LADDERS AND SAFETY CAGES.

IF WE CAN HELP FURHTER IN ANY WAY PLEASE DO NOT HESITATE TO CALL ON US.

SINCERELY,

 MAX R. BARNES

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0016
 AREA NAME: COMPRESSED AIR SYSTEMS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0016- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
16-1.	INSTRUMENT AIR COMPRESSOR WATER COOLED					OIL-LESS TYPE, ROTARY 300 SCFM @ 125 PSI	50,000		
16-1.A	FREIGHT							INCL	
16-1.B	MOTOR					E 60 HP 1800 RPM		INCL	
16-1.C	INLET FILTER/SILENCER							INCL	
16-2.	INSTRUMENT AIR RECEIVER					200 GALLONS	4,000		
16-2.A	FREIGHT							INCL	
16-3.	INSTRUMENT AIR DRYER W/INLET AND AFTER FILTERS					300 SCFM	8,500		
16-3.A	FREIGHT							INCL	
16-4.	SERVICE AIR COMPRESSOR WATER COOLED					OIL-LESS TYPE ROTARY 300 SCFM @ 125 PSI	50,000		
16-4.A	FREIGHT							INCL	
16-4.1	MOTOR					E 60 HP 1800 RPM		INCL	
16-4.B	INLET FILTER/SILENCER							INCL	
16-5.	SERVICE AIR RECEIVER					400 GALLON	4,000		
16-5.A	FREIGHT							INCL	
16-6.	SERVICE AIR DRYERS WITH INLET AND AFTER FILTERS					350 SCFM	8,500		
16-6.A	CONTROLS							10,000	

DOE IGCC Project Estimate

Equipment No: 16-1 & 16-4

Description: Instrument & Service Air Compressor Systems

Estimate: \$135,000

Comment:

The attached quote for oil free type compressors from Patton's Inc. is used to develop the system budget cost for the instrument air and service air systems. The total budget is estimated as follows:

2x325 CFM compressors	\$83,286
2x350 CFM Air Dryers	\$14,584
Air Receivers	\$ 7,770
Filters	\$ 2,000
Controls	\$10,000
Freight	\$ 8,000
Escalation	\$ 7,360
Service	\$ 2,000
TOTAL	\$135,000

Patton's

AIR COMPRESSOR
SYSTEMS *Inc.*

November 21, 1989

CRS Serrine
P.O. Box 5456
Greenville, SC 29606-5456

Attention: Mr. Alex George

Dear Mr. George:

Per your request, we at Patton's Inc. are pleased to submit our quotation on the following equipment:

ITEM A:

HELICAL SCREW AIR COMPRESSOR PROPOSAL

- 2 - Kobelco Northwest Model KNW0-W/L, two stage, heavy-duty, oil-free water-cooled rotary screw air compressor mounted on a fabricated steel base and driven by a 75 HP, 460 Volt, 3 Phase, 60 Hz, open dripproof motor with a 1.25 service factor.

Operating Conditions & Performance:

Maximum Working Pressure	135 PSIG
Operating Pressure	125 PSIG
Capacity/Actual Delivered Air @ 125 PSIG	325 CFM
Motor Rating	75 HP
Actual Brake Horsepower Required	88 BHP
Cooling Water Consumption (65°F inlet)	8.2 GPM
Noise Level @ 3 feet	75 dBA

The Assembly includes the following equipment:

- ...Super Rotor screw elements
- ...Gear case with integral sump
- ...Intercooler with moisture separator & automatic drain
- ...Air intake filter/silencer with replaceable element
- ...Aftercooler with moisture separator & automatic drain
- ...Integral base frame for compressor & drive assembly
- ...Open dripproof induction motor with 1.25 service factor
- ...Pressure lubrication system with independent motor driven gear type pump
- ...Lubrication oil cooler
- ...Discharge check valve
- ...Discharge silencer
- ...Acoustical cabinet for sound attenuation

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- ...Instrument panel with:
  - ..Air inlet filter condition indicator
  - ..First stage discharge pressure gauge
  - ..Second stage discharge pressure gauge
  - ..First stage suction air temperature gauge
  - ..Second stage suction air temperature gauge
  - ..Second stage discharge temperature gauge
  - ..Oil temperature gauge
  - ..Oil pressure gauge
  - ..Oil level gauge
  - ..Oil filter condition indicator
  - ..Hour meter running time
  - ..Hour meter loaded time
  - ..Power on light
  - ..Oil pump run light
  - ..Compressor run light
  - ..Compressor load light
- ...Safety devices
  - ..Motor overload shutdown and light
  - ..Low oil pressure shutdown and light
  - ..High first stage air discharge temperature shutdown and light
  - ..High second stage air discharge temperature shutdown and light
  - ..Alarm bell
  - ..Bell cancel switch
  - ..Lamp test switch
  - ..Reset switch
- ...Integral solid state programmable controller. The operation of this compressor and monitoring of the instrumentation is accomplished with this controller. The program is stored in EPROM, and can easily be reprogrammed to meet varying requirements.

UNIT PRICE: ~~\$51,583.00~~
TOTAL (2) Units: \$83,286.00

F.O.B. Portland, OR

OPTIONAL ACCESSORIES:

- 1 - Cooling water shutoff valve
- 1 - Across-the-line starter
- 1 - Lead/lag control

ITEM B:

HELICAL SCREW AIR COMPRESSOR PROPOSAL

QUINCY Model QMA-60 W, single stage, heavy duty, direct drive helical screw air compressor rated at 280 CFM @ 125 PSIG. Watercooled base mounted, with cabinet covering the motor and cooling system. Complete with 60 HP, 460 Volt, 3 Ph, 60 Hz motor with standard open dripproof enclosure.

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UNIT PRICE: \$10,625.00

Both these units come equipped with these:

STANDARD ACCESSORIES:

Mounted, watercooled aftercooler, separator & trap
Mounted, magnetic across-the-line starter
Air/oil separator indicator
Oil filter maintenance indicator
Air temperature gauge
Oil temperature gauge
Percent capacity gauge
Hour meter
Modulating control
Heavy duty intake filter
Quin-Syn synthetic lubricant

ITEM D:

DUAL TOWER HEATLESS AIR DRYER

ZURN, Model PSM-350, dual tower heatless regenerative air dryer. To dry 350 CFM inlet, 298 CFM outlet of compressed air to a -40°F pressure dewpoint, with entering conditions of 100 lbs and 100°F . In addition to standard accessories shown in literature, the following are also included:

...High Humidity and cycle failure indicators
with dry alarm contacts
...Tower regenerative lights
...Color change moisture indicator
...Tower temperature gauges
...Panel mounted air pressure gauges
...Pre and after filters mounted with bypass.

UNIT PRICE: \$7,292.00
F.O.B.: Erie, PA

Prices do not include any applicable sales tax or shipping charges.
Terms are Net 10EOM. Prices are firm for 30 days for immediate release.

If you have any questions concerning this quotation, or if we can be of any further assistance, please do not hesitate to contact us. We appreciate this opportunity of quoting you on this equipment and look forward to receiving your valued order.

Very truly yours,

PATTON'S INC.

Paul E. Bumgardner

PEB/kml

Enclosure

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0017

AREA NAME: NATURAL GAS SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0017- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
17-1.	NATURAL GAS RECEIVER						79,000		
17-1.A	STRAINER						INCL		
17-2.	NATURAL GAS COMPRESSOR						700,000		

DOE IGCC Project Estimate

Equipment No: 17-1 & 17-2

Description: Natural Gas Compressor Station

Estimate: \$779,000

Comment:

The natural gas compressor estimated for the DOE application can be factored from the attached estimate from Oil & Gas Co. The estimate will be for one 110% compressor station sized to take suction at 30 PSIG to 400 PSIG. The total estimate is developed as follows:

Base compressors	\$410,000
Design Change	\$125,000
Options	\$ 74,000
Receiver	\$ 80,000
Controls	\$ 15,000
Freight	\$ 25,000
Escalation	\$ 35,000
Service	\$ 15,000
TOTALS	\$779,000

Cable Address: OGASCO
FAX (713) 498-4464 ..

OIL & GAS

8601 BOONE RD. • TELEPHONE (713) 498-6331

HOUSTON, TEXAS 77099

September 8, 1989

CRS Sirrine, Inc.
200 Executive Center Drive
Greenville, South Carolina 29615

ATTENTION: Michael Feeney

Gentlemen:

Thank you for your inquiry for subject compressors. Oil & Gas Supply Company is pleased to offer the following packages as defined below:

Three (3) Model OGS-WBF-74XHD-1500E   3 X 50 ft   Base

DESIGN CONDITIONS

GAS - Natural Pipeline
Ambient temperature (°F) - 10 - +90

SG - .59   k - 1.28
Elevation - 500 Feet

Suction pressure (PSIG)   -   150
Suction temperature (°F)   -   70
Discharge pressure (PSIG)   -   350
Discharge temperature (°F)   -   185

Capacity (MMSCFH @ 14.7 PSIA & 60°F)   Each   -   1.25
Compressor horsepower   Each   -   1438

PACKAGE DESCRIPTION

There will be three compressor packages, each consisting of one Cooper/Joy WBF-74XHD, horizontally balanced opposed reciprocating compressor, direct driven by a 4160V/3PH/60HZ WP-II motor; bottles; compressor, vessel and motor shutdowns and controls; all assembled, piped, tubed and painted on a structural steel skid. Also, there will be one auxiliary skid consisting of a suction scrubber, recycle valve, recycle gas cooler, and control panel.

The packages will be fabricated pursuant to API-11P and HSPE Specifications. Oil and Gas Supply Company is an authorized API-11P fabricator, #9601.

8601 BUONE RD. • HOUSTON, TX. 77099 • (713) 498-6331
CABLE ADDRESS: UGASCO • TWX 910-880-4051

OIL & GAS SUPPLY CO.

CUSTOMER CRS Sirrene

QN-89192
Revision 1

DATE: September 8, 1989
Page 2 of 4

COMPRESSOR

Manufacturer & Model	- CooperJoy WBF-74XHD
Type	- Reciprocating
Frame lubrication	- Pressurized
Speed & stroke	- 900 RPM & 7.0 Inches
Cylinders	Stage 1 3 X DIA 12.5 Inches MAWP 600 PSIG

Teflon piston rings and packing rings.

Oil system includes pump, full flow filter, level and pressure gauges. Manufacturer's standard divider block cylinder lubrication with no-flow shutdown. Shell and tube type oil cooler with thermostat.

Kenco or equal crankcase oil level control with storage tank. Electric motor driven pre-lube start pump.

Automatic bypass valve for starting, one for each compressor.

CAPACITY CONTROL

For Turbine Fuel Gas Boosting, complete system:

Discharge recycle capacity control using Fisher control valve and controller allows 100% bypass. Includes piping from discharge piping to inlet scrubber. Senses discharge pressure and is always in operation. One on auxiliary skid.

DRIVER

Induction Electric motor, Siemens Allis or equal.			
Horsepower	- 1500 HP	Speed	(Base) - 900 RPM
Enclosure	- WP-II		
Volts/Phase/Hertz	- 4160/3/60	Service Factor	- 1.15
NEMA Design	- Class B	Insulation	- Class F
Space Heaters	- 120/1/60		Nonhygroscopic
Temperature Protection	- 2/PH 100 ohm	Conduit Box	- Oversized
Service	- Severe Duty	Bearings	- Antifriction

Tests are standard MG-1. Includes LO-REZ torsionally soft coupling, flywheel and torsional.

STARTER

Starters not included.

COOLER

Shell and tube TEMA type AEL or BEU; ASME and TEMA-C. Carbon steel tubes, shell, bonnet and tubesheet. In recycle piping only.
Duty Gas AC Design 400 PSIG Temp out 140 °F

OIL & GAS SUPPLY CO.8601 BOONE RD. • HOUSTON, TX 77099 • (713) 496-6331
CABLE ADDRESS: OGASCO • TWX 910 660 4051

CUSTOMER CRS Sirrena

QN-89192
Revision 1DATE: September 8, 1989
Page 3 of 4INSTRUMENTS & CONTROLS Class I Group D, Division 2

Single enclosure is NEMA 4 purged, skid mounted with starting and control switches and indicators. Logic and programmable controller designed and supplied by OGASCO. Remote status, interface, alarm and shutdown capabilities. Pressure and temperature switches are CCS Dual-Snap or equal in hermetically sealed enclosures. First out indication on the following services with direct reading gauges:

<u>FUNCTION</u>	<u>LOCATION</u>	<u>GAUGE</u>	<u>ALARM</u>	<u>SHUTDOWN</u>
Suction Pressure	Pipe	Panel (1)	Low	High (1)
Discharge Pressure	Pipe	Panel (1)		High (1)
Bearing Oil Pressure	Frame	Panel (*)		Low (1)
Bearing Filter Differential	Frame	Local (*)		
Suction Temperature	Pipe	Local (1)		
Discharge Temperature	Cylinder	Local (*)		High (*)
Lubricator Flow	Frame			No Flow (*)
Oil Level Oil Compressor		Local (*)		Low (*)
Liquid Level	Scrubbers	Local (*)		High (*)
Vibration	Motor & Frame			High (*)
Remote Annunciation Contact				X

(*) one per each location

GAS SCRUBBERS, BOTTLES, PIPING & VALVES

Suction scrubber - 46" diameter, rated 285 PSIG, and discharge filter/separators - 24" diameter, rated 400 PSIG. ASME design and stamped. Scrubber with stainless steel mist extractor, LSH, LC, LCV and manual drain. Filter/separators with vane mist extractor, coalescing filters, LSH and manual drain. One suction scrubber and optional dual filter/separators with transfer valves, on auxiliary skid.

Tuned pulsation dampeners, 1-1/2" P-T-P on suction and discharge of each cylinder(s). ASME design and stamped.

Gas piping is per ANSI B31.3, welded carbon steel with flange connections. Lube oil and auxiliary piping, 1-1/2 inch and smaller, schedule 80 with 2000# screwed fittings. Control, lubricant and instrument tubing are SS tubing with cadmium plated fittings. Common utility, vent and drain piping and connections. PSV on discharge of each stage.

Each package with a manual suction ball, discharge piston check and manual ball valve for isolating compressor when not in use. Full port valve on suction for low pressure drop.

Gas pipe size is 10"-150# suction and 8"-300# discharge.

OIL & GAS SUPPLY CO.

CUSTOMER CRS Sirrene

QN-89192
Revision 1DATE: September 8, 1989
Page 4 of 4SKID ASSEMBLY

All components are assembled and rigidly mounted on a structural steel skid with 4 point lifting eyes and partial checkered deck plate liquid containment area. Each package will be coated with red oxide primer and industrial enamel finish coat. Compressor package will be approximately 19'L, 12'W, and 8'H and 55,000 LBS. Auxiliary skid, approximately 10'L, 8'W, 10'H and 25,000 LBS.

NOTES

1. Cylinders have capability for extra capacity.
2. Automatic fixed bottles and/or valve unloaders may be added to compensate for load variations (usually due to pipe line pressure).

PRICE & TERMS

Three (3) Model OGS-WBF-74XHD-1500E
F.O.B. our factory, Houston, Texas.

\$1,100,000.00

Options

Air cooled finned tube gas cooler
Dual filter/separators with transfer valves

+ \$ 13,976
+ \$ 45,802

The price is valid for 90 days and firm through shipment.

Delivery is 26 - 30 weeks.

The terms of payment are progress net 15 days.

The price does not include taxes, freight or installation. Estimated freight to jobsite, excluding offloading, is \$20,000.00. Field installation and/or service are per attached Labor Rates or may be arranged under separate contract.

Thank you for the opportunity to be of service to CRS Sirrene. If you have any questions please do not hesitate to call us.

Very truly yours,

OIL & GAS SUPPLY COMPANY

S. Gary Frisk
S. Gary Frisk

SGR:br

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0019
 AREA NAME: FIRE PROTECTION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0019- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
19-1.	FIREWATER FLOW METER						1,500		
19-2.	FIRE PUMP PKG NO. 1 - DIESEL						60,000		
19-2.A	DIESEL ENGINE DRIVE						INCL		
19-2.B	PUMP ACCESSORIES						INCL		
19-2.C	FUEL TANK						INCL		
19-2.D	FIRE PUMP CONTROLLER						INCL		
19-2.E	JOCKEY PUMP						INCL		
19-2.1	MOTOR						INCL		
19-2.F	JOCKEY PUMP CONTROLLER						INCL		
19-3.	YARD FIRE PROTECTION						24,000		

DOE IGCC Project Estimate

Equipment No: 19-1 ,19-2, & 19-3

Description: Fire Pump Protection System

Estimate: \$84,000

Comment:

This estimate will include one electric and one diesel driven fire pump. In addition the jockey pump and associated controllers for each pump system are included. The attached quote from Fairbanks Morse was used to develop the total budget estimate.

T. Templeton

Fairbanks Morse

MAR 20 1990

March 14, 1990

CRS Serrine Engineers, Inc.
216 South Pleasantburg Drive
Greenville, SC 29607-5456

Attention: Mr. Don Howard

Subject:

Reference:

Dear Mr. Howard:

In response to your inquiry, Fairbanks Morse is pleased to provide a quotation for the following specified pumping equipment.

This quotation is based on your acceptance of Fairbanks Morse's standard terms and conditions, Form KC585 (attached) and "Exceptions to the Specifications".

Sales tax in the amount of 5% (applicable for Duplin County, North Carolina) is quoted separately. No other taxes are included.

If you have any questions, please feel free to contact us.

Very truly yours,

FAIRBANKS MORSE PUMP CORPORATION

John M. Titus

John M. Titus
Senior Application Engineer
Fire Pump Market

JMT/sar

Enclosure

CC: K. Lyon, P.S.I. Carolinas
D. Shoemaker, Fairbanks Morse Pump Corporation

CRS Sirrine Engineers, Inc.
March 14, 1990
Page 2

Engine Driven Fire Pump Rating: 1500 GPM @ 125 PSI

Quantity: One (1)

Description: Fairbanks Morse 8" X 6" model 5824F UL Listed horizontal split case fire pump including fabricated steel base plate, suction gauge, discharge pressure gauge, automatic air release valve, 6" main relief valve, enclosed waste cone, flow meter, 8" X 8" X 6" tee.

Clarke (Detroit) model DDFP04A7 UL Listed diesel fire pump engine including flexible coupling, coupling guard, heat exchanger piping loop, jacket water heater, batteries with rack and cables, industrial grade silencer, flexible exhaust connector, 270 gallon fuel tank with gauge and fittings.

Automatic diesel engine fire pump control UL Listed including dual 12 volt battery charger and all alarms required by NFPA #20, NEMA 12 enclosure, specified remote alarm contacts.

Net price.....\$33,062.00
F.O.B. factories, with freight allowed.

Sales Tax, 5% \$1,653.00

Specification No. 99512-010-001, page 2, article 2.2.1 specifies maximum speed of 1,800 rpm. If 2,100 rpm is acceptable, the pump selection would change to 10" x 6" 2823CF. The engine selection would change to Cummins model 6BTA5.9F1

Net Price.....\$28,875.00
F.O.B. factories, with freight allowed.

Sales Tax, 5% \$1,444.00

CRS SIRRIE EQUIPMENT LIST

CRS SIRRIE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0020
 AREA NAME: WASTEWATER SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0020- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
20-1.	PROCESS SUMP PUMP (2)					100 GPM @ 50 FT EACH	9,000		
20-1.A	FREIGHT						INCL		
20-1.1	MOTOR						INCL		
20-2.	OIL/WATER SEPARATOR (2)					250 GPM EACH	100,000		
20-2.1	MOTORS						INCL		

CRS SIRRINE EQUIPMENT LIST

S SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0021
 AREA NAME: HVAC

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0021- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
21-1.	HVAC SYSTEMS							250,000	

DOE IGCC Project Estimate

Equipment No: 21-1

Description: HVAC System Equipment

Estimate: \$250,000

Comment:

An estimate of \$250,000 has been allocated for HVAC in the CC portion of the project. This equipment will include all heating, ventilation, and air conditioning equipment and controls associated with the combined cycle buildings. Installation dollars will be reflected in the CC construction estimate.

CRS SIRRIE EQUIPMENT LIST

CRS SIRRIE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0022

AREA NAME: ELECTRICAL DISTRIBUTION

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0022- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
22-1.	101 MVA TRANSFORMER						990,000		
22-2.	52/74 MVA TRANSFORMER						450,000		
22-3.	14 MVA AUX TRANSFORMER					13.8 KV/4160 V	225,000		
22-4.	BALANCE OF PLANT ELECTRICAL						3,200,200		
22-5.	TRANSMISSION LINE (ERECTED)						1,100,000		
22-6.	SWITCHYARD (ERECTED)						1,500,000		

DOE IGCC Project Estimate

Equipment No: 22-1

Description: 101 MVA Transformer

Estimate: \$990,000

Comment:

This equipment only estimate is for a 101/135/169 MVA transformer with a 13.8kv primary and 115kv secondary. It is to be used as the combustion turbine generator's step-up transformer. A budgetary price estimate from a transformer vendor follows.

ITEM #
1Date: 2/16/90Attention: G. HIRANI Phone: _____Location: CRS SIRRINE Fax: 803-281-3712Pages: 1 (including cover sheet)From: RON WILL Phone: _____

CC BOBB KIGER 704-377-5253

L YOUR NEG 184GVXM 017010 CRS SIRRINE

	<u>WIN</u>	<u>BELL</u>
Verification:	228-6686	(412) 928-6686
Facsimile:	228-2030	(412) 928-2030

NOTES: GORDEN, you requested an up date price for
duplicates of LHM 5482 (ABB HOWEWEEL) I gave you
 an "estimate" of \$820,000 earlier in Feb 1990. I do
 have the correct cost from engineering.

the price, based on shipment prior to 12-31-90 is
 \$973,240 ea SP 50-000 & UDS 48-501 apply. Ship.

ABB Power T&D Company Inc.

ment is FOB Factory, freight prepaid to nearest
 accessible rail siding.

651 Holiday Drive
 Pittsburgh, Pennsylvania 15220

DOE IGCC Project Estimate

Equipment No: 22-2

Description: 52/74 MVA Transformer

Estimate: \$450,000

Comment:

This equipment only estimate is for a 52/74 MVA transformer with a 13.8kv primary and 115kv secondary. It is to be used as the steam turbine generator's step-up transformer. A budgetary price estimate from a transformer vendor follows.

ITEM 2

GENERAL ELECTRIC

UTILITY & INDUSTRIAL SALES DIVISION

QUOTATION NO. 327L00640

Unless otherwise stated, this quotation (Form FN 1090, ... Rev.) expires 15 days from its date and may be modified or withdrawn by SELLER prior to any acceptance. All communications should refer to the quotation number and be addressed to our office at:

37 Villa Rd., Suite 412, B-116
PO Box 5797
Greenville, SC 29606
November 27, 1989

PURCHASING

NOV 27 1989

Don Howard
Jones/CRSS Lakewood
A Joint Venture
c/o CRS Sirrine, Inc.
PO Box 5456
Greenville, SC 29606

Subject:

Dear Don:

GE is pleased to submit our quotation for the five (5) power transformers per your inquiry of 11/1/89 as follows:

Item 1 Qty 5 GE primary substation oil filled transformers each rated
OA/FA/FOA-T-60-54,000/72,000 (65°C). Voltage: 230,000
GRY/132,800 - 13,800V.

Imp: 10.0 percent
HV BIL: 750 KV
LV BIL: 110 KV

Transformer and accessories will be per your inquiry specifications and enclosed GEA-11047 with exceptions noted herein.

Lot net price \$ 490,000 each
\$2,450,000 Lot net for qty 5

Item 1 (Alt) Qty 5 GE primary substation oil filled transformers each rated
OA/FA/FOA-T-60-39,000/52,000/55,000/72,800 (55/65°C) with
voltages 230,000 GRY/132,800-13,800V.

Each transformer shall have a special impedance of 7.22 percent so 10% impedance can be available at 54 MVA.

Transformer and accessories are per your inquiry specs with the noted exceptions herein.

Lot net price \$ 450,000 each
\$2,250,000 Lot net for qty 5

NOTICE: Sale of any products or services covered by those on the back of this letter. Any addition binding upon Seller unless specifically assented to by Seller's authorized representative.

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DOE IGCC Project Estimate

Equipment No: 22-3

Description: 14 MVA Aux. Transformer

Estimate: \$225,000

Comment:

This equipment only estimate is for a 14 MVA transformer with a 13.8kv primary and 4.16kv secondary. It is to be used as a step-down transformer to power the station's auxiliary loads. The estimated price is based on our experience from similar projects.

DOE IGCC Project Estimate

Equipment No: 22-4

Description: Balance of Plant Electrical

Estimate: \$3,200,200 Total

\$1,740,000 combustion gas turbine and steam turbine related

\$1,260,200 coal gasification fuel supply related

Comment:

This estimate includes the equipment; switchgear, motor control centers, transformers, isolated phase bus, load break switches, distribution panels, batteries, uninterruptible power supplies, telephone systems, fire alarm systems, conduit, cables, and grounding and labor for the erection and construction of the balance of plant station service auxiliaries. This estimate is based on the vendor quotes for the major equipment that follow and experience in the construction of similar facilities. An allowance for heat tracing of \$150,000 was assumed.

ITEM #3

THE
CALVERT
COMPANY

CUSTOMER: CRS STRRINE
JOB USER:
REQUEST NO.: G086-34

DATE: 3-12-90
SECT.B:PRICING: IPB Cu COND.

