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(CONFIDENTIAL) Hearing Exhibit No. 108 from 2/5/20 DOAH Hearing. [CLK Note: See DN 10935-2019 for Exh Nos. 1, 68-75, 80, 82, 100]

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EXHIBIT NO. 108

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DOCKET NO:	20190001-EI
WITNESS:	Jeffrey Swartz
PARTY:	Duke
DESCRIPTION:	February 13, 2018 MHPS RFP response
DOCUMENTS:	Bates DEF-19FUEL- 002382-2611
PROFFERED BY:	Office of Public Counsel

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MHPS

Upgraded 40" L-0 blade for Bartow

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Nicholas Porteous – Director ST Engineering
Muhammad Riaz – Engineering Manager

Mitsubishi Hitachi Power Systems, LTD
Steam Turbine Engineering Department

13-Feb-2018

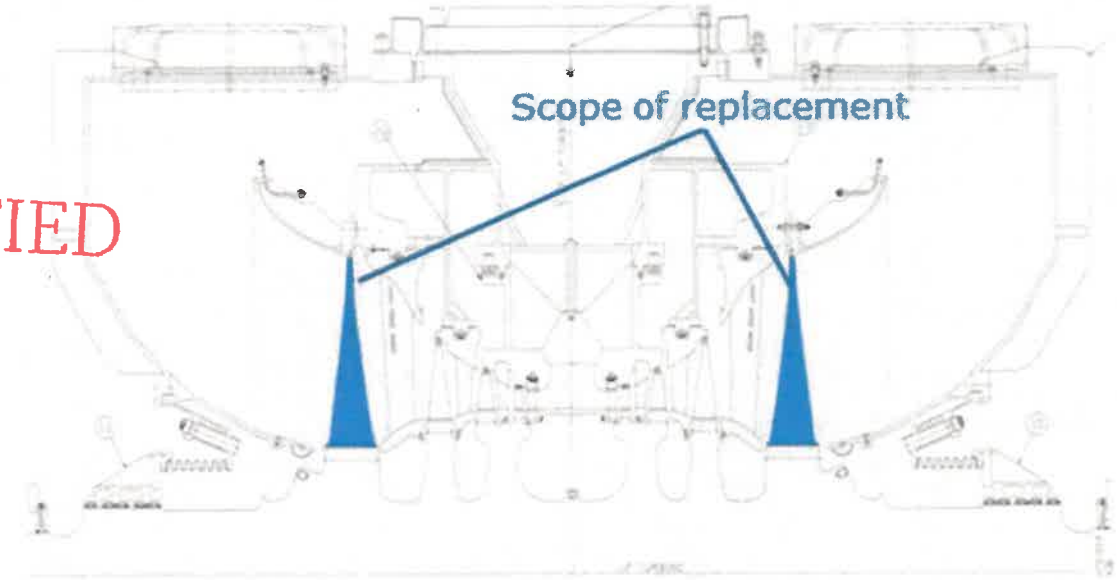
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Scope of Replacement:

- Upgraded 40" LP Last Stage Blades will be provided along with long term monitoring.
- No change in exit conditions from 450MW exit conditions per RFP.

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Bartow LP Turbine

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Agenda

1. Executive summary
2. RCA Summary of 40" L-0 Blade
3. Design Description of Upgraded 40" L-0 Blade
4. Tolerance and Quality control of Shroud and Stub Gap
5. Verification Test and Long-term Monitoring
6. Future Schedule

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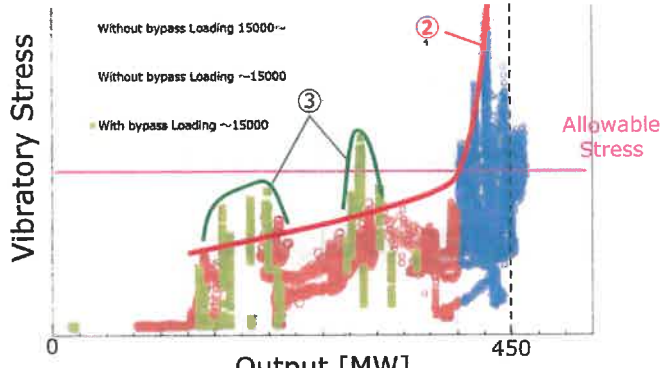
1. Executive Summary

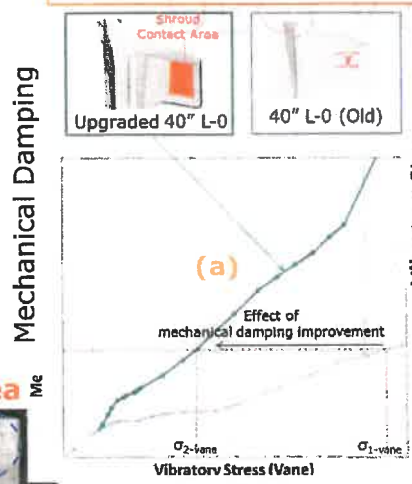
Root Cause of High Vibration

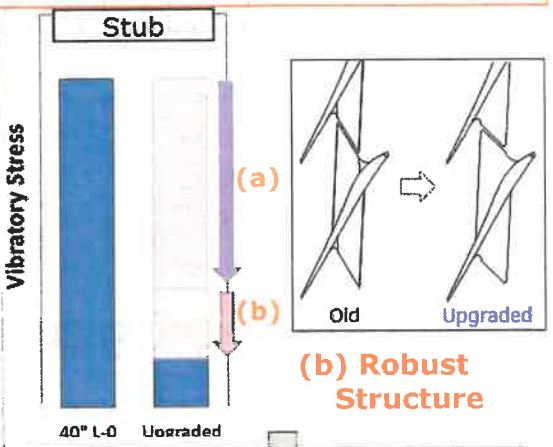
① **Low Mechanical Damping** due to small contact area of integral shroud
② **Higher Dynamic Load** to cause unstable aerodynamic damping
③ **Bypass Operation** in a specific condition to increase the blade response

Upgraded Blade Design

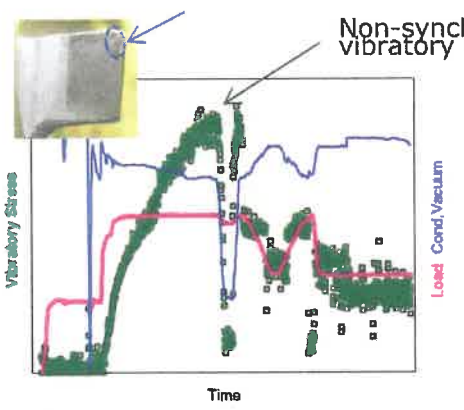
a) **High Mechanical Damping** Large Contact Area of shroud for higher mechanical damping
b) **Lower Dynamic Response** Robust Structure of Vane, Integral Shroud and Mid Span Stub to endure the higher dynamic load
c) **Blade Vibration Monitoring** to ensure no high blade response exists under any operating condition.



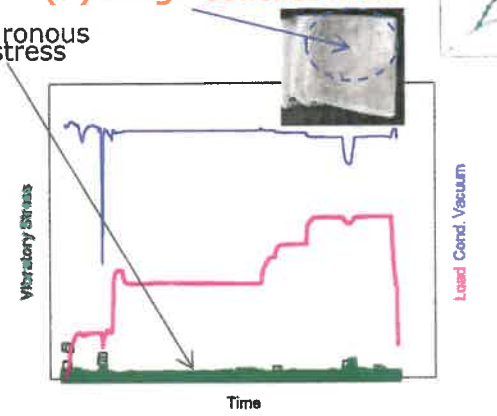


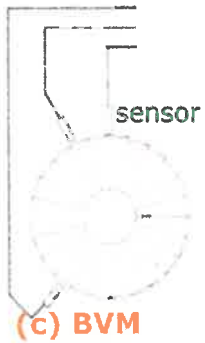


① **Small contact area**

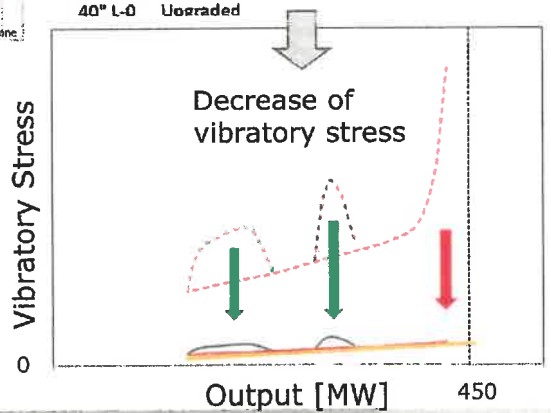


(a) **Large contact area**





(c) **BVM**



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2. RCA Summary

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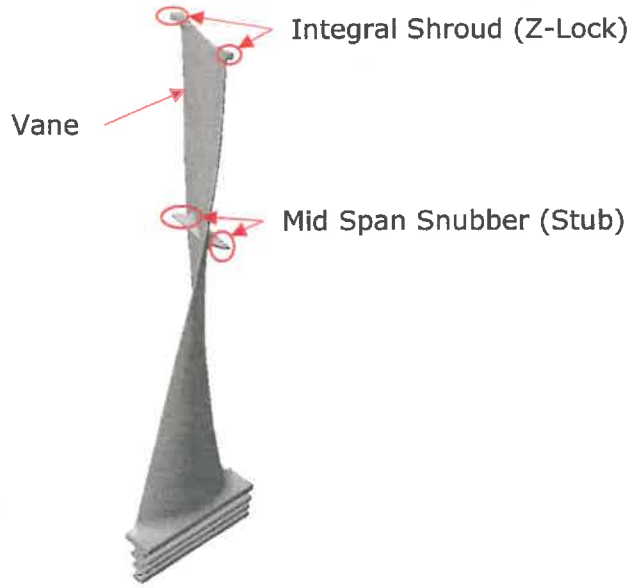
Damage Mechanism

Blade damage occurs when : **Stress > Material Capability**

- Stress comes from Dynamic Loads superimposed on the steady state loads (Centrifugal + Steam Bending Loads).
- Limiting stress locations for 40" L-0 Blade :

  1) Mid Span Snubber
  2) Integral Shroud
  3) Vane HCF

- Dynamic Stresses are controlled by avoiding resonant operating conditions where the blade response frequency matches frequency of the stimulus, and ensuring adequate damping.



Root Cause Analysis has identified all blade damage from Period1 thru Period5 as Dynamic Loads from Non-Synchronous Self Excited Vibration. (Flutter)

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Influencing Factor of Flutter

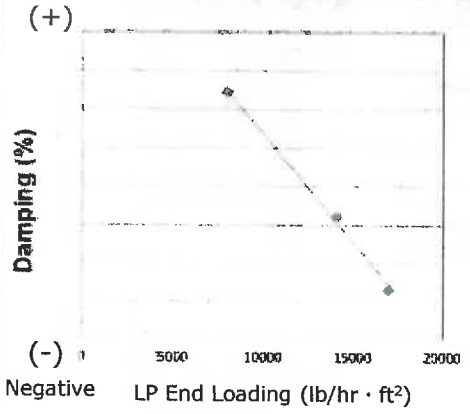
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- Vibratory stress caused by Flutter would be defined by Dynamic Load, Aerodynamic Damping and Mechanical Damping.

