DOE/MC/27363-3649
(DE94004070)

**CPC Air-Blown Integrated Gasification
Combined Cycle Project**

**Quarterly Report
October - December 1992**

January 1993

Work Performed Under Contract No.: DE-FC21-91MC27363

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

**By
Tampa Electric Company
Tampa, Florida**

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

**By
Tampa Electric Company
P.O. Box 111
Tampa, Florida 33601-0111**

January 1993

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TAMPA ELECTRIC COMPANY
DOE I. G. C. C. PROJECT
QUARTERLY REVIEW MEETING

November 12, 1992

For OCTOBER - DECEMBER, 1992

Nelson Rekos, Project Manager, for the U. S. Department of Energy (DOE) Clean Coal Branch welcomed the group and introduced the DOE project team members present.

Charles R. Black, Project Director, Tampa Electric Co. (TEC), introduced the TEC project team. He then gave an overview of the progress on the project including the status of the Site Certification Application, and the major contracts recently signed with General Electric and Texaco for the combined cycle engineered equipment package and gasification license, respectively. Mr. Black also discussed the Tampa Electric expansion plan and how this project is the first unit to be built on the Polk site.

Don Pless, Project Manager, TECO Power Services, discussed the project description. This covered the current cycle status of the unit: MW, Heat Rate, emissions, by-products and cycle optimization studies. It was also pointed out that due to current market conditions and expertise we will probably purchase the syngas coolers from foreign suppliers. The domestic bidders for this equipment either removed themselves from the competition or submitted unacceptable bids from a technical standpoint. A general arrangement drawing was shown and an artist rendering of the site and plant layout drawings were distributed. DOE requirements were covered relating to surveillance contracts, the advance patent waiver and Memo of Understanding with EPA.

Don Pless discussed the construction approach which has now changed from a turn key to a traditional approach of a construction manager and one or more general contractors. Major construction contracts will probably be broken-down by: site development, combustion turbine and combined cycle areas and the air separation unit.

The Project Team arrangement was covered showing the organizational structure of: the DOE IGCC portion, Tampa Electric non-IGCC, Texaco, General Electric, and GEESI with the A/E soon to be added. The various roles of the related project members were covered.

Mike Hegarty, Cost & Schedule, TECO Power Services, discussed the overall project cost and schedule. The combustion turbine commercial operation date is scheduled for 7/1/95 with the combined cycle commercial operation date of 7/1/96. A two year demonstration period will commence after IGCC commercial operation. Details of costs on a total project and DOE Envelope basis along with detailed schedule components were covered. Major cost variances to date were discussed. The major variances this year relate to contracts which were anticipated to be finalized mid 1992 but which are not executed. These include GEESI, the ASU and key vessels. Some of these contracts are almost in place and others are scheduled for the first quarter 1993.

Charles R. Black discussed the current status of the project as it relates to Tampa Electric. The internal Program Scope Approval (PSA) authorizing the project was approved in July, 1992. The Polk Project is The No. 1 priority project within our company. The addition of Polk Power Station will increase Tampa Electric's asset base by one-third. There has been a substantial increase in resource requirements within our organization impacting many departments in support of the project.

In the Regulatory area, the Tampa Electric Need Hearing (need for power) was approved in December, 1991 by the Florida Public Service Commission (FPSC). Intervenorors at that time filed for the use of demand side management to offset the need for additional plant in service. The FPSC reapproved the TEC need for power with one intervenor now filing suit in the state supreme court with expected outcome in January, 1993. It is important to note that the supreme court traditionally leaves need issues to the FPSC and the court has not overturned a commission ruling on need for power. Tampa Electric's Price Change process was discussed. A major issue in that case is the treatment of construction work in progress (CWIP) from the Polk Project.

Dave Cowdrick, Tampa Electric's Production Project Leader, discussed the technical/engineering side of the project. Numerous project specifications, process flow diagrams, piping and instrument diagrams and other drawings have been reviewed and approved as part of the preliminary engineering process by Production Engineering. The A/E scope of work and bidder's documents have been prepared and sent to the four companies bidding on the project: Bechtel, Fluor Daniel, United Engineers-UHDE and Ebasco-Foster Wheeler. The contract will be awarded in the first quarter 1993. Construction Management bidding documents are being prepared now, with contract award expected by mid 1993.

Dave Cowdrick also emphasized the value John McDaniel from EPRI and Bernard Schleper from UHDE have provided in the design review of existing processes related to our project design. They also have specific experience with syngas coolers, operations and maintenance, and the Cool Water project.

Greg Nelson, Environmental, Tampa Electric discussed the environmental issues and processes. Major items discussed were related to water discharge, demineralized wastes offsite, transmission lines, sufficiency issues and the state permitting schedule. Greg further discussed air emission permitting, the Land Use & Zoning Process, and the Conceptual Reclamation Plan. Greg Nelson emphasized the criticality of meshing the EIS preparation by DOE with TEC's SCA effort.

Jack Doolittle, Environmental Consulting & Technology Inc. gave an environmental status update: Tampa Electric submitted the Conceptual Reclamation Plan Application to the Florida Department of Natural Resources (FDNR) on October 13, 1992. Comments on our SCA application were received from FDNR in late November 1992.

The Land Use Hearing was held on October 29, 1992, in Polk County. No comments or issues were raised at the hearing. The recommended order stated that the project is consistent with and in compliance with, existing land use plans and zoning ordinances and was filed November 12, 1992.

TEC provided to DOE 10 copies of responses to additional information requests from U.S. Department Of Energy (DOE) on the Volume of Environmental Information (EIV). TEC also provided comments on the transcript from DOE's scoping meeting.

John Duff, Project Manager, Tampa Electric showed the site location details and an overview of the site power block, cooling pond and transmission areas. John also discussed the wetlands area, soil borings at the site, wild life corridor, clay settling pond and the earthwork/revegetation package.

Bill Preston, Texaco, gave an overview of the gasification process (block flow diagram), syngas cooler configuration (1 gasifier, 1 radiant heat exchanger, 2 convection coolers and 2 gas/gas exchangers) and the expected system performance at various temperatures. Air emissions related to cold and hot gas cleanup were also discussed. It was noted that Texaco expects to issue their preliminary engineering package on December 7, 1992.

Tampa Electric has finalized the license agreements with TPA, Inc. TPA is a subcontractor to Texaco for preliminary engineering for the sulfur recovery unit and tail gas treatment unit (parts of Cold Gas Clean Up). It was necessary for Tampa Electric to have these agreements to use TPA's specific technology.