DESCRIPTION	QTY/PHASE			QTY TOTAL	PRICING	
	A	B	C		EACH	EXTENSION
=====						
1 BUS SECTIONS, ELBOWS, TEES, TRANSPOSES, & SOLAR SHIELDS:						
1A Bus Sections: (FEET/SINGLE PHASE)						
1A1a Main Bus Sections	42	42	42	126	315.00	39690.00
1B Elbows: (EACH/SINGLE PHASE)						
1B1a Main Bus	2	2	2	6	812.00	4872.00
2 COMPARTMENTS: (EACH)						
2A1b Gen. Phase Bushings	-	COMMON	-	1	4451.00	4451.00
2A12 Ckt. Bkr. Bushings	-	COMMON	-	1	4451.00	4451.00
3 TERMINATIONS: (EACH/SINGLE PHASE)						
3A1a Main Bus to Generator	1	1	1	3	1724.00	5172.00
3A1g Main Bus to Gen. Breaker	1	1	1	3	1724.00	5172.00
4 SEAL ASSEMBLIES: (EACH)						
4A1a Wall/Floor, Main Bus, 3-Ph	-	COMMON	-	0	6265.00	OPTION
4A2a Bus End Seal @ Generator	1	1	1	3	975.00	2925.00
4A2e Bus End Seal @ Gen. Breaker	1	1	1	3	975.00	2925.00
4B1a Seal/Fire Stop - 2Hr Rated	-	COMMON	-	1	9265.00	9265.00
5 JOINTS: (EACH/SINGLE PHASE)						
5A Splice, Welded Type, Field Installed						
5A1a Main Bus Sections	3	3	3	9	325.00	2925.00
6 SUPPORTS: (EACH)						
6A Saddle Type						
6A1a Main Bus Sections	3	3	3	9	300.00	2700.00
6B Trapeze Type						
6B1a Main Bus Sections	-	COMMON	-	3	600.00	1800.00
6C 2-Column Type						
6C1 Main Bus, 2-Column Tower	-	COMMON	-	1	1500.00	1500.00
8 CONDENSATION CONTROL:						
8A Electric Heater Type						
8A1a Main Bus Sections	-	COMMON	-	1	7644.00	7644.00
10 TEST: (EACH)						
10A Insulators						
10A1 Complete ANSI Test	-	COMMON	-	0	0.00	N/R
10B Test Bus						
10B1 Main Bus Sections	-	COMMON	-	0	16120.00	OPTION
10C Basic Impulse Level Test						
10C1 Main Bus Sections	-	COMMON	-	0	1200.00	OPTION
10D Temperature Rise Test						
10D1 Main Bus Sections	-	COMMON	-	0	2400.00	OPTION
10E Momentary Short Circuit Test						
10E1 Main Bus Sections	-	COMMON	-	0	5500.00	OPTION
=====						
TOTAL EQUIPMENT, FOB FACTORY						95492.00
=====						
ESTIMATED DOMESTIC FREIGHT						0.00
=====						
TOTAL EQUIPMENT, FOB FACTORY, INCLUDING ESTIMATED FREIGHT						0.00

Item # 3

DOE/ELE/EQP

6000A, 15 KV, 150 PH Bus Duct

	QTY/PHAS	TOT QTY	RATE	AMT \$
STRAIGHT SEC	290	870	273	237,510
ELBOW	6	18	819	14,742
TEE-TAPS	1	3	1,012	3,036
GEN PHASE BUSH	5	15	2,317	34,755
IND PH BUSH	0	0	4,252	0
XFMR BUSH	0	0	6,950	0
TERMINATION	5	15	1,966	29,490
WALL SEAL	0	0	7,173	0
EXPANSION JOINT	0	0	3,124	0
BUS END SEAL	6	18	1,116	20,088
BOLTED DISCONNECT COMPARTMENT	2	6	1,849	11,094
STRIP HEATER	15	45	70	3,150
THERMOSTAT	LOT	2	100	200
GROUND BUS	LOT	300	35	10,500
OUTDOOR EXPANSION JOINT	3	9	3,124	28,116
DISCONNECTING LINKS	2	6	1,849	11,094
			TOTAL	403,775

+ Labor

Item # 4

DOE/ELE/EQP

3000A, 15KV NON-SEG
PHASE BUS DUCT

1000	250	250000
	6	4914
	1	1012
	5	11585
	0	0
	0	0
	5	9830
	1	7173
	3	9372
	0	0
	2	3698
	15	1050
	2	200
	250	8750
	3	9372
	3	5547

322,503

26 Mar-90

CRS SIRRINE

Inquiry Number: 99512-100-030-001

Non-Segregated Phase Busway

24 Feet 3000A Busway,
non-ventilated
Steel Enclosure
Copper Bus
Space Heaters
NORYL Tube INSULATORS
13.8 KV 3Ph 3W
100 KA Bracing

ITEM # 4

1 Generator Conn

2 Switchboard Connections

7 Indoor Trapeze Hangers

3 Elbows - Vertical

16 Mar-90

CRS SIRRINE

COMMERCIAL DATA SHEET

Company Name: Square D Company

Signed: *Jerry Mulroche*

Date: 3/26/90

1 Total firm base price, including all required quantities of drawings and manuals	\$47,544
2 Pricing is subject to escalation. If YES, explain in proposal	No
3 Terms of Payment	Net 30
4 F.O.B. Terms. (Quote for jobsite required; F.O.B. Shipping point is an alternate.)	Shipping Point Full prepaid and Allowed
5 Origin of shipment	Oxford, Ohio
6 Method of shipment	Truck
7 Estimated shipping weight	5500 Lbs
8 Estimated freight cost	Included in 1
9 Recommended spare parts and pricing are included with bid	no
10 Time to submit recommended spare parts proposal if not included	2 wks
11 Time required for complete shipment (ADA).	18-20 wks
12 Exceptions to Terms, Conditions, Forms, etc. are clearly referenced in the proposal	YES X
13 Exceptions to technical documents are clearly referenced in the proposal.	YES X
14 Proposal validity expiration date (90 days preferred)	90 days
15 Sellers plant labor affiliation contract expiration date	Non Union Not Applicable

GENERAL ELECTRIC

UTILITY & INDUSTRIAL SALES DIVISION

QUOTATION NO. 327L00645E

Unless otherwise stated, this quotation (Form FN 1090, ... Rev.) expires 15 days from its date and may be modified or withdrawn by SELLER prior to any acceptance. All communications should refer to the quotation number and be addressed to our office at:

37 Villa Rd., Ste 412, B-116
Greenville, SC 29615
(903) 241-3001
March 30, 1990

Jim Belvin
CRS Sirrine
FAX # 234-2449

Dear Jim:

GE is pleased to offer an estimating price for the balance of plant equipment per your single line SK-E-J1532 you marked up and gave me on 3/27/90. Our estimate is based on standard GE terms and conditions of sale and is as follows:

Item 1	5KV indoor 350 MVA double ended Power/Vac Metalclad Switchgear line-up	
	Lot net estimating price	\$379,000
Item 2	Cooling Tower Unit Substation with 1500 KVA oil filled transformer, 5KV/480V and coupled to MCC-005 in outdoor construction.	
	Lot net estimating price	\$44,400
Item 3	Outdoor waste treatment unit substation with 1000 KVA oil filled transformer, 5KV/480V, close coupled to MCC-004.	
	Lot net estimating price	\$51,700
Item 4	Indoor double ended low voltage Unit Substation with 2-2500 KVA dry type transformers, 5KV/480V, and close coupled to GE AKD-8 LV Switchgear.	
	Lot net estimating price	\$170,000

NOTICE: Sale of any products or services covered by those on the back of this letter). Any additional conditions proposed by Buyer are objected to and will not be binding upon Seller unless specifically assented to in writing by Seller's authorized representative.

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Jim Belvin
CRS Sirrine
March 30, 1990
Page 2

327L00645E

Item 5   Steam Gen. Aux & Utility Unit Substation - indoor.
             Includes 1000 KVA dry type transformer 5KV/480V and close
             coupled to MCC-003.

Lot net estimating price   \$57,500

Item 6   MCCs and PDPs to be fed from to double ended LVUS (Item 4
             above). Includes MCC-001, MCC-002, PDP-1, PDP-2 and
             PDP-3.

Lot net estimating price   \$49,800

Item 7   Indoor Line-up of 5KV Motor Controllers and 5KV fused
             disconnect switches.

Lot net estimating price   \$70,000

TOTAL ESTIMATING PRICE, ITEMS 1 - 7 ABOVE   \$882,400

Please call if you have any questions or need additional help.

Sincerely,

Tom G. Van Norstrand /s/

Tom G. Van Norstrand
Account Manager

cc: George Siokos

CRS SIRRINE ENGINEERS, INC.

D.O.E

EQUIPMENT LIST

DATE: MARCH 28, 1990

EQP # DESCRIPTION

015-002 VENT FAN #1
015-002 VENT FAN #2
015-003 GEN SPACE HEATER
015-003 GEN VENT FAN #1
015-003 GEN VENT FAN #2
015-004 CIRC PHP #1
015-004 CIRC PHP #2
015-004 EVAPORATOR COOL PHP1
015-004 EVAPORATOR COOL PHP2
015-005 CHARGE PHP
015-005 START SYS HEATER
015-005 TUR HYD PHP ST MOTOR
015-006 WTR WASH SYS PHP
015-007 TURB LO HEATERS
015-008 GEN LO HEATERS
015-008 AUX LUBE PHP
015-009 GT-1, FO PHP
015-013 BATTERY CHARGER-1
015-014 BATTERY CHARGER-2

CONN OPR STA

125 125 125 3C
125 125 125 4C
5 5 5 3A
100 100 100 5A
100 100 100 5B
3 3 3 6A
3 3 3 6B
3 3 3 8C
3 3 3 8D
5 5 5 4A
200 0 200 6C
50 50 0 7B
5 5 5 8A
5 5 5 8B
7.5 7.5 7.5 4B
80 7C
SCL
SCR

TOTAL

800.5

(ESTIMATED COST.)

BASED ON QUOTE (NORTHWEST)

51-1.

MCC-001 : GAS TURBINE GENERATOR.

1A	2A	3A	4A	5A	6A	7A	8A	9A
1800A	L R	2B 2B	3B	4B	5B	6B	7B	8B
INCO	L R	3C	4C	5C	6C	7C	8C	9C
SEC	2C	3C	4C	5C	6C	7C	8C	9C
WITH	18CK							
M.L.O	PB							
	2D							
	15							
	KVA							
	XHR							

SPARE SPACE ONLY

Budget Price:
= \$25.000.

CRS SIRRINE ENGINEERS, INC.

D.O.E

EQUIPMENT LIST

DATE: MARCH 28, 1990

EQP #	DESCRIPTION	CONN	OPR	STA
021-004	VAPOR EXTRACTOR	1.5		3A
021-004	L.O. MAIN OIL PHP #1	15	15	5A
021-004	L.O. MAIN OIL PHP #2	15	15	5B
021-005	ACCU FILT SYS PHP	5		3E
021-005	OIL SYS RESERVOIR PHP1	20		6D
021-005	OIL SYS RESERVOIR PHP2	20		4B
030-002	COND PHP #1	40	40	7A
030-003	VAC PHP #1	3		3B
030-003	COND PHP #2	40	40	7B
030-003	COND PHP #3	40	40	7C
030-005	COND DRP PHP #1	3	3	3C
030-006	COND DRP PHP #2	3	3	3D
030-009	FUEL OIL PHP	80	80	80 8C
030-014	LP BOILER FEED PHP #1.T1	15		5C
030-015	LP BOILER FEED PHP #2.T1	15		5D
030-018	LP BOILER FEED PHP #1.T2	7.5		3F
030-019	LP BOILER FEED PHP #2.T2	7.5		4A
030-020	LP BOILER FEED PHP AUX1	15		6A
030-021	LP BOILER FEED PHP AUX2	15		6B
030-001	AUXSTMBOI#1.AIR FAN#1	15		6C
	BFP NO. 1	50		8A
	BFP NO. 2	50		8B
	FD FAN NO. 1	100		9A
	FD FAN NO. 2	100		9B
033-001	FIRE JOCKEY PHP	10	0	0 8C
	TOTAL	655.5		

EQP #	DESCRIPTION	CONN	OPR	STA
3A				
5A				
5B				
3E				
6D				
4B				
7A				
3B				
7B				
7C				
3C				
3D				
80 8C				
5C				
5D				
3F				
4A				
6A				
6B				
6C				
8A				
8B				
9A				
9B				
0 8C				

TOTAL

655.5

MCC-003 : STEAM TURBINE GENERATOR. ST-1

1A	2A	3A	4A	5A	6A	7A	8A	9A
1800A	12B	12B	13B	4B	5B	6B	7B	8B
INCO	L	R						
SEC	L	R						
WITH	18CK	3C	3C	3C	5C	6C	7C	8C
M.L.O	PB	3D	3D	3D	5D	6D	7D	8D
	2D	3E	3E	3E	5E	6E	7E	8E
	15	KVA	15	15	5F	6F	7F	8F
	XMR							

SPARE SPACE ONLY

(Budget Price)

X 16.300.

D.O.E

EQUIPMENT LIST

DATE: MARCH 28, 1990

EQP #	DESCRIPTION	CONN	OPR	STA
031-001	CLSD COOLING PMP #1	7.5	7.5	7B
031-001	CLSD COOLING PMP #2	7.5	7.5	7C
031-001	CTVR GEAR RED FAN #1	125	125	3A
031-001	CTVR GEAR RED FAN #2	125	125	4A
031-001	CTVR GEAR RED FAN #3	125	125	5A
031-001	CTVR GEAR RED FAN #4	125	125	6A
031-003	CTVR VTR TRT AGI	5	5	4B
031-003	CTVR VTR TRT AGI	5	5	4C
031-003	CTVR VTR TRT INH	5	5	5B
031-003	CTVR VTR TRT INHIBTR	5	5	5C
031-003	CTVR VTR TRT PMP	5	5	6B
034-001	NO.2 FUEL FO U/L PMP #1	20	20	8A
034-002	NO.2 FUEL FO U/L PMP #2	20	20	8B
034-006	NO.2 FO XFR PMP #1	5	5	6C
034-007	NO.2 FO XFR PMP #2	5	5	7A
034-008	NO.2 FO XFR PMP #4	3	3	3B
034-010	NO.2 FO XFR PMP #3	3	3	3C

598

1.6500
1.25
1000000

(ADD. BETWEEN XFRM.
4 BUS CONNECTION
ASPER ENG. QUOTE)

Cooling Tower Acc.

(ESTIMATED)

MCC-004 - COOLING TOWER AREA											
1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A
1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B
1C	2C	3C	4C	5C	6C	7C	8C	9C	10C	11C	12C
1D	2D	3D	4D	5D	6D	7D	8D	9D	10D	11D	12D
1E	2E	3E	4E	5E	6E	7E	8E	9E	10E	11E	12E
1F	2F	3F	4F	5F	6F	7F	8F	9F	10F	11F	12F
1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G
1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	11H	12H
1I	2I	3I	4I	5I	6I	7I	8I	9I	10I	11I	12I
1J	2J	3J	4J	5J	6J	7J	8J	9J	10J	11J	12J
1K	2K	3K	4K	5K	6K	7K	8K	9K	10K	11K	12K
1L	2L	3L	4L	5L	6L	7L	8L	9L	10L	11L	12L
1M	2M	3M	4M	5M	6M	7M	8M	9M	10M	11M	12M
1N	2N	3N	4N	5N	6N	7N	8N	9N	10N	11N	12N
1O	2O	3O	4O	5O	6O	7O	8O	9O	10O	11O	12O
1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P	12P
1Q	2Q	3Q	4Q	5Q	6Q	7Q	8Q	9Q	10Q	11Q	12Q
1R	2R	3R	4R	5R	6R	7R	8R	9R	10R	11R	12R
1S	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S	12S
1T	2T	3T	4T	5T	6T	7T	8T	9T	10T	11T	12T
1U	2U	3U	4U	5U	6U	7U	8U	9U	10U	11U	12U
1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	11V	12V
1W	2W	3W	4W	5W	6W	7W	8W	9W	10W	11W	12W
1X	2X	3X	4X	5X	6X	7X	8X	9X	10X	11X	12X
1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y	11Y	12Y
1Z	2Z	3Z	4Z	5Z	6Z	7Z	8Z	9Z	10Z	11Z	12Z

SPARE SPACE ONLY

(Two Speed Reversing)

\$41,000

CRS SIRRINE ENGINEERS, INC.
DOE
GEDDES, NY
EQUIPMENT LIST
DATE: MARCH 28, 1990

EQP #	DESCRIPTION	CONN	OPR	STA
032-002	PROC DRAIN PMP #1	30	5	0 4B
032-003	DESPHT PMP #1	30	30	10A
032-004	DESPHT PMP #2	75	75	10B
032-005	RAV VTR FEED PMP #1	75	75	12B
032-006	RAV VTR FEED PMP #2	75	75	12C
032-007	RAV VTR FILTER # 1	5	5	4C
032-008	RAV VTR FILTER # 2	5	5	4D
032-009	DECARB BLOWER #1	5	5	4E
032-010	DECARB BLOWER #2	5	5	4F
032-011	DECARB VTR PMP #1	25	25	13C
032-012	DECARB VTR PMP #2	25	25	13B
032-013	ACID PMP # 1	1	1	3A
032-014	ACID PMP # 2	1	1	3B
032-015	CAUS CHEM 1.FED PMP #1	1	1	3C
032-016	CAUS CHEM 1.FED PMP #2	1	1	3D
032-017	DILUTION ELEC HEATER	75	75	13A
032-018	ACID XFR: PMP	3	3	3E
032-019	CAUSTIC XFR PMP	3	3	3F
032-020	CAUSTIC XFR PMP	3	3	4A
032-021	NEUT MIXER	5	5	0 5A
032-022	NEUT PMP # 1	10	10	0 9C
032-023	NEUT PMP # 2	10	10	0 9D
032-024	DEMIN XFR PMP # 1	30	30	10C
032-025	DEMIN XFR PMP # 2	30	30	11A
032-026	DEMIN XFR PMP # 3	30	30	11B
032-027	AUX CLG VTR PMP # 1	60	60	11C
032-028	AUX CLG VTR PMP # 2	60	60	12A
032-029	OXY SCA DRUM AGI	5	5	5B
032-030	OXY SCA DRUM FD PMP #2	5	5	5C
032-031	OXY SCA DRUM FD PMP#1	5	5	5D
032-032	OXY SCA DRUM XFR PMP	5	5	5E
032-033	NEUT DRUM AGI	5	5	5F
032-034	NEUT DRUM FD PMP #1	5	5	6A
032-035	NEUT DRUM FD PMP #2	5	5	6B
032-036	NEUT DRUM XFR PMP	5	5	6C
032-037	PHOS CHEM FD AGI	5	5	6D
032-038	PHOS CHEM FEED PMP#1	5	5	6E
032-039	PHOS CHEM 2.AGI	5	5	6F
032-040	PHOS CHEM 2.FED PMP #1	5	5	7A
032-041	PHOS CHEM 2.FED PMP #2	5	5	7B
032-042	PHOS CHEM 3.AGI	5	5	7C
032-043	PHOS CHEM 3.FED PMP #1	5	5	7D
032-044	PHOS CHEM 3.FED PMP #2	5	5	7E
032-045	PHOS CHEM 3.FED PMP #2	5	5	7F

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WATER TREATMENT
Based on. *Estimation*

MCC-005: WATER TREATMENT AREA

1A	2A	3A	4A	5A	6A	7A	8A	9A
1000A	2B	3B	4B	5B	6B	7B	8B	9B
INCO	2C	3C	4C	5C	6C	7C	8C	9C
SEC	2D	3D	4D	5D	6D	7D	8D	9D
WITH 18CK	2E	3E	4E	5E	6E	7E	8E	9E
M.L.O PB	2F	3F	4F	5F	6F	7F	8F	9F
15								
KVA								
XHR								

10A	11A	12A	13A	14A
10B	11B	12B	13B	14B
10C	11C	12C	13C	14C
			13D	14D

SPARE SPACE ONLY

Estimation

CRS SIRRINE ENGINEERS. INC.

D.O.E.

EQUIPMENT LIST

DATE: MARCH 28. 1990

EQP #	DESCRIPTION	CONN	OPR	STA	
032-051	PHOS CHEM 3.FED PHP #3	5		8A	
032-052	CAUS CHEM FED PHP #2	5		8B	
032-052	CAUS CHEM FEED PHP#1	5		8C	
032-053	CAUS CHEM 2.FED PHP #1	5		8D	
032-053	CAUS CHEM 2.FED PHP #2	5		8E	
032-054	CAUS CHEM 3.FED PHP #1	5		8F	
032-054	CAUS CHEM 3.FED PHP #2	5		9A	
032-054	CAUS CHEM 3.FED PHP #3	5		9B	
032-055	GT-1 INJ SKID.PHP1.GAS FU	5		9C	
032-055	GT-1 INJ SKID.PHP2.GASFU	5		9D	
032-055	GT-1 INJ SKID.PHP3.LIQ FU	5		9E	
032-055	GT-1 INJ SKID.PHP4.LIQ FU	5		9F	
032-056	GT-1 INJ SKID.PHP2.DULFU	5		9A	
032-056	GT-2 INJ SKID.PHP1.DUL FU	5		9B	
	NOX VTR SUP PHP #1	60		14A	
	NOX VTR SUP PHP #2	30		14C	
	TOTAL				853

3/28/90 1:13 PM

Page 6 OF 8

CRS SIRRINE ENGINEERS. INC.

D.O.E.

EQUIPMENT LIST

DATE: MARCH 28. 1990

EQP #	DESCRIPTION	CONN	OPR	STA
037-001	AIR COMPRESSOR #1	40		0 3A
037-002	AIR COMPRESSOR #2	40		0 3B
042-001	WASTE VTR DISCH PMP#1	5		3C
042-002	WASTE VTR DISCH PMP#2	5		3D
042-003	WASTE VTR DISCH PMP#3	5		4A
042-008	SUMP PUMP	5		4B
	CABINET HTR-1	5		4E
	CABINET HTR-2	5		4F
	CONMP BLDG EF-1	5		5A
	CONMP BLDG EF-2	5		5B
	CONMP ROOM UH-1	5		5C
	CONMP ROOM UH-2	5		5D
	CONT ROOM AHU-1	25		8A
	OFFICE AREA AHU-1	10		7F
	SWGR ROOM AHU-1	25		8B
	SWGR ROOM UH-1	5		5E
	SWGR ROOM UH-2	5		5F
	TUR BLDG EF-1	5		6A
	TUR BLDG EF-2	5		6B
	TUR BLDG EF-3	5		6C
	TUR BLDG EF-4	5		6D
	TUR BLDG EF-5	5		6E
	TUR BLDG EF-6	5		6F
	TUR BLDG EUH -1	10		7A
	TUR BLDG EUH -2	10		3 7B
	TUR BLDG EUH -3	10		1.5 7C
	TUR BLDG EUH -4	10		50 7D
	TUR BLDG EUH -5	10		7E
	TUR BLDG EUH -6	10		7F
	TURNING GEAR	3		4D
	VAP EXTRACTOR	1.5		4C
	WATER WASH PMP	50		8C
	WT AREA EF-1	5		7A
	WT AREA EF-2	5		7B
	WT AREA EF-3	5		7C
	VTR TRT UH-1	5		7D
	VTR TRT UH-2	5		7E

389.5

UTILITIES HVAC.

BASED ON. G.E. QUOTATIONS
NORMALS.

MCC-008: UTILITIES AND HVAC											
1A	2A	3A	4A	5A	6A	7A	8A				
L	R										
800A	2B	3B	4B	5B	6B	7B	8B				
INCO	L	R									
SEC	2C	3C	4C	5C	6C	7C					
WITH	18CK										
M.L.O	PB	3D	4D	5D	6D	7D	8C				
	2D	3E	4E	5E	6E	7E					
	15										
	KVA	3F	4F	5F	6F	7F	8D				
	XMR										

SPARE SPACE ONLY

BUDGET PRICE

= \$116,000.

4-3-90
Page Three
EATON/C-H

UNIT PRICING (MCC'S)

MCC-001.....	\$ <u>15,016.⁰⁰</u>
MCC-002.....	\$ <u>10,877.⁰⁰</u>
MCC-003.....	\$ <u>14,806.⁰⁰</u>
MCC-004.....	\$ <u>15,335.⁰⁰</u>
MCC-005.....	\$ <u>31,786.⁰⁰</u>
MCC-006.....	\$ <u>18,174.⁰⁰</u>
=====	
TOTAL - ALL MCC'S.....	\$ <u>105,994.⁰⁰</u>

07-Apr-90

CRS SIRRINE

Inquiry Number . . . . .
480 V Switchgear

COMMERCIAL DATA SHEET

Company Name: Square D Company

Signed:

Date: 4/06/90

1 Total firm base price, including all required quantities of drawings and manuals	\$264,387
2 Pricing is subject to escalation. If YES, explain in proposal	NO
3 Terms of Payment	Net 30
4 F.O.B. Terms. (Quote for jobsite required; F.O.B. Shipping point is an alternate.)	FOB Factory Full prepaid and allowed
5 Origin of shipment	Monroe, N.C. Middletown, OH.
6 Method of shipment	Truck
7 Estimated shipping weight	W/A
8 Estimated freight cost	Included in 1
9 Recommended spare parts and pricing are included with bid	NO
10 Time to submit recommended spare parts proposal if not included	2 wks
11 Time required for complete shipment (ADA).	17-21 wks
12 Exceptions to Terms, Conditions, Forms, etc. are clearly referenced in the proposal	YES X NONE
13 Exceptions to technical documents are clearly referenced in the proposal.	YES X NONE
14 Proposal validity expiration date (90 days preferred)	90 days
15 Sellers plant labor affiliation contract expiration date	Monroe Non Union Middletown, IBEW 1991

TRANSFORMERS T5 & T6

- 2 2500 KVA Outdoor Station Transformer
 Silicone Oil Filled
 4.16KV Primary, 60KV BIL
 480V/277V Wye Secondary, 10KV BIL
 55/65 Degree Rise
 5.75 % Impedance +/- 7.5%
 Manual Tap Changer w/ Key Interlock
 Provisions for Future Fans (includes wiring)
 Primary Air Terminal Chamber (500 MCM Lugs) 2
 Secondary Throat for Busway Connection
 Aluminum Windings
 Accessories:
   Top filter press connection w/ valve
   1" globe type drain & filter valve
     w/ sampling device
   Liquid level gauge w alarm contacts
   Dial type thermometer w/ alarm contacts
   Pressure/vacuum gauge
   Pressure relief device
   High Pressure Alarm Device 63P

Alternate for mineral oil (deduct)

Total for 2   \$22,015

480 V Draw Out Switchgear

QTY   ITEM

- 7 DSL-206 M/O Complete Brkr & Space
 1 DSL-416 M/O Complete Brkr & Space
 3 DSL-840 E/O Complete Brkr & Space
 3 Grd Fault 4W - 4000A
 11 Short Time Delay
   1 Portable Test Kit
 11 Aux Switch - Each 4 Contacts
   3 Keylock / Cylinder
   3 UV (Blown Fuse) Trip
   3 Brkr Control Switch W/Lights
   2 Brkr Lifting Device - Top
   1 UL Label / Line-Up
   2 4W Busway Connection 4000A
   8 Compression Lugs / Brkr - 800A
   2 4000A Main Bus, 4W, 50%N, 22" Wide
   3 4000A Main Bus, 4W, 50%N, 34" Wide
   3 Barrier-Main Bus/Cable / Section
   5 Side Barriers / Section
 13 Engraved Plastic Nameplates - Ea.
 24 CT'S 5-800A
   9 CT'S 2000-6000A

- 4 PT'S 1, 2, 2.4, 2.5, 4, 5:1
- 2 CPT 5KVA
- 3 Ammeter 4" with Selector Switch
- 2 Voltmeter 4" with Selector Switch
- 8 Ammeter 2" with Selector Switch
- 2 Alarm Monitoring Panels
- 2 WH Demand Meter
- 2 Auxiliary Relay, Light Duty
- 1 AC Control Panelboard
- 1 Three Breaker Xfer 3-PH Detect
- 1 Control Power Transfer

DIM: 190" Wide x 72" Deep x 92" High

Non-Segregated Phase Busway

- 62 Feet 4000A Busway,
  - non-ventilated
  - Steel Enclosure
  - Copper Bus, Silver Plated
  - Space Heaters, 240 V
  - NORYL Tube INSULATORS
  - 480V 3Ph 4W
  - 100 KA Bracing
- 2 Transformer Conn.
- 2 Switchboard Connections
- 7 Indoor Trapeze Hangers
- 4 Elbows - Vertical
- 2 Elbows - Horizontal
- 2 Wall Flange

QUOTATION
Subject to terms and conditions on reverse side.

Emerson Electric Co.
Industrial Controls Division
10033 Grand Junction Rd.
P.O. Box 23098 3/8/90
Charlotte, NC 28212-23098
(704) 545-0151

CRS Sirrine Engineers, Inc.
P.O. Box 5456
Greenville, SC 29607-5456

MAR 18 1990

Attn: Don L. Howard

GENTLEMEN:

Swartz Sales Company, on behalf of Emerson Computer Power is pleased to submit this proposal for an Uninterruptible Power System. Emerson is the leader in Computer Power Equipment, both in terms of installed base and field support network.

Our quotation is as follows:

- (1) EMERSON model AP-381-04 rated 125 KVA;100 KW;
Complete system as described in the attached E/M.

Price; \$61,906.00

Shipping Point; FOB Fact. Frt. allowed on truck

Delivery; 6 wks ARO ARO

Warranty; 12 months after startup or 18 months after shipment, whichever occurs first. Covers parts and labor.

Payment Terms; Net 30; Other terms per Emerson standard or as mutually agreed.

Thankyou for this opportunity to submit this proposal. After you have reviewed the content, we are available to meet with you to discuss details. Please let me know how we can be of further assistance.

Sincerely,

William A. Morris
William A. Morris
Representative

HDR**Uninterruptible
Power Systems****PRICE
QUOTATION**

TO: CRS Sirrine
C/O Jake Rudisill Associates, Inc.
1225 Harding Place
Charlotte, NC 28236

Attention: Jim Forkins & Bob Pace

DATE 03/26/90 QUOTE #4524

INQUIRY Request for Quotations UPS

Fax of 3/23/90

VALIDITY 90 days TERMS Net 30 days

FOB Factory
FRT. Prepaid & Add SHIPMENT 10-12 wks ARO

ITEM	QTY	DESCRIPTION	PRICE
	1	Wall mounted battery disconnect in NEMA-1 enclosure.	\$ 989.00
5	1	HDR stand alone battery charger, with standard instrumentation, AC input and DC output circuit breakers. One (1) Model GLC-130-150 150 Amp, 130 VDC Charger Charger dimensions: 78"H x 29"W x 36"D Weight: 525 lbs.	\$ 7,130.00
6	1	Battery bank, 4 hours duration, 100 amps discharge, 120 VDC nominal, GNB Model No. 75A15, with integral rack. DC charger calculation for Item #5: $\frac{\text{Amps} \times \text{dis/hrs} \times 1.15}{\text{Recharge Hours}} + \text{Load}$ $\frac{100 \times 4 \times 1.15}{12} + 100$ $\frac{460}{12} + 100 = 138$ amps charger required PRICES ARE FIRM FOR EQUIPMENT SHIPPED THROUGH AUGUST 1990. HDR STANDARD TERMS & CONDITIONS OF SALES APPLY. WARRANTY HDR will warrant the equipment for 12 months from start-up, not to exceed 18 months from date of shipment. During the warranty period, all equipment or parts returned to the HDR factory in Hilliard, Ohio would be repaired or replaced at no charge. In the unlikely event a service technician is required on the jobsite during the warranty period, HDR would require technician time in accordance with the attached Field Service/Start-Up Rates plus reimbursement of technician's travel and living expenses. Start-Up supervision would be provided in accordance with the attached HDR Field Service/Start-Up Rates.	\$19,800.00

PAGE 2 of 2

PRICES QUOTED ARE ☒ FIRM ☐ SUBJECT TO E 228

THIS QUOTATION IS SUBJECT TO THE TERMS AND CONDITIONS ON THE REVERSE SIDE AND ALL PREVIOUS QUOTATIONS WRITTEN OR ORAL - SHIPMENTS ARE CONTINGENT UPON STRIKES, FIRES, AVAILABILITY OF MATERIALS FROM SUB-SUPPLIERS, ACTS OF GOD AND ALL OTHER CONDITIONS BEYOND HDR CONTROL

BY Donald J. Larson
TITLE Senior Applications Engineer

WESTINGHOUSE ELECTRIC CORPORATION
DCBU - CONSTRUCTION EQUIPMENT DIVISION

Main
circuits
Job

Lighting Circuits PANEL TYPE PRL. 1

[illegible]

WESTINGHOUSE ELECTRIC CORPORATION
DCBU - CONSTRUCTION EQUIPMENT DIVISION

$A_{\text{mp}} = \frac{7}{2}$

PANEL TYPE PRL- 3

JOB NO.		DISTRIBUTOR ORDER NO.						INDICATE AIC SHORT CIRCUIT RATING AND IF SERIES RATED OR FULLY RATED. SR = SERIES RATED FR = FULLY RATED			
NEG. NO.		G.O. NO.									
DISTRIBUTOR		SALESMAN									
SERVICE		A. 3/4/120/208 B. 3/4/277/480	C. 1/3/120/240 D. 3/3/240	E. 3/3/480 F.							
ITEM NO.		2	3								
DESIGNATION											
SERVICE		B	B								
TRIM - S OR F											
FEEDER	CABLE SIZE										
	NO. PER PH & N										
	LOCA - T OR B										
	AIC RATING	65	65								
AIC	SR OR FR										
MAINS	MLO								TOTAL	LIST EA	EXTENDED LIST
		X	24	1					1	3064	3064
		X	48	1					1	4066	4066
BRANCHES	AMPS	POLES	FRAME								
	26	1	HFD	12	24					36	287
ODIFICATIONS	S. E. LABEL										
	EQ. GROUND BAR	1	1						2	29	58
	NAMEPLATE	1	1						2	27	54
	CU BUS	1	std						1	212	212
BOXES	HEIGHT										
	WIDTH										
	DEPTH										
									TOTAL LIST MULT. BOOK		17786 x.32 * 5692

DOE IGCC Project Estimate

Equipment No: 22-5

Description: Transmission Line (Erected)

Estimate: \$1,100,000

Comment:

This estimate includes the design and construction of 3 miles of 115kv transmission line; structures, insulators, ASCR conductors, overhead ground wires, deadend structures, hardware, grounding, clearing, restoration, reseeded, engineering, and tie-in to an existing 115kv substation.