Blade Response = Fn (Dynamic Load , Aerodynamic Damping , Mechanical Damping)

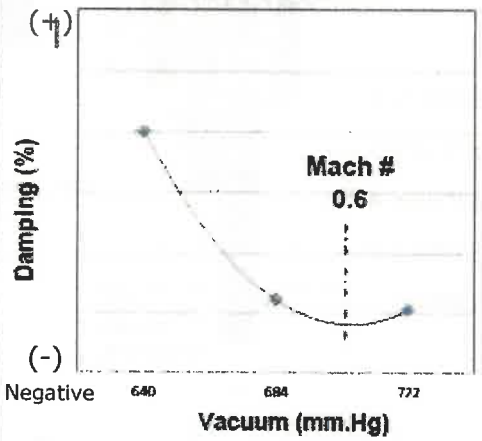
Analytical results of damping below show trends, but the magnitude of blade response is established empirically from the telemetry test conducted at the start of period 3

Aerodynamic Damping as Fn of LP End Loading



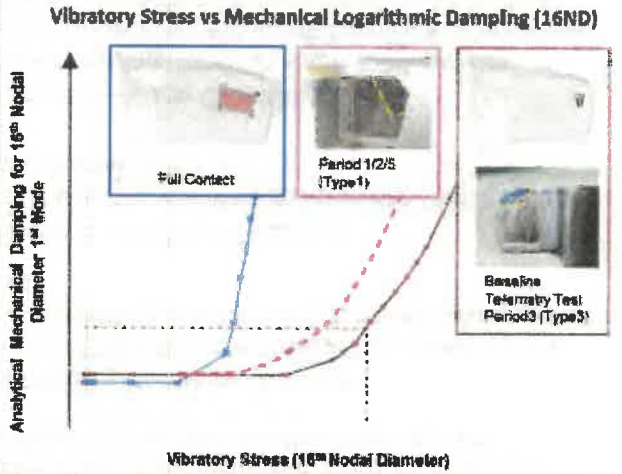
- Aerodynamic damping decreases with higher LP End Loading

Aerodynamic Damping as Fn of Vacuum



- Minimum aerodynamic damping at Mach# = 0.6

Mechanical Damping as Fn of Contact Area and Vibratory stress



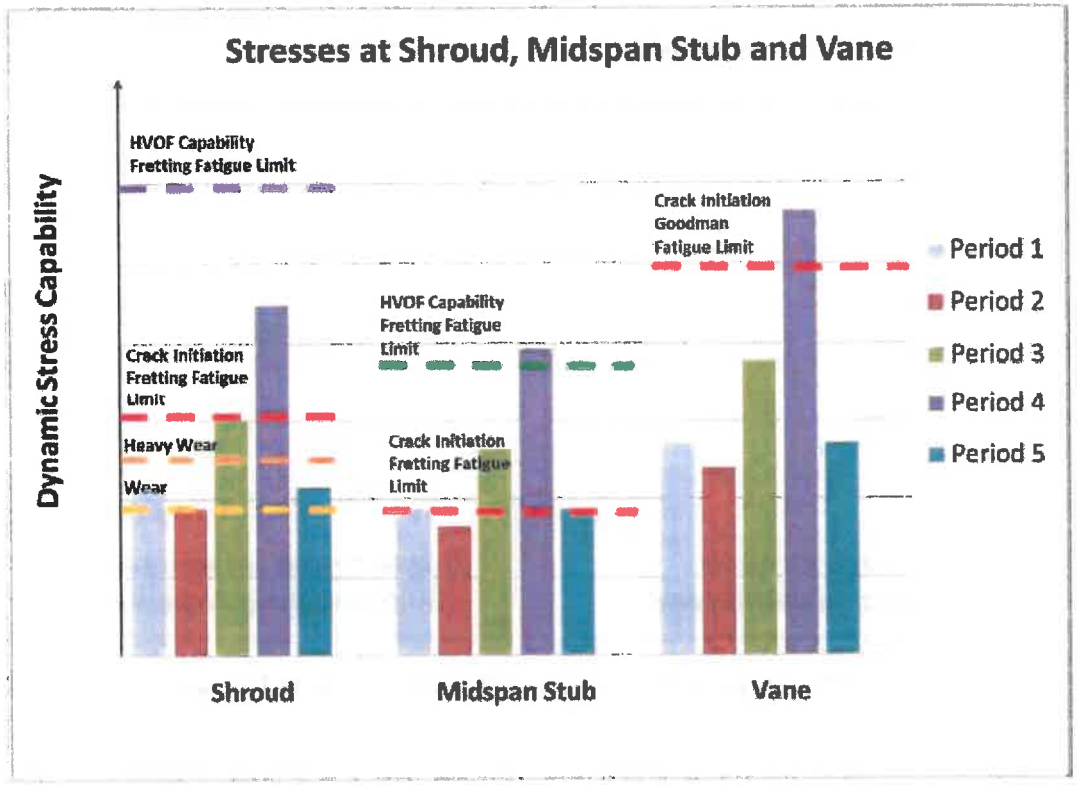
- Mechanical damping decreases with smaller contact area

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Stress Summary



- **Period 1 – Mid Span Stub Cracking**

High LP Loading but increased mechanical damping from Type 1 blade over baseline telemetry test

- **Period 2 – No Major Damage**

Reduced LP Loading over Period 1, reduced bypass operation loading over period 5, light wear observed on shroud

- **Period 3 – Shroud Cracking**

High LP Loading identified in Telemetry Test. Mid Span Stub protected by HVOF

- **Period 4 – Vane Cracking**

Reduced Loading. Application of HVOF reduces mechanical damping increasing amplitude of response. With HVOF protecting Shroud and Stub, the limiting location becomes the Vane

- **Period 5 – Mid Span Stub Cracking**

Reduced Loading with longer periods of bypass operation at High Mach Number over Period 2. No HVOF Protection

Damage observed in all 5 Periods of operation is consistent Blade Response vs Capability Model

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RCA Summary

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Period	Operating Time	Blade Type	Loading	Aerodynamic Damping	Mechanical Damping	Root Cause
Period 1	2009 - 2012	Type 1 (No HVOF)	>2400 hrs with high loading High Load Bypass Operation (4th GT)	Baseline Response Assumed	Baseline Response Assumed	Operation beyond design limit of 15,000#/hr/ft^2. Mechanical damping improves with contact surface wear over time reducing rate of damage.
Period 2	2012 - 2014	Type 1 (No HVOF)	~1hr with high loading High Load Bypass Operation (4th GT)	Baseline Response Assumed	Baseline Response Assumed	No significant damage observed
Period 3	Dec 2014 – Apr 2016	HVOF Midspan Type 3	169 hrs Operation in avoidance zone High Load Bypass Operation (4th GT)	Baseline Response	Baseline Response	Operation 169 hrs in avoidance zone Mid Span protected by HVOF resulting in no Damage from Bypass Operation
Period 4	Jun 2016 – Oct 2016	HVOF Midspan + HVOF Shroud Type 3	69 min Operation in avoidance zone High Load Bypass Operation (4th GT)	Baseline Response Assumed	HVOF reduces contact area and reduces mechanical damping	Low mechanical damping from application of HVOF increased magnitude of blade response above telemetry test levels. No Bypass Operation at high loading / Mach #
Period 5	Dec 2016 – Feb 2017	Type 1 (No HVOF)	No operation in avoidance zone. Increased time with High Load Bypass Operation (4th GT) Bypass Water Hammer Event	Baseline Response Assumed	Baseline Response Assumed	Blending GT C or D as 4th GT at high load 4on1 Configuration is creating higher blade loading than fleet experience Vibration events from the bypass are not showing a blade response. Impact of water hammer event on blade is not confirmed.

Based on the root cause summary described in previous pages, MHPS would propose adoption of "Upgraded 40inch L-0 blade" which has features shown in the next page.

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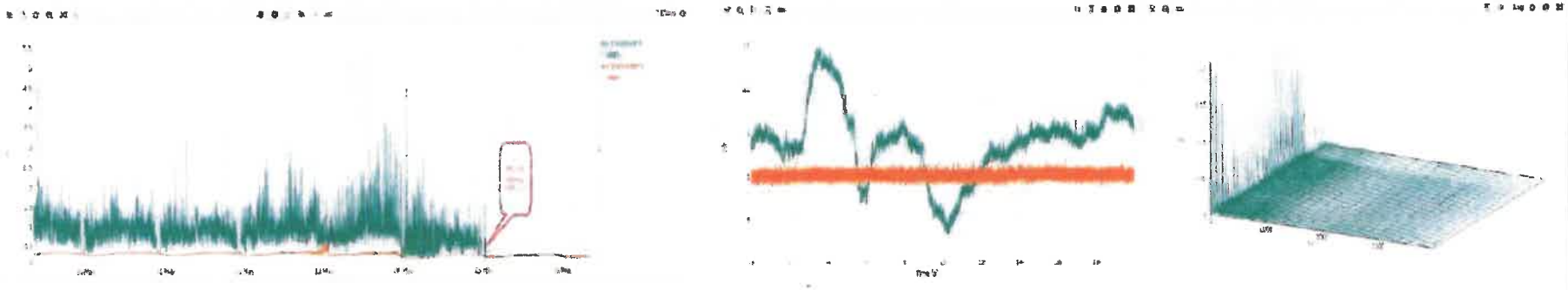
Impact of Hood Sprays

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Does flashing of water droplets from hood sprays or curtain sprays within the steam path or exhaust produce a forced response on the blades?

- Telemetry Test does not show evidence of forced vibration. Blade response is self excited vibration
- Vaporization of attemperation steam droplets has not been identified as a potential source of pressure stimulus to the blades as flashing only occurs when spray water temperature is above saturation temperature (108F @ 2.4in Hg) . Larger droplet evaporate more slowly due to lower surface area.

Dynamic pressure identified associated with Hood Sprays :



Pressure fluctuations did not have high frequency content, and identified pressure rising from 2.5" Hg to atmospheric pressure. No corresponding blade response identified during telemetry test.

Hood Sprays were not identified as causing blade stimulus

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2. Design Description of Upgraded 40” L-0 Blade

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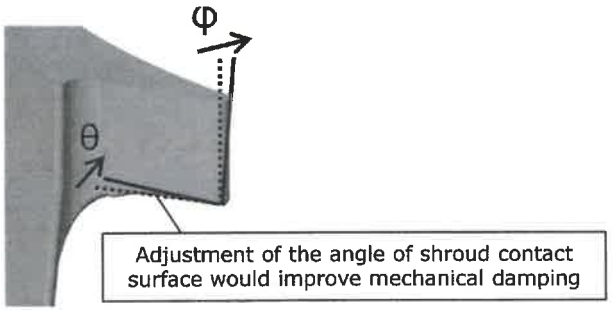
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Features of Upgraded 40" L-0 blade

1) Improvement of mechanical damping

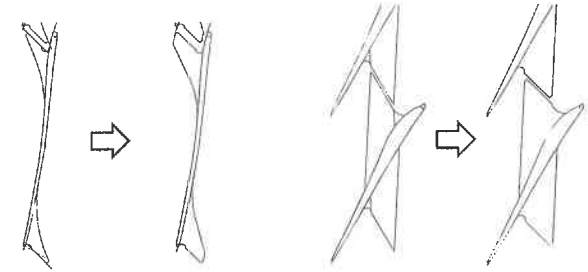
Improvement of mechanical damping would achieve reduction of vibratory stress, even if large excitation force works on the blade.



Shroud contact surface (T.E.)

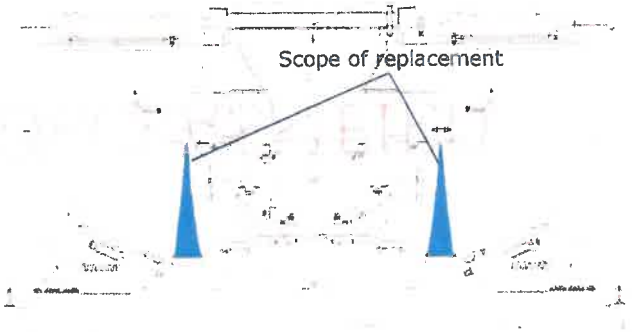
2) Improvement of fretting strength

Based on development material testing as part of RCA, Fretting Design Criteria is updated.
Improvement of fretting strength would be achieved due to upgraded shroud and stub geometry.



3) No need to replace rotor and inner casing

Since upgraded 40" blades could be designed with same height, count, root and groove geometry as original 40" blades, less replacement work is required.