Rick Heiman, Texaco, discussed the Industrial Waste Water design philosophy. The design would segregate contaminated streams and combine each type of contaminated stream with other streams containing similar contaminants. The process would further treat each combined stream for only its contaminant and route the combined effluents of each system into an equalization basin and filter before sending the streams to the cooling reservoir.

Paul Wallace, Texaco, discussed the optimization study results along with their cost savings and Heat Rate improvement. The following optimization studies were presented: ASU Compressor Drives, Syngas Cooler Configuration, Clean Gas Heater, Gasifier Train Size, Condensate Heating, Low Temperature Gas Cooling, Acid Gas Removal, Process Water Treating and Hot Gas Clean Up - Tail Gas Treating.

Charlie Cook, GEESI, discussed the hot gas clean up system operation using zinc titanate as the sorbent. The sizing of the absorber tank and regenerator with associated fuel gas piping was discussed. The next testing at Schenectady, N.Y. is scheduled for the last part of 1992. Issues to be resolved are: sorbent life, cost, and removal performance, NH_3 , particulate and trace elements.

Carl VanTine, General Electric, discussed the Combustion Turbine component installation, controls, accessories, and exhaust stack installation.

Terry Lynch, General Electric, discussed the combustion turbine rating with an 18 stage, axial flow compressor and a 3 stage turbine, with 2300°F firing temperature. Expected shipment is April, 1994. General Electric has gained field experience and continues to make design improvements to the 7F Combustion Turbine. The Steam Turbine is a Reheat Design/down exhaust with 26" last stage buckets with shipment due March 1995. Three HRSG supplier proposals in final evaluation stage are from domestic companies with shipment scheduled for March 1995.

Initial testing on Low BTU coal gas was completed with no surprises down to 110 BTU/SCF. The testing program will go into the first part of 1993 with Tampa Electric involved in testing.

Upcoming events:

- Award Architect/Engineer Contract
- Bid Construction Manager Services
- Purchase major equipment - SGC, Key Vessels, ASU
- Texaco change over from Preliminary Engineer to Licensor Reviewer

Upcoming Issues:

- Shipment of SGC to site:
 - route/cost
- Oxygen Plant - owner/lease arrangement
- Sale of CO_2
- GEESI HGCU specifications
- MOU

Upcoming Technical Milestones

- GEESI Cycle & Design
- A/E start
- CM bid
- Resolve SCA Sufficiency Issues
- EIS Implementation Plan
- Detailed SGC Design
- ASU Design
- Follow Industry Progress:
 - Shell, Destec, Europe, China
- Testing Program

Attachments: Slides & View Graphs

**TAMPA ELECTRIC COMPANY
DOE - IGCC PROJECT
4th Quarter Review
November 12, 1992**

Introduction	(1:00 p.m. - 1:15 p.m.)	DOE/TEC
Project Overview	(1:15 p.m. - 2:00 p.m.)	TEC
General		
Overall Engineering Status		
Major Contracts		
Project Description		
Project Team		
Current Status		
Upcoming Events & Issues		
Technical Presentation	(2:00 p.m. - 3:30 p.m.)	TEC
Site		
Technology Description		
Texaco		
GE		
GEESI		
Upcoming Milestones		
Closing Remarks & Questions	(3:30 p.m. - 3:45 p.m.)	DOE/TEC

**TAMPA ELECTRIC COMPANY
POLK POWER STATION
1992 4TH QUARTER REVIEW**

	DOE BUDGET PERIOD 1						DOE BUDGET PERIOD 2											
	JUL-SEP	OCT-DEC	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
	1992	1992	1993	1993	1993	1993	1994	1994	1994	1994	1995	1995	1995	1995	1996	1996	1996	1996
COMPLETE PRELIMINARY ENGINEERING (DEC 92)	CCCCCCCC																	
DETAILED ENGINEERING & CM (JAN93 - JUL98)			CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC
STATE PERMITTING PROCESS (ONGOING - OCT93)	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX												
FEDERAL PERMITTING PROCESS (ONGOING - DEC93)	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC												
BID & AWARD SITEWORK PACKAGE (SEP93 - DEC93)					XX	XXXXXX												
BID & AWARD CT PACKAGE (SEP93 - DEC93)						CCCC												
START CONSTRUCTION, SITE DEVELOPMENT & REVEGATION (JAN94 - MAR96)							CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC
CT FOUNDATIONS (MAY94 - JUL94)								CCC	CC									
DELIVERY & ERECTION OF CT & ACCESSORY EQUIPMENT (JUN94 - APR95)								CC	CCCC	CCCC	CCCC	CCCC	CC					
STARTUP/CHECKOUT OF CT (MAY95 - JUL95)													CCC	CC				
BID & AWARD BALANCE OF IGCC ERECTION PACKAGE (MAY94 - JUL94)								CCC	CC									
COMPLETE BALANCE OF IGCC FOUNDATIONS (AUG94 - DEC94)									CCC	CCCC								
COMPLETE BALANCE OF IGCC DELIVERY & ERECTION (JAN95 - APR96)													CCCC	CCCC	CCCC	CCCC	CCCC	CC
STARTUP/CHECKOUT OF IGCC FACILITIES (MAY96 - JUL96)																	CCC	CC

CCCCCCCC - DENOTES CRITICAL PATH ACTIVITIES

Cycle Optimization Summary

Study	Result	Savings
1. Air Separation Unit	Electric drives selected over steam drives.	\$7M Savings*
2. High Temperature Gas Cooling	Raw gas clean gas exchanger selected over high pressure economizer configuration.	\$9.7M Savings 91 Btu/Kwh Improvement 5.6 MW Loss
3. Clean Fuel Gas Heating	Currently being updated.	-----
4. Gasification Train Number	Ongoing - Syngas cooler vendor to be selected soon and configuration finalized.	-----
5. Steam Turbine Condensate Heating	Cooling water selected to cool black water flash drum vapor instead of steam turbine condensate.	\$400K Savings
6. Low Temperature Gas Cooling	Three stages of cooling selected over two stages.	\$500K Cost 37 Btu/Kwh Improvement 1.1 MW Increase
7. Acid Gas Removal	A chemical solvent was selected over a physical solvent.	\$6.5M Savings* 100+ Btu/Kwh Improvement* .5 MW Increase*
8. Effluent Water Treating	Vapor recompression evaporation selected over double effect evaporation.	\$1.0M Cost 46 Btu/Kwh Improvement 1.4 MW Increase
9. Hot Gas Cleanup Offgas Routing	Selection was made to convert the hot gas cleanup stream to sulfuric acid.	\$7.0M Savings 51 Btu/Kwh Improvement .12 MW Increase
*Base case selected. Figure presented represents additional cost associated with option evaluated but not selected.		
Totals: Total Capital Impact = \$15.6M Savings Heat Rate Impact = 225 Btu/Kwh Improvement Capacity Impact = 2.98 MW Lower		