DOE IGCC Project Estimate

Equipment No: 22-6

Description: Switchyard (Erected)

Estimate: \$1,500,000

Comment:

This estimate includes the engineering, designing, furnishing, fabrication, installing, and commissioning of a 115kv substation. The scope and supply is detailed on the single line. It is based on elementary phase and neutral overcurrent relaying, and the design parameters contain in the following budget price quotation.

CRS SIRRINE
2 Patewood Drive
Greenville, SC

March 30, 1990

Attention: Mr. Brian Cripps

Reference:

Gentlemen:

ABB Power T&D Company Inc. is pleased to offer a budgetary proposal for the 115/13.8kV switchyard at Onodaga.

Included in our price are engineering, design, detailing, furnishing, fabrication, installation, commissioning and civil work.

For technical and commercial information, please refer to the attached sections.

ABB Power T&D Company Inc. is looking forward to doing business with you.

If you have any questions or comments, please do not hesitate to contact us.

Very truly yours,

ABB POWER T&D COMPANY INC.

Ewald Warzecha
Marketing
Substations Division

Enclosure

cc: Bob Pace - Jake Rudisill
Jim Vorkins - Jake Rudisill

EW:24:1:jm

ABB Powe 233 pany Inc.

COMMERCIAL PROPOSAL

- Our price for the 115/13.8 kV substation switchyard as described in the technical part attached:

\$ 2,580,000.00

- Our price is based on:

- FOB Jobsite
- Budgetary (within +10%)
- Validity until May 31, 1990

- Terms of Payment:

- 10% down payment with order
- 20% upon first submittal of drawing
- 60% upon receipt of the equipment at jobsite
- 10% upon acceptance of the equipment, but not later than four weeks after completion of commissioning of the substation

The ABB Power T&D Company Inc. Standard Terms and Conditions of Sale, attached, apply to this proposal.

- Delivery:

Delivery is 12 months after receipt of order and technical clarification.

- Installation:

Installation time is 2 - 3 months.

- Taxes:

The above prices do not include taxes or local permits, and are based on using ABB trained labor.

EW:24:3:jm

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 100 MW

AREA NO.: 0023
 AREA NAME: CONTROL SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0023- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCH NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
23-1.	CONTROL SYSTEM							1,455,000	
23-2.	INSTRUMENTATION							1,375,000	
23-3.	CONTROL VALVES							W/23-2	
23-4.	MOTOR OPERATED VALVES							300,000	

DOE IGCC Project Estimate

Equipment No: 23-1 thru 23-4

Description: Controls and Instrumentation

Estimate: \$3,130,000

Comment:

The attached reference quotation from Bailey Controls is from a recent gas turbine based cogeneration project. This quote is for only the hardware and software associated with the DCS. Additional estimates are added for the plant instrumentation, control valves and motorized control valves. The total estimate is \$3,130,000.

Bailey Controls Company

Babcock & Wilcox a McDermott company

29801 Euclid Avenue
Wickliffe, Ohio 44092
(216) 585-8500
Telex: 980621 — Cable: Bailymeter
Fax: (216) 943-4609

October 10, 1989

Mr. Ron Lawler
CRS Sirrine
P. O. Box 5456
Greenville, SC 29606

Reference:

Dear Ron,

The following information is provided per items raised during our meeting at CRS Sirrine on 9/15/89:

1. Bailey will provide five (5) color printers as part of the project to replace the five (5) black & white printers that were previously shown on the Equipment List.
2. The base proposal offering includes Bailey engineering services to define and implement a total of 50 custom graphics and 100 faceplate displays for the control system. Please refer to the following descriptions for definitions of Bailey's graphic displays:

Custom Graphic:

A graphic display in the form of a process schematic detailing the plants piping system or any other display that needs to be implemented in a custom format by drawing lines, circles, arcs, polygons, etc.

Faceplate Display:

A graphic display comprised of standard Management Command System display elements. Each faceplate display may contain any combination of the following elements:

- Alarm Summary
- Analog Value Box (32 max. per display)
- Digital Value Box (32 max. per display)
- Device Driver to enable manual control of digital devices with control feedback (16 max. per display)

- Control Station Faceplate to indicate the PV, Setpoint and Control output for an analog station (16 max. per display)
- Trend Display Element enables up to five points to be plotted on a grid vs. time (4 max. per display providing 20 trend points)

3. The proposed system contains engineering services to define and implement a total of 35 logs.
4. The base control system contains the following hardware in the control rooms as shown on attached Drawing No. SK880318-01B:

Control Room:

- 8 19" CRT's
- 5 Keyboards
- 5 Annunciator Display Select Panels
- 4 Color Printers
- 4 Printer Consoles
- 4 15" Wedges

Engineer's Room:

- 2 Intel 301 based Engineering Workstations with 19" CRT's
- 2 Console Work Surfaces
- 1 Color Printer
- 1 "D" Size Plotter
- 1 Printer Console

Relay Room:

- 1 Maintenance Terminal

5. The maintenance terminal located in the Relay Room is a Wyse terminal used to perform off-line diagnostics on the Management Command System driver electronic packages.
6. Bailey has included all cables required to connect the CRT's and printers and to the electronic driver packages.
7. The revised proposal includes four (4) RS-232 serial interfaces to Woodward Gas Turbine Control systems. Each interface will consist of an NMFC03 Multifunction Controller module with a custom program written in "C" language to accomplish the protocol conversion.
8. Bailey has assumed that the interface to the steam turbine control system will be hardwired and not require an RS-232 serial interface per our discussions with CRS Sirrine.

9. The revised Equipment List (Revision B) attached to this letter details the following scope changes as discussed at our meeting with CRS Sirrine:

- Controls for Auxiliary Boiler #2 have been deleted from the scope of supply.
- All panel mounted control stations and logic stations have been deleted.
- Both auxiliary control panels have been deleted.
- One set of auxiliary boiler hardware has been deleted

The base proposal price for Revision B is \$1,410,000.

10. A preliminary project schedule is attached to this letter.
11. The Management Command System driver electronic packages will be configured such that the failure of a single electronics package will not affect the operation of any CRT. This will be accomplished via a series of manual transfer switches that must be switched by the operator upon a driver electronics package failure.
12. The following documentation will be provided as part of this project:

External Connection Drawings - identify the terminal blocks location for each I/O point in the system

Power Distribution - provides an one-line power distribution diagram for the proposed system

Cabinet Arrangement - identifies the various locations of components within Bailey's system cabinets

Cable List - provides a tabulation of all cables supplied on the contract with customer cable numbers, length, location, etc.

Configuration Drawings - define the control logic for the system with SAMA-like symbology and provides detailed configuration data

CRS Sirrine

(4)

October 10, 1989

MCS Database - a preliminary copy of the MCS database in a dBase III format will be sent to the customer for comment and approval

MCS Graphics - copies of graphic displays defined by Bailey will be sent to customer for review and comment

Instruction Manuals

13. A brief description of the software packages available within Bailey's Engineering Workstation is provided in Product Specification E96-700 which is attached to this letter.
14. The price deduct to remove the auxiliary boiler hardware as defined under Item 14 of the attached Equipment List is \$37,200.
15. The optional price adder to include hardware/software necessary to upgrade the second Engineering Workstation to a Process Control View console which will enable engineers to view the same graphics as the operators view on the MCS consoles is 7,500. A description of the Process Control View capabilities is included in Product Specification E96-819 which is attached to this letter.
16. Please refer to the attached write-up for a complete description of the services performed by Bailey's Start-up Engineer.

If there are any further questions, please call me at (216) 585-6849.

Sincerely,

R. J. Bowser
Market Manager
Energy Management Systems

RJB/nc

cc: Proposal File
Lynn Fisher, CR
Rod Busbee

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 100 MW

AREA NO.: 0024

AREA NAME: BUILDINGS

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0024- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CC# NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
24-1.	MAIN BUILDING STEEL							1,300,000	
24-2.	MAIN BUILDING ROOFING							W/24-1	
24-3.	MAIN BUILDING SIDING							W/24-1	
24-4.	MAIN BUILDING LOUVERS							W/24-1	
24-5.	MAIN BUILDING MISC. ARCH. TREATMENT							W/24-1	
24-6.	GT & ST CRANE							W/24-1	

**200 MW COMBINED CYCLE
BUDGET PRICES FOR
EQUIPMENT**

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0003
 AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0003- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-1.	RAIL UNLOADING BUILDING					20' X 80' L X 20' H		96,000	
03-2.	CAR SHAKER W/HOIST							49,500	
03-3.	CAR DUMP HOPPER (2)					10' X 20' X 6' DEEP		116,000	
03-4.	VIBRATING FEEDER (2)							53,000	
03-5.	DUST SUPPRESSION SYSTEM							48,000	
03-6.	UNLOADING BUILDING SUMP PUMP							7,000	
03-7.	VENT FAN							15,500	
03-8.	UNLOADING CONVEYOR BC-1					42" WIDE, APPROX 418' LG		335,000	
03-9.	SERVICE HOIST							11,000	
03-10.	TRANSFER CONVEYOR BC-2					42" WIDE, APPROX 120' LG		112,600	
03-11.	LOWERING TUBE (2)					10' DIA X 75' H		200,000	
03-12.	RECLAIM HOPPER (4)					8' X 8' X 5' DEEP		108,000	
03-13.	RACK & PINION GATE (4)							10,000	
03-14.	VIBRATING FEEDER (4)							54,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0003
 AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0003- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-15.	RECLAIM TUNNEL VENT FAN						15,500		
03-16.	RECLAIM TUNNEL SUMP PUMP						7,000		
03-17.	DUST COLLECTOR						32,100		
03-18.	RECLAIM CONVEYORS BC-3					30" WIDE, APPROX 446' LG	213,000		
03-18A.	RECLAIM CONVEYORS BC-3A					30" WIDE, APPROX 446' LG	213,000		
03-19.	CRUSHER/SCREENING BLDG					20' X 20' X 60' H	135,000		
03-20.	TRAMP IRON MAGNET (2)						40,400		
03-21.	SCALPER GRIZZLEY (2)						22,000		
03-22.	CRUSHER (2)						40,000		
03-23.	SIZING SCREEN (2)						50,000		
03-24.	DUST COLLECTOR & CRUSHER BUILDING						32,100		
03-25.	CRUSHER BUILDING VENTILATION						15,500		
03-26.	SILLO FEED CONVEYOR BC-4					30" WIDE, APPROX 430' LG	230,600		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

OB NAME: STANDARDIZED COAL/GAS IGCC

OB LOCATION: 200 NW

AREA NO.: 0003

AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0003- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-26A.	SIL0 FEED CONVEYOR BC-4A					30" WIDE, APPROX 430' LG	230,600		
03-27.	SIL0 TRANSFER CONVEYOR BC-5					30" WIDE, APPROX 40' LG	51,400		
03-27A.	SIL0 TRANSFER CONVEYOR BC-5A					30" WIDE, APPROX 40' LG	51,400		
03-28.	SERVICE HOIST						7,500		
03-29.	GASTIGHT VALVE (8)						120,000		
03-30.	SIL0 (8)					450 TON CAP	584,000		
03-31.	BIN VENT FILTER (8)						28,000		
03-32.	BIN ACTIVATOR (8)						131,200		
03-33.	RAIL SCALE						70,000		
03-34.	BULL DOZER (2)						800,000		
03-35.	FRONT END LOADER (2)						600,000		
03-36.	FORKLIFT (2)						200,000		

Coal Handling System

Coal is received from a unit train (typically 90, 100-ton rail cars) through a below grade receiving hopper at 1200 ton per hour. The coal is delivered to a storage pile containing both live and dead storage. Live storage is a seven (7) day supply and dead storage is for approximately thirty (30) days and can be expanded if required.

The reclaim is handled by four (4) under pile, in-line reclaim hoppers. They use vibrating feeders that discharge to reclaim belt conveyor conveying material to the screening and crushing tower at approximately 300 tons per hour. A dual 100% system is supplied from the pile reclaim to the gasifiers.

In the screening and crushing tower, coal is reduced in size to 2" nominal and screened to remove all material less than 1/2" in size. The fines material is conveyed to the briquetting silo and the screened and sized coal is conveyed to the eight (8) coal bunkers at the gasifiers.

D.O.E STANDARD IGCC PLANT
FUEL SYSTEM
200 MW UNIT

**D.O.E. Standard IGCC Plant
Fuel Handling System
200 MW Unit**

Equipment:	\$3,585,900
Storage/Conveying and Reclaim	

Erection:	\$1,255,100

Total:	\$4,841,000

Mobile Equipment	\$1,600,000

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING

A. Coal System

- 1 Rail Unloading Building(appr. 20' x 80'L x 20'H), 32000 cu ft
  - o Use historical factor of \$3 / cu ft for this structure \$96,000
  - o Includes auxiliaries
- 2 Car Shaker w/ Hoist
  - o Use phone quote and add freight allowance
  - o $48500+1000=$ \$49,500
- 3 Car Dump Hoppers,2 (appr. 10'x 20'x 6' deep)
  - o Use 1/4" wall construction for appr. 25,000# A36
@\$1.50 and 5,000# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $(55,000+3000) \times 2 =$ \$116,000
- 4 Vibrating Feeder 1 & 2
  - o Use phone quote and factor up for increased capacity
  - o Add freight allowance
  - o $200>600\text{tph}, (13000 \times 2)+500=26,500\text{ea}$ \$53,000
- 5 Dust Suppression System
  - o Use quote and piping allowance
  - o Add freight allowance
  - o $41500+2500+4000=$ \$48,000
- 6 Unloading Building Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 7 Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 8 Unloading Conveyor BC-1(42" wide belt appr. 418' Lg.)
  - o Use price/ft historical factor of \$515/ft(incl. truss/no truss sect.)
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a diverter gate allowance
  - o Add a height allowance for add'l steel
  - o $215000+100000+5000+5000+10000=$ \$335,000
- 9 Service Hoist
  - o Use an allowance for hoist and monorail
  - o Add freight allowance
  - o $10000+500+500=$ \$11,000

- 10 Transfer Conveyor BC-2(42" wide belt appr. 120' Lg.)
  - o Use price/ft historical factor of \$580/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a height allowance for add'l steel
  - o $69600+30000+6500+6500=$ \$112,600
- 11 Lowering Tube 1&2 (10'dia. x 75'H)
  - o Use 1/4" wall construction for appr. 50,000# A36
@ \$1.50 historical fabrication factor.
  - o Add allowance for doors and misc. eq.
  - o $75000+25000=\$100,000$ ea. \$200,000
- 12 Reclaim Hopper 1,2,3,4(appr.8' x 8' x 5' Deep)
  - o Use 1/4" wall construction for appr. 5,200# A36
@ \$1.50 and 5,200# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $26000+1000=\$27,000$ ea. \$108,000
- 13 Rack & Pinion Gate 1,2,3,4
  - o Use allowance
  - o Add freight allowance
  - o $2000+500=2,500$ ea. \$10,000
- 14 Vibrating Feeder 3,4,5,6
  - o Use telephone quote
  - o Add freight allowance
  - o $13000+500=13,500$ ea. \$54,000
- 15 Reclaim Tunnel Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 16 Reclaim Tunnel Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 17 Dust Collector(at transfer in tunnel)
  - o Use quote from AirTechniques including ductwork
  - o Add freight allowance
  - o $25100+5000+2000=$ \$32,100
- 18 Reclaim Conveyor BC-3 (30" belt appr. 446' Lg.)
  - o Use price/ft historical factor of \$409/ft(incl. truss/no truss sect.)
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o $183000+25000+5000=$ \$213,000
- 18A Reclaim Conveyor BC-3A (30" belt appr. 446' Lg.)
  - o Use price/ft historical factor of \$409/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o $183000+25000+5000=$ \$213,000

- 19 Crusher/Screening Building(appr. 20'x20'x60'h) 24,000 cuft
 o Use historical factor of \$5/ cu ft for this structure
 o Includes auxiliaries
 o $120000+15000=$ \$135,000
- 20 Tramp Iron Magnet No 1&2
 o Use telephone quote and add allowance for supports
 o Add freight allowance
 o $18700+1500=20200$ ea. \$40,400
- 21 Scalper Grizzly No 1&2
 o Use telephone quote and add allowance for supports
 o Add freight allowance
 o $9800+500+700=11000$ \$22,000
- 22 Crusher No 1&2
 o Use telephone quote and add allowance for increased capacity.
 o Add freight allowance
 o $17600+900+1500=20000$ ea \$40,000
- 23 Sizing Screen(final) No 1&2
 o Use an allowance including chutework
 o Add freight allowance
 o $20000+2500+2500= 25000$ ea \$50,000
- 24 Dust Collector (at crusher bldg)
 o Use quote from AirTechniques including ductwork
 o Add freight allowance
 o $25100+5000+2000=$ \$32,100
- 25 Crusher Building Ventilation
 o Use telephone quote and add allowance for ductwork
 o Add freight allowance
 o $12500+2500+500=$ \$15,500
- 26 Silo Feed Conveyor BC-4 (30" Belt appr. 430'Lg.)
 o Use price/ft historical factor of \$420/ft
 o Use horsepower factor of \$500/HP
 o Add a chutework allowance
 o Add a diverter gate allowance
 o Add a height allowance for add'l steel
 o $180600+25000+5000+5000+15000=$ \$230,600
- 26A Silo Feed Conveyor BC-4A (30" Belt appr. 430'Lg.)
 o Use price/ft historical factor of \$420/ft
 o Use horsepower factor of \$500/HP
 o Add a chutework allowance
 o Add a diverter gate allowance
 o Add a height allowance for add'l steel
 o $180600+25000+5000+5000+15000=$ \$230,600

27 Silo Transfer Conveyor BC-5 (30" Belt appr. 40' Lg.)		
o Use price/ft historical factor of \$285/ft		
o Use horsepower factor of \$500/HP		
o Add a chutework allowance		
o Add a tripper allowance		
o $11400+5000+5000+30000=$	\$51,400	
27A Silo Transfer Conveyor BC-5A (30" Belt appr. 40' Lg.)		
o Use price/ft historical factor of \$285/ft		
o Use horsepower factor of \$500/HP		
o Add a chutework allowance		
o Add a tripper allowance		
o $11400+5000+5000+30000=$	\$51,400	
28 Service Holst		
o Use an allowance including monorail		
o Add freight allowance		
o $6500+500+500=$	\$7,500	
29 Gastight Valve 1,2,3,4,5,6,7,8		
o Use an allowance		
o Add freight allowance		
o $14000+1000=15,000\text{ea.}$	\$120,000	
30 Silo 1,2,3,4,5,6,7,8 (450 ton cap.)		
o Use 3/8" wall construction for appr. 41,000# A36		
o @\$1.50 and 2,500# AR @ \$3.50		
o historical fabrication factor.		
o Add freight allowance		
o $70000+3000=73,000\text{ ea.}$	\$584,000	
31 Bin Vent Filters 1,2,3,4,5,6,7,8		
o Use Telephone quote		
o Add freight		
o $3000+500$	\$28,000	
32 Bin Activator 1,2,3,4,5,6,7,8		
o Use Carman quote plus supports		
o Add freight allowance		
o $13400+1000+2000=16400\text{ea}$	\$131,200	
33 Rail Scale		
o Use telephone quote and add allowance misc. stl.		
o Add freight allowance		
o $65000+2500+2500=$	\$70,000	
33a Unlisted and Misc. (allowance)	\$50,000	
Total Coal System Equipment Price:	\$3,585,900	
Erection		
Erection pricing for this system was obtained from factors based on historical data and similar jobs.		
Coal System Erection is based on 35% of equipment price		
Total Coal System Erection Price		\$1,255,065
	USE	\$1,255,100
Total Coal System Price	\$4,841,000	

B Mobile Equipment

Mobile equipment pricing is based on historical factors

34 (2) Large dozers

o Use allowance of \$400,000 each \$800,000

35 (2) Frontend loader

o Use allowance of \$300,000 each \$600,000

36 (2) Forklift type units

o Use allowance of \$100,000 each \$200,000

Total Mobile Equipment allowance \$1,600,000

CRS SIRRINE

CONVEYOR PRICE AUG'S FROM
(3) RECENT QUOTES: MONTAQUO, FMC, CRSS
OTHER SIZES FACTORED

MAR 87 CRSS 51

ITEM

CLIENT CRSS LOCATION _____ JOB NO. _____
SUBJECT _____ DATE 11/6/89 PREPARED BY MV
DEPT _____ CHECKED BY _____

Conveyor Pricing

24" belt conveyor
Erected (mech) top & found

Conv. only	Walk-on	Enclosed
\$150/ft \$195/ft	\$320/ft \$480/ft	\$835/ft \$1250/ft

30" belt conveyor
Erected

\$285/ft \$370/ft	\$400/ft 600/ft	\$970/ft \$1465/ft

36" belt conveyor
Erected

\$340/ft \$440/ft	\$480/ft \$720/ft	\$1025/ft \$1540/ft

42" belt conveyor
Erected

\$400/ft \$520/ft	\$560/ft 840/ft	\$1085/ft \$1630/ft

48" belt conveyor
Erected

\$455/ft \$590/ft	\$660/ft \$990/ft	\$1140/ft \$1710/ft

54" belt conveyor
Erected

\$515/ft \$670/ft	\$740/ft \$1110/ft	\$1200/ft \$1800/ft

• Cantilevered conveyor add to conveyor

100/ft

+ \$20/FT FOR HANDRAIL GRATING OR GRIP STRUT
254

1200
- 515
\$685/ft
Turns

1750 Eastwood Drive, Aurora, Illinois 60506 (708) 844-1300

May 24, 1990

CRS SIRRINE
200 Executive Center Drive
Barnwell Building
Greenville, S. C. 29615

Attn: Mr. Mike Voss

Subject: Equipment and Turnkey installation proposal for a BT-102
Foam Dust suppression System for a Rail Car Dumper and
Truck Dumper Operation

Dear Mike,

Benetech, Inc. is pleased to submit the following proposal for two separate BT-102 Foam dust suppression systems. The table of content includes material list and description of, installation, CRS Sirene responsibilities and detailed operating sequences.

Detailed in the pricing section is the cost for each individual system, and corresponding installation cost. I have also provided deducts should CRS Sirene elect to take them. For example you will see a deduct for using a common chemical storage tank for both the car and truck dump systems. I have also enclosed a corporate video, Benetech reference lists and a technical summary of why foam dust suppression should be considered over wet suppression.

Should you have any questions in regard to this proposal please contact me at your earliest convenience.

Respectfully submitted,

J. Pircon

JJP/dhd

Att.

CC: CRSS.CT
File 28C

TABLE OF CONTENTS

- I. ROTARY CAR DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE
- II. TRUCK DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE
- III. PRICING
- IV. CLARIFICATIONS
- V. CORPORATE LITERATURE/BROCHURES

I. Benetech BT-102F Rotary Car Dump Foam Dust Suppression System
CRS Sirrine.

A.) Material List

N/A
The Benetech BT-102F Foam Dust Suppression System for a
Rotary Car Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 7.5 HP, 3600 RPM, 3 phase, 23-/46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges. flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including manual isolation valve, filter, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to each side of the car dumper.
2	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to each side of the car dumper.

- 2   1-1/2" Compressed Air Pressure Regulators to be mounted with air solenoids to control pressure to each side of the car dumper.
- 12   Benetech Foamer Assembly including foamer, check valve, flow control valves, pressure gauges, chemical pressure regulator and required pipe and fittings.
- 1   6,000 gallon horizontal insulated steel chemical storage tank.
- 1   6,000 watt storage tank emmersion heater to be wired into equipment enclosure.
- 1   Chemical storage tank level indicator. . Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT   Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
- 2.) Install concrete slab-on-grade (maximum 7' x 7') to support equipment enclosure and set enclosure.
- 3.) Install piping to feed chemical from storage tank to equipment enclosure (maximum 25" run).
- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install twelve (12) Benetech foamer assemblies. Six (6) will be mounted on each side of the car dumper.
- 8.) Install twelve (12) foam spray manifolds along the perimeter of the car dump pit.

- 9.) Install Benetech Remote Control Center in Car Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigidgalvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
  - a.) Chemical feed from tank to enclosure.
  - b.) Water/Chemical line from enclosure to foamers.
  - c.) Benetech foamers and foam spray manifold.
- 14.) Install insulation and covering on heat traced pipe described in Section 13. Insulation shall be fiberglass type with 1-1/2" thick walls. Covering shall be .006" thick aluminum fastened with sheet metal screws or bands.
- 15.) Provide full installation supervision and start-up services.

c.) Field Installation Services Provided by Others

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 120 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
- 3.) Provide 120 scfm/100 psi compressed air source to the equipment enclosure. All piping by others.

D.) Operations Sequence

All equipment required to transfer the fluid and control the flow rate will be housed in the Benetech equipment enclosure. The water/chemical flow rate is controlled using the needle valves and pressure regulators located at each foamer. In the equipment enclosure the chemical flow rate is controlled by a variable output metering pump which will proportion the chemical flow rate to the water flow rate. Air flow is controlled using regulators mounted in the field and needle valves installed.

The control sequence utilizes a Square D model 50 programmer and will allow the system to operate either automatically or manually. In addition a Remote Panel will be mounted in the ar Dump Operator's Control Center to provide remote operation.

In the Manual Mode the water pump and chemical pump will start and all solenoids will open to allow for a continual spray.

There will be two modes of operation from the remote panel. In the manual start cycle mode, a push button on the remote panel will start the spray cycle. The car dumper spray system has been broken into two zones front side and back side. Each side will be fitted with a "Delay On" and "Length on Spray" timer. The spray cycle will start on the front side as the rail car starts to rotate and dump coal into the pit. The foamers on the back side of the dump will start as coal is deposited in the pit and airborne coal dust is being forced through that area.

In the automatic start cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energize the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

SIMILAR
HOPPER

(II)

Benetech BT-102F Rotary Truck Dump Foam Dust Suppression System CRS Sirrine Engineers Inc.

A.) Material List

The Benetech BT-102F Foam Dust Suppression System for a Rotary Truck Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 5 HP, 3600 RPM, 3 phase, 23-/46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges. flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including solenoid operated isolation valve, manual isolation valve, filter, pressure regulator, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to the truck dump.
1	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to the truck dumper.

- 6 Benetech Foamer Assembly Including foamer, check valve, flow control valves, pressure gauges, chemical pressure regulator and required pipe and fittings.
- 1 6,000 gallon horizontal insulated steel chemical storage tank.
- 1 6,000 watt storage tank immersion heater to be wired into equipment enclosure.
- 1 Chemical storage tank level indicator. Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
- 2.) Install concrete slab-on-grade (maximum 7' x 7') to support equipment enclosure and set enclosure.
- 3.) Install piping to feed chemical from storage tank to equipment enclosure (maximum 25" run).
- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install six (6) Benetech foamer assemblies. Foamers will be mounted on the vibrating feeder elevation. Piping will be routed through the pit wall to each spray manifold.

- 8.) Install six (6) foam spray manifolds along the perimeter of the truck dump.
- 9.) Install Benetech Remote Control Center in Truck Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigid galvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
  - a.) Chemical feedd from tank to enclosure.
  - b.) Water/Chemical line from enclosure to foamers.
  - c.) Benetech foamers and foam spray manifold.
- 14.) Install insulation and covering on heat traced pipe described in Section 13. Insulation shall be fiberglass type with 1-1/2" thick walls. Covering shall be .006" thick aluminum fastened with sheet metal screws or bands.
- 15.) Provide full installation supervision and start-up services.