Bartow LP Turbine

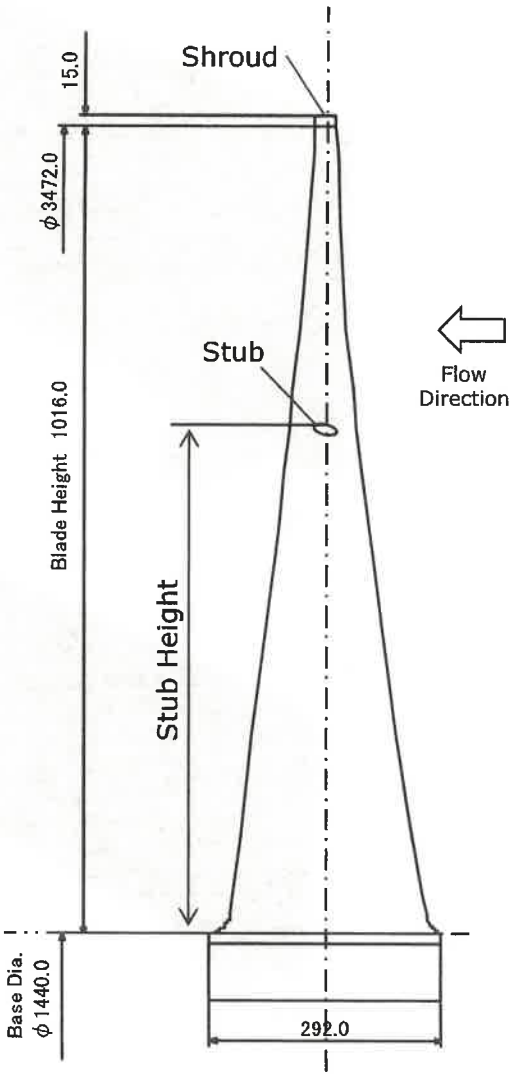
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Specification of Upgraded 40" L-0 blade

	40" L-0 (Original)	Upgraded 40" L-0
Blade Height	1016 mm	Same
Base Dia.	1440 mm	Same
Stub Height	635 mm	620 mm
Annulus Area	7.8 m^2	Same
Root Width	292 mm	Same
Blade count	64	Same
Root Type	Side Entry (Axial)	Same
Material	17-4PH Steel	Same
Shroud Geometry	(Base)	· Upgraded geometry · Angle adjustment of contact surface
Stub Geometry	(Base)	· Upgraded geometry
Profile Geometry	(Base)	· Increase of thickness
Weight	22.2 kg	23.8 kg (+1.6kg)



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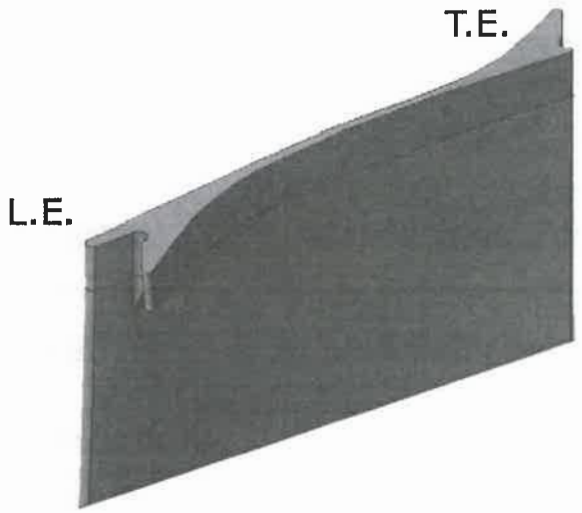
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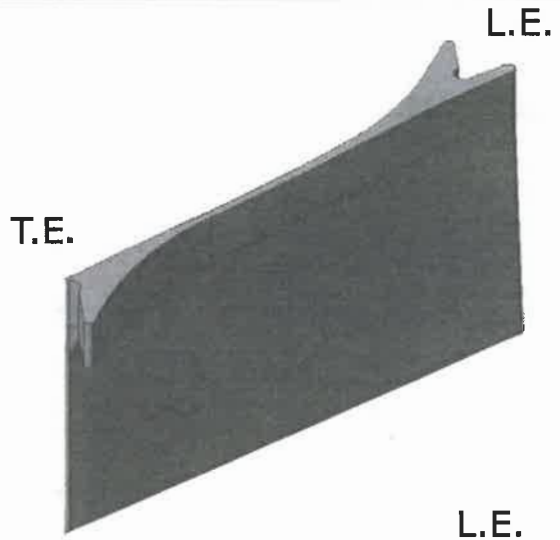
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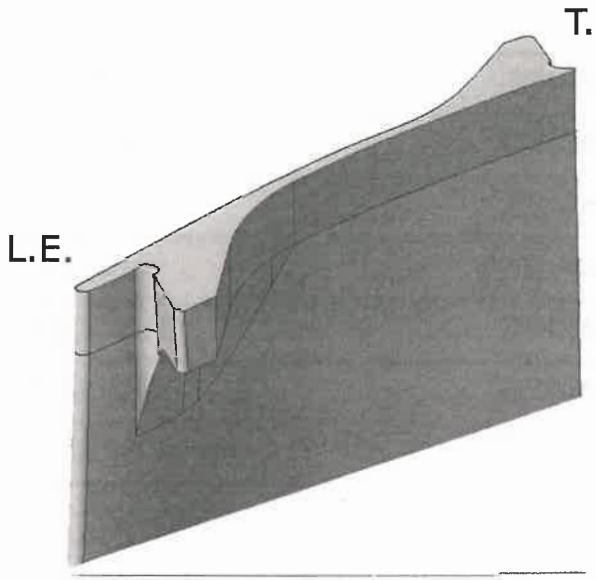
Comparison of Shroud Geometry between Original and Upgraded 40″ L-0 blade

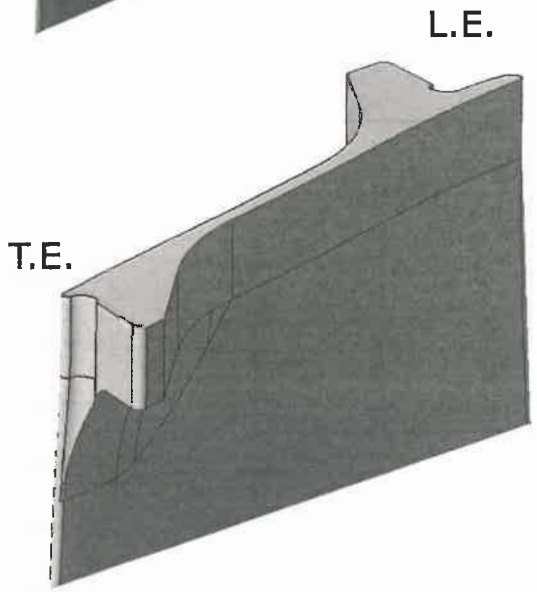
40″ L-0 Original
(Type 1, 3)





Upgraded 40″ L-0





L.E. :Leading Edge

T.E. :Trailing Edge

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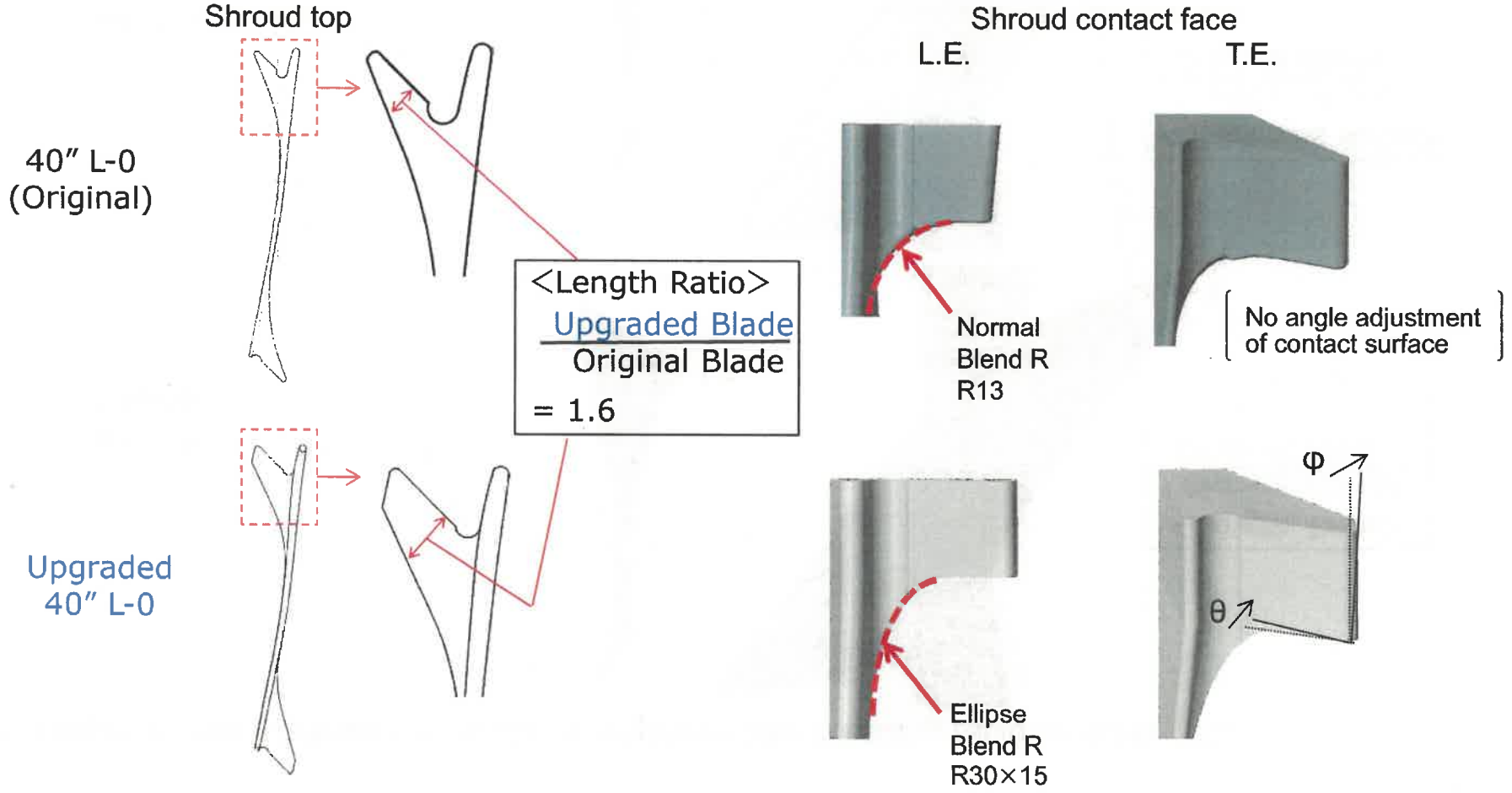
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Modification of Shroud Geometry

➢ Upgrade the stiffness of shroud to improve the fretting fatigue strength.

<Comparison of Original and Upgraded 40″ L-0 blade>



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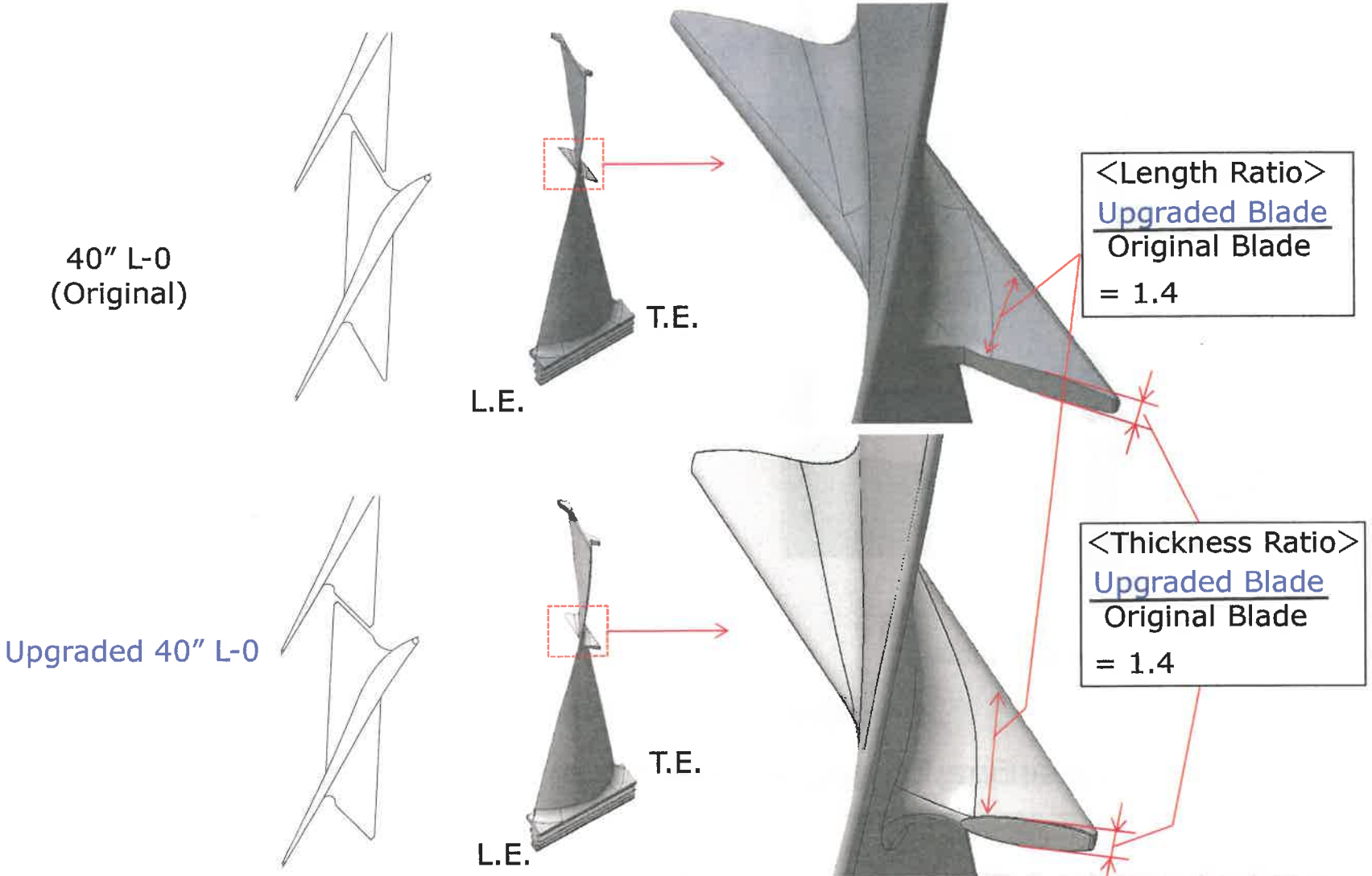
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Comparison of Stub Geometry between Original and Upgraded 40" L-0 blade