**TAMPA ELECTRIC COMPANY
POLK POWER STATION
1992 3RD QUARTER REVIEW
(\$ x 1,000)**

COST SUMMARY

TOTAL POLK IGCC PROJECT FORECAST THRU 9/92	25,278.0
TOTAL POLK IGCC PROJECT ACTUALS THRU 9/92	<u>8,970.6</u>
VARIANCE----->	(16,307.4)
POLK DOE ENVELOPE FORECAST THRU 9/92	11,615.0
POLK DOE ENVELOPE ACTUALS THRU 9/92	<u>3,035.8</u>
VARIANCE----->	(8,579.2)

MAJOR CONTRACTS ORIGINALLY ANTICIPATED DURING 3RD QUARTER

	<u>DATE</u>
- TEXACO GASIFICATION LICENSE	10-21-92
- GE ENGINEERED EQUIPMENT PACKAGE	11-06-92
- GEESI HOT GAS CLEANUP ENGINEERING	DEC 1992
- AIR SEPARATION UNIT	EARLY 1993
- KEY GASIFICATION VESSELS	EARLY 1993

TOTAL COMMITMENT	----->	166,850
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POLK POWER STAION UNIT 1

TOTAL PROJECT CASH FLOWS

POLK POWER STATION UNIT 1

BUDGET PERIOD 1 TOTAL PROJECT CASH FLOWS

POLK POWER STATION UNIT 1

DOE ENVELOPE PROJECT CASH FLOWS

POLK POWER STATION UNIT 1

BUDGET PERIOD 1 DOE ENVELOPE CASH FLOWS

**TAMPA ELECTRIC COMPANY
POLK POWER STATION
1992 4TH QUARTER REVIEW**

	DOE BUDGET PERIOD 1						DOE BUDGET PERIOD 2											
	JUL-SEP 1982	OCT-DEC 1982	JAN-MAR 1983	APR-JUN 1983	JUL-SEP 1983	OCT-DEC 1983	JAN-MAR 1984	APR-JUN 1984	JUL-SEP 1984	OCT-DEC 1984	JAN-MAR 1985	APR-JUN 1985	JUL-SEP 1985	OCT-DEC 1985	JAN-MAR 1986	APR-JUN 1986	JUL-SEP 1986	OCT-DEC 1986
COMPLETE PRELIMINARY ENGINEERING (DEC 82)	CCCCCCCC																	
DETAILED ENGINEERING & CM (JAN83 - JUL88)			CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC
STATE PERMITTING PROCESS (ONGOING - OCT83)	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX												
FEDERAL PERMITTING PROCESS (ONGOING - DEC83)	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC												
BID & AWARD SITEWORK PACKAGE (SEP83 - DEC83)					XX XXXXX													
BID & AWARD CT PACKAGE (SEP83 - DEC83)					CCCCC													
START CONSTRUCTION, SITE DEVELOPMENT & REVEGATION (JAN84 - MAR85)							*CCCCCCCC	CCXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX
CT FOUNDATIONS (MAY84 - JUL84)							CCC CC											
DELIVERY & ERECTION OF CT & ACCESSORY EQUIPMENT (JUN84 - APR85)							CC CCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC								
STARTUP/CHECKOUT OF CT (MAY85 - JUL85)												CCC CC						
BID & AWARD BALANCE OF IGCC ERECTION PACKAGE (MAY84 - JUL84)							CCC CC											
COMPLETE BALANCE OF IGCC FOUNDATIONS (AUG84 - DEC84)								CCC CCCCC										
COMPLETE BALANCE OF IGCC DELIVERY & ERECTION (JAN85 - APR86)											CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC	CCCCCCCC
STARTUP/CHECKOUT OF IGCC FACILITIES (MAY86 - JUL86)																CCC CC		

CCCCCCCC - DENOTES CRITICAL PATH ACTIVITIES

TAMPA ELECTRIC CO
POLK POWER STATION
POLK UNIT ONE
PROJECT SCHEDULE
DRAFT

PERMITS

FEDERAL RECORD
OF DECISION
NEPA APPROVAL

TRANS

CONSTRUCTION
OPERATION
COMMERCIAL

START CONSTRUCTION

SOA FINAL
APPROVAL

CI

SITE

SI

HRSG

SO2

ASU
GASIFIER
COMMERCIAL
OPERATION

ASU

GAS

FOR COMMENTS

BUDGET

POLK UNIT No. 1 TOTAL PROJECT ORGANIZATION

**POLK POWER STATION
UNIT 1 COST SUMMARY
PHASES I & II ONLY
\$ x 1,000**

TOTAL PROJECT CAPITAL SUMMARY

ACTIVITY	1992	1993	1994	1995	1996	TOTAL \$	DOE ENV	NON DOE	DOE \$	TEC \$
I.G.C.C. FACILITIES	27,885	27,827	259,680	90,869	20,884	427,145	171,285	255,860	85,643	341,503
HOT GAS CLEANUP										
COLD GAS CLEANUP										
GASIFICATION										
AIR SEPARATION UNIT										
POWER BLOCK										
BALANCES OF IGCC										
ENGINEERING										
LICENSE FEES										
SITE DEVELOPMENT	91	388	26,156	7,806	1,762	36,202	14,517	21,685	7,259	28,944
TEC/TPS MANAGEMENT	10,513	20,192	4,412	7,555	9,048	51,722	15,456	36,266	7,728	43,994
IGCC PM & GENERAL										
ENVIRONMENTAL/PERMITTING										
CONSTRUCTION SUBSTATION										
PLNT MONITORING & COMMUN										
PLNT CONTROL & INFO SYS										
MOBILIZATION										
LAND PURCHASE										
PREVIOUS COSTS (THRU 6/92)										
TOTAL PROJECT	38,490	48,407	290,248	106,230	31,694	515,069	201,258	313,811	100,629	414,440
DOE REIMBURSEMENT	(6,896)	(6,872)	(53,327)	(25,887)	(7,647)	(100,629)	N/A	N/A	N/A	N/A
NET TEC COSTS	31,594	41,535	236,921	80,343	24,047	414,440	201,258	313,811	100,629	414,440