C.) Field Installation Services Provided by Others

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 60 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
- 3.) Provide 60 scfm/100 psi compressed air source to the equipment enclosure. All piping by others.

D.) Operations Sequence

All equipment required to transfer the fluid and control the flow rate will be housed in the Benetech equipment enclosure. The water/chemical flow rate is controlled using the needle valves and pressure regulators located at each foamer. In the equipment enclosure the chemical flow rate is controlled by a variable output metering pump which will proportion the chemical flow rate to the water flow rate. Air flow is controlled using a regulator mounted in the enclosure and needle valves installed.

The control sequence utilizes a Square D model 50 programmer and will allow the system to operate either automatically or manually. In addition a Remote Panel will be mounted in the Truck Dump Operator's Control Center to provide remote operation.

In the Manual Mode the water pump and chemical pump will start and all solenoids will open to allow for a continual spray.

There will be two modes of operation from the remote panel. In the "Manual Start Cycle" mode, a push button on the remote panel will start the spray cycle. The car dumper spray system has been broken into two zones front side and back side. Each side will be fitted with a "Delay On" and "Length on Spray" timer. The spray cycle will start on the front side as the rail car starts to rotate and dump coal into the pit. The foamers on the back side of the dump will start as coal is deposited in the pit and airborne coal dust is being forced through that area.

In the "Automatic Start" cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energize the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

PRICING

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PRICE</u>
1	One (1) BT-102 Foam Dust Suppression System per Section I, Part A	\$47,260 FOB Aurora, IL
2	Turnkey installation per per Section I, Part B	\$80,250
3	One (1) BT-102 Foam Dust Suppression per Section II, Part A	\$41,490 FOB Aurora, IL
4	Turnkey installation per Section II, Part B	\$70,625
5	Project Mgt., should CRS Sirene elect to install themselves but require Benetech supervision	\$350/day plus ex- penses
6	System start up engineer shold CRS Sirene purchase equipment only	\$350/day plus ex- penses
7	BT-102 Chemical T/L quantities	\$3.40/gal FOB Aurora, IL
8	Deducts	
	1. Common use of bulk storage tank for both systems -	
	a. Equipment	\$8,500
	b. Installation	\$4,000

INSTALLATION CONDITIONS

- a.) Work on both areas simultaneously
- b.) No winter protection
- c.) Pricing Base On
  - 1.) 8 hour work day
  - 2.) 5 day work week
- d.) Water, air, and electrical piped to enclosures as described in quotation.

AIR TECHNIQUES INC.

1724 Nekoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

TELECOPIER COVER LETTER

DATE: 5-18-90

TOTAL NUMBER OF PAGES (including cover letter): 3

TO: Mike Voss - CRS-Sirrine Power Division
Dust Collectors For Mechanical Coal
Handline Project

TELECOPIER NUMBER

(or main number if no direct line):

803-281-3712

(AREA CODE)

NUMBER

BILL WAGNER

FROM:

Air Techniques, Inc.
 1724 Nekoma St.
 Marietta, GA 30067

If you have any difficulty receiving any of the transmission, call (404) 977-7090 and report any difficulty. We are transmitting from a Canon Faxphone 10 machine. If you wish to transmit any documents to this office, the direct line to our automatic receiving equipment is (404) 977-8109. After dialing the number, begin transmitting after the tone.

COMMENTS: Mike,

Attached is my hand written budget proposal
as per your request. Please let me know if you have
any questions or if you require a formal submittal.
Also keep in mind that these numbers are rough
approximations.

Regards,

Bill Wagner

AXED: ☐

DATE: _____

CRS-Sixsine-Mike Joss

1) 10,000 CFM - Reverse Pulse Dust Collector cloth Area 2160
 JA-240-DA, 4.62 to 1 A/C Ratio, 10' x 6'
 Basic Price \$17,080 includes pyramidal hopper
 Support Steel \$1,675
 Upper Walkway \$1,905
 Side Platform \$475
 Walk in Plenum \$860
 Explosion Venting \$SEE ATTACHED
 Rotary Tieclock \$2,695

30484

+ 3459

2) 30,000 CFM - Reverse Pulse Dust Collector cloth Area 6840
 JA-760-CA, 4.39 to 1 A/C Ratio, 10' x 20.5'
 Basic Price \$46,310
 Support Steel \$3,700
 Upper Walkway \$2,090
 Side Platform \$1,575
 Walk in Plenum \$1,625
 Explosion Venting \$SEE ATTACHED
 Screw Conveyor \$2,975 (2) Rotary Tieclock \$2,630

+ 80430

3) 5,000 CFM - Reverse Pulse Dust Collector cloth Area 1080
 JA-120 SA, 4.62 to 1 A/C Ratio, 5' x 6'
 Basic Price \$9,655 Walk in Plenum \$625
 Support Steel \$1,265 Explosion Venting \$SEE ATTACHED
 Upper Walkway \$1,805 Rotary Tieclock \$2,235
 Side Platform \$34 268

22134

+ 2475

+ 129

For Explosion Proof Construction - Griffin ENC
recommends the following:

	ATY, 3+3 Relief Door	NEMA 9 PANELS	NEMA 9 Solenoids	Listed Bugs	GROUND WIRES
# 120 S.F.	(1) \$360. ⁰⁰ ea	\$510. ⁰⁰	(12) \$47. ⁰⁰ ea	\$2,075. ⁰⁰	~~\$1450.⁰⁰~~
-240 D.A.	(2) \$360. ⁰⁰ ea	\$510. ⁰⁰	(12) \$47. ⁰⁰ ea	\$4,000. ⁰⁰	~~\$2900.⁰⁰~~
4-760-CA	(5) \$360. ⁰⁰ ea	\$510. ⁰⁰	(4) \$47. ⁰⁰ ea	\$12,360. ⁰⁰	~~\$8900.⁰⁰~~

CRSS BIRRIANE

PH → 25-07-99512-9-508-685-5145-84064

NOTE
Rep

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-21-90PLACED TELE. 508
NO. 617/685-5145
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Brian Power
(LAWRENCE, MA) ON CRSS JOB NO. 99512
OF Lawrence Pump

CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT:

UNLOADER BLD'G
SUMP PUMP 10 HP (EXP. PROOF)
1-REQ'D

MILL AREA NO.: COAL HANDLING

P.O. NO.:

(Use Inquiry
No. prior to
purchase)

VERTICAL TYPE (carbon steel)
30 GPM
TOTAL DYNAMIL HEAD = 30'
3/8" COAL PARTICLES
6' pit

\$6,500
600
+ FR 7,000

DISTRIBUTION

(List here, the person talked with)

CR3 BIRRIE

NOT IN 2-20-90
CALL BACK PM

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

TELE. NO. 803/242-5885
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH EDDIE SEIGLER
(Greenville, SC)
OF Edgar B. Heape & Son - Toledo ON CRSS JOB NO. 99512CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT: _____

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)COAL RAIL SCALE
CONTROLS
LOAD CELLS
PRINTER W/INDICATOR

2 - REQ'D

PIT - 8'W x 14'LG x 2'D.
(6,15' x 12.5' x 2'-6") - Per Toledo

SCALE — \$21,500

PIT & APPROACH RAMPS — 40,300
61,800 USE \$65,000
(for each scale)DISTRIBUTION

(Sum 2 axes)

4 Scales = \$260,000

- 2 scales = 130,000

(list here, the person talked with)

130,000 Savings
+ ELECT.

CR3 BIRRIANE

Steve Phillips
@ Mac

PH → 25-07-99512-9-205-967-7888-84064

Rep

John

Reinck

Material Dynamic Co. - Charlotte, NC
704/549-4419

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

PLACED _____

TELE. _____

NO. 205/967-7088
(AC-EXCH. - NO.)

RECEIVED _____

LAYMON MITCHELL

TALKED WITH

Steve Phillips @ MAC

OF MAC EQUIP. CO. (TEC. ENGR.)

(Bham AL)

NO LONGER REPS MAC
ON CRSS JOB NO. 995122-20-90
Kent
Irwin
OUT
will call meCLIENT DENBERRY & DAVISPROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT: HVAC

RAIL UNLOADER BUILDING
MCC & CONTROL ROOM
VENTILATION2 - REQ'D
SIZE 17" 270 CFM 2" S.P.1 - VENT FAN 2 1/2 HP @ UNLOADER
SIZE 25 13,000 CFM 2" S.P.1 - CRUSHER BLD'G FAN
(SAME)3 - BUNKER BIN VENTS w/SCREEN
NO. 72 ST9 ST FILTER

→ \$3,000 ea

DISTRIBUTION OPTION

(List here, the person talked with)

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

17 MW \$2,800 ea.

Spark Proof

Alum.

10 MW 42" wheel 570 rpm
Radial Fan 8.2 php

\$12,500

\$12,500

+ 500
12,500
2500
15,500
ductBuffalo Forge Co.
Chris Bucker Inc. - Sales Rep
704 E. Washington St. 242-0435

+ F12

DUCTWK

12,500
50013,000
5,000
18,000

271-1075 (Local)
PH → 25-07-99512-9-476-7523-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE 2-20-90

TELE. NO. 803/476-7523
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH LARRY FISHER → will call prices tomorrow
OF JEFFREY / DRESSER (WOODRUFF SC) ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT:

VIBRATING FEEDERS 3HP

3 - REQ'D 200 TPH

30" W X 8 FT. LONG

BRUTE FORCE

HD3008 5HP

CONSTANT SPEED + FR

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

$\$13,000 \times 3 = \$39,000$
 $\$13,500$

GRIZZLEY FEEDER 3HP

1 - REQ'D 300 TPH W/Cont

36" W X 7'-3" (33" grizzly included)

9,800

\$48,800

REF: FAX DATED 2-1-90

FR. $\frac{9800}{500}$
\$10,300

USE \$50,000 TOTAL

DISTRIBUTION OPTION

Adams Brothers (Eriez-Magnetic)
Doug Norton

(List here, the person talked with)

P.O. Box 570
1005 W. Riverside Drive
Jeffersonville, IN 47130
FAX 812/288-4708
Executive Offices 812/288-4710
Sales and Accounting 812/288-4700

TELECOPIER COVER LETTER

DATE: May 2, 1990

TIME: 2:55

TO: NAME: Laymond Mitchell
FIRM: CRS Serrine
FAX NO: 803-281-3712

FROM: NAME: Robert L. Wolz

WE ARE TRANSMITTING 3 PAGE(S) (INCLUDING THIS COVER LETTER)

Reference: Carman File No. CHAR-90-4-1631

Dear Laymond,

In response to your telephone request yesterday, listed below please find some brief specifications and unit pricing for the bin dischargers you requested for this Pennsylvania project.

Item 1 will be a quantity of two Carman Model ~~12GBD~~ ^{12GBD} Gyrated Bin Dischargers, carbon steel construction with number 11 gauge number 304 stainless steel internal liner. All material contact surfaces would be of solid or lined with stainless steel. This unit would be furnished with a 7.5 HP TENV vibratory motor, a quantity of twenty heavy duty hanger arms, flexible inlet and outlet socking connections.

List price each, \$24,022.00, OEM discount \$1,400.00, your net cost ~~each \$22,622.00~~

Item 2 will be a quantity of one Carman Model ~~8GBD~~ ^{8GBD} Gyrated Bin Discharger, carbon steel construction with number 11 gauge number 304 stainless steel liner. This unit would be furnished with a 3 HP explosion proof vibratory motor, six heavy duty hanger arms and flexible inlet and outlet socking connections.

List price, \$14,748.00, OEM discount \$869.00, your net cost ~~\$13,879.00~~

Item 3 will be a quantity of one Carman Model ~~3GBD~~ ^{3GBD} Gyrated Bin Discharger. This unit would be furnished with a number 8 gauge number 304 stainless steel cone, no liner. This unit would be furnished with a 0.75 HP TENV vibratory motor, three standard duty hanger arms and flexible inlet and outlet socking connections.

List price, \$3,552.00, OEM discount \$300.00, your net cost ~~\$3,252.00~~

Laymond, each of these units has been quoted with a welded type adapter ring. Painting would be in accordance with the enclosed specification QA-860.1.

CR3 BIRRIE

704-364-8402

PH → 25-07-99512-9-414-672-7830-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

PLACED _____

RECEIVED _____

TELE. _____

NO. _____

414/672-7830
(AC-EXCH.- NO.)LAYMON MITCHELL TALKED WITH
(MILWAUKEE, WI)
OF DINGS MAGNETICGARY
ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY.

COGENERATION FACILITY

SUBJECT:

TRAMP IRON MAGNET
7 1/2 HP
PERMANENT-SUSPENDED
SELF-CLEANING
1-REQ'D

MILL AREA NO.: COAL HANDLING

P.O. NO.:

(Use Inquiry
No. prior to
purchase)MOUNT OVER HD OF 48" B.W. CONV.,
300 TPH ; 140 FPMModel DSC 1542
7-8 WK delivery

Work thru → DINGS

(Bob) Gerrard & Associates
Charlotte, NC

704/364-8402

Lynn Alexander - will call back

DISTRIBUTION OPTION

Adams Brothers (Eriez)

Doug Norton 704/365-4255

Eriez 6448 #18,419

(List here, the person talked with)

R/L \$18,700

Model DSC-1542

CRJ BIRRIINE

PH → 25-07-99512-9-788-1424-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-20-90TELE. NO. 803/788-1424
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Author LeonardOF HEWITT-ROBINS (COLUMBIA) ON CRSS JOB NO. 99512CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT: .

MILL AREA NO.: COAL HANDLING

CAR SHAKER W/HOIST (FIXED)

P.O. NO.: _____

3 HP HOIST

20HP SHAKER

1-REQ'D

HEWITT-ROBINS HDV CAR SHAKEOUT

SHAKER — \$22,947

MTA — 920 + 250 EXP. PROOF (230/460)

- HOIST — 14,060 + 7,263 EXP. PROOF + 5,940

V-Belt GUARD — \$726

URETHANE PADS (REDUCE NOISE TO 60dBA) — \$2,275

\$22,947

1,170

21,323

726

2,275

\$48,441

GIVES 7% OFF ALSO

USE \$48,500

DISTRIBUTION

(List here, the person talked with)

CRSS BIRRIANE

PH → 25-07-99512-9-404-448-2341-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE 2-20-90

PLACED _____ TELE. NO. 404/448-2341
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH BRIAN STINSON
OF AS-TECH (AMERICAN PULV) (AH-3GA)

ON CRSS JOB NO. 99512

CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT: _____

MILL AREA NO.: COAL HANDLING

COAL CRUSHER (RING TYPE)

P.O. NO.: _____

150 HP 1 1/2" PRODUCT
MOTOR 2" X 0 INPUT

(Use Inquiry
No. prior to
purchase)

150 TPH

American
WC30NF → w/ V-belt drive & base & guard & motor
75 HP

\$17,640

10-12 WK DEL.

DISTRIBUTION

(List here, the person talked with)

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 NW

AREA NO.: 0004

AREA NAME: BRIQUETTING SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0004- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
04-1.	BRIQUETTING SYSTEM							6,965,000	
04-1.A	TRANSFER STORAGE EQUIP.								
04-1.B	DRYER								
04-1.C	SCREENING/SIZING EQUIP.								
04-1.D	BRIQUETTING EQUIPMENT								
04-1.E	AUXILIARIES								
04-1.F	ELECTRICAL CONTROLS								
04-1.G	BUILDING								
04-2.	FINES CONVEYOR BC-6					24" WIDE, APPROX 300' LG		126,000	
04-2.A	CHUTEWORK								
04-2.B	DIVERTER GATE								
04-3.	BRIQUET TRANSFER CONVEYOR BC-7					24" WIDE, APPROX 375' LG		136,500	
04-3.A	CHUTEWORK								
04-4.	CHAR & TAR RETURN CONVEYOR					PNEUMATIC SYSTEM, 600' LG		222,500	

Briquetting System

Fine coal is received from the coal reclaim system at less than 1/2" size containing approximately 12% maximum combined moisture and will be stored in a silo (8 hours storage) located at the briquetting plant or discharged to grade when the plant is not operations. Coal is reclaimed from the silo by a vibrating feeder that meters the flow to the briquetting system dryer at a rate of approximately 100 tons per hour. The fines are delivered from the silo by conveyor to the thermal dryer to remove excess moisture before briquetting. The material is screened and crushed to less than a No. 4 mesh size and conveyed to a surge hopper. Material is metered from the surge hopper through a vibrating feeder into two briquetting lines. Coal can now be blended with a binder agent if necessary and transferred to the briquet machines. Char and tar fines from the gasifier cyclone will be conveyed to the briquetting area for use as a binder. After briquetting, material is screened again to remove fines generated during the process. They are transferred back to the blender by bucket elevator for recycling. The 1" nominal briquets are now transferred by a collecting conveyor to a common bed type dryer for curing before re-entry into the coal system at the coal bunkers.

D.O.E. STANDARD IGCC PLANT
BRIQUET SYSTEM
200 MW UNIT

D.O.E. Standard IGCC Plant
Briquetting System
200 MW Unit

Briquetting Equipment: Black Box Turnkey Supply	\$6,965,000

Erection:	<u>\$2,985,000</u>

Subtotal:	\$9,950,000

Balance of system: Conveyors and Misc.	\$485,000

Erection:	<u>\$169,750</u>

Subtotal:	\$654,750

Use	\$654,800

Total:	\$10,604,800

D.O.E. Standard IGCC Plant
Briquetting System
200 MW Unit

Briquetting System

1 The briquetting system price is based on a blackbox vendor quote for a complete operating facility (See attached quote from PSI). The price includes: transfer/storage equipment, dryer, screening/sizing equipment, briquetting equipment, auxiliaries, electrical controls and buildings. Additional vendor data was obtained from individual equipment manufacturers such as briquettor and dryer suppliers (K.R.Komarik, Ludman Machine) to check major equipment suitability and prices.

\$6,965,000

Auxiliary Equipment

Additional equipment is required to transfer material from the fines screens to the briquetting plant and take the finished product back to the gasifier feed system.

2. Fines Conveyor BC-6 (24" Belt appr.300' Lg.)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o Add a diverter gate allowance
- o Add a height allowance for add'l steel
- o $102000+10000+4000+5000+5000=$

\$126,000

3. Briquet Transfer Conveyor BC-7 (24" Belt, appr. 375' Lg)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o $127500+5000+4000=$

\$136,500

4. Char & Tar Return Conveyor System(Assume pneumatic transfer system appr. 600' Lg.)

- o Use allowance of \$350/ft.
- o Add allowance for pipe supports
- o Add freight allowance
- o $210000+10000+2500=$

\$222,500

Total Auxiliary Equipment Price

\$485,000

Total Briquetting Equipment

\$7,450,000

Erection

Erection pricing for this system was obtained from the PSI vendor budget quote. This price was checked against historical and industry data from previous jobs and factors for like installations.

1.Briquetting System (From Quote)		\$2,985,000
2.Auxiliary Equipment(Historical Allowance: 35% of Equip.)		\$169,750
Total Equipment Erection Price		\$3,154,750
	Use	\$3,154,800
Total Briquetting Equipment		\$7,450,000
Total Equipment Erection Price		\$3,112,800
Briquetting System Total Price		\$10,562,800

240 MW UNIT

1 of 5

PROCESS SYSTEMS, INC.

P.O. Box 1679, Ponte Vedra Beach, FL 32082 (904) 249-0002

FAX (904) 249-1166

DATE: 3/29/90

TIME:

PAGES: 5 (INCLUDING COVER SHEET)

FAX TRANSMISSION COVER SHEET

TO: CRS SIRRINE INC.

FAX NO: 803/281-3712

ATTN: Mr. Mike Voss - Power Department

FROM: Process Systems Inc./ Gordon W. Covey

COMMENTS: REF: Revised budget proposal - for coal handling, drying
crushing, briquetting as per attached.

GWC

SHOULD THIS TRANSMISSION BE INCOMPLETE OR ILLEGIBLE, PLEASE CONTACT
US AT OUR TELEPHONE NUMBER - 904/249-0002 OR THROUGH OUR FAX MACHINE
NUMBER - 904/249-1166. THANK YOU

284

PROCESS SYSTEMS, INC.

PROCESS SYSTEMS, INC.

P.O. Box 1679, Ponte Vedra Beach, FL 32004 (904) 249-0002

FAX (904) 249-1168

May 28, 1990

CRS SIRRINE ENGINEERS INC.
Power Division
216 South Pleasantburg Drive
Greenville, S.C. 29606

ATTN: Mr. Mike Voss

REFERENCE: Coal handling, drying crushing, briquetting
Roberts & Schaefer Company - Eastern Operations

Dear Mr. Voss:

We are most appreciative for the courtesies extended us during our discussions with Mr. D.C. Sisti of Roberts and Schaefer Co. and your people including Mr Ken Bishop.

Please find enclosed a summary of the equipment involved on your important project as well as the design criteria as follows:

100 TPH as received Illinois No 6 seam
contains 12% total moisture
ROM 6" x 0 will be screened to give 100 TPH $\frac{1}{2}$ " x 0
maximum.
Ash 35% BTU 9000-12,000 BTU/# $2\frac{1}{2}$ - 4% Total S
1.5% N₂ (88TPH Dried Product)

The pricing is very rough and favored on the high side to protect your needs.

Please find enclosed the required equipment list.

It may be helpful for us to get together in your good offices. at a later date at your convenience.

We are appreciative for the time taken from your busy schedule. Our thanks for your patience.

Sincerely yours,

Gordon W. Covey
Gordon W. Covey
GWC:CS
encl.

Specializing in Comp

285

stems

MAP 28 190 13:38 TO 9042491160

FROM P. S. - ENI

T-770 P. 02

3 of 5

ROBERTS & SCHAEFER COMPANY - EASTERN OPERATION

ENI ENGINEERING COMPANY

339 HAYMAKER ROAD
MONROEVILLE, PENNSYLVANIA 15146

Coal Preparation and
Thermal Drying Systems

March 28, 1990

Engineers and Contractors

Telephone (412) 373-8020

(412) 241-9226

TWX 710 797 3651 ENI ENG MOLE

TELECOPY (412) 373-7065

TO: Gordon Covey

FROM: D. C. Sisti

SUBJECT: Coal Handling, Drying, Crushing & Briquetting

Design Criteria 100 TPH as received Illinois No. 6 seam containing 12% TM.
ROM 6" X 0 will be screened to give 100 TPH $\frac{1}{2}$ " x 0 (maximum)
Ash 35%. BTU 9000-12000 BTU/# $2\frac{1}{2}$ - 4% Total S,
1.5% N₂ (88TPH Dried Product)

Equipment List:

Combustion System/Ash and Lime Handling Systems

Dryer Feed Bin

Dryer Proper Recirculation Type

Impactors

Internal Insulation

Dryer Dust Collector Cyclones 1st Stage

Dryer Dust Collector Cyclones 2nd Stage

Dryer Exhaust Fan

Briquetting Machines

Dryer Baghouse Damper

Dryer Recycle Damper

Dryer Dust Bag Collectors

Exhaust Stack

Product Blender

Natural Gas Train System

Dust Conveying System

Fugitive Dust Collector

External Insulation

286

Equipment List

Cont'd. (2)

210110
4 of 5

Pumps

Dryer Cyclone Screw Conveyors 1st Stage

Dryer Cyclone Screw Conveyors 2nd Stage

Dried Product Conveyor Belt #1 Collecting

Dried Product Conveyor Belt #2 Collecting

Electrical Distribution

Transformers

Motors

Motor Control Center

Instrumentation

Air Compressors

Lighting and Fixtures

Heating, Ventilation, Pressurization and Air Conditioning

Auxiliary Electrical Equipment

Power and Light Wiring

Piping

Structural Steel

Platework

Floors and Walkways

Doors and Windows

Roofing and Siding

Stairs, Lift Beams and Handrails

Trolleys and Hoists

Painting

Machinery Guards

Concrete Work and Foundations based on spread footings $4000\#/Ft^2$ at depth of 4'0

Noise Suppression

Engineering

Materials and Services Furnished by Contractor

Contractors Alternate "or equal" Defined

Cont'd. (3)

240 MW
S&FS

Freight

Estimated Total Pricing Black Box Turnkey Basis.

Nine million and nine-hundred and
fifty-thousand dollars
(\$9,950,000.00)
as below:

Erection Estimate

\$ 2,985,000

Engineering, Materials and
Project Management

\$ 6,965,000

D. C. Sisti

CRS SIRRINE EQUIPMENT LIST

S SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 B NAME: STANDARDIZED COAL/GAS IGCC
 B LOCATION: 200 MW

AREA NO.: 0005
 AREA NAME: ASH HANDLING SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0005- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
05-1.	PNEUMATIC AIR SYSTEM					CONVEYING DIST 400'		220,000	
05-2.	BIN VENT FILTER							50,000	
05-3.	ASH STORAGE SILO (2)					24' DIA, 60' H		610,000	
05-4.	CONDITIONER (2)							100,000	

Ash Handling System

Bottom ash is received by the handling system at the discharge lock hopper of the gasifiers and transferred via a pneumatic conveying system to the ash storage silos. The ash silos are three (3) day storage structures equipped with either truck or rail loadout. At each silo, ash is discharged through an isolation gate and rotary feeder into an ash conditioner. After the ash is conditioned, it is discharged directly into truck or rail car.

D.O.E. STANDARD IGCC PLANT
ASH SYSTEM
200 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW

Ash Handling System

Equipment:
Storage/Conveying
and loadout

\$980,000

Erection:

\$343,000

Total:

\$1,323,000

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW

Ash Handling System

The ash handling system pricing was based on previous vendor quotes and jobs with similar equipment and system configuration.

Equipment

1. Pneumatic Air System(Conveying distance appr. 400')	
o Use historical factor of \$500/ft.	
o Add rotary feeder allowance	
o Add piping and fitting allowance	
o $\$200000+10000+10000=$	\$220,000
2. Bin Vent Filter	
o Use allowance	\$50,000
3. Ash Storage Silo(2)(appr. size: 24'Dia. x 60', appr. 27,500 cuft)	
o Use concrete silo allowance of \$10/cuft	
o Add allowance for foundation	
o $275000+30000=$	\$610,000
4. Conditioner(2)	
o Use allowance including freight	\$100,000
Total Ash System Equipment Price	\$980,000

1 Erection

Erection pricing for this system was obtained from similar jobs.

Ash System Erection is based on 35% of equipment price

Total Ash System Erection Price	\$343,000
Total Ash System Price	\$1,323,000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 MW

AREA NO.: 0006

AREA NAME: ZINC FERRITE HANDLING SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0006- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
06-1.	PNEUMATIC AIR SYSTEM					CONVEYING DISTANCE APPROX 400'	210,000		
06-2.	ZINC STORAGE BIN					12' DIA X 30' H	26,000		
06-3.	LOADOUT SCREW CONVEYOR					9' X 20' LG	20,000		
06-4.	BIF VENT FILTER						35,000		

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclones. The material is transferred by a pneumatic conveying system designed to transport the zinc ferrite fines to a seven (7) day holding silo. The loadout will be capable of loading trucks only. The loading will be achieved by discharging material through a rotary feeder into a screw conveyor. The screw conveyor will transfer the material to the outside of the structure into a truck parked alongside the silo.

D.O.E. STANDARD IGCC PLANT
ZINC FERRITE SYSTEM
200 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW

Zinc Ferrite Handling System

Equipment:
Storage/Conveying
and loadout

\$291,000

Erection:

\$101,850

Total:

\$392,900

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclone.

Equipment

1. Pneumatic Air System(Conveying distance appr. 400')
  - o Use historical factor of \$450/ft.
  - o Add rotary feeder allowance
  - o Add piping and fitting allowance
  - o $\$180000 + 10000 + 20000 =$ \$210,000
2. Zinc Storage Bin(appr. size: 12'Dia. x 30', appr. 1250 cuft)
  - o Use 1/4" wall construction for appr. 13,500# A36
@ \$1.50 historical fabrication factor.
  - o Add allowance for rotary screw
  - o Add freight allowance
  - o $20500 + 2500 + 3000 =$ \$26,000
3. Loadout Screw(appr. 9" x 20' Lg)
  - o Use allowance including freight \$20,000
4. Bin Vent Filter
  - o Use allowance including freight \$35,000

Total Zinc Ferrite Equipment Price	\$291,000

1 Erection

Erection pricing for this system was obtained from factors based on historical data and similar jobs.

Zinc Ferrite Erection is based on 35% of equipment price

Total Zinc Ferrite System Erection Price	\$101,850

Total Zinc Ferrite System Price	\$392,850	
	Use	\$392,900

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 MW

AREA NO.: 0007

AREA NAME: SORBENT AUXILIARIES

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0007- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
97-1.	SORBENT UNLOADING BUILDING					16' X 55' LG X 18' H		48,000	
97-2.	RAIL CAR PULLER							150,000	

Sorbent System Auxiliaries

The sorbent unloading/transfer and storage systems will be furnished by NaTec.