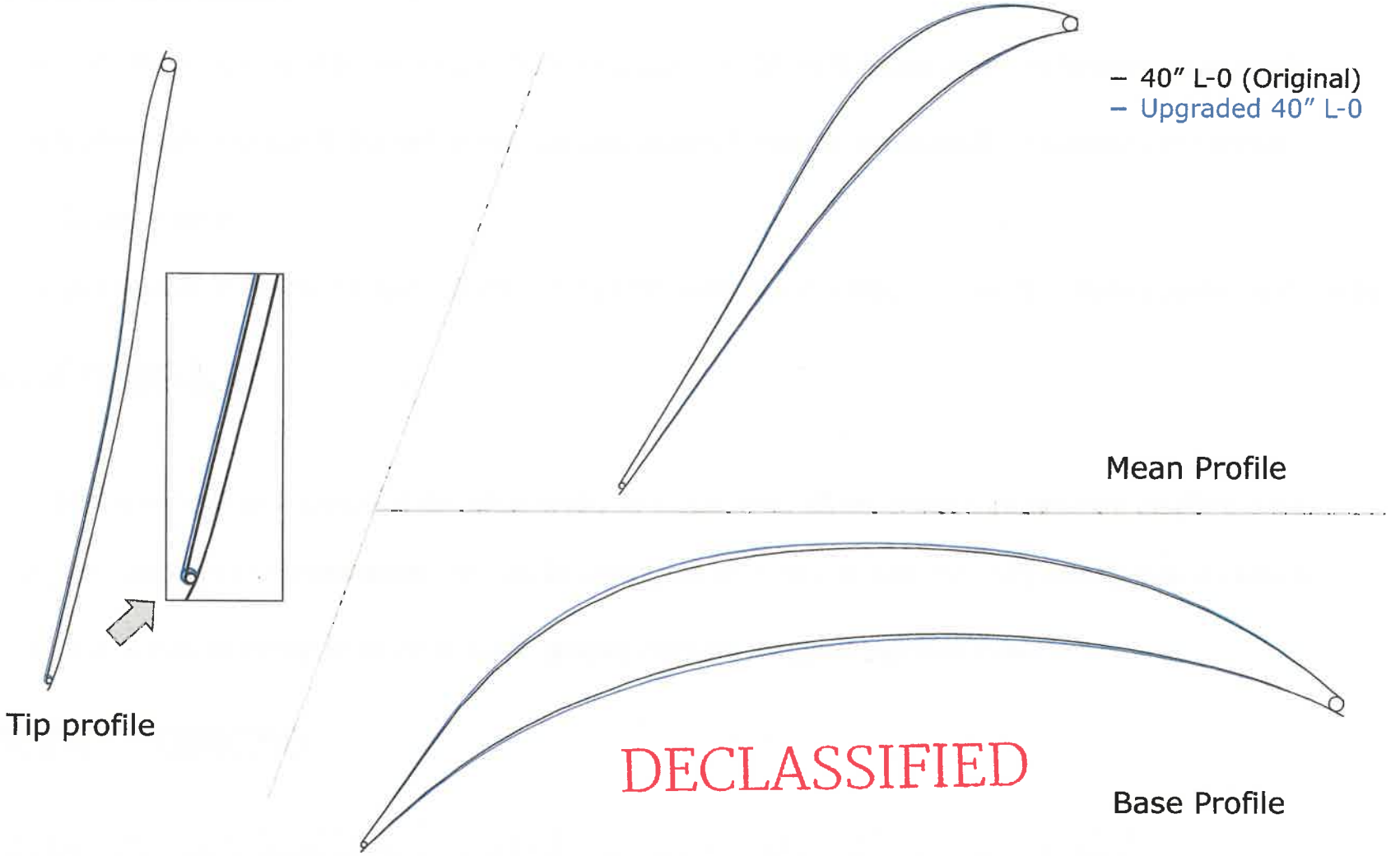
- Upgrade the stiffness of stub to improve the fretting fatigue strength.



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Profile of Upgraded 40" L-0 blade to reduce dynamic response

- Increase the thickness of blade profile with the increase in the centrifugal force of shroud and stub.



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Criterion for Fretting Fatigue of Shrouds and Stubs

Former criterion

- Limits the contact pressure only, based on the fretting fatigue map.
- This criteria is interpreted as the prevention of crack initiation, but small cracks were observed on the contact surface even in unbroken specimens (below the fatigue limit).

New criterion

- Assuming a crack on the contact surface, and the criterion is for the prevention of growth of the crack.
- Allowable vibrating stress given by the criteria varies according to contact pressure.
- The allowable stress also changes with the shape and dimension of shroud and stub.

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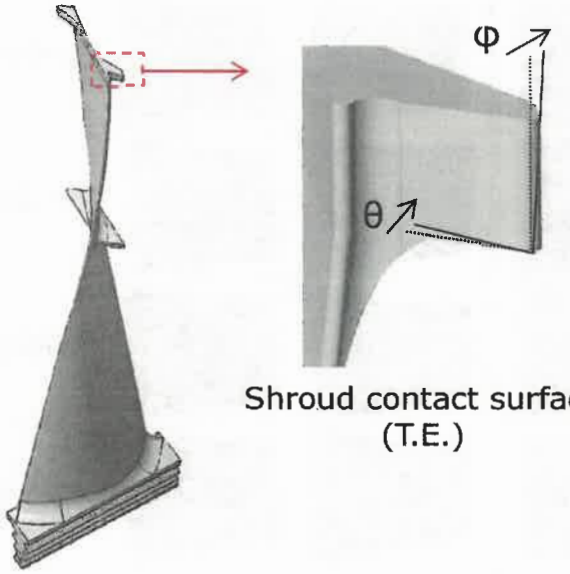
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Enlargement of Shroud Contact Area

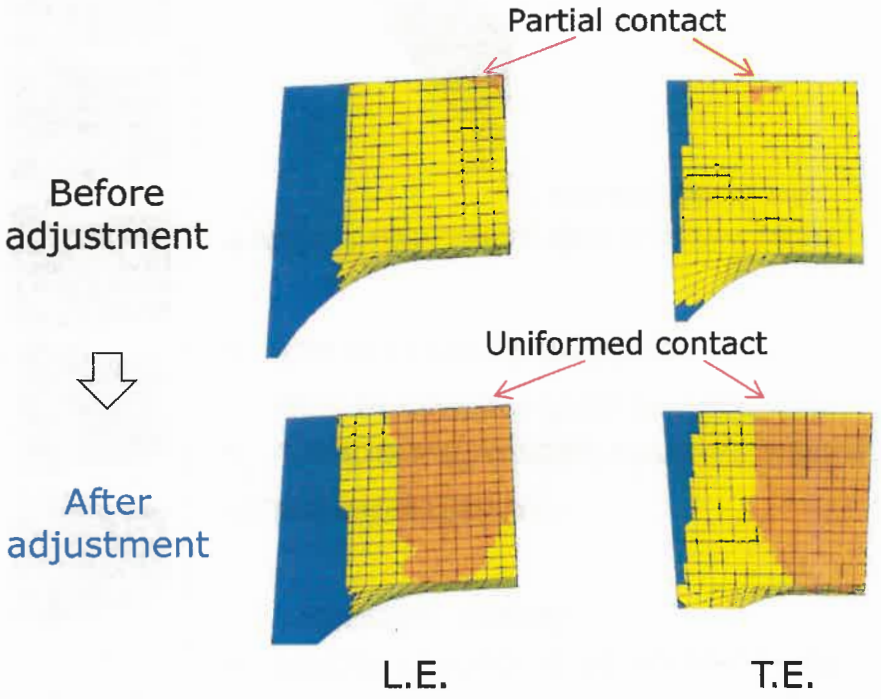
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To Increase the mechanical damping

- Adjust the angle of the shroud contact surface to enlarge contact area by using the latest non-linear numerical analysis method (FEM).
- Optimum Shroud and Stub gaps are designed to control the contact speed and reaction force.



Shroud contact surface
(T.E.)



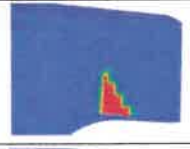
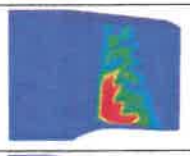
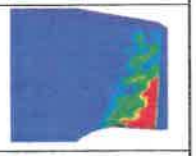
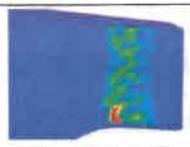
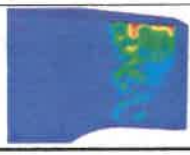
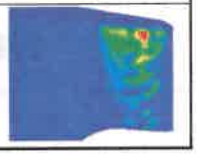
Numerical analysis result of shroud contact condition

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Shroud Contact Condition as a function of Rotational Speed

	40" L-0 (Original)		Upgraded 40" L-0	
	L.E.	T.E	L.E.	T.E.
2400rpm				
2600rpm				
2800rpm				
3000rpm				
3200rpm				
3400rpm				
3600rpm				

< Original Blade>

- Partial contact is observed at all rotational speed.

<Upgraded Blade>

- Location of shroud contact area is inner side of contact face at 2400rpm.
- Full contact at 3600 rpm.

* View of each contact face is shown below.



* Color shows contact pressure as the picture below.



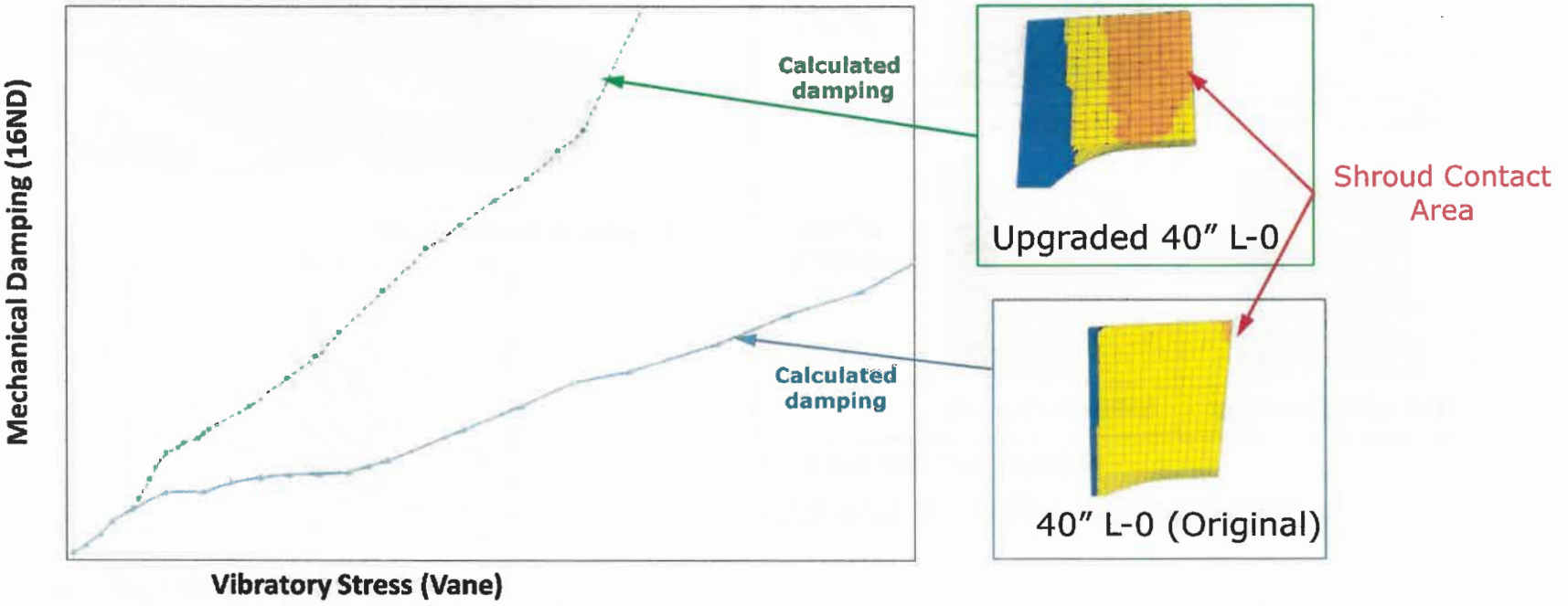
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Prediction of Mechanical Damping

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- Analysis of mechanical damping of 40" Original blade is performed with the method described in the previous page.
- Analysis result is almost same as measured mechanical damping.