INCLUDES ALL BUDGET PERIOD 1 & 2 CAPITAL COSTS

System Performance

Expected Output

● Gas Turbine Production	190MW
● Steam Turbine Production	130MW
● <u>Internal Power Consumption</u>	<u>60MW</u>
● Net Output	260MW

Expected Heat Rate

- About 8,500 BTU/NetKWH

Expected Efficiency

- Greater than 40%

MAXIMUM EMISSIONS FROM THE IGCC UNIT'S CT (all values lb/hr)

<u>Pollutant</u>	<u>Post - Demonstration*</u>	<u>Demonstration†</u>	<u>No. 2 Fuel Oil</u>
Particulate Matter**	72	72	27
SO ₂	518	518	92
NO _x	223	664	311
CO	98	99	99
VOCs	3	3	32

* Maximum emission after the 2-year demonstration period, based on emissions achievable with CGCU. Utilization of HGCU to be based on ability to achieve maximum post-demonstration emission rates.

† Maximum emissions during the 2-year demonstration period, based on up to 50% utilization of HGCC. Maximum post-demonstration emissions rates to be achieved thereafter.

** Includes H₂SO₄ mist

Source: GE, 1992
Texaco, 1992
ECT, 1992

POLK POWER STATION BY-PRODUCTS

<u>By-Product</u>	<u>Tons/Yr.</u>
Sulfur	32,850
Sulfuric Acid	45,000
Slag	98,550

DOCUMENT STATUS

● SPECIFICATIONS	142	ISSUED FOR COMMENT
	77	REISSUED FOR APPROVAL
	45	APPROVED
● PROCESS FLOW DIAGRAMS	54	ISSUED FOR COMMENT
	54	REISSUED FOR APPROVAL
	7	APPROVED
● PIPING AND INSTRUMENT DIAGRAMS	145	ISSUED FOR COMMENT
	2	REISSUED FOR APPROVAL
	0	APPROVED
● OTHER DRAWINGS	124	ISSUED FOR COMMENT
	3	REISSUED FOR APPROVAL
	0	APPROVED

DETAIL ENGINEERING CONTRACT STATUS

- **SELECTION OF BIDDERS IS COMPLETE**
THERE WILL BE FOUR BIDDERS
- **BID DOCUMENTS ARE NEAR COMPLETION AND BIDS WILL BE SENT**
OUT THIS MONTH
- **SELECTION OF AN ENGINEER WILL BE MADE DURING FIRST QUARTER, 1993**

CONSTRUCTION STATUS

- **SELECTION OF BIDDERS FOR CONSTRUCTION MANAGEMENT IS COMPLETE.
THERE WILL BE FIVE BIDDERS**
 - **BID DOCUMENTS FOR CONSTRUCTION MANAGEMENT ARE BEING PREPARED
NOW**
 - **SELECTION OF A CONSTRUCTION MANAGER WILL BE MADE DURING
FIRST HALF, 1993**
 - **A CONSTRUCTION PLAN WILL BE PREPARED WITH THE CONSTRUCTION
MANAGER REFLECTING MULTIPLE CONTRACTORS FOR THE WORK**
-

TAMPA ELECTRIC IGCC RESOURCES

- **BERNARD SCHLEPER - UHDE**
 - **SAR, RUHRCHEMIE EXPERIENCE**
 - **SYN GAS COOLERS**
 - **PROCESS DESIGN**
 - **OPERATING AND MAINTENANCE EXPERIENCE**

- **JOHN MCDANIEL - EPRI**
 - **COOLWATER EXPERIENCE**
 - **COOLWATER VIDEO ARCHIVES**
 - **COOLWATER TEST AND OPERATING DATA**
 - **ACCESS TO EPRI'S OTHER TECHNICAL EXPERTISE**

DESIGN DEVELOPMENTS

- **MAKING SULFURIC ACID FROM HGCU OFF GAS INSTEAD OF SULFUR**
- **ONE RADIANT SYN GAS COOLER WITH TWO OUTLETS**
- **TWO CONVECTIVE SYN GAS COOLERS**
 - **ONE EXHAUSTS TO A RAW SYN GAS/NITROGEN HEAT EXCHANGER**
 - **THE OTHER EXHAUSTS TO A RAW SYN GAS/COLD SYN GAS HEAT EXCHANGER OR TO THE HGCU SYSTEM**
- **SYN GAS TEMPERATURE TO THE CT HAS BEEN INCREASED FROM 520°F TO 650°F, LOWERING STEAM TURBINE OUTPUT BUT IMPROVING OVER ALL EFFICIENCY**

File: FIG311-1

FIGURE 3.1.1-1.

GENERALIZED FLOW DIAGRAM OF IGCC SYSTEMS AND PROCESS

Source: ECT, 1992.

**POLK
POWER
STATION**

UPCOMING EVENTS'

- A/E Award
- Construction Management Bid
- Major Equipment Purchases
- Change in Texaco Role

FIGURE 3.2.0-2

POWER BLOCK AND DIRECTLY ASSOCIATED FACILITIES ARRANGEMENT

SOURCES UEC, 1992; ECT, 1992.

**POLK
POWER
STATION**

Tampa Electric Block Flow Diagram

**Tampa Electric
Expected Performance
Pittsburgh 8 Coal**

Ambient (°F)	59	90
<u>Feed</u>		
Oxygen (sTPD)	1868	1861
Coal (sTPD)	1907	1900
Coal HHV (MMBTU/h)	2199	2191
<u>Fuel Gas</u>		
Fuel Gas Temp (°F)	654	640
Fuel Gas Consump - LHV (MMBTU/h)	1566	1560
Fuel Gas LHV (BTU/SCF)	130	120
<u>Power</u>		
CT. Power (MW)	192.0	189.7
ST Power (MW)	123.5	122.9
ASU Consumption (MW)	(47.5)	(49.4)
BOP Consumption (MW)	(10.6)	(10.7)
Net Power Production	257.4	252.5
<u>Efficiency</u>		
HHV Net Heat Rate (BTU/kwh)	8543	8677

Tampa Electric Air Emissions

Tampa Electric Trace Element Air Emissions

Tampa Electric Syngas Cooler Configuration

Tampa Electric Low Temperature Gas Cooling Configuration

Tampa Electric Optimization Study Results

<u>Optimization Study</u>	<u>Cost Savings (\$/kw)</u>	<u>Heat Rate Improvement (BTU/kw-h)</u>
1) ASU Compressor Drives	0	0
2) Syngas Cooler Configuration	5	91
3) Clean Gas Heater	0	0
4) Gasifier Train Size	----- under study -----	
5) Condensate Heating	2	0
6) Low Temperature Gas Cooling	4	37
7) Acid Gas Removal	0	0
8) Process Water Treating	4	46
9) HGCU - Tail Gas Treating	<u>27</u>	<u>51</u>
Total	42	225