Additional items needed to complete the system include:

- Unloading Structure
- Rail Car Puller for Positioning

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW

Sorbent Auxilairies

Equipment:

\$198,000

Includes unloading building and car puller

Erection:

\$69,300

Total:

\$267,300

**D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 200MW**

Sorbent Auxiliaries

The sorbent unloading/transfer and storage systems will be furnished by NaTec
(Listed in other areas) Additional items needed to complete the system include:
Unloading Structure and a rail car puller for positioning.

Equipment

1. Sorbent Unloading Building(Appr. 16' x 55'L. x 18'H), 15,800 cu ft.	
o Use historical factor of \$3 / cu ft for this building	
o Includes auxiliaries	\$48,000
2. Railcar Puller	
o Use allowance including freight	\$150,000
Total Equipment Price	\$198,000

Erection

Erection pricing for this system was obtained from factors based on historical
data and similar jobs.
Sorbent Auxiliaries Erection is based on 35% of equipment price

Total Sorbent Aux. Erection Price	\$69,300
Total Sorbent Auxiliaries Price	\$267,300

D.O.E. STANDARD IGCC PLANT
200 MW UNIT

PRELIMINARY UTILITIES REQUIREMENT

Coal Handling System

Electrical:

Total Connected HP	900
Motors over 200 HP	None

Water:

Service Water	-Washdown	120 GPM
		@40PSIG
	-Dust Supp.	120 GPM
		@40PSIG

Air:

Instrument	None
Service	60SCFM
	@90PSIG

Briquetting System

Electrical:

Total Connected HP	1600
Motors over 200 HP(incl'd)	2@400

Water:

Service Water	-Washdown	120GPM
		@40PSIG
	-Cooling Water	500GPM
		@40PSIG

Air:

Instrument	None
Service	50SCFM
	@90PSIG

Natural Gas:

28,000cf/hr
@1050BTU/cf

Ash Handling System

Electrical:

Total Connected HP

200

Motors over 200 HP

None

Water:

Service Water

100GPM
@40PSIG

Air:

Instrument

None

Service

10SCFM
@90PSIG

Sorbent Handling System

Electrical:

Total Connected HP

100

Motors over 200 HP

None

Water:

Service Water

None

Air:

Instrument

None

Service

10SCFM
@90SCFM

Zinc Ferrite System

Electrical:

Total Connected HP

75

Motors over 200 HP

None

Water:

Service Water

None

Air:

Instrument

None

Service

10SCFM
@90PSIG

BRIQUET SYSTEM UTILITIES
240 MW SYSTEM

1 of 1.

IMPORTANT MESSAGE

FOR MU
TE 412 TIME 2:35 A.M. P.M.
M Gordon Covey
OF _____
PHONE 904-249-0002
AREA CODE NUMBER EXTENSION

TELEPHONED	☒	PLEASE CALL	
CAME TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		RUSH	
RETURNED YOUR CALL		SPECIAL ATTENTION	

MESSAGE ① Natural Gas Requirement
is 28,000 cf/hr. based
on 1050 Btu/cf
② Amount of Water - 500 gpm
③ Working on Roll compactors:
One roll compactor will do 50
SIGNED tons/hr. (over)

TOPS FORM 4005 LITHO IN U.S.A.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 OB NAME: STANDARDIZED COAL/GAS IGCC
 OB LOCATION: 200 MW

AREA NO.: 0008
 AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0008- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-1.	COAL LOCKS (8)						1,963,000		
08-2.	ASH LOCKS (8)						2,426,000		
08-3.	COAL LOCK CONTROL SYSTEM (8)						503,200		
08-4.	ASH LOCK CONTROL SYSTEM (8)						503,200		
08-5.	COAL BUNKERS						1,307,000		
08-6.	COAL LOCK FEED CHUTES (8)						347,000		
08-7.	ASH LOCK DISPOSAL CHUTE (8)						108,000		
08-8.	GASIFIER (8)						8,592,000		
08-9.	GRATES (8)						4,400,000		
08-10.	GRATES, VARIABLE SPEED DRIVES (8)						472,000		
08-11.	COAL DISTRIBUTOR AND DRIVE (8)						225,000		
08-12.	WASTE HEAT EXCHANGER (8)						3,321,000		
08-13.	COAL LOCK EJECTORS (8)						37,640		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 MW

AREA NO.: 0008

AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0008- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-14.	ASH LOCK EXP CONDENSER (8)							350,000	
08-15.	START-UP SCRUBBER (8)							40,000	
08-16.	RAW GAS KNOCKOUT DRUM (3)							344,000	
08-17.	MIXING PIPES							190,000	
08-18.	HYDRAULIC AND LUBE SYSTEM							1,046,500	
08-19.	INSTRUMENTATION							3,585,000	
08-20.	CONTROL AND RELIEF VALVES							1,050,000	
08-21.	ELECTRICAL							5,600,000	
08-22.	PIPING							17,636,000	

Gasifier Cost Analysis Based on ANR Great Plains Gasification Project with 14 Lurgi Mark IV Gasifiers:
 GASIFICATION, UNITY BASIS: (ITEM 1100) 0.09 Scaling Factor for 14 TO 1 Gasifiers Escalated by 20% for 1990
 (=1/14*1.2)

Diameter Scaling Factor	Equipment	Installation	Lurgi Mark IV 12.63 ft ID 1 Total	PyGas Equivalent 12.63 ft ID 1 Total
FEEDERS: COAL LOCKS (1100.35600)	\$300,119	\$8,118	\$308,237	\$308,237
ASH LOCKS: (1100.35630)	\$360,439	\$5,724	\$366,163	\$366,163
COAL BUNKERS: (1100.35901)	\$118,350	\$45,000	\$163,350	\$163,350
COAL LOCK FEED CHUTES: (1100.35830)	\$34,945	\$8,442	\$43,387	\$43,387
ASH LOCK DISPOSAL CHUTE: (1100.35850)	\$292	\$13,217	\$13,509	\$13,509
GASIFIER: (1100.42400)	\$937,606	\$136,365	\$1,073,971	\$1,073,971
GRATES: (1100.42430)	\$549,834	\$0	\$549,834	\$549,834
GRATE, VAR SPEED DRIVES: (1100.42450)	\$59,049	\$0	\$59,049	\$59,049
COAL DISTRIBUTOR & DRIVE: (1100.42460)	\$28,143	\$0	\$28,143	\$0
WASTE HEAT EXCHANGER: (1100.43500)	\$402,865	\$12,303	\$415,168	\$0
COAL LOCK EJECTOR3: (1100.43500)	\$3,375	\$1,080	\$4,455	\$0
ASH LOCK EXP CONDENSOR: (1100.44110)	\$40,771	\$3,024	\$43,795	\$43,795
RAW GAS KNOCKOUT DRUM: (1100.44110)	\$37,647	\$3,024	\$40,671	\$0
MIXING PIPES: (1100.44710)	\$23,192	\$552	\$23,744	\$23,744
HYDRAULIC & LUBE SYSTEM: (1100.46110)	\$126,288	\$4,518	\$130,806	\$130,806
PIPING: (1100.61000)	\$897,745	\$1,306,709	\$2,204,454	\$988,575
INSTRUMENTATION: (1100.51100)	\$189,738	\$69,480	\$259,218	\$259,218
CONTROL & RELIEF VALVES: (1100.51100)	\$131,229	\$0	\$131,229	\$131,229
ELECTRICAL: (1100.82000)	\$209,199	\$490,834	\$700,033	\$700,033
MISCELLANEOUS: (1100)	\$93,572	\$62,382	\$155,954	\$411,667
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL			\$6,715,170	\$5,266,567
by MAJOR GROUPS				
COAL LOCK SYSTEM	\$1,475,454	\$704,706	\$2,180,250	\$964,371
ASH LOCK SYSTEM	\$1,829,563	\$873,947	\$2,703,510	\$2,662,839
GASIFIERS	\$1,239,381	\$592,029	\$1,831,410	\$1,639,357
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
PYGAS EQUIVALENT COSTS				
COAL LOCK SYSTEM	\$652,625	\$311,746	\$964,371	\$964,371
ASH LOCK SYSTEM	\$1,802,039	\$860,800	\$2,662,839	\$2,662,839
GASIFIERS & COAL CRUSHING	\$1,109,412	\$529,945	\$1,639,357	\$1,639,357
TOTAL	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567
PYGAS EQUIVALENT COSTS	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0009
 AREA NAME: HOT GAS CLEANUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0009- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
09-1.	REGENERATION AIR HEATER						12,836,000		
09-2.	REGENERATION GAS HEATER						W/09-1		
09-3.	REGENERATION GAS COOLER						W/09-1		
09-3.A	FAN								
09-3.1	MOTOR								
09-4.	AIR TRIM HEATER						W/09-1		
09-5.	START-UP HEATER						W/09-1		
09-6.	RECYCLE GAS COMPRESSOR						W/09-1		
09-6.1	MOTOR								
09-7.	SECONDARY CYCLONE						W/09-1		
09-8.	RECYCLE GAS FILTER						W/09-1		
09-9.	SORBENT FINES SEPARATOR						W/09-1		
09-9.1	VIB DRIVE MOTOR								
09-10.	SORBENT TRANSFER ELEVATOR						W/09-1		
09-10.1	DRIVE MOTOR								
09-11.	ABSORBER OUTLET ROTARY FEEDER						W/09-1		
09-12.	REGENERATOR OUTLET ROTARY FEEDER						W/09-1		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0009
 AREA NAME: HOT GAS CLEANUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
09-13.	SORBENT MAKEUP FEEDER								W/09-1

Hot Gas Clean-Up System (HGCU)

The base price of \$10,124,000 is for a H₂S flow rate of 0.93 lb/sec. Prices for the 50 MW, 100 MW, and 200 MW cycles are based on this quote. It should be noted that the volumetric percentage of H₂S in the low-Btu gas is assumed constant so that H₂S flow rate may be used to scale from one size to another. The following chart shows the corresponding cost of the HGCU for the various sizes.

Size	Flow Rate	Cost Adjustment Rate	Budget Price
100MW	0.824 lb/sec	0.92	\$ 9,415,000
200MW	1.381 lb/sec	1.27	\$12,836,000
50MW	0.303 lb/sec	0.51	\$ 5,170,000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 MW

AREA NO.: 0010

AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-1.	HUMIDIFYING TOWER							5,962,000	
10-1.A	HUMIDIFYING TOWER PUMP TANK								
10-1.B	HUMIDIFYING TOWER PUMPS								
10-1.1	MOTORS				E 200	HP RPM			
10-2.	WASHING TOWER							W/10-1	
10-2.A	WASHING TOWER PUMPS								
10-2.1	MOTORS				E 175	HP RPM			
10-3.	WEAK ACID STRIPPER							W/10-1	
10-4.	DRYING TOWER							W/10-1	
10-4.A	DRYING TOWER PUMP								
10-4.1	MOTOR				E 40	HP RPM			
10-4.B	DRYING TOWER PUMP TANK								
10-5.	ACID STRIPPING							W/10-1	
10-6.	ABSORPTION TOWER (2)							W/10-1	
10-6.A	ABSORPTION PUMP								
10-6.1	MOTOR				E 40	HP RPM			
10-7.	COLD HE (2)							W/10-1	
10-8.	HOT HE (2)							W/10-1	
10-9.	DRYING TOWER COOLER							W/10-1	
10-10.	ABSORBER COOLER (2)							W/10-1	
10-11.	WEAK ACID COOLER (2)							W/10-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-12.	PREHEATER							W/10-1	
10-13.	PRODUCT ACID COOLER							W/10-1	
10-14.	SEAL POT							W/10-1	
10-15.	NEUTRALIZATION PIT							W/10-1	
10-16.	SULPHUR HOLDING PIT							W/10-1	
10-17.	REACTOR CONVERTER							W/10-1	
10-18.	GAS LIQUID SEPARATOR							W/10-1	
10-19.	ELECTROSTATIC PRE- CIPITATOR							W/10-1	
10-20.	DRYING TOWER DEMISTER							W/10-1	
10-21.	ABSORBER DEMISTER (2)							W/10-1	
10-22.	NEUTRALIZATION TANK (2)							W/10-1	
10-22.1	MIXER MOTOR					E 10 HP RPM			
10-23.	PREHEATER AND SULPHUR FURNACE							W/10-1	
10-24.	PRODUCT AND DRAIN PUMPS (2)							W/10-1	
10-24.1	MOTORS					E 7.5 HP RPM			

CRS SIRRIE EQUIPMENT LIST

CRS SIRRIE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 DB NAME: STANDARDIZED COAL/GAS IGCC
 DB LOCATION: 200 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-25. 10-25.1	FUEL OIL PUMPS (2) MOTORS					E .5 HP RPM		W/10-1	
10-26. 10-26.1	SLURRY PUMPS (3) MOTORS					E 10 HP RPM		W/10-1	
10-27. 10-27.1	MAIN GAS BLOWER MOTOR					E 1250 HP RPM		W/10-1	
10-28. 10-28.1	START-UP BLOWER MOTOR					E 50 HP RPM		W/10-1	
10-29. 10-29.1	ATOMIZING AIR BLOWER MOTOR					E 30 HP RPM		W/10-1	
10-30.	STACK					150' HIGH X 4' DIAM		W/10-1	
10-31.	INSTRUMENTS							W/10-1	
10-32.	CONTROL VALVES							W/10-1	

DOE IGCC Project Estimate

Equipment Area: 0010

Description: Sulfuric Acid Plant

Estimate: \$ 5,962,000

Comment:

Tim J. Browder Co. prepared a "Conceptual Design Report for Sulphuric Acid Production from Coal Gasification/Hot Gas Cleanup Island" (DE-F21-89MC26019). Mr. Tim Browder was contacted to discuss the effect on cost estimates for utilizing a more highly concentrated SO₂ stream. He estimated a capital cost of \$8,000,000 for a sulphuric acid plant consuming 15,000 lb/hr of SO₂ @ 12% vol. The 200MW Combined Cycle produces 9,263 lb/hr of SO₂ @ 11.74% vol. Using the above quote, the above capital costs associated with this size plant is obtained from multiplying the estimate by a scaling factor. The scaling factor is found by raising the ratio of the SO₂ flow rates to the 0.61 power.

Thus,

$$\begin{aligned}\text{cost of 200 MW Cycle} &= \$8,000,000 * (9,263/15,000)^{0.61} \\ &= \$5,962,000.\end{aligned}$$

The sulphuric acid plant will consume 750 kW.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0011
 AREA NAME: BOOSTER COMPRESSOR

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0011- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
11-1.	BOOSTER COMPRESSOR							1,000,000	

DOE IGCC Project Estimate

Equipment Area: 0011

Description: Booster Compressor

Estimate: \$ 1,000,000

Comment:

Elliott Compressor and A-C Compressor ,were contacted with respect to the 200 MW Combined Cycle conditions of boosting 391,630 lb/hr of 205 psia air to 350 psia. The air is bled off of the gas turbine compressor at 721 F and is cooled to an inlet temperature to the booster compressor of 400 F by water spray. A-C Compressors responded by quoting a price of \$1,000,000 for these conditions.

Contact at A-C Compressors is Paul Johnson.

DOE IGCC Project Estimate

Equipment No:

Description: Construction costs for 200 MW cycle

Estimate: \$25,403,000

Comment:

Construction costs were scaled up from the 100 MW budget price of \$16,760,000.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-1.	NO. 1 COMBUSTION GAS TURBINE GENERATOR (CGTG)							31,400,000	
12-2.	NO. 1 T-G INLET AIR SYSTEM							W/12-1	
12-2.A	FILTER					TWO STAGE		INCL	
12-2.B	SILENCER					SYSTEM		INCL	
12-2.C	DUCT							INCL	
12-3.	NO. 1 T-G GAS FUEL SYSTEM							W/12-1	
12-4.	TURBINE T-G LUBE OIL SYSTEM							W/12-1	
12-5.	NO. 1 GENERATOR							W/12-1	
12-6.	NO.1 T-G FIRE PROTECTION SYSTEM							W/12-1	
12-7.	NO. 1 T-G CONTROL MODULE							W/12-1	
12-8.	NO. 1 T-G GENERATOR BREAKER MODULE							W/12-1	
12-9. 12-9.A	GENERATOR NON SEGREGATED BUS. DUCT GENERATOR TO BREAKER							W/12-1	
12-10.	HEAT RECOVERY STEAM GENERATOR (ERECTED)							6,910,000	
12-11.	SCR							4,547,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-12.	STACK							1,250,000	
2-12.A	PLATFORMS & LADDERS							INCL	
12-13.	NO. 1 CGTG/HRSG EMISSION MONITORING SYSTEM							110,000	
2-14.	STEAM TURBINE EXTRACTION/CONDENSING							15,830,000	
2-15.	GENERATOR							W/12-14	
2-16.	T-G GLAND STEAM SYSTEM							W/12-14	
2-16.A	GLAND STEAM CONDENSER								
2-17.	T-G LUBE OIL SYSTEM							W/12-14	
12-17.A	RESERVOIR AND PUMPS								
2-18.	GENERATOR BREAKER MODULE							375,000	
2-19.	GENERATOR NON SEGREGATED							486,200	
12-19.A	BUS DUCT								
12-20.	STEAM TURBINE CONTROL MODULE							W/12-14	
12-21.	ST BRIDGE CRANE							264,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-1.	CONDENSER					TWO PASS	1,439,900		
13-1.1	HOTWELL						INCL		
13-1.2	EXPANSION JOINT						INCL		
13-2.	CONDENSATE PUMP NO 1 & 2 (110%)						47,600		
13-2.1	MOTOR						INCL		
13-3.	ATMOSPHERE DRAIN TANK					4' DIA X 4' S.S.	4,250		
13-4.	ATMOSPHERE DRAIN TANK PUMP NO. 1						5,100		
13-4.1	MOTOR						INCL		
13-4.A	INSULATION						INCL		
13-5.	CONDENSATE DRIP TANK PUMP NO. 1						5,100		
13-5.1	MOTOR						INCL		
13-5.A	INSULATION						INCL		
13-6.	CBD FLASH TANK						11,900		
13-6.A	INSULATION						INCL		
13-7.	CBD HEAT EXCHANGER						6,800		
13-7.A	FREIGHT						INCL		
13-8.	DEAERATOR HRSG (COMBINED)						187,000		
13-8.A	INSULATION						INCL		
13-9.	DEAERATOR OVERFLOW FLASH TANK						8,500		
13-9.A	FREIGHT						INCL		
13-9.B	INSULATION						INCL		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-10.	HRSG HP/IP BOILER FEEDWATER PUMPS 1, 2, & 3 (50%)						900,000		
13-10.A	FREIGHT							INCL	
13-10.1	MOTOR							INCL	
13-10.B	ARC VALVE							INCL	
13-10.C	WARM UP ORIFICE							INCL	
13-10.D	START UP STRAINER							INCL	
13-10.E	INSULATION							INCL	
13-11.	BLOWOFF TANK (2)						14,000		
13-12.	DESUPERHEATER PUMP NO. 1 & 2 (110%)						50,000		
13-12.1	MOTOR								

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
JOB NAME: STANDARDIZED COAL/GAS IGCC
JOB LOCATION: 200 MWAREA NO.: 0014
AREA NAME: COOLING TOWER CIRC. WTR SYS

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
14-1.	COOLING TOWER					5 CELL, COUNTERFLOW		1,405,700	
14-1.A	FREIGHT							INCL	
14-1.B	PERFORMANCE TEST							INCL	
14-1.C	ERECTION							INCL	
14-2.	COOLING TOWER WATER TREATMENT SYSTEM							27,500	
14-2.A	INHIBITOR BULK TANK								
14-2.B	INHIBITOR PUMP								
14-2.1	MOTOR					E 0.33 HP 1800 RPM			
14-2.C	HYPOCHLORITE BULK TANK								
14-2.D	HYPOCHLORITE PUMP								
14-2.2	MOTOR					E 0.25 HP 1800 RPM			
14-2.E	CAUSTIC PUMP								
14-2.3	MOTOR					E 0.25 HP 1800 RPM			
14-3.	CIRCULATING WATER PUMP					35,000 GPM EACH		430,400	
	(3) - (55%)								
14-3.1	MOTOR								

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-1.	RAW & FIRE WATER STORAGE TANK							680,000	
15-1.A	FREIGHT							INCL	
15-1.B	ERECTION							INCL	
15-2.	RAW WATER PUMPS (6) (100%)					700 GPM @ 150 FL		64,000	
15-2.A	FREIGHT							INCL	
15-2.1	MOTOR							INCL	
15-3.	DEMINERALIZED WATER MAKEUP SYSTEM							1,950,000	
15-3.A	FREIGHT							INCL	
15-3.B	STARTUP SUPERVISION							INCL	
15-4.	NEUTRALIZATION TANK							220,000	
15-4.A	FREIGHT							INCL	
15-4.B	ERECTION							INCL	
15-5.	DEMINERALIZED WATER STORAGE TANK							520,000	
15-5.A	FREIGHT							INCL	
15-5.B	ERECTION							INCL	
15-6.	DEMINERALIZED WATER TRANSFER PUMP 1, 2 & 3					300 GPM @ 250 FT.		48,000	
15-6.A	FREIGHT							INCL	
15-6.1	MOTOR					E 40 HP 3600 RPM		INCL	
15-7.	NEUTRALIZING TANK							W/15-3	
15-7.A	AGITATOR								
15-7.1	MOTOR					E 10 HP 1800 RPM			
15-8.	SAMPLE CONDITIONING RACK							72,000	

CRS SIRRINE EQUIPMENT LIST

S SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-9.	SILICA ANALYZER						40,000		
15-10.	SODIUM ANALYZER						24,000		
15-11.	MISC. ANALYZERS COND. PH ETC. OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC.					CONDUCTIVITY & PH OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC	85,000		
15-12.	INTERNAL BOILER WATER TREATMENT						96,000		
15-13. 15-13.1	PHOSPHATE PUMPS MOTORS					METERING E .77 HP 1800 RPM	W/15-12 FWE		
15-14. 15-14.A	AUXILIARY COOLING WATER HEAD TANK FREIGHT						19,000 INCL		
15-15. 15-15.A	AUXILIARY COOLING WATER HEAT EXCHANGER FREIGHT						80,000 INCL		
15-16. 15-16.A 15-16.1	AUXILIARY COOLING WATER PUMP (2) (110%) FREIGHT MOTOR						30,000 INCL INCL		
15-17. 15-17.A 15-17.1	AUXILIARY COOLING WATER PUMP NO. 2 (110%) FREIGHT MOTOR						30,000 INCL INCL		
15-18.	WATER LAB FURNITURE						30,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 200 MW

AREA NO.: 0015

AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-19.	CLOSED COOLING WATER							16,000	
	PUMP NO. 1 (110t)								
15-19.A	FREIGHT							INCL	
15-19.1	MOTOR							INCL	
15-20.	CLOSED COOLING WATER							16,000	
	PUMP NO. 2 (110t)								
15-20.A	FREIGHT							INCL	
15-20.1	MOTOR							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0016
 AREA NAME: COMPRESSED AIR SYSTEMS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0016- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
16-1.	INSTRUMENT AIR COMPRESSOR WATER COOLED						76,300		
16-1.A	FREIGHT							INCL	
16-1.1	MOTOR				E 60	HP 1800 RPM		INCL	
16-1.B	INLET FILTER/SILENCER							INCL	
16-2.	INSTRUMENT AIR RECEIVER						6,100		
16-2.A	FREIGHT							INCL	
16-3.	INSTRUMENT AIR DRYER W/INLET AND AFTER FILTERS						12,900		
16-3.A	FREIGHT							INCL	
16-4.	SERVICE AIR COMPRESSOR WATER COOLED						76,300		
16-4.A	FREIGHT							INCL	
16-4.1	MOTOR							INCL	
16-4.B	INLET FILTER/SILENCER							INCL	
16-5.	SERVICE AIR RECEIVER						6,100		
16-5.A	FREIGHT							INCL	
16-6.	SERVICE AIR DRYERS WITH INLET AND AFTER FILTERS						12,900		
16-6.A	CONTROLS						15,300		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 B NAME: STANDARDIZED COAL/GAS IGCC
 B LOCATION: 200 MW

AREA NO.: 0017
 AREA NAME: NATURAL GAS SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0017- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
17-1.	NATURAL GAS RECEIVER							115,200	
17-1.A	STRAINER							INCL	
17-2.	NATURAL GAS COMPRESSOR							1,400,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 MW

AREA NO.: 0019
 AREA NAME: FIRE PROTECTION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0019- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
19-1.	FIREWATER FLOW METER						2,300		
19-2.	FIRE PUMP PKG NO. 1 - DIESEL						91,580		
19-2.A	DIESEL ENGINE DRIVE						INCL		
19-2.B	PUMP ACCESSORIES						INCL		
19-2.C	FUEL TANK						INCL		
19-2.D	FIRE PUMP CONTROLLER						INCL		
19-2.E	JOCKEY PUMP						INCL		
19-2.1	MOTOR						INCL		
19-2.F	JOCKEY PUMP CONTROLLER						INCL		
19-3.	YARD FIRE PROTECTION						36,630		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 200 NW

AREA NO.: 0020
 AREA NAME: WASTEWATER SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0020- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
20-1.	PROCESS SUMP PUMP							13,700	
	NO. 1, 2 & 3								
20-1.A	FREIGHT							INCL	
20-1.1	MOTOR							INCL	
20-2.	OIL/WATER SEPARATOR							152,630	
	NO. 1 - 5								
20-2.1	MOTORS							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 OB NAME: STANDARDIZED COAL/GAS IGCC
 OB LOCATION: 200 MW

AREA NO.: 0021
 AREA NAME: HVAC

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0021- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
21-1.	HVAC SYSTEMS							381,600	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 DB NAME: STANDARDIZED COAL/GAS IGCC
 DB LOCATION: 200 MW

AREA NO.: 0022
 AREA NAME: ELECTRICAL DISTRIBUTION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0022- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
22-1.	TRANSFORMERS							2,884,140	
22-2.	BALANCE OF PLANT ELECTRICAL							4,578,000	
22-3.	TRANSMISSION LINE (ERECTED)							1,678,000	
2-4.	SWITCHYARD (ERECTED)							2,289,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

DB NAME: STANDARDIZED COAL/GAS IGCC

DB LOCATION: 200 NW

AREA NO.: 0023

AREA NAME: CONTROL SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0023- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
23-1.	CONTROL SYSTEM							4,744,000	
23-2.	INSTRUMENTATION							W/23-1	
23-3.	CONTROL VALVES							W/23-1	
23-4.	MOTOR OPERATED VALVES							W/23-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 OB NAME: STANDARDIZED COAL/GAS IGCC
 OB LOCATION: 200 MW

AREA NO.: 0024
 AREA NAME: BUILDINGS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0024- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
24-1.	MAIN BUILDING STEEL							1,976,000	
24-2.	MAIN BUILDING ROOFING							W/24-1	
24-3.	MAIN BUILDING SIDING							W/24-1	
24-4.	MAIN BUILDING LOUVERS							W/24-1	
24-5.	MAIN BUILDING MISC. ARCH. TREATMENT							W/24-1	
24-6.	GT & ST CRANE							W/24-1	

**50 MW COMBINED CYCLE &
STIG
BUDGET PRICES FOR
EQUIPMENT**

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

OB NAME: STANDARDIZED COAL/GAS IGCC

OB LOCATION: 50 NW

AREA NO.: 0003

AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0003- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-1.	RAIL UNLOADING BUILDING					20' X 80' L X 20' H		96,000	
03-2.	CAR SHAKER W/HOIST							49,500	
03-3.	CAR DUMP HOPPER (2)					10' X 20' X 6' DEEP		116,000	
03-4.	VIBRATING FEEDER (2)							54,000	
03-5.	DUST SUPPRESSION SYSTEM							48,000	
03-6.	UNLOADING BUILDING SUMP PUMP							7,000	
03-7.	VENT FAN							15,500	
03-8.	UNLOADING CONVEYOR BC-1					42" WIDE, APPROX 418' LG		335,000	
03-9.	SERVICE HOIST							11,000	
03-11.	LOWERING TUBE #1					10' DIA X 75' H		100,000	
03-10.	TRANSFER CONVEYOR BC-2					42" WIDE, APPROX 120' LG		112,600	
03-12.	RECLAIM HOPPER (2)					8' X 8' X 5' DEEP		54,000	
03-13.	RACK & PINION GATE (2)							5,000	
03-14.	VIBRATING FEEDER (2)							27,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0003
 AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0003- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-15.	RECLAIM TUNNEL VENT FAN						15,500		
03-16.	RECLAIM TUNNEL SUMP PUMP						7,000		
03-17.	DUST COLLECTOR						32,100		
03-18.	RECLAIM CONVEYORS BC-3					30" WIDE, APPROX 326' LG	163,000		
03-19.	CRUSHER/SCREENING BLDG					20' X 20' X 60' H	135,000		
03-20.	TRAMP IRON MAGNET						20,200		
03-21.	SCALPER GRIZZLEY						11,000		
03-22.	CRUSHER						20,000		
03-23.	SIZING SCREEN						25,000		
03-24.	DUST COLLECTOR @ CRUSHER BUILDING						32,100		
03-25.	CRUSHER BUILDING VENTILATION						15,500		
03-26.	SILo FEED CONVEYOR BC-4					30" WIDE, APPROX 430' LG	230,600		
03-27.	SILo TRANSFER CONVEYOR BC-5					30" WIDE, APPROX 40' LG	51,400		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

OB NAME: STANDARDIZED COAL/GAS IGCC

OB LOCATION: 50 NW

AREA NO.: 0003

AREA NAME: COAL HANDLING

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
03-28.	SERVICE HOIST						7,500		
03-29.	GASTIGHT VALVE (2)						30,000		
03-30.	SILO (2)					450 TON CAP	146,000		
03-31.	BIN VENT FILTER (2)						7,000		
03-32.	BIN ACTIVATOR (2)						32,800		
03-33.	RAIL SCALE						70,000		
03-34.	BULL DOZER						400,000		
03-35.	FRONT END LOADER						300,000		
03-36.	FORKLIFT						100,000		

Coal Handling System

Coal is received from rail cars (typically a cut of 25 to 30, 100-ton rail cars) through a below grade receiving hopper at 600 ton per hour. The coal is delivered to a storage pile containing both live and dead storage. Live storage is a seven (7) day supply and dead storage is for approximately thirty (30) days and can be expanded if required.