Mechanical damping reduces blade vibratory stress for given load

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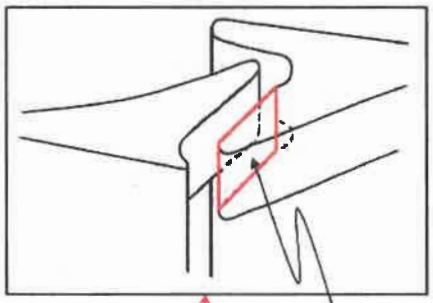
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Improvement of Shroud Contact Condition in Existing L-0 Blade

- Shroud contact condition of exiting blades with and without angle adjustment were verified after high speed balance test was performed in MHPS shop.
- Improvement of shroud contact condition was observed due to adjustment of shroud contact surface.



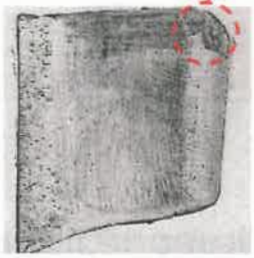
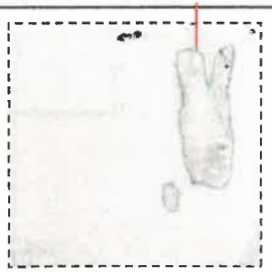
Copy of shroud contact face by replica



Actual LP rotor after high speed balance

<Result of angle adjustment>

- Existing L-0 blade

	No Adjustment	After Adjustment
Analysis Result	 Partial Contact	 Uniformed Contact
Actual Contact Condition (replica)		

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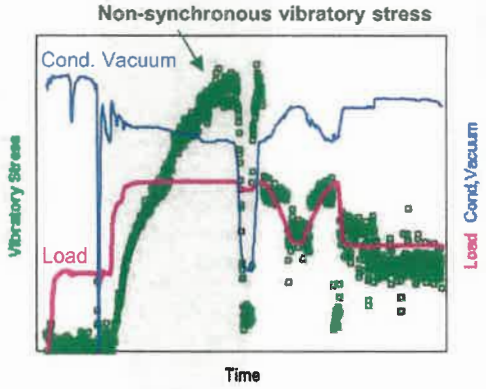
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Experience of Reducing the Non-Synchronous Vibratory Stress

- MHPS has the experience of reducing non-synchronous vibratory stress due to increase in shroud contact area in an actual 50Hz unit.

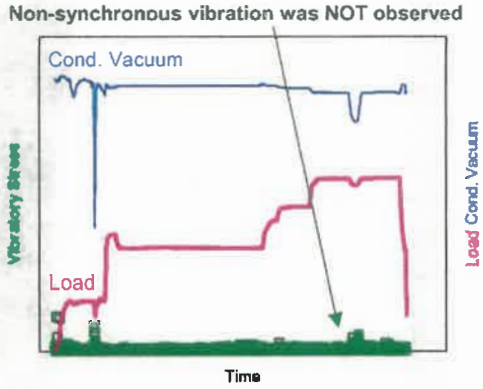
"Small" contact area

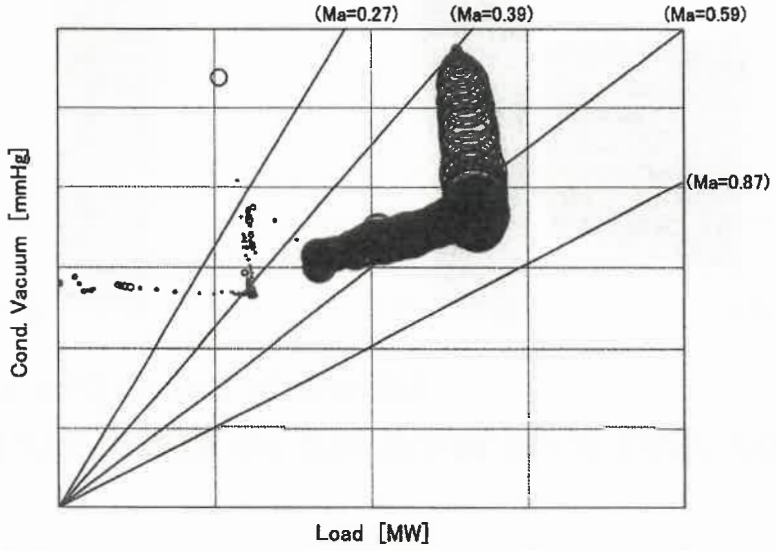


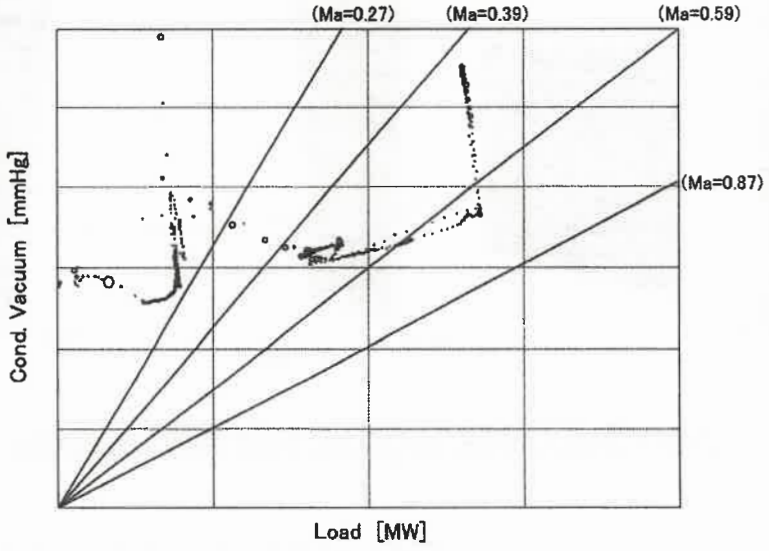


"Large" contact area









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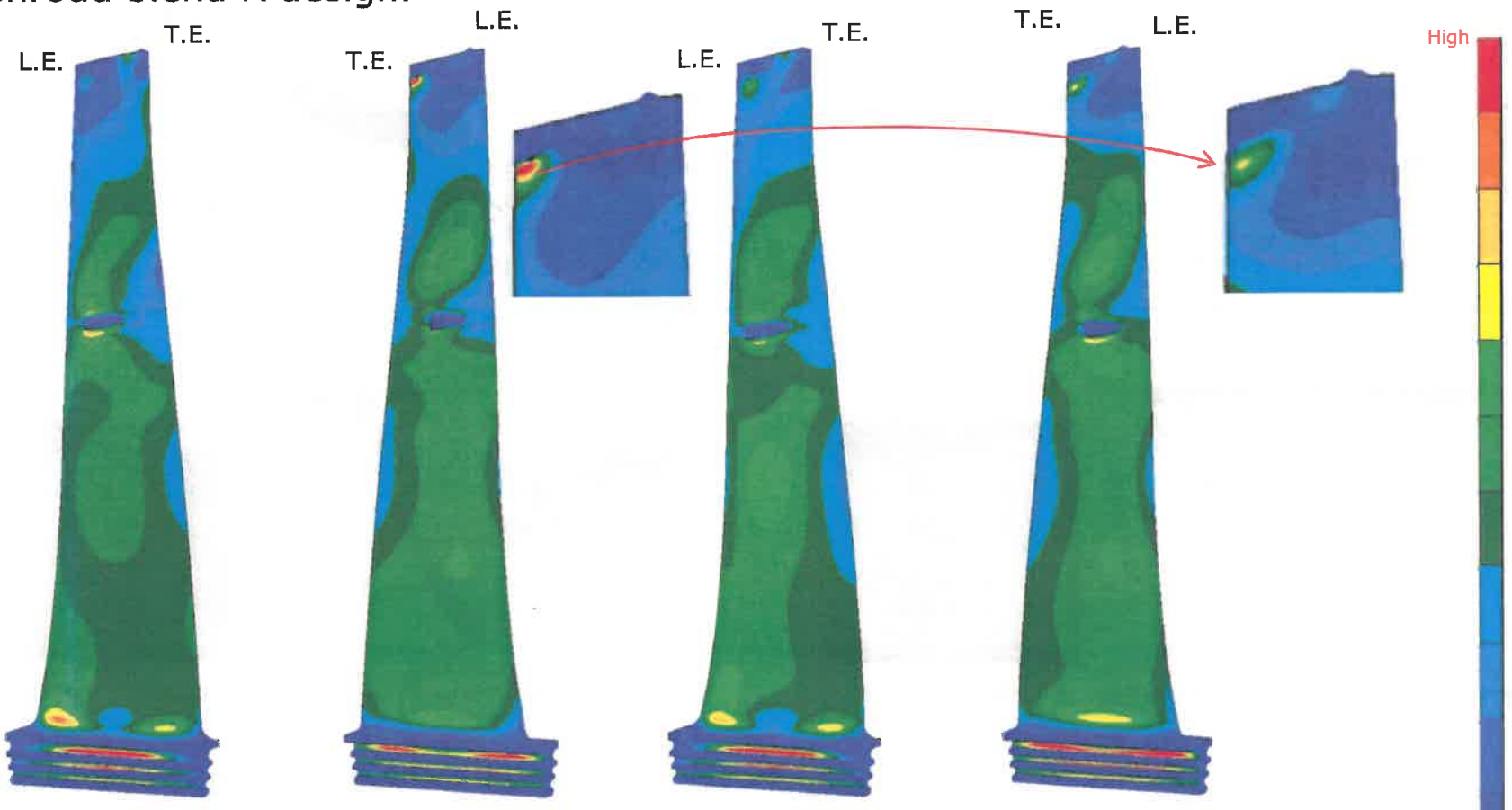
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Reduced centrifugal static stress on the blade tip

- Static stress on the blade tip is reduced by optimizing the profile stacking and shroud blend R design.

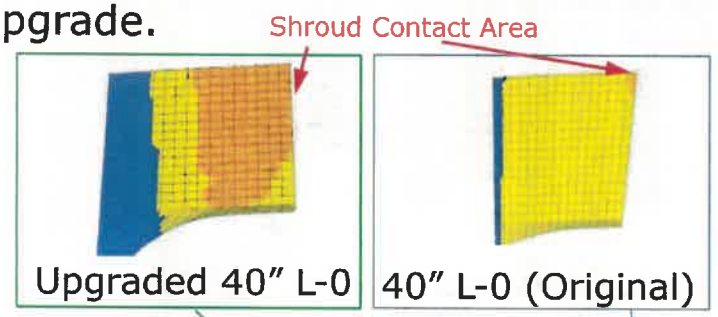


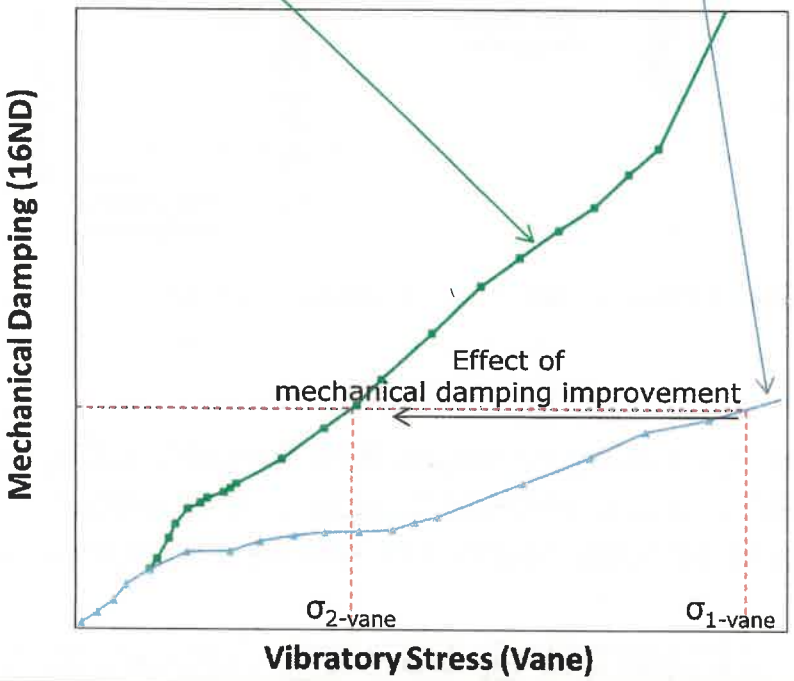
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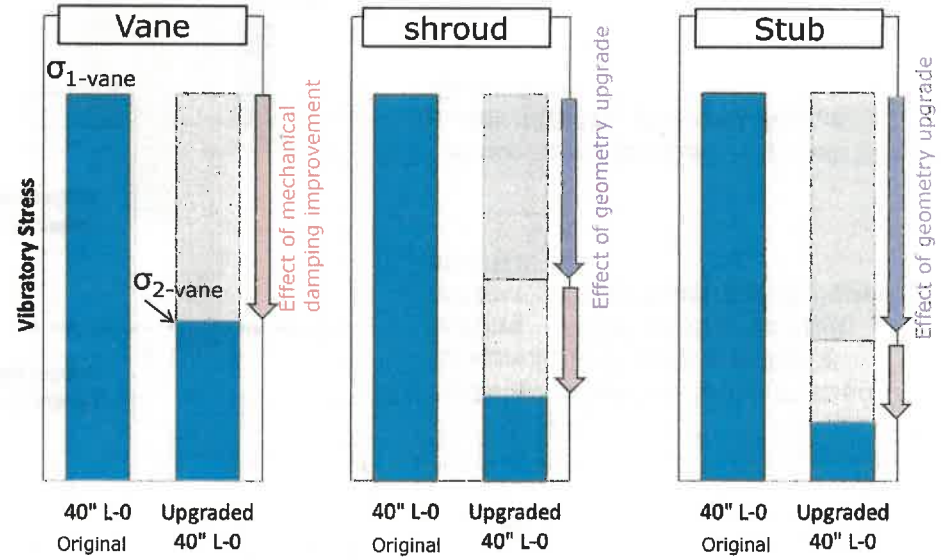
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Vibratory Stress Evaluation of Upgraded Blade