Tampa Electric Air Separation Unit Optimization (Study 1)

Optimum ASU

- electric compressor drives
- high pressure cold box (50 psig)
- all nitrogen routed to combustion turbine
- compressor heats nitrogen (limited intercooling)
- supplies soot blowing nitrogen
- supplies low pressure oxygen to Claus

Tampa Electric Syngas Cooling Optimization (Study 2)

Optimum Cooling System

- dual fire tube convection coolers
- separate nitrogen and fuel gas heaters
- raw gas/clean gas exchanger recovers low level heat
- high chrome metallurgy is cost effective

Tampa Electric Fuel Gas Heating Optimization (Study 3 and 6)

Optimum Heating System

- higher fuel gas temperature reduces overall plant cost
- higher fuel gas temperature increases efficiency
- raw gas/clean gas exchanger provides highest temperature
- scrubbed syngas/clean gas exchanger provides cost effective heating

Tampa Electric Process Waste Water Optimization (Study 5 and 8)

Optimum Treating

- primary separation by vapor recompression**
- secondary separation by LP steam evaporation**
- brine cake production by drum dryer**
- steam turbine condensate heating in WWT is not cost effective**

Tampa Electric Sulfur Removal Optimization (Study 7 and 9)

Optimum Removal

- amine based AGR provides low cost and good efficiency for CGCU
- HGCU tail gas treating in dedicated acid plant
- LP oxygen used to concentrate combusted sulfur streams

INDUSTRIAL WASTE TREATMENT DESIGN PHILOSOPHY

- SEGREGATE CONTAMINATED STREAMS.
- COMBINE EACH TYPE OF CONTAMINATED STREAM WITH STREAMS CONTAINING SIMILAR CONTAMINANTS.
- TREAT EACH COMBINED STREAM FOR ONLY ITS CONTAMINANT.
- COMBINE EFFLUENTS OF EACH SYSTEM INTO EQUALIZATION BASIN AND FILTER BEFORE SENDING TO COOLING RESERVOIR.

ENGINEERING

- o **Higher Fuel Temperature And Lower Fuel Pressure At Delivery Point – Improved Cycle Efficiency**
- o **Control Valves For High Temperature Syngas Tested At CR&D; Valve Selection Has Been Made**
- o **Product Engineering And Design Now Fully Released**

LOW BTU COAL GAS COMBUSTION TESTING

- o **DOE/EPRI/GE Cooperative Agreement Screening Program**
 - Determine effects of moisture, nitrogen and carbon dioxide as diluents
 - Determine emissions characteristics (NO_x, CO, etc.)
 - Operate on two syngas compositions – air blown and integrated oxygen blown to confirm combustion characteristics are in line with predictions
- o **Initial Tests Complete – No Surprises – Able to Maintain Stable Combustion Down To 110 BTU/SCF With Predicted Emission Levels**
- o **Plans (With Proposed Modifications)**

Remainder of 1992:

- o All 1/2 flow tests
- o DOE generic air blown gas 113 BTU (dry), 87 BTU (wet), H₂/CO=3.3
- o NH₃ to NO_x conversion Dry air blown, 250 – 1500 ppm NH₃

First Half of 1993:

- o Head end N₂ injection 1/2 Flow test, same combustible mixture as N₂ blending test, i.e., H₂/CO = 3.3
- o Head end N₂ injection Simulate TECO gas from CGCU stream full flow verification 1/2 flow comparison – (H₂/CO)