The reclaim is handled by two (2) under pile, in-line reclaim hoppers. They use vibrating feeders that discharge to reclaim belt conveyor conveying material to the screening and crushing tower at approximately 100 tons per hour.

In the screening and crushing tower, coal is reduced in size to 2" nominal and screened to remove all material less than 1/2" in size. The fines material is conveyed to the briquetting silo and the screened and sized coal is conveyed to the two (2) coal bunkers at the gasifier.

D.O.E. STANDARD IGCC PLANT
FUEL SYSTEM
50 MW UNIT

D.O.E. Standard IGCC Plant
Fuel Handling System
50 MW Unit

Equipment: Storage/Conveying and Reclaim	\$2,018,700
Erection:	\$706,500
Total:	\$2,725,200
Mobile Equipment	\$800,000

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING

A. Coal System

- 1 Rail Unloading Building(appr. 20' x 80'L x 20'H), 32000 cu ft
  - o Use historical factor of \$3 / cu ft for this structure \$96,000
  - o Includes auxiliaries
- 2 Car Shaker w/ Hoist
  - o Use phone quote and add freight allowance
  - o $48500+1000=$ \$49,500
- 3 Car Dump Hoppers,2 (appr. 10'x 20'x 6' deep)
  - o Use 1/4" wall construction for appr. 25,000# A36
@\$1.50 and 5,000# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $(55,000+3000) \times 2 =$ \$116,000
- 4 Vibrating Feeder 1 & 2
  - o Use phone quote and factor up for increased capacity
  - o Add freight allowance
  - o $200>600\text{tph}, (13000 \times 2)+500=26,500\text{ea}$ \$53,000
- 5 Dust Suppression System
  - o Use quote and piping allowance
  - o Add freight allowance
  - o $41500+2500+4000=$ \$48,000
- 6 Unloading Building Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 7 Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 8 Unloading Conveyor BC-1(42" wide belt appr. 418' Lg.)
  - o Use price/ft historical factor of \$515/ft(incl. truss/no truss sec
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a diverter gate allowance
  - o Add a height allowance for add'l steel
  - o $215000+100000+5000+5000+10000=$ \$335,000
- 9 Service Hoist
  - o Use an allowance for hoist and monorail
  - o Add freight allowance
  - o $10000+500+500=$ \$11,000

- 10 Transfer Conveyor BC-2(42" wide belt appr. 120' Lg.)
  - o Use price/ft historical factor of \$580/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a height allowance for add'l steel
  - o $69600+30000+6500+6500$ \$112,600
- 11 Lowering Tube 1 (10'dia. x 75'H)
  - o Use 1/4" wall construction for appr. 50,000# A36
@ \$1.50 historical fabrication factor.
  - o Add allowance for doors and misc. eq.
  - o $75000+25000=\$100,000$ ea. \$100,000
- 12 Reclaim Hopper 1,2(appr.8' x 8' x 5' Deep)
  - o Use 1/4" wall construction for appr. 5,200# A36
@ \$1.50 and 5,200# AR @ \$3.50
historical fabrication factor.
  - o Add freight allowance
  - o $26000+1000=\$27,000$ ea. \$54,000
- 13 Rack & Pinion Gate 1,2
  - o Use allowance
  - o Add freight allowance
  - o $2000+500=2,500$ ea. \$5,000
- 14 Vibrating Feeder 3,4
  - o Use telephone quote
  - o Add freight allowance
  - o $13000+500=13,500$ ea. \$27,000
- 15 Reclaim Tunnel Vent Fan
  - o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 16 Reclaim Tunnel Sump Pump
  - o Use telephone quote
  - o Add freight allowance
  - o $6500+500=$ \$7,000
- 17 Dust Collector (at tunnel)
  - o Use quote from AirTechniques including ductwork
  - o Add freight allowance
  - o $25100+5000+2000=$ \$32,100
- 18 Reclaim Conveyor BC-3 (30" belt appr. 326' Lg.)
  - o Use price/ft historical factor of \$409/ft(incl. truss/no truss sec
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o $133000+25000+5000=$ \$163,000
- 19 Crusher/Screening Building(appr. 20'x20'x60'h) 24,000 cu ft
  - o Use historical factor of \$5/ cu ft for this structure
  - o Includes auxiliaries
  - o $120000+15000=$ \$135,000

- 20 Tramp Iron Magnet
- o Use telephone quote and add allowance for supports
  - o Add freight allowance
  - o $18700+1500=$ \$20,200
- 21 Scalper Grizzly
- o Use telephone quote and add allowance for supports
  - o Add freight allowance
  - o $9800+500+700=$ \$11,000
- 22 Crusher
- o Use telephone quote and add allowance for increased capacity.
  - o Add freight allowance
  - o $17600+900+1500=$ \$20,000
- 23 Sizing Screen(final)
- o Use an allowance including chutework
  - o Add freight allowance
  - o $20000+2500+2500=$ \$25,000
- 24 Dust Collector (at crusher bldg)
- o Use quote from AirTechniques including ductwork
  - o Add freight allowance
  - o $25100+5000+2000=$ \$32,100
- 25 Crusher Building Ventilation
- o Use telephone quote and add allowance for ductwork
  - o Add freight allowance
  - o $12500+2500+500=$ \$15,500
- 26 Silo Feed Conveyor BC-4 (30" Belt appr. 430'Lg.)
- o Use price/ft historical factor of \$420/ft
  - o Use horsepower factor of \$500/HP
  - o Add a chutework allowance
  - o Add a diverter gate allowance
  - o Add a height allowance for add'l steel
  - o $180600+25000+5000+5000+15000=$ \$230,600
- 27 Silo Transfer Conveyor BC-5 (30" Belt appr. 40' Lg.)
- o Use price/ft historical factor of \$285/ft
  - o Use horsepower factor of \$500/HP
  - o Add a tripper allowance
  - o Add a chutework allowance
  - o $11400+5000+5000+30000=$ \$51,400
- 28 Service Hoist
- o Use an allowance including monorail
  - o Add freight allowance
  - o $6500+500+500=$ \$7,500
- 29 Gastight Valve 1 & 2
- o Use an allowance
  - o Add freight allowance
  - o $14000+1000=15,000\text{ea.}$ \$30,000

30 Silo 1 & 2 (450 ton cap.)		
o Use 3/8" wall construction for appr. 41,000# A36		
@\$1.50 and 2,500# AR @ \$3.50		
historical fabrication factor.		
o Add freight allowance		
o 70000+3000=73,000 ea.	\$146,000	
31 Bin Vent Filters 1&2		
o Use Telephone quote		
o Add freight		
o 3000+500	7000	
32 Bin Activator 1 & 2		
o Use Carman quote plus supports		
o Add freight allowance		
o 13400+1000+2000=16400ea	\$32,800	
33 Rail Scale		
o Use telephone quote and add allowance misc. stl.		
o Add freight allowance		
o 65000+2500+2500=	\$70,000	
33a Unlisted and Misc. (allowance)	\$50,000	
Total Coal System Equipment Price:	\$2,131,300	

Erection

Erection pricing for this system was obtained from factors based on historical data and similar jobs.

Coal System Erection is based on 35% of equipment price

Total Coal System Erection Price		\$745,955
	USE	\$706,500
Total Coal System Price	\$2,837,800	

B Mobile Equipment

Mobile equipment pricing is based on historical factors

34 (1) Large dozers		
o Use allowance of \$400,000 each	\$400,000	
35 (1) Frontend loader		
o Use allowance of \$300,000 each	\$300,000	
36 (1) Forklift type units		
o Use allowance of \$100,000 each	\$100,000	
Total Mobile Equipment allowance	\$800,000	

1750 Eastwood Drive, Aurora, Illinois 60506 (708) 844-1300

May 24, 1990

CRS SIRRINE
200 Executive Center Drive
Barnwell Building
Greenville, S. C. 29615

Attn: Mr. Mike Voss

Subject: Equipment and Turnkey installation proposal for a BT-102
Foam Dust suppression System for a Rail Car Dumper and
Truck Dumper Operation

Dear Mike,

Benetech, Inc. is pleased to submit the following proposal for two separate BT-102 Foam dust suppression systems. The table of content includes material list and description of, installation, CRS Sirene responsibilities and detailed operating sequences.

Detailed in the pricing section is the cost for each individual system, and corresponding installation cost. I have also provided deducts should CRS Sirene elect to take them. For example you will see a deduct for using a common chemical storage tank for both the car and truck dump systems. I have also enclosed a corporate video, Benetech reference lists and a technical summary of why foam dust suppression should be considered over wet suppression.

Should you have any questions in regard to this proposal please contact me at your earliest convenience.

Respectfully submitted,

J. Pircon

JJP/dhd

Att.

CC: CRSS.CT
File 28C

TABLE OF CONTENTS

- I. ROTARY CAR DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE

- II. TRUCK DUMP BT-102 SYSTEM
  - A. MATERIAL LIST AND DESCRIPTION
  - B. INSTALLATION
  - C. CRS SIRRINE RESPONSIBILITIES
  - D. OPERATING SEQUENCE

- III. PRICING

- IV. CLARIFICATIONS

- V. CORPORATE LITERATURE/BROCHURES

I. Benetech BT-102F Rotary Car Dump Foam Dust Suppression System
CRS Sirrine.

A.) Material List

The Benetech BT-102F Foam Dust Suppression System for a
Rotary Car Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 7.5 HP, 3600 RPM, 3 phase, 23-/46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges. flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including manual isolation valve, filter, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to each side of the car dumper.
2	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to each side of the car dumper.

- 2 1-1/2" Compressed Air Pressure Regulators to be mounted with air solenoids to control pressure to each side of the car dumper.
- 12 Benetech Foamer Assembly including foamer, check valve, flow control valves, pressure gauges, chemical pressure regulator and required pipe and fittings.
- 1 6,000 gallon horizontal insulated steel chemical storage tank.
- 1 6,000 watt storage tank immersion heater to be wired into equipment enclosure.
- 1 Chemical storage tank level indicator. Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
- 2.) Install concrete slab-on-grade (maximum 7' x 7') to support equipment enclosure and set enclosure.
- 3.) Install piping to feed chemical from storage tank to equipment enclosure (maximum 25" run).
- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install twelve (12) Benetech foamer assemblies. Six (6) will be mounted on each side of the car dumper.
- 8.) Install twelve (12) foam spray manifolds along the perimeter of the car dump pit.

- 9.) Install Benetech Remote Control Center in Car Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigidgalvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
  - a.) Chemical feed from tank to enclosure.
  - b.) Water/Chemical line from enclosure to foamers.
  - c.) Benetech foamers and foam spray manifold.
- 14.) Install insulation and covering on heat traced pipe described in Section 13. Insulation shall be fiberglass type with 1-1/2" thick walls. Covering shall be .006" thick aluminum fastened with sheet metal screws or bands.
- 15.) Provide full installation supervision and start-up services.

C.) Field Installation Services Provided by Others

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 120 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
- 3.) Provide 120 scfm/100 psi compressed air source to the equipment enclosure. All piping by others.

D.) Operations Sequence

All equipment required to transfer the fluid and control the flow rate will be housed in the Benetech equipment enclosure. The water/chemical flow rate is controlled using the needle valves and pressure regulators located at each foamer. In the equipment enclosure the chemical flow rate is controlled by a variable output metering pump which will proportion the chemical flow rate to the water flow rate. Air flow is controlled using regulators mounted in the field and needle valves installed.

The control sequence utilizes a Square D model 50 programmer and will allow the system to operate either automatically or manually. In addition a Remote Panel will be mounted in the ar Dump Operator's Control Center to provide remote operation.

In the Manual Mode the water pump and chemical pump will start and all solenoids will open to allow for a continual spray.

There will be two modes of operation from the remote panel. In the manual start cycle mode, a push button on the remote panel will start the spray cycle. The car dumper spray system has been broken into two zones front side and back side. Each side will be fitted with a "Delay On" and "Length on Spray" timer. The spray cycle will start on the front side as the rail car starts to rotate and dump coal into the pit. The foamers on the back side of the dump will start as coal is deposited in the pit and airborne coal dust is being forced through that area.

In the automatic start cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energized the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

SIMILAR
HOPPER

II

Benetech BT-102F Rotary Truck Dump Foam Dust Suppression System CRS Sirrine Engineers Inc.

A.) Material List

The Benetech BT-102F Foam Dust Suppression System for a Rotary Truck Dump will include the following

<u>Qty.</u>	<u>Description</u>
1	6' x' 6' Insulated fiberglass equipment enclosure with fabricated steel baseplate to house the pumping and control components. Shed will be fitted with a 1500 watt heater, light, 110 Volt receptacle.
1	Burks close coupled centrifugal water pump with 5 HP, 3600 RPM, 3 phase, 23-46- v TEFC motor.
1 LOT	Water control piping including manual inlet isolation valve, solenoid operated isolation, strainer with manual blow-down valve, pump by-pass, inlet and discharge pressure gauges. flow meter, flow switch, and required pipe and fittings.
1	Milton Roy duplex diaphragm chemical metering pump with 3/4 HP, 1800 RPM, 3 phase 230/460 Volt TEFC motor.
1 LOT	Chemical control piping including inlet manual isolation valve, calibration column, discharge pressure gauges, discharge isolation valves, and required pipe fittings.
1 LOT	Compressed air control piping including solenoid operated isolation valve, manual isolation valve, filter, pressure regulator, pressure gauge, and required pipe and fittings.
1	Benetech designed control center mounted in enclosure and wire to pumping components.
1	Benetech designed NEMA 12 Remote Control Center to be mounted in Rotary Car Dump Operators Control Room.
2	2" Water/Chemical Isolation Solenoids to be mounted in the field along the main pipes feeding chemical to the truck dump.
1	1-1/2" Compressed Air Isolation Solenoids to be mounted in the field along the main pipes feeding air to the truck dumper.

- 6 Benetech Foamer Assembly Including foamer, check valve, flow control valves, pressure. gauges, chemical pressure regulator and required pipe and fittings.
- 1 6,000 gallon horizontal insulated steel chemical storage tank.
- 1 6,000 watt storage tank emmersion heater to be wired into equipment enclosure.
- 1 Chemical storage tank level indicator. Gauge indicating quantity of material in tank will be mounted inside the equipment enclosure.
- 1 LOT Storage tank fill piping, including ball valve check valve, KAMLOK style base fitting and required pipe and fittings.

B. Field Installation Services Provided by Benetech

- 1.) Install concrete spread footing foundations (maximum 4' depth) to support 6,000 gallon storage tank and set tank.
- 2.) Install concrete slab-on-grade (maximum 7' x 7') to support equipment enclosure and set enclosure.
- 3.) Install piping to feed chemical from storage tank to equipment enclosure (maximum 25" run).
- 4.) Install all components on storage tank.
- 5.) Install schedule 40 galvanized pipe (required sizes per equipment specification) equipment enclosure to each foamer for the water/chemical feed shed to be installed within 50 ft. of car dumper.
- 6.) Install schedule 40 galvanized pipe (required sizes as per equipment specification) from equipment enclosure to each foamer for the compressed air feed shed to be installed within 50 ft. of car dumper.
- 7.) Install six (6) Benetech foamer assemblies. Foamers will be mounted on the vibrating feeder elevation. Piping will be routed through the pit wall to each spray manifold.

- 8.) Install six (6) foam spray manifolds along the perimeter of the truck dump.
- 9.) Install Benetech Remote Control Center in Truck Dump Operator's Control Room.
- 10.) Install Conduit and Wiring from Remote Control Center to Equipment Enclosure, maximum conduit run estimated at 100 feet. All conduit shall be rigid galvanized steel with weatherproof fittings. All wiring shall be single stranded type THHN. Conductor and conduit shall be as determined by NEC.
- 11.) Install conduit and wiring for storage tank immersion heater.
- 12.) Install conduit and wiring to control all field mounted solenoids.
- 13.) Install Raychem model 3 BTV-CT (3 watts per foot) self regulating heat trace on the following pipe
  - a.) Chemical feedd from tank to enclosure..
  - b.) Water/Chemical line from enclosure to foamers.
  - c.) Benetech foamers and foam spray manifold.
- 14.) Install insulation and covering on heat traced pipe described in Section 13. Insulation shall be fiberglass type with 1-1/2" thick walls. Covering shall be .006" thick aluminum fastened with sheet metal screws or bands.
- 15.) Provide full installation supervision and start-up services.

C.) Field Installation Services Provided by Others

- 1.) Provide 60 Amp, 480 Volt, power source to the Benetech Control Center located in the equipment enclosure.
- 2.) Provide 60 GPM/40 psi water source to the equipment enclosure. All piping, heat-trace and insulation to be provided by others.
- 3.) Provide 60 scfm/100 psi compressed air source to the equipment enclosure. All piping by others.

D.) Operations Sequence

All equipment required to transfer the fluid and control the flow rate will be housed in the Benetech equipment enclosure. The water/chemical flow rate is controlled using the needle valves and pressure regulators located at each foamer. In the equipment enclosure the chemical flow rate is controlled by a variable output metering pump which will proportion the chemical flow rate to the water flow rate. Air flow is controlled using a regulator mounted in the enclosure and needle valves installed.

The control sequence utilizes a Square D model 50 programmer and will allow the system to operate either automatically or manually. In addition a Remote Panel will be mounted in the Truck Dump Operator's Control Center to provide remote operation.

In the Manual Mode the water pump and chemical pump will start and all solenoids will open to allow for a continual spray.

There will be two modes of operation from the remote panel. In the "Manual Start Cycle" mode, a push button on the remote panel will start the spray cycle. The car dumper spray system has been broken into two zones front side and back side. Each side will be fitted with a "Delay On" and "Length on Spray" timer. The spray cycle will start on the front side as the rail car starts to rotate and dump coal into the pit. The foamers on the back side of the dump will start as coal is deposited in the pit and airborne coal dust is being forced through that area.

In the "Automatic Start" cycle mode a 110V signal from the customers equipment signaling the start of a car dumper cycle will initiate the zone timers.

All heat trace circuits will be energized from the equipment enclosure. AQ selector switch on the main control panel will energize the heat trace circuits. indicating lights on the main control center and the remote operators panel will signal the status of the heat trace power.

PRICING

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PRICE</u>
1	One (1) BT-102 Foam Dust Suppression System per Section I, Part A	\$47,260 FOB Aurora, IL
2	Turnkey installation per per Section I, Part B	\$80,250
3	One (1) BT-102 Foam Dust Suppression per Section II, Part A	\$41,490 FOB Aurora, IL
4	Turnkey installation per Section II, Part B	\$70,625
5	Project Mgt., should CRS Sirene elect to install themselves but require Benetech supervision	\$350/day plus ex- penses
6	System start up engineer shold CRS Sirene purchase equipment only	\$350/day plus ex- penses
7	BT-102 Chemical T/L quantities	\$3.40/gal FOB Aurora, IL
8	Deducts 1. Common use of bulk storage tank for both systems - a. Equipment b. Installation	 \$8,500 \$4,000

INSTALLATION CONDITIONS

- a.) Work on both areas simultaneously
- b.) No winter protection
- c.) Pricing Base On
  - 1.) 8 hour work day
  - 2.) 5 day work week
- d.) Water, air, and electrical piped to enclosures as described in quotation.

PH → 25-07-99512-9-788-1424-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE 2-20-90

TELE. NO. 803/788-1424
PLACED _____ (AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Author Leonard
OF HEWITT-ROBINS (COLUMBIA) ON CRSS JOB NO. 99512
CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY
F.C.

COGENERATION FACILITY

SUBJECT: ..

MILL AREA NO.: COAL HANDLING

CAR SHAKER W/HOIST (FIXED)
3 HP HOIST
20HP SHAKER
1-REQ'D

P.O. NO.: _____
(Use Inquiry No. prior to purchase)

HEWITT-ROBINS HDV CAR SHAKEOUT

SHAKER —	\$22,947	\$22,947
MTA —	920 + 250 EXP. PROOF (230/460)	1,170
- HOIST —	14,060 + 7,263 EXP. PROOF + 5,940 (TROLLEY)	21,323
V-Belt GUARD —	\$726	726
URETHANE PADS (REDUCE NOISE TO 60dBA) —	\$2,275	2,275
		<u>\$48,441</u>

GIVES 7% OFF ALSO

USE \$48,500

DISTRIBUTION

(List here, the person talked with)

CRS BIRRIANE

Steve Phillips
@ Mac

913-284-2191

PH → 25-07-99512-9-205-967-7888-84064

Rep

John

Reinck

Material Dynamic

COI - Charlotte, NC

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

TELE. _____

PLACED _____

NO. 205/967-7888
(AC-EXCH. - NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH

Steve Phillips @ MAC

OF MAC EQUIP. CO. (BIRMINGHAM, AL)

NO LONGER REPS MAC
ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS

PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT: HVAC

RAIL UNLOADER BUILDING
MCC & CONTROL ROOM
VENTILATION2 - REQ'D
SIZE 17" 270 CFM 2" S.P.1 - VENT FAN 2 1/2 HP @ UNLOADER
SIZE 25 13,000 CFM 2" S.P.1 - CRUSHER BLD'G FAN
(SAME)3 - BUNKER BIN VENTS w/SCREEN
NO. 72 ST9 ST FILTER

→ \$3,000 ea

DISTRIBUTION OPTION

(List here, the person talked with)

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

17 MW \$2,800 ea.

Spark Proof

Alumy 42" wheel 570 rpm
Radial Fan 8.2 php
\$12,500

\$12,500

Buffalo Forge Co.
Chris Bucker Inc - Sales Rep
704 E. Washington St. 242-0435

360

+ F12

DUCTWK

12,500

12,000
5,000
1,8002-20-90
Kent
Irwin
OUT
will call me

CRSS BIRRIANE

PH → 25-07-99512-9-508-685-5145-84064

NOTE.
Rep

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATIONDATE 2-21-90PLACED TELE. 508
NO. 617/685-5145
(AC-EXCH. - NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH Brian Power
(LAWRENCE, MA) ON CRSS JOB NO. 99512
OF Lawrence PumpCLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTYCOGENERATION FACILITY

SUBJECT:

UNLOADER BLD'G
SUMP PUMP 10 HP (EXP. PROOF)
1-REQ'D

P.O. NO.:

(Use Inquiry
No. prior to
purchase)VERTICAL TYPE (carbon steel)
30 GPM
TOTAL DYNAMIL HEAD = 30'
3/8" COAL PARTICLES

6' pit

\$6,500

+ FR 600
7,000DISTRIBUTION

(List here, the person talked with)

10:30
NOT IN 2-20-90
CALL BACK PM

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____

PLACED _____ TELE. NO. 803/242-5885
(AC-EXCH. - NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH EDDIE SEIGLER
(Greenville, SC)
OF Edgar B. Heape & Son - Toledo ON CRSS JOB NO. 99512

CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT: .

COAL RAIL SCALE
CONTROLS
LOAD CELLS
PRINTER W/INDICATOR
2 - REQ'D

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____
(Use Inquiry
No. prior to
purchase)

PIT - 8' W x 14' LG x 2' D.
(6.15' x 12.5' x 2' 6") - Per Toledo

SCALE — \$21,500
PIT & APPROACH RAMPS — 40,300
61,800

USE \$65,000
(for each scale)

DISTRIBUTION

(Sum 2 axes)

(List here, the person talked with)

4 Scales = \$260,000
2 Scales = 130,000

130,000 Savings
+ ELECT.

271-1075 (Local)
PH → 25-07-99512-9-476-7523-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE 2-20-90

TELE. NO. 803/476-7523
(AC-EXCH.- NO.)

PLACED _____

RECEIVED _____

LAYMON MITCHELL TALKED WITH LARRY FISHER → will call prices tomorrow
OF JEFFREY / DRESSER (WOODRUFF SC) ON CRSS JOB NO. 99512
CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY

COGENERATION FACILITY

SUBJECT:

VIBRATING FEEDERS 3HP

3-REQ'D 200 TPH

30" W X 8 FT. LONG

BRUTE FORCE

HD3008 5HP

CONSTANT SPEED + FR

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

\$13,000 X 3 = \$39,000
\$1,500
\$13,500

GRIZZLEY FEEDER 3HP

1-REQ'D 300 TPH W/Cont

36" W X 7'-3" (33" grizzly included)

9,800

\$48,800

REF: FAX DATED 2-1-90

FR. $\frac{9800}{500}$
\$10,300

USE \$50,000 TOTAL

DISTRIBUTION OPTION

Adams Brothers (Eriez-Magnetic)
Doug Norton

(List here, the person talked with)

AIR TECHNIQUES INC.

1724 Nekoma Street, NE • Marietta, Georgia 30067 • 404/977-7090

TELECOPIER COVER LETTER

DATE: 5-18-90

TOTAL NUMBER OF PAGES (including cover letter): 3

TO: Mike Voss - CRS - SIRRINE POWER DIVISION
Dust Collector For Mechanical Coal
Handling Project

TELECOPIER NUMBER
 (or main number if no direct line): 803-281-3712
 (AREA CODE) NUMBER

BILL WAGNER

FROM: _____

Air Techniques, Inc.
 1724 Nekoma St.
 Marietta, GA 30067

If you have any difficulty receiving any of the transmission, call (404) 977-7090 and report any difficulty. We are transmitting from a Canon Faxphone 10 machine. If you wish to transmit any documents to this office, the direct line to our automatic receiving equipment is (404) 977-8109. After dialing the number, begin transmitting after the tone.

COMMENTS: Mike,
Attached is my hand written budget proposal
as per your request. Please let me know if you have
any questions or if you require a formal submittal.
Also keep in mind that these numbers are rough
approximations.

Regards,

Bill Wagner

AXED: ☐
 DATE: _____

C.R.S. - Sicine - Mike Joss

clath Area

- 1) 10,000 CFM - Reverse Pulse Dust Collector 2160
 JA-240-DA, 4.62 to 1 A/C Ratio 10' x 6'
 Basic Price \$17,080 includes pyramidal hopper
 Support Steel \$1,675
 Upper Walkway \$1,905
 Side Platform \$475
 Walk in Plenum \$860
 Explosion Venting \$SEE ATTACHED
 Rotary Airlock \$2,695

30484
 + 415
 = 30899

- 2) 30,000 CFM - Reverse Pulse Dust Collector 6840
 JA-760-CA, 4.39 to 1 A/C Ratio, 10' x 20.5'
 Basic Price \$46,310
 Support Steel \$3,700
 Upper Walkway \$2,090
 Side Platform \$1,575
 Walk in Plenum \$1,625
 Explosion Venting \$SEE ATTACHED
 Screw Conveyor \$2,975 (2) Rotary Airlock \$2,630

980430

clath Area

- 3) 5,000 CFM - Reverse Pulse Dust Collector 1080
 JA-120 SA, 4.62 to 1 A/C Ratio, 5' x 6'
 Basic Price \$9,655
 Support Steel \$1,265
 Upper Walkway \$1,536
 Side Platform \$340
 Walk in Plenum \$625
 Explosion Venting \$SEE ATTACHED
 Rotary Airlock \$2,235

22134
 + 2475
 = 24609

For Explosion Proof Construction - Griffith ENU
recommends the following:

C-2 common 9's		NEMA 9 Panels	NEMA 9 Solenoids	Listened Bugs	GROUND WIRES
(QTY) 3+3- Relief Ports					
120 S.A.	(1) \$360. ⁰⁰ ea	\$510. ⁰⁰	(12) \$47. ⁰⁰ ea	\$2,075. ⁰⁰	~~\$14,500.⁰⁰~~
-240 D.A.	(2) \$360. ⁰⁰ ea	\$510. ⁰⁰	(12) \$47. ⁰⁰ ea	\$4,000. ⁰⁰	~~\$2900.⁰⁰~~
4-760-CA	(5) \$360. ⁰⁰ ea	\$510. ⁰⁰	(40) \$47. ⁰⁰ ea	\$12,360. ⁰⁰	~~\$8900.⁰⁰~~

704-364-8402
PH → 25-07-99512-9-414-672-7830-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE _____ TELE. _____

PLACED _____ NO. 414/672-7830
(AC-EXCH.- NO.)