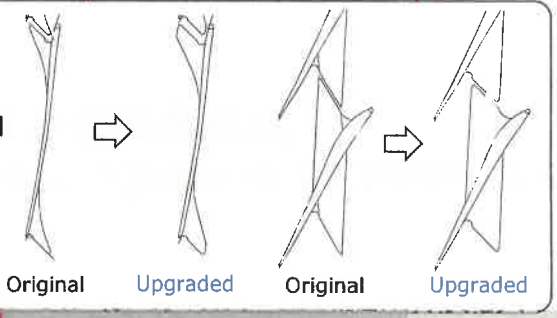
- Upgraded 40" L-0 blade will achieve higher mechanical damping than the original blade due to increase of shroud contact area.
- Furthermore, shroud and stub stress additionally decrease due to geometry upgrade.







Vibratory stress working on shroud and stub would reduced further due to upgraded geometry



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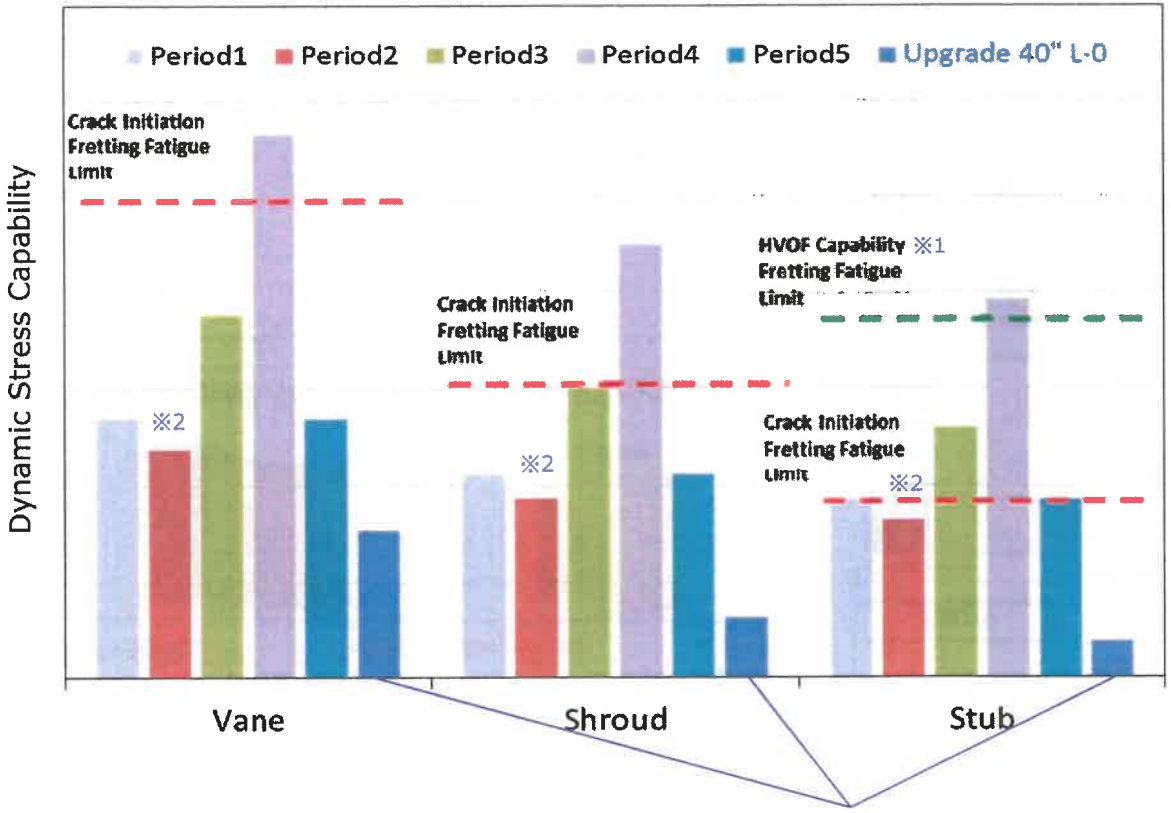
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Vibratory Stress Evaluation

- Vibratory stress on vane, shroud and stub of Upgraded 40" L-0 would be below the criterion of fretting fatigue limit. (Dashed red line shown in the graph)
- High loading operation (450MW) is acceptable.



※1 : Dashed green line show fretting fatigue limit of stub with HVOF coating. (HVOF coating on stub contact surface is applied in Period 3 and 4.)

※2 : Since operation load was restricted under 420MW, stress in Period2 is under limit.

Upgrade 40" L-0

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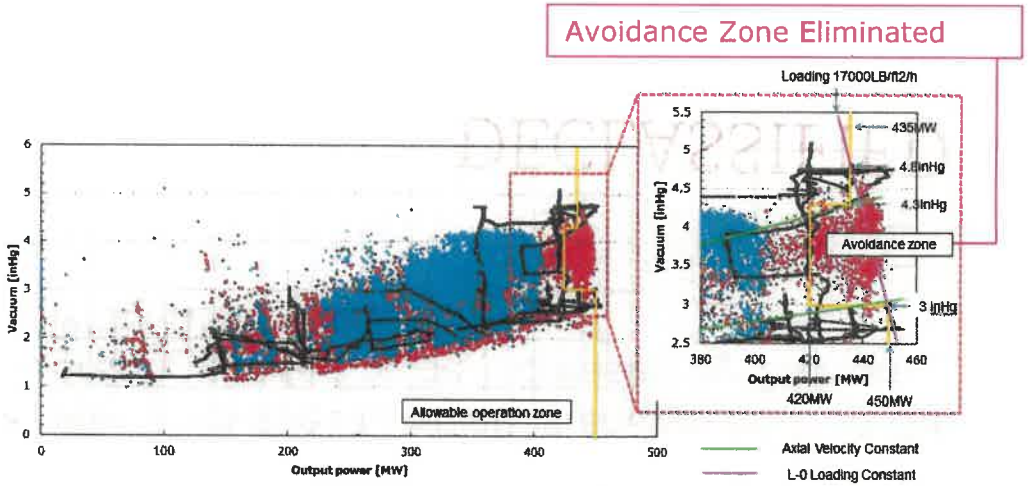
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No Operation Restriction

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1) No Need of an Avoidance Zone

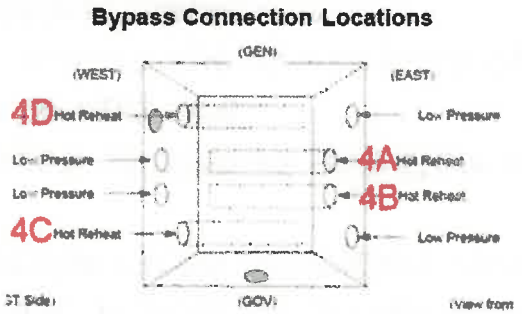
High loading operation can be acceptable due to the improvement of mechanical damping and upgraded stub and shroud geometry.



Telemetry Test in Dec, 2014

2) Bypass Operation

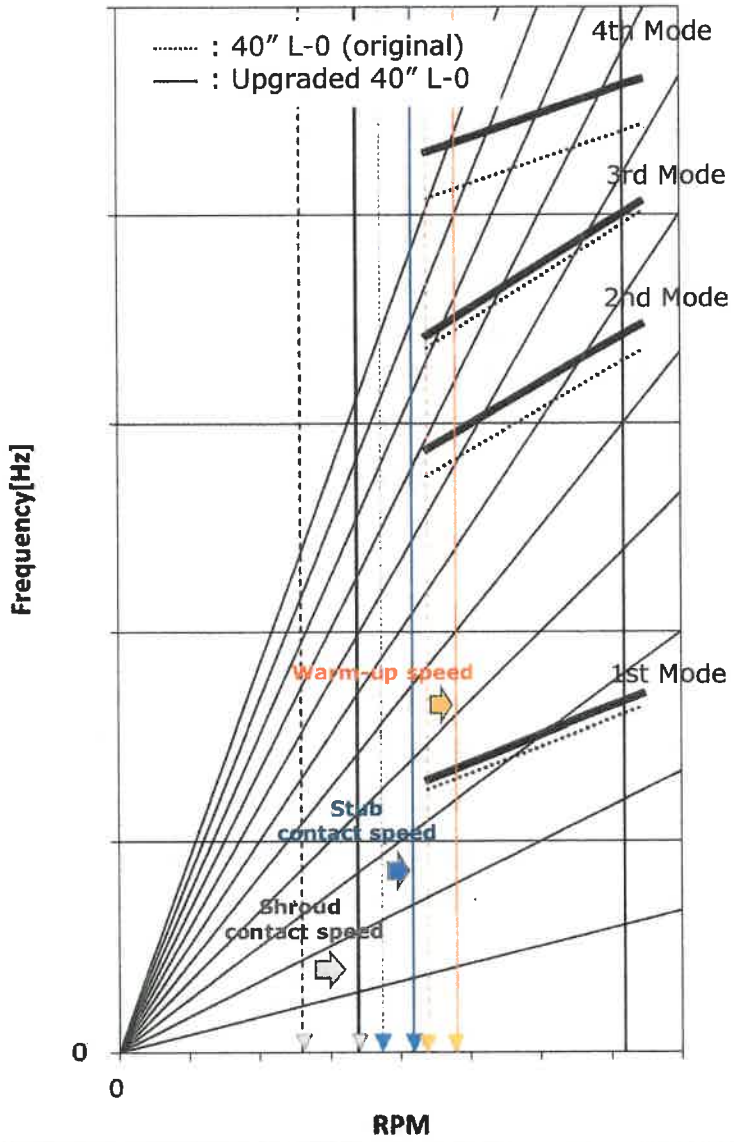
The upgraded blades have been designed so that there are no operating restriction to achieve operation for the all GT blend in/out for 4 on 1 Combined Cycle Configuration. The validation will be confirmed by Blade Vibration Monitoring.



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Campbell Diagrams of Upgraded 40" L-0 blade



- 10Hz resonance avoidance is maintained for each mode at the rated operation speed.
- Rotational speed of shroud and stub contact increase due to upgrade.
  - ▼ : Shroud contact speed increase by 31% from original blade.
  - ▼ : Stub contact speed increase by 12% from original blade.
- Warm up speed, which is shown as ▼ in the graph, needed to be increased by 200rpm from current speed.