- o **TECO Production Development Testing**

- Baseline CGCU – NH₃ to NO_x conversion
- HGCU – Final design mods

LEGEND

— STEAM

- - - WATER

... AIR AND GAS

- . - FUEL

REV. SYMBOLS		AC - APPROVED FOR FA - FOR APPROVAL B - BY APPROVED P - PRELIMINARY R - REVISION		REVISION		NO. SYM. DATE		A 1 5/6/82		B 2 7/30/82		C 3 8/1/82		D 4 8/1/82		E 5 8/1/82		F 6 8/1/82		G 7 8/1/82		H 8 8/1/82		I 9 8/1/82		J 10 8/1/82		K 11 8/1/82		L 12 8/1/82		M 13 8/1/82		N 14 8/1/82		O 15 8/1/82		P 16 8/1/82		Q 17 8/1/82		R 18 8/1/82		S 19 8/1/82		T 20 8/1/82		U 21 8/1/82		V 22 8/1/82		W 23 8/1/82		X 24 8/1/82		Y 25 8/1/82		Z 26 8/1/82		AA 27 8/1/82		AB 28 8/1/82		AC 29 8/1/82		AD 30 8/1/82		AE 31 8/1/82		AF 32 8/1/82		AG 33 8/1/82		AH 34 8/1/82		AI 35 8/1/82		AJ 36 8/1/82		AK 37 8/1/82		AL 38 8/1/82		AM 39 8/1/82		AN 40 8/1/82		AO 41 8/1/82		AP 42 8/1/82		AQ 43 8/1/82		AR 44 8/1/82		AS 45 8/1/82		AT 46 8/1/82		AU 47 8/1/82		AV 48 8/1/82		AW 49 8/1/82		AX 50 8/1/82		AY 51 8/1/82		AZ 52 8/1/82		BA 53 8/1/82		BB 54 8/1/82		BC 55 8/1/82		BD 56 8/1/82		BE 57 8/1/82		BF 58 8/1/82		BG 59 8/1/82		BH 60 8/1/82		BI 61 8/1/82		BJ 62 8/1/82		BK 63 8/1/82		BL 64 8/1/82		BM 65 8/1/82		BN 66 8/1/82		BO 67 8/1/82		BP 68 8/1/82		BQ 69 8/1/82		BR 70 8/1/82		BS 71 8/1/82		BT 72 8/1/82		BU 73 8/1/82		BV 74 8/1/82		BW 75 8/1/82		BX 76 8/1/82		BY 77 8/1/82		BZ 78 8/1/82		CA 79 8/1/82		CB 80 8/1/82		CC 81 8/1/82		CD 82 8/1/82		CE 83 8/1/82		CF 84 8/1/82		CG 85 8/1/82		CH 86 8/1/82		CI 87 8/1/82		CJ 88 8/1/82		CK 89 8/1/82		CL 90 8/1/82		CM 91 8/1/82		CN 92 8/1/82		CO 93 8/1/82		CP 94 8/1/82		CQ 95 8/1/82		CR 96 8/1/82		CS 97 8/1/82		CT 98 8/1/82		CU 99 8/1/82		CV 100 8/1/82		CW 101 8/1/82		CX 102 8/1/82		CY 103 8/1/82		CZ 104 8/1/82		DA 105 8/1/82		DB 106 8/1/82		DC 107 8/1/82		DD 108 8/1/82		DE 109 8/1/82		DF 110 8/1/82		DG 111 8/1/82		DH 112 8/1/82		DI 113 8/1/82		DJ 114 8/1/82		DK 115 8/1/82		DL 116 8/1/82		DM 117 8/1/82		DN 118 8/1/82		DO 119 8/1/82		DP 120 8/1/82		DQ 121 8/1/82		DR 122 8/1/82		DS 123 8/1/82		DT 124 8/1/82		DU 125 8/1/82		DV 126 8/1/82		DW 127 8/1/82		DX 128 8/1/82		DY 129 8/1/82		DZ 130 8/1/82		EA 131 8/1/82		EB 132 8/1/82		EC 133 8/1/82		ED 134 8/1/82		EE 135 8/1/82		EF 136 8/1/82		EG 137 8/1/82		EH 138 8/1/82		EI 139 8/1/82		EJ 140 8/1/82		EK 141 8/1/82		EL 142 8/1/82		EM 143 8/1/82		EN 144 8/1/82		EO 145 8/1/82		EP 146 8/1/82		EQ 147 8/1/82		ER 148 8/1/82		ES 149 8/1/82		ET 150 8/1/82		EU 151 8/1/82		EV 152 8/1/82		EW 153 8/1/82		EX 154 8/1/82		EY 155 8/1/82		EZ 156 8/1/82		FA 157 8/1/82		FB 158 8/1/82		FC 159 8/1/82		FD 160 8/1/82		FE 161 8/1/82		FF 162 8/1/82		FG 163 8/1/82		FH 164 8/1/82		FI 165 8/1/82		FJ 166 8/1/82		FK 167 8/1/82		FL 168 8/1/82		FM 169 8/1/82		FN 170 8/1/82		FO 171 8/1/82		FP 172 8/1/82		FQ 173 8/1/82		FR 174 8/1/82		FS 175 8/1/82		FT 176 8/1/82		FU 177 8/1/82		FV 178 8/1/82		FW 179 8/1/82		FX 180 8/1/82		FY 181 8/1/82		FZ 182 8/1/82		GA 183 8/1/82		GB 184 8/1/82		GC 185 8/1/82		GD 186 8/1/82		GE 187 8/1/82		GF 188 8/1/82		GG 189 8/1/82		GH 190 8/1/82		GI 191 8/1/82		GJ 192 8/1/82		GK 193 8/1/82		GL 194 8/1/82		GM 195 8/1/82		GN 196 8/1/82		GO 197 8/1/82		GP 198 8/1/82		GQ 199 8/1/82		GR 200 8/1/82		GS 201 8/1/82		GT 202 8/1/82		GU 203 8/1/82		GV 204 8/1/82		GW 205 8/1/82		GX 206 8/1/82		GY 207 8/1/82		GZ 208 8/1/82		HA 209 8/1/82		HB 210 8/1/82		HC 211 8/1/82		HD 212 8/1/82		HE 213 8/1/82		HF 214 8/1/82		HG 215 8/1/82		HH 216 8/1/82		HI 217 8/1/82		HJ 218 8/1/82		HK 219 8/1/82		HL 220 8/1/82		HM 221 8/1/82		HN 222 8/1/82		HO 223 8/1/82		HP 224 8/1/82		HQ 225 8/1/82		HR 226 8/1/82		HS 227 8/1/82		HT 228 8/1/82		HU 229 8/1/82		HV 230 8/1/82		HW 231 8/1/82		HX 232 8/1/82		HY 233 8/1/82		HZ 234 8/1/82		IA 235 8/1/82		IB 236 8/1/82		IC 237 8/1/82		ID 238 8/1/82		IE 239 8/1/82		IF 240 8/1/82		IG 241 8/1/82		IH 242 8/1/82		II 243 8/1/82		IJ 244 8/1/82		IK 245 8/1/82		IL 246 8/1/82		IM 247 8/1/82		IN 248 8/1/82		IO 249 8/1/82		IP 250 8/1/82		IQ 251 8/1/82		IR 252 8/1/82		IS 253 8/1/82		IT 254 8/1/82		IU 255 8/1/82		IV 256 8/1/82		IW 257 8/1/82		IX 258 8/1/82		IY 259 8/1/82		IZ 260 8/1/82		JA 261 8/1/82		JB 262 8/1/82		JC 263 8/1/82		JD 264 8/1/82		JE 265 8/1/82		JF 266 8/1/82		JG 267 8/1/82		JH 268 8/1/82		JI 269 8/1/82		JJ 270 8/1/82		JK 271 8/1/82		JL 272 8/1/82		JM 273 8/1/82		