RECEIVED _____

LAYMON MITCHELL TALKED WITH GARY
(MILWAUKEE, WI)
OF DINGS MAGNETIC

ON CRSS JOB NO. 99512

CLIENT DEWBERRY & DAVIS PROJECT DUPLIN COUNTY
COGENERATION FACILITY

SUBJECT:

TRAMP IRON MAGNET
7 1/2 HP
PERMANENT-SUSPENDED
SELF-CLEANING
1-REQ'D

MILL AREA NO.: COAL HANDLING

P.O. NO.: _____
(Use Inquiry
No. prior to
purchase)

MOUNT OVER HD OF 48" B.W. CONV,
300 TPH ; 140 FPM

Model DSC 1542
7-8 WK delivery
Work thru → DINGS

\$18,700
R/L #
Model DSC-1542

(Bob) Gerrard & Associates
Charlotte, NC
704/364-8402

Lynn Alexander - will call back

DISTRIBUTION OPTION

Adams Brothers (Eriez)
Doug Norton 704/365-4255

Eriez 6448 #18,419

(List here, the person talked with)

CRSS IRINE

CONVEYOR PRICE AUG'S FROM
(3) RECENT QUOTES: MONTAQUO, FMC, CRSS
OTHER SIZES FACTORED

MAR 87 CRSS 51

CLIENT CRSS LOCATION _____ DATE 11/6/89 PREPARED BY MV
SUBJECT _____ CHECKED BY _____
DEPT _____

Conveyor Pricing24" belt conveyor
Erected (mech) top & found30" belt conveyor
erected36" belt conveyor
erected42" belt conveyor
erected48" belt conveyor
erected54" belt conveyor
erected

Conv. only	Walk-on	Enclosed
\$150/ft \$195/ft	\$320/ft \$480/ft	\$835/ft \$1250/ft
\$285/ft \$370/ft	\$400/ft 600/ft	\$920/ft \$1465/ft
\$340/ft \$440/ft	\$480/ft \$720/ft	\$1025/ft \$1540/ft
\$400/ft \$520/ft	\$560/ft 840/ft	\$1085/ft \$1630/ft
\$455/ft \$590/ft	\$660/ft \$990/ft	\$1140/ft \$1710/ft
\$515/ft \$670/ft	\$740/ft \$1110/ft	\$1200/ft \$1800/ft

Countersunk conveyor add to conveyor

+ \$20/FT FOR HANDRAIL GRATING OR GRIP STRUT

100/ft

1200
- 515
\$685/ft
Turns

P.O. Box 570
1005 W. Riverside Drive
Jeffersonville, IN 47130
FAX 812/288-4708
Executive Offices 812/288-4710 -
Sales and Accounting 812/288-4700

TELECOPIER COVER LETTER

DATE: May 2, 1990

TIME: 2:55

TO: NAME: Laymond Mitchell
FIRM: CRS Sirrine
FAX NO: 803-281-3712

FROM: NAME: Robert L. Wolz

WE ARE TRANSMITTING 3 PAGE(S) (INCLUDING THIS COVER LETTER)

Reference: Carman File No. CHAR-90-4-1631

Dear Laymond,

In response to your telephone request yesterday, listed below please find some brief specifications and unit pricing for the bin dischargers you requested for this Pennsylvania project.

Item 1 will be a quantity of two Carman Model ~~12GBD~~ Gyrated Bin Dischargers, carbon steel construction with number 11 gauge number 304 stainless steel internal liner. All material contact surfaces would be of solid or lined with stainless steel. This unit would be furnished with a 7.5 HP TENV vibratory motor, a quantity of twenty heavy duty hanger arms, flexible inlet and outlet socking connections.

List price each, \$24,022.00, OEM discount \$1,400.00, your net cost ~~each \$22,622.00~~

Item 2 will be a quantity of one Carman Model ~~18GBD~~ Gyrated Bin Discharger, carbon steel construction with number 11 gauge number 304 stainless steel liner. This unit would be furnished with a 3 HP explosion proof vibratory motor, six heavy duty hanger arms and flexible inlet and outlet socking connections.

List price, \$14,748.00, OEM discount \$869.00, your net cost ~~\$13,879.00~~

Item 3 will be a quantity of one Carman Model ~~24GBD~~ Gyrated Bin Discharger. This unit would be furnished with a number 8 gauge number 304 stainless steel cone, no liner. This unit would be furnished with a 0.75 HP TENV vibratory motor, three standard duty hanger arms and flexible inlet and outlet socking connections.

List price, \$3,552.00, OEM discount \$300.00, your net cost ~~\$3,252.00~~

Laymond, each of these units has been quoted with a welded type adapter ring. Painting would be in accordance with the enclosed specification QA-860.1.

CRS BIRRIE

PH → 25-07-99512-9-404-448-2341-84064

Correspondence No. _____

COMMUNICATION RECORD

Date Typed: _____

OFFICE CONVERSATION

DATE _____

PLACE _____

TELEPHONE CALL CONVERSATION

DATE 2-20-90

PLACED _____ TELE. NO. 404/448-2341
(AC-EXCH.- NO.)

RECEIVED _____

will call
back

LAYMON MITCHELL TALKED WITH BRIAN STINSON
OF AS-TECH (AMERICAN PULV) ON CRSS JOB NO. 99512
CLIENT DENBERRY & DAVIS PROJECT DUPLIN COUNTY
COGENERATION FACILITY

SUBJECT: _____

MILL AREA NO.: COAL HANDLING

COAL CRUSHER (RING TYPE)
150 HP 1 1/2" PRODUCT
MOTOR 2" X 0 INPUT

P.O. NO.: _____

(Use Inquiry
No. prior to
purchase)

150 TPH
American WC30NF → w/ V-belt drive & base & guard & motor
75 HP

\$17,640

10-12 WK DEL.

DISTRIBUTION

(List here, the person talked with)

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW

AREA NO.: 0004

AREA NAME: BRIQUETTING SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0004- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
04-1.	BRIQUETTING SYSTEM							3,027,000	
04-1.A	TRANSFER STORAGE EQUIP.								
04-1.B	DRYER								
04-1.C	SCREENING/SIZING EQUIP.								
04-1.D	BRIQUETTING EQUIPMENT								
04-1.E	AUXILIARIES								
04-1.F	ELECTRICAL CONTROLS								
04-1.G	BUILDING								
04-2.	FINES CONVEYOR BC-6					24" WIDE, APPROX 300' LG		126,000	
04-2.A	CHUTEWORK								
04-2.B	DIVERTER GATE								
04-3.	BRIQUET TRANSFER CONVEYOR BC-7					24" WIDE, APPROX 375' LG		136,500	
04-3.A	CHUTEWORK								
04-4.	CHAR & TAR RETURN CONVEYOR					PNEUMATIC SYSTEM, 500' LG		187,500	

Briquetting System

Fine coal is received from the coal reclaim system at less than 1/2" size containing approximately 12% maximum combined moisture and will be stored in a silo (8 hours storage) located at the briquetting plant or discharged to grade when the plant is not operational. Coal is reclaimed from the silo by a vibrating feeder that meters the flow to the briquetting system dryer at a rate of approximately 25 tons per hour. The fines are delivered from the silo by conveyor to the thermal dryer to remove excess moisture before briquetting. The material is screened and crushed to less than a No. 4 mesh size and conveyed to a surge hopper. Material is metered from the surge hopper through a vibrating feeder into two briquetting lines. Coal can now be blended with a binder agent if necessary and transferred to the briquet machine. Char and tar fines from the gasifier cyclone will be conveyed to the briquetting area for use as a binder. After briquetting, material is screened again to remove fines generated during the process. They are transferred back to the blender by bucket elevator for recycling. The 1" nominal briquets are now transferred by a collecting conveyor to a common bed type dryer for curing before re-entry into the coal system at the coal bunkers.

D.O.E. STANDARD IGCC PLANT
BRIQUET SYSTEM
50 MW UNIT

D.O.E. Standard IGCC Plant
Briquetting System
50 MW Unit

Briquetting Equipment: Black Box Turnkey Supply	\$3,027,000

Erection:	<u>\$1,552,000</u>

Subtotal:	\$4,579,000

Balance of system: Conveyors and Misc.	\$450,000

Erection:	<u>\$157,500</u>

Subtotal:	\$607,500

Total:	\$5,186,500

D.O.E. Standard IGCC Plant
Briquetting System
50 MW Unit

Briquetting System

1 The briquetting system price is based on a blackbox vendor quote for a complete operating facility (See attached quote from PSI). The price includes: transfer/storage equipment, dryer, screening/sizing equipment, briquetting equipment, auxiliaries, electrical controls and buildings. Additional vendor data was obtained from individual equipment manufacturers such as briquettor and dryer suppliers (K.R.Komarik, Ludman Machine) to check major equipment suitability and prices.

\$3,027,000

Auxiliary Equipment

Additional equipment is required to transfer material from the fines screens to the briquetting plant and take the finished product back to the gasifier feed system.

2. Fines Conveyor BC-6 (24" Belt appr.300' Lg.)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o Add a diverter gate allowance
- o Add a height allowance for add'l steel
- o $102000+10000+4000+5000+5000=$

\$126,000

3. Briquet Transfer Conveyor BC-7 (24" Belt, appr. 375' Lg)

- o Use price/ft historical factor of \$340/ft
- o Use horsepower factor of \$500/HP
- o Add a chutework allowance
- o $127500+5000+4000=$

\$136,500

4. Char & Tar Return Conveyor System(Assume pneumatic transfer system appr. 500' Lg.)

- o Use allowance of \$350/ft.
- o Add allowance for pipe supports
- o Add freight allowance
- o $175000+10000+2500=$

\$187,500

Total Auxiliary Equipment Price

\$450,000

Total Briquetting Equipment

\$3,477,000

Erection

Erection pricing for this system was obtained from the PSI vendor budget quote. This price was checked against historical and industry data from previous jobs and factors for like installations.

1.Briquetting System (From Quote)	\$1,552,000
2.Auxiliary Equipment(Historical Allowance: 35% of Equip.)	\$157,500
Total Equipment Erection Price	\$1,709,500
 Total Briquetting Equipment	 \$3,477,000
Total Equipment Erection Price	\$1,709,500
Briquetting System Total Price	\$5,186,500

PROCESS SYSTEMS, INC.

P.O. Box 1878, Ponte Vedra Beach, FL 32004 (904) 249-0002

FAX (904) 249-1166

TO: CRS SIRRINE
ATTN: Mr. Mike Yoss - POWER DEPARTMENT

FAX NO. 803-281-3712

FROM: PROCESS SYSTEMS INC, for Gordon W. Covey

DATE: June 26, 1990

Should you have any problems receiving the following transmission, please contact us at (904) 249-0002.

Our Fax Machine Number is (904) 249-1166.

Comments: REF: REVISION BUDGET PROPOSAL - for coal handling, drying, crushing, briquetting as per attached letter.

There will be a total of 4 pages, including this cover sheet, in this transmission.
Thank you.

377

Specializing In Complete Process Systems

PROCESS SYSTEMS, INC.

P.O. Box 1679, Ponte Vedra Beach, FL 32004 (904) 249-0002

FAX (904) 249-1188

June 26, 1990

CRS SIRRINE INC.
Power Division
216 South Pleasantburg Drive
Greenville, S.C. 29606

ATTN: Mr. Mike Voss

REFERENCE: COAL HANDLING + DRYING CRUSHING, MIXING, BRIQUETTING PLANT
Roberts & Schaeffer- Eastern Operations
BUDGET PROPOSAL Rev 2. This is based on 12% Total Moisture
* Moisture should be qualified as Illinois ROM could be
as much as 12% inherent moisture with as much as 5% surface
moisture.

Dear Mr. Voss:

At your request we are revising the previous proposal to reflect a
downsizing to 25 TPH rate. This is based on the same design criteria
previously submitted.

ESTIMATED FREIGHT: \$ 34,000.00

ENGINEERING, MATERIAL, & PROJECT
MANAGEMENT: \$ 2,993,000.00

FOUNDATIONS AND ERECTION: \$ 1,552,000.00
TOTAL TURNKEY: \$ 4,579,000.00

We attach a brief breakdown of components and a flow sheet. If
you decide to proceed further, these budget figures will be
revised based on more detailed information.

Sincerely yours,

Gordon W. Covey
GWC:CS
encl.

Specializing in Complete Process Systems

Page 2
CRS SIRRINE ENGINEERS INC,
Mr. Mike Yoss
June 26. 1990

REF: COAL HANDLING - DRYING, CRUSHING, MIXING, BRIQUETTING PLANT

To operate for 25 TPH Rate. BUDGETARY ONLY

EQUIPMENT:

Feed Conveyors
DRYER

FURNACE & BURNER
FEED AIRLOCK
FLUIDIZED BED DRYER & DAMPERS
PRIMARY CYCLONES & AIRLOCKS
PRIMARY CYCLONE SCREW
EXHAUST FAN
RECYCLE FAN

BAGHOUSE

HAMMERMILL

MIXER

PRODUCT TRANSFER CONVEYOR

BRIQUETTER

PROCESS INSULATION

PROCESS PLATEWORK

MILD STEEL CHUTES & BINS

MILD STEEL DUCTWORK

INSTRUMENTATION

ELECTRICAL

PIPING

FIRE PROTECTION

STRUCTURAL STEEL

BUILDING COMPONENTS

ENGINEERING & PROJECT MANAGEMENT

PRICE:..... \$2,993,000.00

FOUNDATIONS & ERECTION

PRICE:..... \$1,552,000.00

ESTIMATED FREIGHT

PRICE:..... \$ 34,000.00

TURNKEY TOTAL:

\$4,579,000.00

ROBERTS & SCHAEFER COMPANY
6/23/90

COAL DRYING & BRIQUETTING PROCESS MATERIAL HANDLING SYSTEM FLOWSHEET

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

PRINT DATE: Jan 30 1991

JOB NAME: STANDARDIZED COAL/GAS IGCC

AREA NO.: 0005

DATA DATE: Jan 30 1991

JOB LOCATION: 50 MW

AREA NAME: ASH HANDLING SYSTEM

PAGE 0005- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
05-1.	PNEUMATIC AIR SYSTEM					CONVEYING DIST 300' LG		100,000	
05-2.	BIN VENT FILTER							25,000	
05-3.	ASH STORAGE SILO					24' DIA, 60' H		305,000	
05-4.	CONDITIONER							50,000	

Ash Handling System

Bottom ash is received by the handling system at the discharge lock hopper of the gasifiers and transferred via a pneumatic conveying system to the ash storage silos. The ash silo is a three (3) day storage structures equipped with either truck or rail loadout. Ash is discharged through an isolation gate and rotary feeder into an ash conditioner. After the ash is conditioned, it is discharged directly into truck or rail car.

D.O.E. STANDARD IGCC PLANT
ASH SYSTEM
50 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Ash Handling System

Equipment:	\$480,000
Storage/Conveying and loadout	

Erection:	<u>\$168,000</u>

Total:	\$648,000

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Ash Handling System

The ash handling system pricing was based on previous vendor quotes and jobs with similar equipment and system configuration.

Equipment

1. Pneumatic Air System(Conveying distance appr. 300')	
o Use historical factor of \$300/ft.	
o Add rotary feeder allowance	
o Add piping and fitting allowance	
o $\$90000+5000+5000=$	\$100,000
2. Bin Vent Filter	
o Use allowance	\$25,000
3. Ash Storage Silo(appr. size: 24'Dia. x 60', appr. 27,500 cuft)	
o Use concrete silo allowance of \$10/cuft	
o Add allowance for foundation	
o $275000+30000=$	\$305,000
4. Conditioner	
o Use allowance including freight	\$50,000
Total Ash System Equipment Price	\$480,000

1 Erection

Erection pricing for this system was obtained from similar jobs.

Ash System Erection is based on 35% of equipment price

Total Ash System Erection Price	\$168,000
Total Ash System Price	\$648,000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0006
 AREA NAME: ZINC FERRITE HANDLING SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0006- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
06-1.	PNEUMATIC AIR SYSTEM					CONVEYING DISTANCE APPROX 200'		74,500	
06-2.	ZINC STORAGE BIN					12' DIA X 20' H		20,500	
06-3.	LOADOUT SCREW CONVEYOR					9" X 12' LG		12,000	
06-4.	BIN VENT FILTER							20,000	

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclones. The material is transferred by a pneumatic conveying system designed to transport the zinc ferrite fines to a seven (7) day holding silo. The loadout will be capable of loading trucks only. The loading will be achieved by discharging material through a rotary feeder into a screw conveyor. The screw conveyor will transfer the material to the outside of the structure into a truck parked alongside the silo.

D.O.E. STANDARD IGCC PLANT
ZINC FERRITE SYSTEM
50 MW UNIT

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Zinc Ferrite Handling System

Equipment:
Storage/Conveying
and loadout

\$127,000

Erection:

\$44,450

Total:

\$171,500

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Zinc Ferrite Handling System

Zinc ferrite is received into the handling system at the discharge hopper of the dust final cyclone.

Equipment

1. Pneumatic Air System(Conveying distance appr. 200')	
o Use historical factor of \$350/ft	
o Add rotary feeder allowance	
o Add piping and fitting allowance	
o \$70,000+\$2,500+\$2,000	\$74,500
2. Zinc Storage Bin(appr. size: 12'Dia. x 20', appr. 840 cuft)	
o Use 1/4" wall construction for appr. 10,000# A36	
o @ \$1.50 historical fabrication factor.	
o Add allowance for rotary screw	
o Add freight allowance	
o \$15,000+\$2,500+\$3,000	\$20,500
3. Loadout Screw(appr. 9" x 12' Lg)	
o Use allowance including freight	\$12,000
4. Bin Vent Filter	
o Use allowance including freight	\$20,000
Total Zinc Ferrite Equipment Price	\$127,000

1 Erection

Erection pricing for this system was obtained from factors based on historical data and similar jobs.

Zinc Ferrite Erection is based on 35% of equipment price

Total Zinc Ferrite System Erection Price	\$44,450
Total Zinc Ferrite System Price	\$171,450
Use	\$171,500

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0007
 AREA NAME: SORBENT AUXILIARIES

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0007- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
07-1.	SORBENT UNLOADING BUILDING					16' X 55' LG X 18' H		48,000	
07-2.	RAIL CAR PULLER							150,000	

Sorbent System Auxiliaries

The sorbent unloading/transfer and storage systems will be furnished by NaTec.

Additional items needed to complete the system include:

- Unloading Structure
- Rail Car Puller for Positioning

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Sorbent Auxilairies

Equipment:
Includes unloading building and car puller

\$198,000

Erection:

\$69,300

Total:

\$267,300

D.O.E. STANDARD IGCC PLANT
MATERIALS HANDLING
BASIS OF PRICING 50MW

Sorbent Auxilairies

The sorbent unloading/transfer and storage systems will be furnished by NaTec
(Listed in other areas) Additional items needed to complete the system include:
Unloading Structure and a rail car puller for positioning.

Equipment

1. Sorbent Unloading Building(Appr. 16' x 55'Lg. x 18'H), 15,800 cu ft.
    - o Use historical factor of \$3 / cu ft for this building
    - o Includes auxiliaries \$48,000
  2. Railcar Puller
    - o Use allowance including freight \$150,000
- Total Equipment Price \$198,000

Erection

Erection pricing for this system was obtained from factors based on historical
data and similar jobs.
Sorbent Auxiliaries Erection is based on 35% of equipment price

Total Sorbent Aux. Erection Price \$69,300

Total Sorbent Auxiliaries Price \$267,300

D.O.E. STANDARD IGCC PLANT
50 MW UNIT

PRELIMINARY UTILITIES REQUIREMENT

Coal Handling System

Electrical:

Total Connected HP	600
Motors over 200 HP	None

Water:

Service Water	-Washdown	120 GPM
		@40PSIG
	-Dust Supp.	120 GPM
		@40PSIG

Air:

Instrument	None
Service	60SCFM
	@90PSIG

Briquetting System

Electrical:

Total Connected HP	800
Motors over 200 HP(incl'd)	1@200

Water:

Service Water	-Washdown	120GPM
		@40PSIG
	-Cooling Water	125GPM
		@40PSIG

Air:

Instrument	None
Service	50SCFM
	@90PSIG

Natural Gas:

7,000cf/hr
@1050BTU/cf

Ash Handling System

Electrical:

Total Connected HP

75

Motors over 200 HP

None

Water:

Service Water

100GPM
@40PSIG

Air:

Instrument

None

Service

10SCFM
@90PSIG

Sorbent Handling System

Electrical:

Total Connected HP

60

Motors over 200 HP

None

Water:

Service Water

None

Air:

Instrument

None

Service

10SCFM
@90SCFM

Zinc Ferrite System

Electrical:

Total Connected HP

30

Motors over 200 HP

None

Water:

Service Water

None

Air:

Instrument

None

Service

10SCFM
@90PSIG

10F2.

BRIQUET SYSTEM UTILITIES
240 MW SYSTEM

IMPORTANT MESSAGE

FOR M V
 FE 4/2 TIME 2:35 A.M. P.M.
 M Gordon Covey
 OF _____
 PHONE 904-249-0002
AREA CODE NUMBER EXTENSION

TELEPHONED ☒	PLEASE CALL
CAME TO SEE YOU	WILL CALL AGAIN
WANTS TO SEE YOU	RUSH
RETURNED YOUR CALL	SPECIAL ATTENTION

MESSAGE ① Natural Gas Requirement
is 28,000 cf/hr. based
on 1050 Btu/cf
② Amount of Water - 500 gpm
③ Working on Roll compactors:
One roll compactor will do 50
SIGNED tons/hr. (over)

TOPS FORM 4005 LITHO IN U.S.A.

Use 25% for 25T/HR SYS.

GAS: $.25 \times 28000 = 7000 \text{ cf/hr.}$

WATER $.25 \times 500 = 125 \text{ GPM}$

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW

AREA NO.: 0008

AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0006- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-1.	COAL LOCKS (2)							490,700	
08-2.	ASH LOCKS (2)							606,500	
08-3.	COAL LOCK CONTROL SYSTEM (2)							125,000	
08-4.	ASH LOCK CONTROL SYSTEM (2)							125,000	
08-5.	COAL BUNKERS							326,700	
08-6.	COAL LOCK FEED CHUTES (2)							86,775	
08-7.	ASH LOCK DISPOSAL CHUTE (2)							27,020	
08-8.	GASIFIER (2)							2,147,900	
08-9.	GRATES (2)							1,099,670	
08-10.	GRATES, VARIABLE SPEED DRIVES (2)							118,100	
08-11.	COAL DISTRIBUTOR AND DRIVE (2)							56,300	
08-12.	WASTE HEAT EXCHANGER (2)							830,350	
08-13.	COAL LOCK EJECTORS (2)							8,910	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0008
 AREA NAME: COAL GASIFICATION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0008- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
08-14.	ASH LOCK EXP CONDENSER (2)						87,590		
08-15.	START-UP SCRUBBER (2)						10,000		
08-16.	RAW GAS KNOCKOUT DRUM (2)						86,000		
08-17.	MIXING PIPES						47,500		
08-18.	HYDRAULIC AND LUBE SYSTEM						261,600		
08-19.	INSTRUMENTATION						896,300		
08-20.	CONTROL AND RELIEF VALVES						262,460		
08-21.	ELECTRICAL						1,400,000		
08-22.	PIPING						4,409,000		

Gasifier Cost Analysis Based on ANR Great Plains Gasification Project with 14 Lurgi Mark IV Gasifiers:
 GASIFICATION, UNITY BASIS: (ITEM 1100)
 0.09 Scaling Factor for 14 TO 1 Gasifiers Escalated by 20% for 1990
 (=1/14*1.2)

Diameter Scaling Factor	Equipment	Installation	Lurgi Mark IV 12.63 ft ID 1 Total	PyGas Equivalent 12.63 ft ID 1 Total
FEEDERS: COAL LOCKS (1100.35600)	\$300,119	\$8,118	\$308,237	\$308,237
ASH LOCKS: (1100.35630)	\$360,439	\$5,724	\$366,163	\$366,163
COAL BUNKERS: (1100.35801)	\$118,350	\$45,000	\$163,350	\$163,350
COAL LOCK FEED CHUTES: (1100.35830)	\$34,945	\$8,442	\$43,387	\$43,387
ASH LOCK DISPOSAL CHUTE: (1100.35850)	\$292	\$13,217	\$13,509	\$13,509
GASIFIER: (1100.42400)	\$937,606	\$136,365	\$1,073,971	\$1,073,971
GRATES: (1100.42430)	\$549,834	\$0	\$549,834	\$549,834
GRATE, VAR SPEED DRIVES: (1100.42450)	\$59,049	\$0	\$59,049	\$59,049
COAL DISTRIBUTOR & DRIVE: (1100.42460)	\$28,143	\$0	\$28,143	\$0
WASTE HEAT EXCHANGER: (1100.43500)	\$402,865	\$12,303	\$415,168	\$0
COAL LOCK EJECTORS: (1100.43500)	\$3,375	\$1,080	\$4,455	\$0
ASH LOCK EXP CONDENSOR: (1100.44110)	\$40,771	\$3,024	\$43,795	\$43,795
RAW GAS KNOCKOUT DRUM: (1100.44110)	\$37,647	\$3,024	\$40,671	\$0
MIXING PIPES: (1100.44710)	\$23,192	\$552	\$23,744	\$23,744
HYDRAULIC & LUBE SYSTEM: (1100.46110)	\$126,288	\$4,518	\$130,806	\$130,806
PIPING: (1100.61000)	\$897,745	\$1,306,709	\$2,204,454	\$988,575
INSTRUMENTATION: (1100.51100)	\$189,738	\$69,480	\$259,218	\$259,218
CONTROL & RELIEF VALVES: (1100.51100)	\$131,229	\$0	\$131,229	\$131,229
ELECTRICAL: (1100.82000)	\$209,199	\$490,834	\$700,033	\$700,033
MISCELLANEOUS: (1100)	\$93,572	\$62,382	\$155,954	\$411,667
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL			\$6,715,170	\$5,266,567
by MAJOR GROUPS				
COAL LOCK SYSTEM	\$1,475,454	\$704,796	\$2,180,250	\$964,371
ASH LOCK SYSTEM	\$1,829,563	\$873,947	\$2,703,510	\$2,662,839
GASIFIERS	\$1,239,381	\$592,029	\$1,831,410	\$1,639,357
SUB-TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
Special Instrumentation & Test Apparatus			\$0	\$0
TOTAL	\$4,544,398	\$2,170,772	\$6,715,170	\$5,266,567
PYGAS EQUIVALENT COSTS				
COAL LOCK SYSTEM	\$652,625	\$311,746	\$964,371	\$964,371
ASH LOCK SYSTEM	\$1,802,039	\$860,800	\$2,662,839	\$2,662,839
GASIFIERS & COAL CRUSHING	\$1,109,412	\$529,945	\$1,639,357	\$1,639,357
TOTAL	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567
PYGAS EQUIVALENT COSTS	\$3,564,076	\$1,702,491	\$5,266,567	\$5,266,567

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

OB NAME: STANDARDIZED COAL/GAS IGCC

OB LOCATION: 50 MW

AREA NO.: 0009

AREA NAME: HOT GAS CLEANUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0009- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
09-1.	REGENERATION AIR HEATER						5,170,000		
09-2.	REGENERATION GAS HEATER						W/09-1		
09-3.	REGENERATION GAS COOLER						W/09-1		
09-3.A	FAN								
09-3.B	MOTOR								
09-4.	AIR TRIM HEATER						W/09-1		
09-5.	START-UP HEATER						W/09-1		
09-6.	RECYCLE GAS COMPRESSOR						W/09-1		
09-6.A	MOTOR								
09-7.	SECONDARY CYCLONE						W/09-1		
09-8.	RECYCLE GAS FILTER						W/09-1		
09-9.	SORBENT FINES SEPARATOR						W/09-1		
09-9.A	VIB DRIVE MOTOR								
09-10.	SORBENT TRANSFER ELEVATOR						W/09-1		
09-10.A	DRIVE MOTOR								
09-11.	ABSORBER OUTLET ROTARY FEEDER						W/09-1		
09-12.	REGENERATOR OUTLET ROTARY FEEDER						W/09-1		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0009
 AREA NAME: HOT GAS CLEANUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0009- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
09-13.	SORBENT MAKEUP FEEDER								W/09-1

Hot Gas Clean-Up System (HGCU)

The base price of \$10,124,000 is for a H₂S flow rate of 0.93 lb/sec. Prices for the 50 MW, 100 MW, and 200 MW cycles are based on this quote. It should be noted that the volumetric percentage of H₂S in the low-Btu gas is assumed constant so that H₂S flow rate may be used to scale from one size to another. The following chart shows the corresponding cost of the HGCU for the various sizes.