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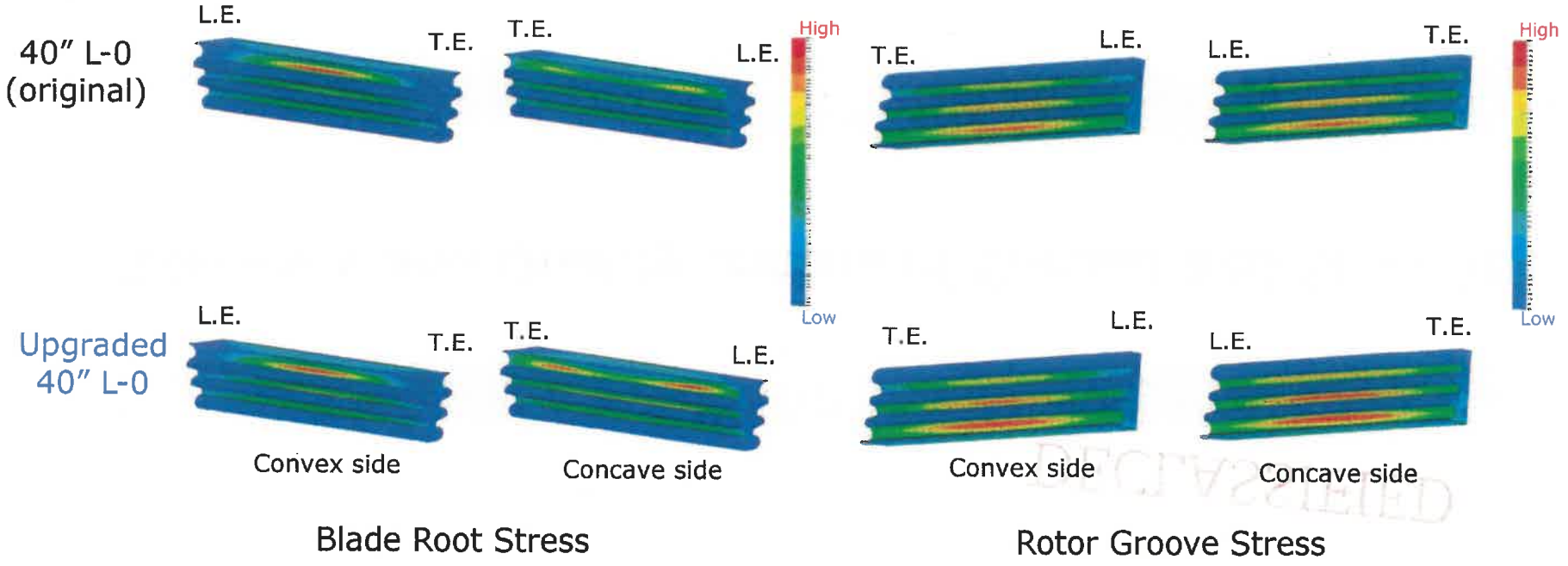
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Impact of blade weight increase

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No Change in turbine start and stop count

- Since root and groove peak stress is almost same as original 40" L-0 blade, restriction of turbine start and stop count is not necessary.
- This was achieved by optimization of blade stacking and root/platform position.



- ✓ Increase of blade weight : +1.6kg/blade Total +204.8kg/rotor
- ✓ No affection on bearing stress and rotor's critical speed

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3. Tolerance and Quality control of Shroud and Stub Gap

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Shroud and Stub Gap Management Procedure

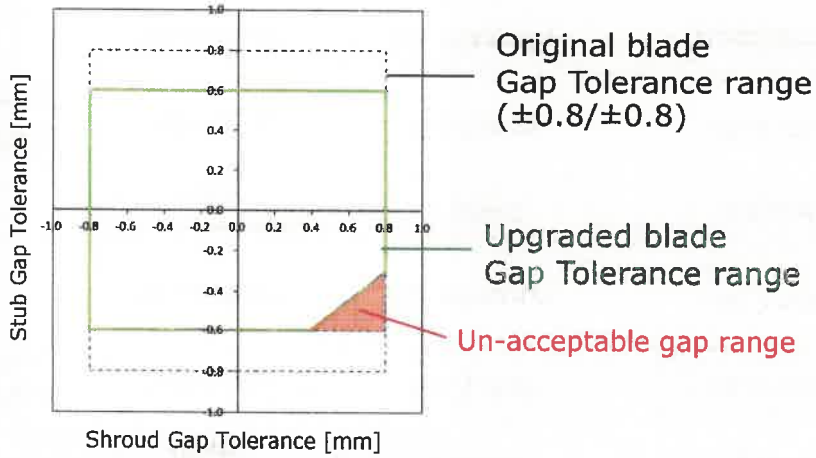
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➢ Shroud and stub gap would be managed by following procedure.

<Individual blade measurement>

1. Gap measurement with Box Gauge

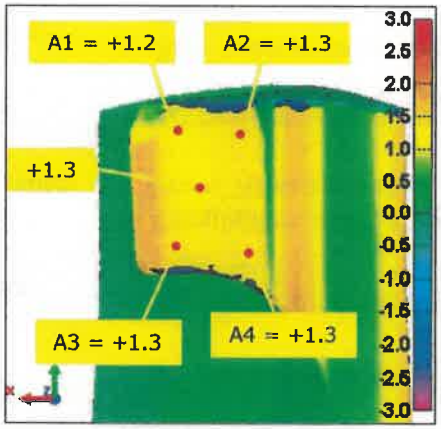
・Shroud and stub gap have to be within new allowable range. (Green line)



2. 3D Scan

・3D Scan would be conducted on all 128 upgraded blades to evaluate manufacturing variation.

・Inclination of shroud contact face is also evaluated from 3D scan data, and check whether it is manufactured accurately.



3D scan of shroud contact face

<Gap measurement at assembly>

・Since individual blade measurement would be conducted strictly, gap measurement record of blade assembly would be treated as reference.

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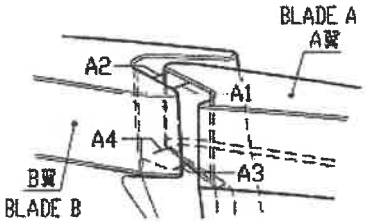
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Summary of Shroud and Stub Gap Tolerance

		40″ L-0 Type1 (Replacement in Dec.,2014)	40″ L-0 Type3	Upgraded 40″ L-0	
Measurement Method		Box Gauge	Box Gauge	Box Gauge 3D Scan	
Shroud Gap	Measurement Point	1 point	4 point※	4 point※	➢ No need to change
	Tolerance	±0.8 mm	±0.8 mm	New Range	➢ New tolerance range will be applied.
	Parallelism	No criterion	±0.3 mm	Evaluation of 3D scan data	➢ Parallelism will be evaluated from 3D scan data.
Stub Gap	Measurement Point	2 point	4 point	4 point	➢ No need to change
	Tolerance	±0.8 mm	±0.8 mm	New Range	➢ New tolerance range will be applied.
	Parallelism	No criterion	No criterion	Evaluation of 3D scan data	➢ Parallelism will be evaluated from 3D scan data.

※Shroud gap measurement point



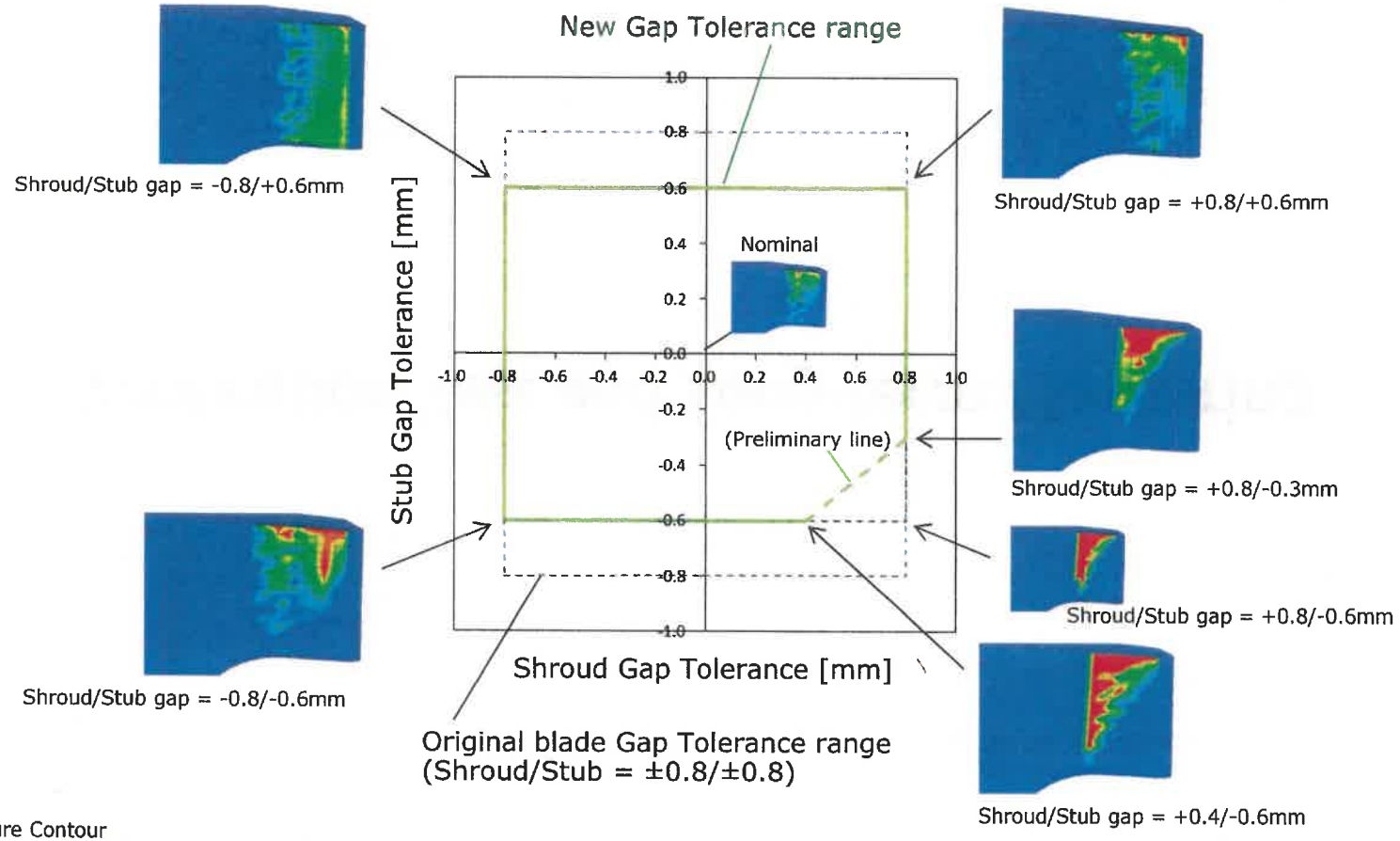
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New Tolerance of shroud and stub gap

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- Shroud and stub gap tolerance of upgraded blade would be set as shown below to avoid high contact pressure which is seen at large shroud gap and small stub gap.



*Contact Pressure Contour

Low High

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Verification Test and Long-term Monitoring

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Verification Test and Long-term Monitoring

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- Verification Test for Upgraded 40" L-0 blade is planned as follows:
- Verification Test at Shop
  - Both frequency and response at harmonic resonance for RH upgraded 40" L-0 blade will be measured by air excitation.
  - Mechanical damping for 1st Mode/high nodal diameter will be measured by electromagnetic excitation. Measured mechanical damping will certify reliability for non synchronous vibration.
  - BVM data will be calibrated using telemetry strain gauge data during shop testing.
- Field Validation Testing

  Vibratory amplitude during actual operation will be measured by BVM including Bypass Operation.
- Long-Term Monitoring

  We will keep monitoring long-term by BVM.