JN 274 8/1/82		JO 275 8/1/82		JP 276 8/1/82		JQ 277 8/1/82		JR 278 8/1/82		JS 279 8/1/82		JT 280 8/1/82		JU 281 8/1/82		JV 282 8/1/82		JW 283 8/1/82		JX 284 8/1/82		JY 285 8/1/82		JZ 286 8/1/82		KA 287 8/1/82		KB 288 8/1/82		KC 289 8/1/82		KD 290 8/1/82		KE 291 8/1/82		KF 292 8/1/82		KG 293 8/1/82		KH 294 8/1/82		KI 295 8/1/82		KJ 296 8/1/82		KK 297 8/1/82		KL 298 8/1/82		KM 299 8/1/82		KN 300 8/1/82		KO 301 8/1/82		KP 302 8/1/82		KQ 303 8/1/82		KR 304 8/1/82		KS 305 8/1/82		KT 306 8/1/82		KU 307 8/1/82		KV 308 8/1/82		KW 309 8/1/82		KX 310 8/1/82		KY 311 8/1/82		KZ 312 8/1/82		LA 313 8/1/82		LB 314 8/1/82		LC 315 8/1/82		LD 316 8/1/82		LE 317 8/1/82		LF 318 8/1/82		LG 319 8/1/82		LH 320 8/1/82		LI 321 8/1/82		LJ 322 8/1/82		LK 323 8/1/82		LL 324 8/1/82		LM 325 8/1/82		LN 326 8/1/82		LO 327 8/1/82		LP 328 8/1/82		LQ 329 8/1/82		LR 330 8/1/82		LS 331 8/1/82		LT 332 8/1/82		LU 333 8/1/82		LV 334 8/1/82		LW 335 8/1/82		LX 336 8/1/82		LY 337 8/1/82		LZ 338 8/1/82		MA 339 8/1/82		MB 340 8/1/82		MC 341 8/1/82		MD 342 8/1/82		ME 343 8/1/82		MF 344 8/1/82		MG 345 8/1/82		MH 346 8/1/82		MI 347 8/1/82		MJ 348 8/1/82		MK 349 8/1/82		ML 350 8/1/82		MM 351 8/1/82		MN 352 8/1/82		MO 353 8/1/82		MP 354 8/1/82		MQ 355 8/1/82		MR 356 8/1/82		MS 357 8/1/82		MT 358 8/1/82		MU 359 8/1/82		MV 360 8/1/82		MW 361 8/1/82		MX 362 8/1/82		MY 363 8/1/82		MZ 364 8/1/82		NA 365 8/1/82		NB 366 8/1/82		NC 367 8/1/82		ND 368 8/1/82		NE 369 8/1/82		NF 370 8/1/82		NG 371 8/1/82		NH 372 8/1/82		NI 373 8/1/82		NJ 374 8/1/82		NK 375 8/1/82		NL 376 8/1/82		NM 377 8/1/82		NO 378 8/1/82		NP 379 8/1/82		NQ 380 8/1/82		NR 381 8/1/82		NS 382 8/1/82		NT 383 8/1/82		NU 384 8/1/82		NV 385 8/1/82		NW 386 8/1/82		NX 387 8/1/82		NY 388 8/1/82		NZ 389 8/1/82		OA 390 8/1/82		OB 391 8/1/82		OC 392 8/1/82		OD 393 8/1/82		OE 394 8/1/82		OF 395 8/1/82		OG 396 8/1/82		OH 397 8/1/82		OI 398 8/1/82		OJ 399 8/1/82		OK 400 8/1/82		OL 401 8/1/82		OM 402 8/1/82		ON 403 8/1/82		OO 404 8/1/82		OP 405 8/1/82		OQ 406 8/1/82		OR 407 8/1/82		OS 408 8/1/82		OT 409 8/1/82		OU 410 8/1/82		OV 411 8/1/82		OW 412 8/1/82		OX 413 8/1/82		OY 414 8/1/82		OZ 415 8/1/82		PA 416 8/1/82		PB 417 8/1/82		PC 418 8/1/82		PD 419 8/1/82		PE 420 8/1/82		PF 421 8/1/82		PG 422 8/1/82		PH 423 8/1/82		PI 424 8/1/82		PJ 425 8/1/82		PK 426 8/1/82		PL 427 8/1/82		PM 428 8/1/82		PN 429 8/1/82		PO 430 8/1/82		PP 431 8/1/82		PQ 432 8/1/82		PR 433 8/1/82		PS 434 8/1/82		PT 435 8/1/82		PU 436 8/1/82		PV 437 8/1/82		PW 438 8/1/82		PX 439 8/1/82		PY 440 8/1/82		PZ 441 8/1/82		QA 442 8/1/82		QB 443 8/1/82		QC 444 8/1/82		QD 445 8/1/82		QE 446 8/1/82		QF 447 8/1/82		QG 448 8/1/82		QH 449 8/1/82		QI 450 8/1/82		QJ 451 8/1/82		QK 452 8/1/82		QL 453 8/1/82		QM 454 8/1/82		QN 455 8/1/82		QO 456 8/1/82		QP 457 8/1/82		QQ 458 8/1/82		QR 459 8/1/82		QS 460 8/1/82		QT 461 8/1/82		QU 462 8/1/82		QV 463 8/1/82		QW 464 8/1/82		QX 465 8/1/82		QY 466 8/1/82		QZ 467 8/1/82		RA 468 8/1/82		RB 469 8/1/82		RC 470 8/1/82		RD 471 8/1/82		RE 472 8/1/82		RF 473 8/1/82		RG 474 8/1/82		RH 475 8/1/82		RI 476 8/1/82		RJ 477 8/1/82		RK 478 8/1/82		RL 479 8/1/82		RM 480 8/1/82		RN 481 8/1/82		RO 482 8/1/82		RP 483 8/1/82		RQ 484 8/1/82		RR 485 8/1/82		RS 486 8/1/82		RT 487 8/1/82		RU 488 8/1/82		RV 489 8/1/82		RW 490 8/1/82		RX 491 8/1/82		RY 492 8/1/82		RZ 493 8/1/82		SA 494 8/1/82		SB 495 8/1/82		SC 496 8/1/82		SD 497 8/1/82		SE 498 8/1/82		SF 499 8/1/82		SG 500 8/1/82		SH 501 8/1/82		SI 502 8/1/82		SJ 503 8/1/82		SK 504 8/1/82		SL 505 8/1/82		SM 506 8/1/82		SN 507 8/1/82		SO 508 8/1/82		SP 509 8/1/82		SQ 510 8/1/82		SR 511 8/1/82		SS 512 8/1/82		ST 513 8/1/82		SU 514 8/1/82		SV 515 8/1/82		SW 516 8/1/82		SX 517 8/1/82		SY 518 8/1/82		SZ 519 8/1/82		TA 520 8/1/82		TB 521 8/1/82		TC 522 8/1/82		TD 523 8/1/82		TE 524 8/1/82		TF 525 8/1/82		TG 526 8/1/82		TH 527 8/1/82		TI 528 8/1/82		TJ 529 8/1/82		TK 530 8/1/82		TL 531 8/1/82		TM 532 8/1/82		TN 533 8/1/82		TO 534 8/1/82		TP 535 8/1/82		TQ 536 8/1/82		TR 537 8/1/82		TS 538 8/1/82		TU 539 8/1/82		TV 540 8/1/82		TW 541 8/1/82		TX 542 8/1/82		TY 543 8/1/82		TZ 544 8/1/82		UA 545 8/1/82		UB 546 8/1/82		UC 547 8/1/82		UD 548 8/1/82		UE 549 8/1/82		UF 550 8/1/82		UG 551 8/1/82		UH 552 8/1/82		UI 553 8/1/8	
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HRSG