Size	Flow Rate	Cost Adjustment Rate	Budget Price
100MW	0.824 lb/sec	0.92	\$ 9,415,000
200MW	1.381 lb/sec	1.27	\$12,836,000
50MW	0.303 lb/sec	0.51	\$ 5,170,000

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0010- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-1.	HUMIDIFYING TOWER								
10-1.A	HUMIDIFYING TOWER PUMP TANK								
10-1.B	HUMIDIFYING TOWER PUMPS								
10-1.1	MOTORS					E 200 HP RPM			
10-2.	WASHING TOWER								
10-2.A	WASHING TOWER PUMPS								
10-2.1	MOTORS					E 175 HP RPM			
10-3.	WEAK ACID STRIPPER								
10-4.	DRYING TOWER								
10-4.A	DRYING TOWER PUMP								
10-4.1	MOTOR					E 40 HP RPM			
10-4.B	DRYING TOWER PUMP TANK								
10-5.	ACID STRIPPING								
10-6.	ABSORPTION TOWER (2)								
10-6.A	ABSORPTION PUMP								
10-6.1	MOTOR					E 40 HP RPM			
10-7.	COLD HE (2)								
10-8.	HOT HE (2)								
10-9.	DRYING TOWER COOLER								
10-10.	ABSORBER COOLER (2)								
10-11.	WEAK ACID COOLER (2)								

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0010- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-12.	PREHEATER								
10-13.	PRODUCT ACID COOLER								
10-14.	SEAL POT								
10-15.	NEUTRALIZATION PIT								
10-16.	SULPHUR HOLDING PIT								
10-17.	REACTOR CONVERTER								
10-18.	GAS LIQUID SEPARATOR								
10-19.	ELECTROSTATIC PRE- CIPITATOR								
10-20.	DRYING TOWER DEMISTER								
10-21.	ABSORBER DEMISTER (2)								
10-22.	NEUTRALIZATION TANK (2)								
10-22.1	MIXER MOTOR					E 10 HP RPM			
10-23.	PREHEATER AND SULPHUR FURNACE								
10-24.	PRODUCT AND DRAIN PUMPS (2)								
10-24.1	MOTORS					E 7.5 HP RPM			

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 NW

AREA NO.: 0010
 AREA NAME: SULPHURIC ACID PLANT

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0010- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
10-25.	FUEL OIL PUMPS (2)								
10-25.1	MOTORS					E .5 HP RPM			
10-26.	SLURRY PUMPS (3)								
10-26.1	MOTORS					E 10 HP RPM			
10-27.	MAIN GAS BLOWER								
10-27.1	MOTOR					E 1250 HP RPM			
10-28.	START-UP BLOWER								
10-28.1	MOTOR					E 50 HP RPM			
10-29.	ATOMIZING AIR BLOWER								
10-29.1	MOTOR					E 30 HP RPM			
10-30.	STACK					150' HIGH X 4' DIAM			
10-31.	INSTRUMENTS								
10-32.	CONTROL VALVES								

DOE IGCC Project Estimate

Equipment Area: 0010

Description: Sulfuric Acid Plant

Estimate: \$ 2,364,660

Comment:

Tim J. Browder Co. prepared a "Conceptual Design Report for Sulphuric Acid Production from Coal Gasification/Hot Gas Cleanup Island" (DE-F21-89MC26019). Mr. Tim Browder was contacted to discuss the effect on cost estimates for utilizing a more highly concentrated SO₂ stream. He estimated a capital cost of \$8,000,000 for a sulphuric acid plant consuming 15,000 lb/hr of SO₂ @ 12% vol. The 50MW Combined Cycle produces 2,034 lb/hr of SO₂ @ 11.74% vol. Using the above quote, the above capital costs associated with this size plant is obtained from multiplying the estimate by a scaling factor. The scaling factor is found by raising the ratio of the SO₂ flow rates to the 0.61 power.

Thus,

$$\begin{aligned}\text{cost of 50MW Cycle} &= \$8,000,000 * (2,034/15,000)^{0.61} \\ &= \$2,364,660.\end{aligned}$$

The sulphuric acid plant will consume 160 kW.

DOE IGCC Project Estimate

Equipment Area: 0010

Description: Sulfuric Acid Plant

Estimate: \$ 2,697,420

Comment:

Tim J. Browder Co. prepared a "Conceptual Design Report for Sulphuric Acid Production from Coal Gasification/Hot Gas Cleanup Island" (DE-F21-89MC26019). Mr. Tim Browder was contacted to discuss the effect on cost estimates for utilizing a more highly concentrated SO₂ stream. He estimated a capital cost of \$8,000,000 for a sulphuric acid plant consuming 15,000 lb/hr of SO₂ @ 12% vol. The 50MW STIG cycle produces 2,524 lb/hr of SO₂ @ 11.74% vol. Using the above quote, the above capital costs associated with this size plant is obtained from multiplying the estimate by a scaling factor. The scaling factor is found by raising the ratio of the SO₂ flow rates to the 0.61 power.

Thus,
$$\begin{aligned}\text{cost of 50MW STIG} &= \$8,000,000 * (2,524/15,000)^{0.61} \\ &= \$2,697,420.\end{aligned}$$

The sulphuric acid plant will consume 160 kW.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW

AREA NO.: 0011
 AREA NAME: BOOSTER COMPRESSOR

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0011- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
11-1.	BOOSTER COMPRESSOR							1,000,000	

DOE IGCC Project Estimate

Equipment Area: 0011

Description: Booster Compressor

Estimate: \$ 1,000,000

Comment:

Elliott Compressor and A-C Compressor ,were contacted with respect to the 50 MW Combined Cycle conditions of boosting 86,008 lb/hr of 376 psia air to 450 psia. The air is bled off of the gas turbine compressor at 945 F and is cooled to an inlet temperature to the booster compressor of 400 F by water spray. A-C Compressors responded by saying that they have no equipment available to handle the high-pressure/low-flow conditions. However, development of a compressor for such a case would result in a \$1,000,000 booster compressor .

Contact at A-C Compressors is Paul Johnson.

DOE IGCC Project Estimate

Equipment Area: 0011

Description: Booster Compressor

Estimate: \$ 1,000,000

Comment:

Elliott Compressor and A-C Compressor were contacted with respect to the 50 MW STIG conditions of boosting 106,715 lb/hr of 480 psia air to 600 psia. The air is bled off of the gas turbine compressor at 1052 F and is cooled to an inlet temperature to the booster compressor of 400 F by water spray. A-C Compressors responded by saying that they have no equipment available to handle the high-pressure/low-flow conditions. However, development of a compressor for such a case would result in a \$1,000,000 booster compressor .

Contact at A-C Compressors is Paul Johnson.

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW STIG

AREA NO.: 0012

AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0012- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-1.	NO. 1 COMBUSTION GAS TURBINE GENERATOR (CGTG)							15,678,000	
12-2.	NO. 1 T-G INLET AIR SYSTEM							W/12-1	
12-2.A	FILTER					TWO STAGE		INCL	
12-2.B	SILENCER					SYSTEM		INCL	
12-2.C	DUCT							INCL	
12-3.	NO. 1 T-G GAS FUEL SYSTEM							W/12-1	
12-4.	TURBINE T-G LUBE OIL SYSTEM							W/12-1	
12-5.	NO. 1 GENERATOR							W/12-1	
12-6.	NO.1 T-G FIRE PROTECTION SYSTEM							W/12-1	
12-7.	NO. 1 T-G CONTROL MODULE							W/12-1	
12-8.	NO. 1 T-G GENERATOR BREAKER MODULE							W/12-1	
12-9.	GENERATOR NON SEGREGATED							W/12-1	
12-9.A	BUS. DUCT GENERATOR TO BREAKER								
12-10.	HEAT RECOVERY STEAM GENERATOR (ERECTED)							2,472,500	
12-11.	SCR							1,965,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-12.	STACK						490,000		
2-12.A	PLATFORMS & LADDERS						INCL		
12-13.	NO. 1 CGTG/HRSG EMISSION MONITORING SYSTEM						W/12-12		
2-14.	GENERATOR BREAKER MODULE						250,000		
2-15.	GENERATOR NON SEGREGATED						73,560		
2-15.A	BUS DUCT								
2-16.	ST BRIDGE CRANE						175,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-1.	CONDENSER (NOT NEEDED)					TWO PASS			
13-1.1	HOTWELL							INCL	
13-1.2	EXPANSION JOINT							INCL	
13-2.	CONDENSATE PUMP NO 1 & 2							28,000	
	(110%)								
13-2.1	MOTOR							INCL	
13-3.	ATMOSPHERE DRAIN TANK					4' DIA X 4' S.S.		2,500	
13-4.	ATMOSPHERE DRAIN TANK							3,000	
	PUMP NO. 1								
13-4.1	MOTOR							INCL	
13-4.A	INSULATION							INCL	
13-5.	CONDENSATE DRIP TANK							3,000	
	PUMP NO. 1								
13-5.1	MOTOR							INCL	
13-5.A	INSULATION							INCL	
13-6.	CBD FLASH TANK							15,000	
13-6.A	INSULATION							INCL	
13-7.	CBD HEAT EXCHANGER							4,000	
13-7.A	FREIGHT							INCL	
13-8.	DEAERATOR HRSG							72,000	
	(COMBINED)								
13-8.A	INSULATION							INCL	
13-9.	DEAERATOR OVERFLOW FLASH							5,000	
	TANK								
13-9.A	FREIGHT							INCL	
13-9.B	INSULATION							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-10.	HRSG HP/IP BOILER							150,000	
	FEEDWATER PUMPS (50%)								
13-10.A	FREIGHT							INCL	
13-10.1	MOTOR							INCL	
13-10.B	ARC VALVE							INCL	
13-10.C	WARM UP ORIFICE							INCL	
13-10.D	START UP STRAINER							INCL	
13-10.E	INSULATION							INCL	
13-11.	BLOWOFF TANK (2)							7,000	
13-12.	DESUPERHEATER PUMP							25,000	
	NO. 1 & 2 (110%)								
13-12.1	MOTOR							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-1.	RAW & FIRE WATER STORAGE TANK						65,000		
15-1.A	FREIGHT						INCL		
15-1.B	ERECTION						INCL		
15-2.	RAW WATER PUMPS (2) (100%)						24,000		
15-2.A	FREIGHT						INCL		
15-2.1	MOTOR						INCL		
15-3.	DEMINERALIZED WATER MAKEUP SYSTEM						820,000		
15-3.A	FREIGHT						INCL		
15-3.B	STARTUP SUPERVISION						INCL		
15-4.	NEUTRALIZATION TANK						72,000		
15-4.A	FREIGHT						INCL		
15-4.B	ERECTION						INCL		
15-5.	DEMINERALIZED WATER STORAGE TANK						89,000		
15-5.A	FREIGHT						INCL		
15-5.B	ERECTION						INCL		
15-6.	DEMINERALIZED WATER TRANSFER PUMP (2)						21,200		
15-6.A	FREIGHT						INCL		
15-6.1	MOTOR						INCL		
15-7.	NEUTRALIZING TANK						W/15-3		
15-7.A	AGITATOR								
15-7.1	MOTOR								
15-8.	SAMPLE CONDITIONING RACK						36,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 DB NAME: STANDARDIZED COAL/GAS IGCC
 DB LOCATION: 50 MW STIG

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-9.	SILICA ANALYZER						20,000		
15-10.	SODIUM ANALYZER						12,000		
15-11.	MISC. ANALYZERS COND. PH ETC. OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC.					CONDUCTIVITY & PH OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC	42,500		
15-12.	INTERNAL BOILER WATER TREATMENT						32,000		
15-13. 15-13.1	PHOSPHATE PUMPS MOTORS					METERING FWE E .77 HP 1800 RPM	W/15-12		
15-14. 15-14.A	AUXILIARY COOLING WATER HEAD TANK FREIGHT					10' DIA X 8' H	9,500 INCL		
15-15. 15-15.A	AUXILIARY COOLING WATER HEAT EXCHANGER FREIGHT						26,000 INCL		
15-16. 15-16.A 15-16.1	AUXILIARY COOLING WATER PUMP NO. 1 (110%) FREIGHT MOTOR						15,000 INCL INCL		
15-17. 15-17.A 15-17.B	AUXILIARY COOLING WATER PUMP NO. 2 (110%) FREIGHT MOTOR						15,000 INCL INCL		
15-18.	WATER LAB FURNITURE						15,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-19.	CLOSED COOLING WATER							8,000	
	PUMP NO. 1 (110%)								
15-19.A	FREIGHT							INCL	
15-19.1	MOTOR							INCL	
15-20.	CLOSED COOLING WATER							8,000	
	PUMP NO. 2 (110%)								
15-20.A	FREIGHT							INCL	
15-20.B	MOTOR							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 NW STIG

AREA NO.: 0016
 AREA NAME: COMPRESSED AIR SYSTEMS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0016- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
16-1.	INSTRUMENT AIR COMPRESSOR WATER COOLED					OIL-LESS TYPE, ROTARY 300 SCFM @ 125 PSI		50,000	
16-1.A	FREIGHT							INCL	
16-1.B	MOTOR							INCL	
16-1.C	INLET FILTER/SILENCER							INCL	
16-2.	INSTRUMENT AIR RECEIVER							4,000	
16-2.A	FREIGHT							INCL	
16-3.	INSTRUMENT AIR DRYER W/INLET AND AFTER FILTERS							8,500	
16-3.A	FREIGHT							INCL	
16-4.	SERVICE AIR COMPRESSOR WATER COOLED							50,000	
16-4.A	FREIGHT							INCL	
16-4.1	MOTOR							INCL	
16-4.B	INLET FILTER/SILENCER							INCL	
16-5.	SERVICE AIR RECEIVER							4,000	
16-5.A	FREIGHT							INCL	
16-6.	SERVICE AIR DRYERS WITH INLET AND AFTER FILTERS							8,500	
16-6.A	CONTROLS							10,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0017
 AREA NAME: NATURAL GAS SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0017- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
17-1.	NATURAL GAS RECEIVER							640,261	
17-1.A	STRAINER							INCL	
17-2.	NATURAL GAS COMPRESSOR							W/17-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 NW STIG

AREA NO.: 0019
 AREA NAME: FIRE PROTECTION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0019- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
19-1.	FIREWATER FLOW METER							1,500	
19-2.	FIRE PUMP PKG NO. 1 - DIESEL							60,000	
19-2.A	DIESEL ENGINE DRIVE							INCL	
19-2.B	PUMP ACCESSORIES							INCL	
19-2.C	FUEL TANK							INCL	
19-2.D	FIRE PUMP CONTROLLER							INCL	
19-2.E	JOCKEY PUMP							INCL	
19-2.1	MOTOR							INCL	
19-2.F	JOCKEY PUMP CONTROLLER							INCL	
19-3.	YARD FIRE PROTECTION							24,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0020
 AREA NAME: WASTEWATER SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0020- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
20-1.	PROCESS SUMP PUMP (2)						7,000		
20-1.A	FREIGHT						INCL		
20-1.1	MOTOR						INCL		
20-2.	OIL/WATER SEPARATOR (2)						40,000		
20-2.1	MOTORS						INCL		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0021
 AREA NAME: HVAC

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0021- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
21-1.	HVAC SYSTEMS					INCLUDED ELSEWHERE		SEE DESCRI	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 DB NAME: STANDARDIZED COAL/GAS IGCC
 DB LOCATION: 50 MW STIG

AREA NO.: 0022
 AREA NAME: ELECTRICAL DISTRIBUTION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0022- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
22-1.	TRANSFORMER						1,775,071		
22-2.	BALANCE OF PLANT ELECTRICAL						W/22-1		
22-3.	TRANSMISSION LINE (ERECTED)						W/22-1		
22-4.	SWITCHYARD (ERECTED)						W/22-1		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW STIG

AREA NO.: 0023

AREA NAME: CONTROL SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0023- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
23-1.	CONTROL SYSTEM							916,210	
23-2.	INSTRUMENTATION							W/23-1	
23-3.	CONTROL VALVES							W/23-1	
23-4.	MOTOR OPERATED VALVES							W/23-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW STIG

AREA NO.: 0024
 AREA NAME: BUILDINGS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0024- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
24-1.	MAIN BUILDING STEEL							811,650	
24-2.	MAIN BUILDING ROOFING							W/24-1	
24-3.	MAIN BUILDING SIDING							W/24-1	
24-4.	MAIN BUILDING LOUVERS							W/24-1	
24-5.	MAIN BUILDING MISC. ARCH. TREATMENT							W/24-1	
24-6.	GT & ST CRANE							W/24-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-1.	NO. 1 COMBUSTION GAS TURBINE GENERATOR (CGTG)							15,678,000	
12-2.	NO. 1 T-G INLET AIR SYSTEM							W/12-1	
12-2.A	FILTER					TWO STAGE		INCL	
12-2.B	SILENCER					SYSTEM		INCL	
12-2.C	DUCT							INCL	
12-3.	NO. 1 T-G GAS FUEL SYSTEM							W/12-1	
12-4.	TURBINE T-G LUBE OIL SYSTEM							W/12-1	
12-5.	NO. 1 GENERATOR							W/12-1	
12-6.	NO.1 T-G FIRE PROTECTION SYSTEM							W/12-1	
12-7.	NO. 1 T-G CONTROL MODULE							W/12-1	
12-8.	NO. 1 T-G GENERATOR BREAKER MODULE							W/12-1	
12-9. 12-9.A	GENERATOR NON SEGREGATED BUS. DUCT GENERATOR TO BREAKER							W/12-1	
12-10.	HEAT RECOVERY STEAM GENERATOR (ERECTED)							2,472,500	
12-11.	SCR							1,965,000	

CRS SIRRINE EQUIPMENT LIST

S SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 B NAME: STANDARDIZED COAL/GAS IGCC
 B LOCATION: 50 MW CC

AREA NO.: 0012
 AREA NAME: COGENERATION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0012- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCH NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
12-12.	STACK							490,000	
12-12.A	PLATFORMS & LADDERS							INCL	
12-13.	NO. 1 CGTG/HRSG EMISSION MONITORING SYSTEM							W/12-12	
12-14.	STEAM TURBINE EXTRACTION/CONDENSING							3,722,844	
12-15.	GENERATOR							W/12-14	
12-16.	T-G GLAND STEAM SYSTEM							W/12-14	
12-16.A	GLAND STEAM CONDENSER								
12-17.	T-G LUBE OIL SYSTEM							W/12-14	
12-17.A	RESERVOIR & PUMPS								
12-18.	GENERATOR BREAKER MODULE							250,000	
12-19.	GENERATOR NON SEGREGATED							73,561	
12-19.A	BUS DUCT								
12-20.	STEAM TURBINE CONTROL MODULE							W/12-14	
12-21.	ST BRIDGE CRANE							175,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-1.	CONDENSER					TWO PASS		382,500	
13-1.1	HOTWELL							INCL	
13-1.2	EXPANSION JOINT							INCL	
13-2.	CONDENSATE PUMP NO 1 & 2							28,000	
13-2.1	MOTOR							INCL	
13-3.	ATMOSPHERE DRAIN TANK					4' DIA X 4' SS.		2,500	
13-4.	ATMOSPHERE DRAIN TANK							3,000	
	PUMP NO. 1								
13-4.1	MOTOR							INCL	
13-4.A	INSULATION							INCL	
13-5.	CONDENSATE DRIP TANK							3,000	
	PUMP NO. 1								
13-5.1	MOTOR							INCL	
13-5.A	INSULATION							INCL	
13-6.	CBD FLASH TANK							7,000	
13-6.A	INSULATION							INCL	
13-7.	CBD HEAT EXCHANGER							4,000	
13-7.A	FREIGHT							INCL	
13-8.	DEAERATOR HRSG							72,000	
	(COMBINED)								
13-8.A	INSULATION							INCL	
13-9.	DEAERATOR OVERFLOW FLASH							5,000	
	TANK								
13-9.A	FREIGHT							INCL	
13-9.B	INSULATION							INCL	
13-10.	HRSG HP/IP BOILER							150,000	
	FEEDWATER PUMPS (2)								
	(50%)								

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0013
 AREA NAME: COND. & BOILER FEEDWATER SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0013- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
13-10.A	FREIGHT							INCL	
13-10.1	MOTOR							INCL	
13-10.B	ARC VALVE							INCL	
13-10.C	WARM UP ORIFICE							INCL	
13-10.D	START UP STRAINER							INCL	
13-10.E	INSULATION							INCL	
13-11.	BLOWOFF TANK (2)							7,000	
13-12.	DESUPERHEATER PUMP							25,000	
13-12.1	NO. 1 & 2 (110%) MOTOR							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0014
 AREA NAME: COOLING TOWER CIRC. WTR SYS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0014- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCR NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
14-1.	COOLING TOWER					5 CELL, COUNTERFLOW		750,800	
14-1.A	FREIGHT							INCL	
14-1.B	PERFORMANCE TEST							INCL	
14-1.C	ERECTION							INCL	
14-2.	COOLING TOWER WATER TREATMENT SYSTEM							W/14-1	
14-2.A	INHIBITOR BULK TANK								
14-2.B	INHIBITOR PUMP								
14-2.1	MOTOR					E 0.33 HP 1800 RPM			
14-2.C	HYPOCHLORITE BULK TANK								
14-2.D	HYPOCHLORITE PUMP								
14-2.2	MOTOR					E 0.25 HP 1800 RPM			
14-2.E	CAUSTIC PUMP								
14-2.3	MOTOR					E 0.25 HP 1800 RPM			
14-3.	CIRCULATING WATER PUMP							W/14-1	
14-3.1	(3) - (55%) MOTOR								

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW CC

AREA NO.: 0015

AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-1.	RAW & FIRE WATER STORAGE TANK						65,000		
15-1.A	FREIGHT						INCL		
15-1.B	ERECTION						INCL		
15-2.	RAW WATER PUMPS (2)						24,000		
15-2.A	FREIGHT						INCL		
15-2.1	MOTOR						INCL		
15-3.	DEMINERALIZED WATER MAKEUP SYSTEM						820,000		
15-3.A	FREIGHT						INCL		
15-3.B	STARTUP SUPERVISION						INCL		
15-4.	NEUTRALIZATION TANK						72,000		
15-4.A	FREIGHT						INCL		
15-4.B	ERECTION						INCL		
15-5.	DEMINERALIZED WATER STORAGE TANK						89,000		
15-5.A	FREIGHT						INCL		
15-5.B	ERECTION						INCL		
15-6.	DEMINERALIZED WATER TRANSFER PUMP (2)						24,000		
15-6.A	FREIGHT						INCL		
15-6.1	MOTOR						INCL		
15-7.	NEUTRALIZING TANK						W/15-3		
15-7.A	AGITATOR								
15-7.1	MOTOR								
15-8.	SAMPLE CONDITIONING RACK						36,000		
15-9.	SILICA ANALYZER						20,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 2

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-10.	SODIUM ANALYZER							12,000	
15-11.	MISC. ANALYZERS COND. PH ETC. OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC.					CONDUCTIVITY & PH OXYGEN, TURBIDITY OIL IN WATER, CHLORINE, ETC.		42,500	
15-12.	INTERNAL BOILER WATER TREATMENT							32,000	
15-13.	PHOSPHATE PUMPS					METERING		W/15-12	
15-13.1	MOTORS					E .77 HP 1800 RPM		FWE	
15-14.	AUXILIARY COOLING WATER HEAD TANK					10' DIA X 8'H		9,500	
15-14.A	FREIGHT							INCL	
15-15.	AUXILIARY COOLING WATER HEAT EXCHANGER							26,000	
15-15.A	FREIGHT							INCL	
15-16.	AUXILIARY COOLING WATER PUMP NO. 1 (110%)							15,000	
15-16.A	FREIGHT							INCL	
15-16.1	MOTOR							INCL	
15-17.	AUXILIARY COOLING WATER PUMP NO. 2 (110%)							15,000	
15-17.A	FREIGHT							INCL	
15-17.1	MOTOR							INCL	
15-18.	WATER LAB FURNITURE							15,000	
15-19.	CLOSED COOLING WATER PUMP NO. 1 (110%)							8,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0015
 AREA NAME: RAW WATER/MAKEUP SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0015- 3

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
15-19.A	FREIGHT							INCL	
15-19.1	MOTOR							INCL	
15-20.	CLOSED COOLING WATER PUMP NO. 2 (110%)						8,000		
15-20.A	FREIGHT							INCL	
15-20.1	MOTOR							INCL	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0016
 AREA NAME: COMPRESSED AIR SYSTEMS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0016- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
16-1.	INSTRUMENT AIR COMPRESSOR WATER COOLED						50,000		
16-1.A	FREIGHT						INCL		
16-1.B	MOTOR						INCL		
16-1.C	INLET FILTER/SILENCER						INCL		
16-2.	INSTRUMENT AIR RECEIVER						4,000		
16-2.A	FREIGHT						INCL		
16-3.	INSTRUMENT AIR DRYER W/INLET AND AFTER FILTERS						8,500		
16-3.A	FREIGHT						INCL		
16-4.	SERVICE AIR COMPRESSOR WATER COOLED						50,000		
16-4.A	FREIGHT						INCL		
16-4.1	MOTOR						INCL		
16-4.B	INLET FILTER/SILENCER						INCL		
16-5.	SERVICE AIR RECEIVER						4,000		
16-5.A	FREIGHT						INCL		
16-6.	SERVICE AIR DRYERS WITH INLET AND AFTER FILTERS						8,500		
16-6.A	CONTROLS						10,000		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

JOB NAME: STANDARDIZED COAL/GAS IGCC

JOB LOCATION: 50 MW CC

AREA NO.: 0017

AREA NAME: NATURAL GAS SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

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EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
17-1.	NATURAL GAS RECEIVER								
17-1.A	STRAINER							INCL	
17-2.	NATURAL GAS COMPRESSOR							640,261	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0019
 AREA NAME: FIRE PROTECTION SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0019- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
19-1.	FIREWATER FLOW METER							1,500	
19-2.	FIRE PUMP PKG NO. 1 - DIESEL							60,000	
19-2.A	DIESEL ENGINE DRIVE							INCL	
19-2.B	PUMP ACCESSORIES							INCL	
19-2.C	FUEL TANK							INCL	
19-2.D	FIRE PUMP CONTROLLER							INCL	
19-2.E	JOCKEY PUMP							INCL	
19-2.1	MOTOR							INCL	
19-2.F	JOCKEY PUMP CONTROLLER							INCL	
19-3.	YARD FIRE PROTECTION							24,000	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0020
 AREA NAME: WASTEWATER SYSTEM

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0020- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
20-1.	PROCESS SUMP PUMP (2)						7,000		
20-1.A	FREIGHT						INCL		
20-1.1	MOTOR						INCL		
20-2.	OIL/WATER SEPARATOR (2)						40,000		
	NO. 1 - 5								
20-2.1	MOTORS						INCL		

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

PRINT DATE: Jan 30 1991

JOB NAME: STANDARDIZED COAL/GAS IGCC

AREA NO.: 0021

DATA DATE: Jan 30 1991

JOB LOCATION: 50 NW CC

AREA NAME: HVAC

PAGE 0021- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
21-1.	HVAC SYSTEMS					INCLUDED IN OTHER ACCOUNTS		SEE DESCR	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0022
 AREA NAME: ELECTRICAL DISTRIBUTION

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0022- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCW NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
22-1.	8000 KLB TRANSFORMER							1,775,071	
22-2.	BALANCE OF PLANT ELECTRICAL							W/22-1	
22-3.	TRANSMISSION LINE (ERECTED)							W/22-1	
22-4.	SWITCHYARD (ERECTED)							W/22-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY

OB NAME: STANDARDIZED COAL/GAS IGCC

OB LOCATION: 50 MW CC

AREA NO.: 0023

AREA NAME: CONTROL SYSTEM

PRINT DATE: Jan 30 1991

DATA DATE: Jan 30 1991

PAGE 0023- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
23-1.	CONTROL SYSTEM							916,210	
23-2.	INSTRUMENTATION							W/23-1	
23-3.	CONTROL VALVES							W/23-1	
23-4.	MOTOR OPERATED VALVES							W/23-1	

CRS SIRRINE EQUIPMENT LIST

CRS SIRRINE JOB NO.: J01538

CLIENT NAME: U.S. DEPARTMENT OF ENERGY
 JOB NAME: STANDARDIZED COAL/GAS IGCC
 JOB LOCATION: 50 MW CC

AREA NO.: 0024
 AREA NAME: BUILDINGS

PRINT DATE: Jan 30 1991
 DATA DATE: Jan 30 1991
 PAGE 0024- 1

EQUIPMENT NUMBER	EQUIPMENT NAME	ADD/VOID DATE	CCN NO	VENDOR	PO NUMBER	DESCRIPTION OF EQUIPMENT	PURCHASE PRICE	EQUIPMENT BUDGET	ERCT CODE
24-1.	MAIN BUILDING STEEL							811,650	
24-2.	MAIN BUILDING ROOFING							W/24-1	
24-3.	MAIN BUILDING SIDING							W/24-1	
24-4.	MAIN BUILDING LOUVERS							W/24-1	
24-5.	MAIN BUILDING MISC. ARCH. TREATMENT							W/24-1	
24-6.	GT & ST CRANE							W/24-1	

DOE IGCC Project Estimate

Equipment No:

Description: Construction costs for 50 MW cycle

Estimate: \$9,253,000

Comment:

Construction costs were scaled down from the 100 MW budget price of \$16,760,000.

Development of Standardized Air-Blown Coal Gasifier/
Gas Turbine Concepts for Future Electric Power Systems
Volume V

Appendix D: Cost Support Information

END

**DATE
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4 / 01 / 92