o Exchange With Gasifier

– Steam and water from the combined cycle plant to the fuel plant:

Steam flow of 26,600 lb/hr at 78.1 psia, 312.4°F
Steam flow of 18,500 lb/hr at 84.0 psia, 654.6°F
Steam flow of 14,300 lb/hr at 394.1 psia, 443.2°F
Water flow of 715,800 lb/hr at 250.0 psia, 108.5°F
Water flow of 27,200 lb/hr at 250.0 psia, 315.0°F
Water flow of 515,200 lb/hr at 2015 psia, 593.2°F
Water flow of 11,200 lb/hr at 415 psia, 418.3°F

– Steam and water from the fuel plant to the combined cycle plant:

Steam flow of 515,200 lb/hr at 1650 psia, 609.6°F
Water flow of 715,800 lb/hr at 230 psia, 207.2°F
Water flow of 87,900 lb/hr at 230 psia, 287.1°F
Makeup flow

o Supplier Proposals (3) In Final Evaluation Stage

o Shipment March 1995

STEAM TURBINE

- o Conventional Double Flow Reheat Design; Down Exhaust**

- o Change From 30" LSB To 26" LSB**
 - Significant Cost Reduction
 - Improved Performance At 90°F Ambient
 - 785 KW output increase
 - 13 BTU/KW-HR decrease

- o Shipment March 1995**

MS7001F GAS TURBINE

FIELD EXPERIENCE DESIGN IMPROVEMENTS

Description	Plan	Status
o Combustion liner seal loosen; weld quality	Requalify weld process; revise weld design	Implemented
o Combustor fuel nozzles coke on oil; face cracking	Redesign fuel nozzle tip	Installed on operating units; awaiting results; implemented on new units
o First stage nozzle localized leading edge oxidation	Improved cooling configuration	Underway New units and retro-fit
o First stage bucket cooling blockage – casting process	100% air flow check at GE and vendor	Test at GE implemented Vendor to start tests
o First Stage bucket coating quality; inadvertent coating removal during post coat cleaning	Improved process/inspection	Eliminated cleaning Studying coating sensitivity
o First stage bucket tip oxidation – trailing edge	Provide trailing edge cooling – redesign exit channel	Design concept validated New tooling in place
o Second stage air ejector comes loose	Fix in short term Permanent redesign	Short term set screw stacking in place Redesign underway
o Second stage nozzle creep found	Replace FSX-414 material with GTD-222	Implemented

MS7001F GAS TURBINE

PRODUCT ELEMENTS

- o 18 Stage Axial Flow Compressor**
- o 3 Stage Turbine**
- o 2300°F Firing Temperature**
- o Multi-Nozzle Standard Combustor**
- o Packaged Accessory Modules**
- o Shipment April 1994**

GE ENGINEERED EQUIPMENT PACKAGE DESCRIPTION

- o MS7001F Gas Turbine 192 MW Nom. (Gross)**
 - Packaged Design
 - H₂ Cooled Generator
 - Nitrogen Diluent on Syngas
 - Water Injection on Distillate
- o Double Flow Reheat Steam Turbine 124 MW Nom. (Gross)**
 - 1450 psig/1000°F/1000°F
 - H₂ Cooled Generator
 - 26 Inch LSB
- o Heat Recovery Steam Generator (HRSG)**
 - 3 Pressure Level
 - Integral Deaerator
 - Reheater
- o Power Plant Engineering**
 - Define Power Island Auxiliary Equipment
 - Define Power Island Controls For Integration Into IGCC Plant Controls

UPCOMING MILESTONES

- GEESI Contract
- A/E Start Work
- Environmental Sufficiency
- EIS Implementation Plan
- Detailed Syngas Cooler Design
- Detailed ASU Design
- Industry Progress
 - Shell
 - Destec
 - Europe
 - China
- Testing Program

MAJOR ISSUES TO RESOLVE

- 1 -vs- 2 Gasifiers
- Shipment of Syngas Coolers
- "Over The Fence" Oxygen Supply
- Sale of CO₂
- Potential Methanol - Cool Water Arrangement
- Hot Gas Clean-Up Detailed Design
- MOU
- Truck Coal

APPROVED FOR RELEASE OR
PUBLICATION, METC PATENT
ADVISOR

By L. J. Jarr Date 8/13/83

January 5, 1993

Nelson F. Rekos, Jr.
U.S. Department of Energy
Morgantown, WV 26507-0880
P.O. Box 880

RE: Quarterly Report - October - December 1992
Tampa Electric Company - IGCC Project

Dear Nelson:

On November 12, 1992 Tampa Electric Company, TECO Power Services, General Electric, General Electric Environmental Services and Texaco met in Morgantown with the U.S. Department of Energy (DOE) Morgantown Energy Technology Center (METC) project staff. An additional attendee included Tampa Electric's environmental consultant, Environmental Consulting & Technology.

This meeting was the quarterly review meeting for the subject project, for the fourth quarter of 1992, and was intended to provide an overview of the current status of the Tampa Electric IGCC Project. This document and its attachments will also serve as the participant's report for the 4th quarter.

During this meeting project team members from DOE, Tampa Electric, TECO Power Services, General Electric, General Electric Environmental Services, Texaco and Environmental Consulting & Technology introduced their assignees to the project.

The major topics addressed and discussed at the meeting were:

- 1) Overview of the project progress.
- 2) Project description: MW, Heat Rate, Emissions, by products and cycle optimization studies.
- 3) Construction approach to the project.
- 4) Project Team arrangement.
- 5) Project cost and schedule.
- 6) Current status of the project as it relates to Tampa Electric Company.

- 7) Regulatory update.
- 8) Tampa Electric Company's engineering involvement related to preliminary engineering and preparing A/E scope of work.
- 9) Environmental update.
- 10) Gasification process overview.
- 11) License agreement update.
- 12) Industrial Waste Water design philosophy.
- 13) Optimization study results.
- 14) Hot Gas Clean Up system update.
- 15) Combustion Turbine component installation, rating and testing.
- 16) Upcoming events.
- 17) Upcoming Issues.
- 18) Upcoming Technical Milestones

Attached to this Quarterly Project Report are the minutes and handouts from the Quarterly Review Meeting for you information. Should you require additional information or clarification regarding the fourth quarter 1992 review, please advise.

C. R. Black
Project Director

cc: Mr. G.F. Anderson
L.L. Lefler
J.A. Newcomb
D.E. Pless
R.N. Howell
J.T. Duff
File M11.8
File R2.1.2

DATE

FILMED

4/29/94

END