	Period 3 40" L-0	Upgraded 40" L-0
Verification Test at Shop	Air Excitation	Air Excitation & Electromagnetic Excitation
	Strain Gauge (Telemetry)	Strain Gauge (Telemetry) & BVM
Field Validation Testing	Telemetry Test	BVM
Long-Term Monitoring	None	BVM

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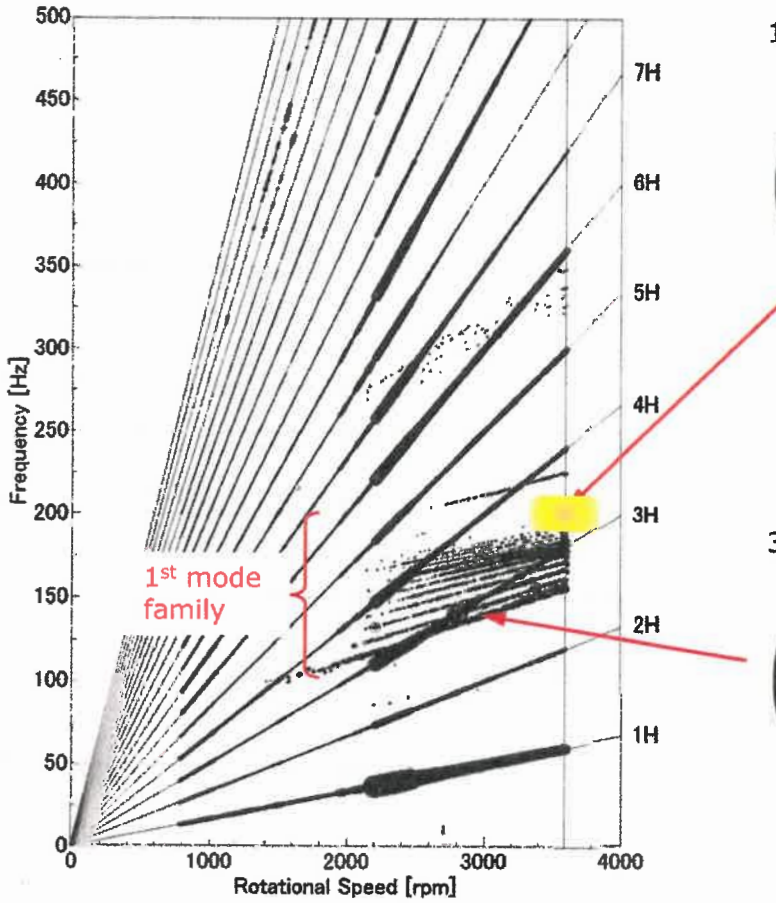
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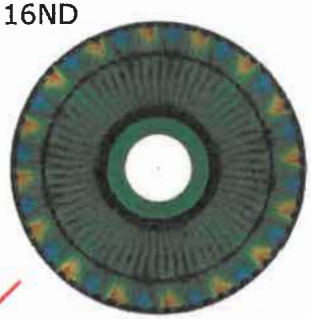
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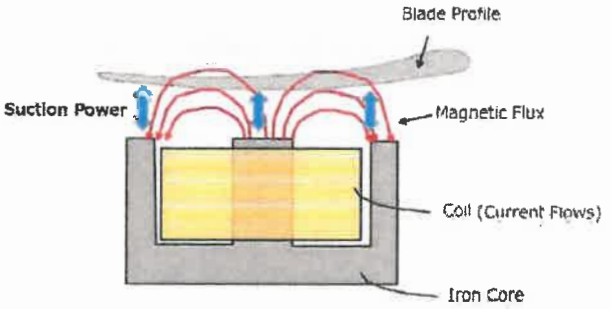
Electromagnetic Vibration Test

- To certify reliability for non synchronous vibration, mechanical damping of high nodal diameter shall be measured by electromagnetic vibration test.



16ND

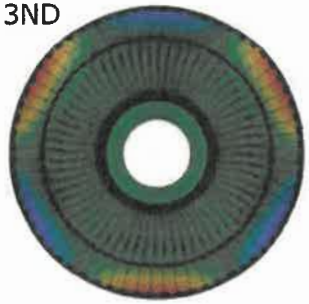


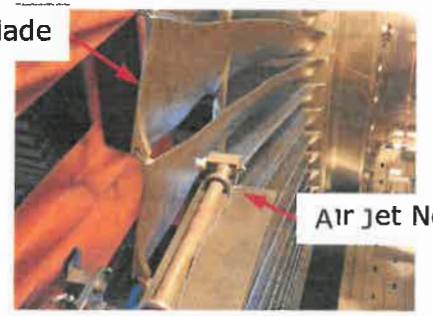


Vibrator (AC) suctions blade by Magnetic Filed

Electromagnetic exciter can excite any high nodal diameter mode at rated rotational speed.

3ND





Blade frequencies and responses of harmonic resonance is measured by Air jet test

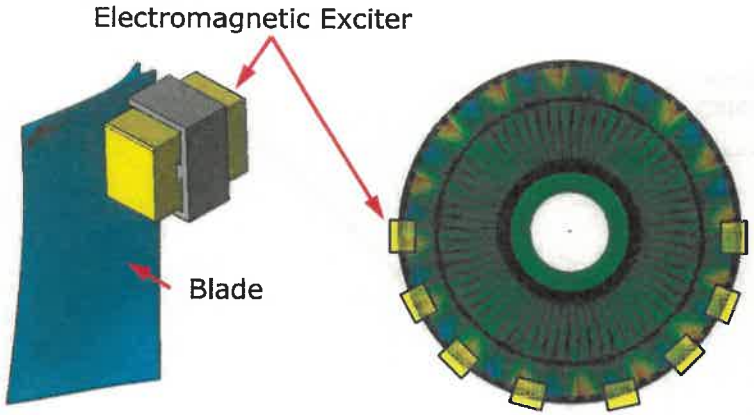
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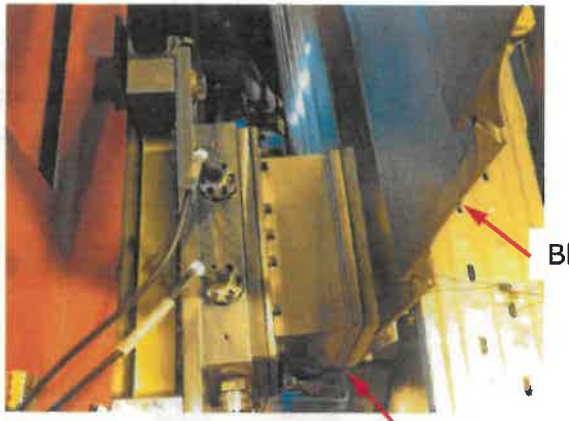
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Electromagnetic Vibration Test

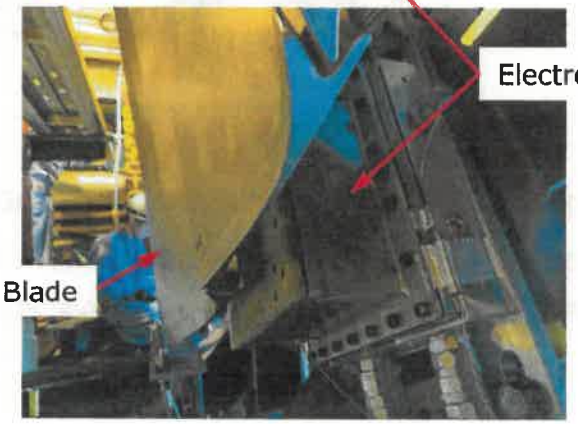
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- MHPS has upgraded the electromagnetic exciting test facilities and verified to excite the actual blade at high nodal diameter of 1st mode family at rated speed.
- Several electromagnetic exciters are located in circumferential direction and exciting force, frequency and phase of each exciter is controlled.
- Blade response will be measured with both strain gauge telemetry and BVM.









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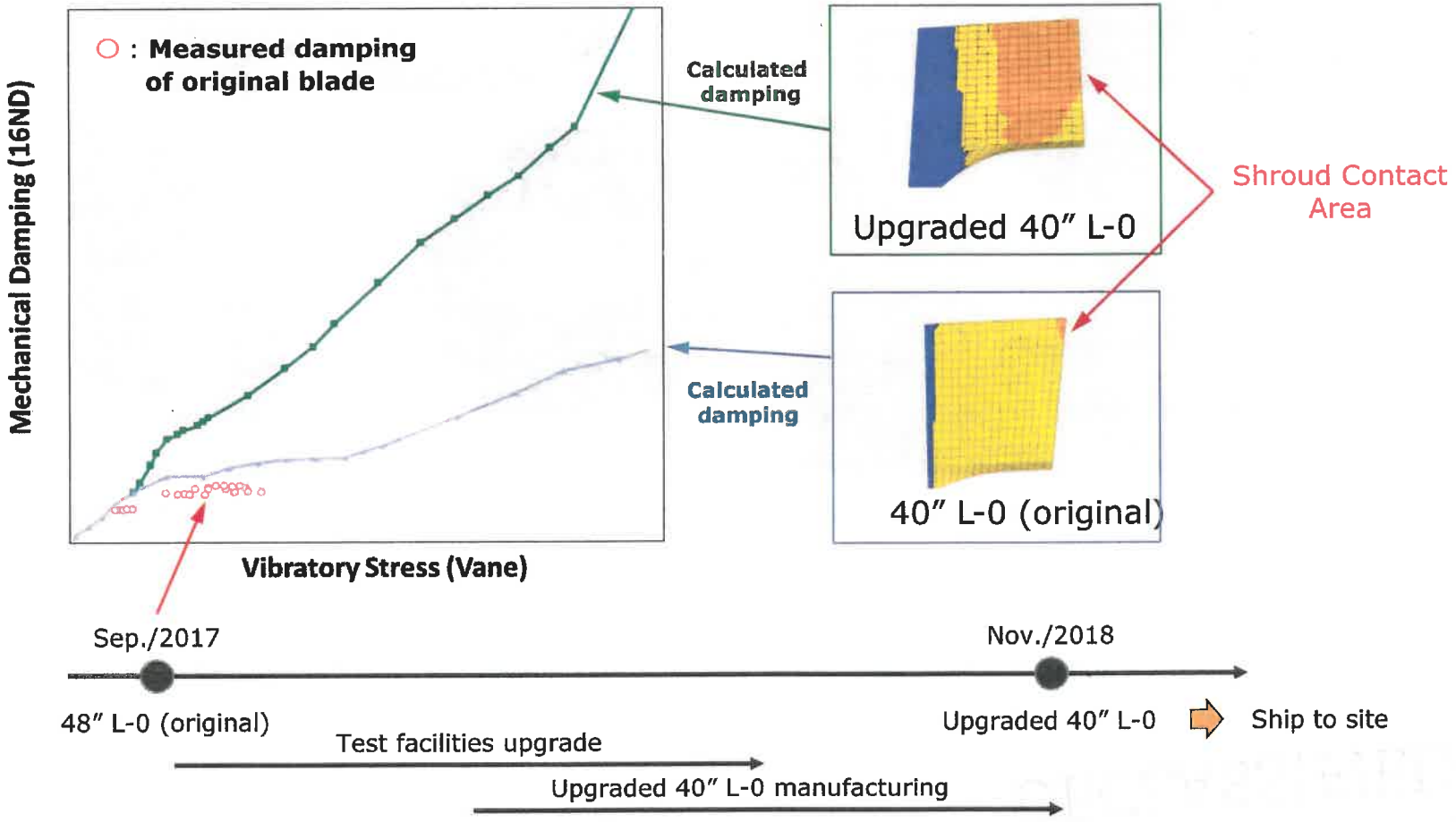
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Electromagnetic Vibration Test

- MHPS measured mechanical damping for 48″ L-0 (scaled 40″ L-0 (original)) by electromagnetic exciting test in Sep 2017. Measured damping was well consistent with expectation.
- The electromagnetic exciting test facilities would be more upgraded in 2018 for larger excitation enough to verify the 450MW operation.



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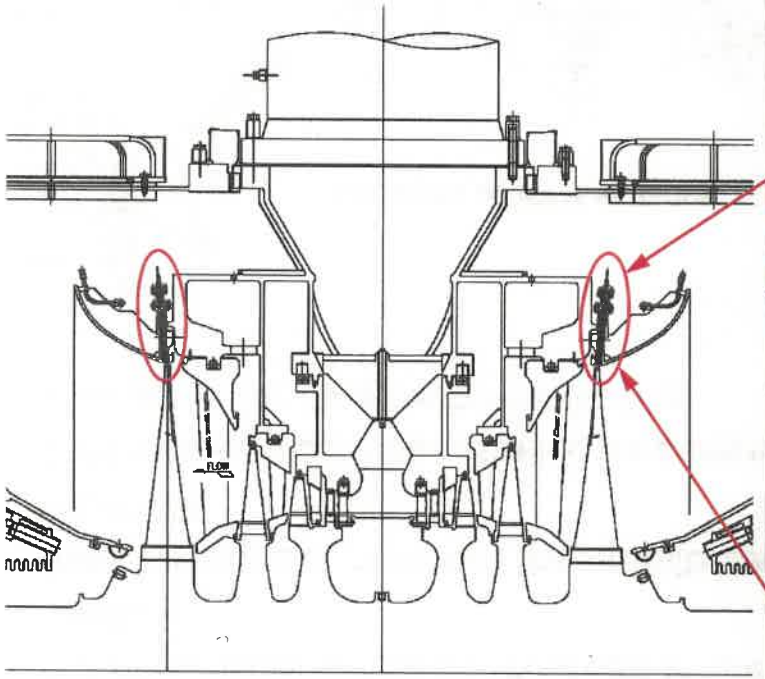
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Field Validation Testing and Long-Term Monitoring

- Blade Vibration Monitoring (BVM) is a method for vibration measurement of rotating blades using non-contacting sensors that is mounted on stationary parts.
- BVM shall be calibrated during the factory verification testing when it was conducted in conjunction with telemetry testing.
- MHPS shall verify the vibratory amplitude (blade stress) in the actual operation including GT 4C and 4D blending and also 4A and/or 4B blending.







Measure the vibration amplitude of blade tip by BVM



Vibratory stress distribution of 1st-mode 16ND.

Relation between the vibratory stress at each point of the blade is calculated by FEM and verified by telemetry testing at shop test.

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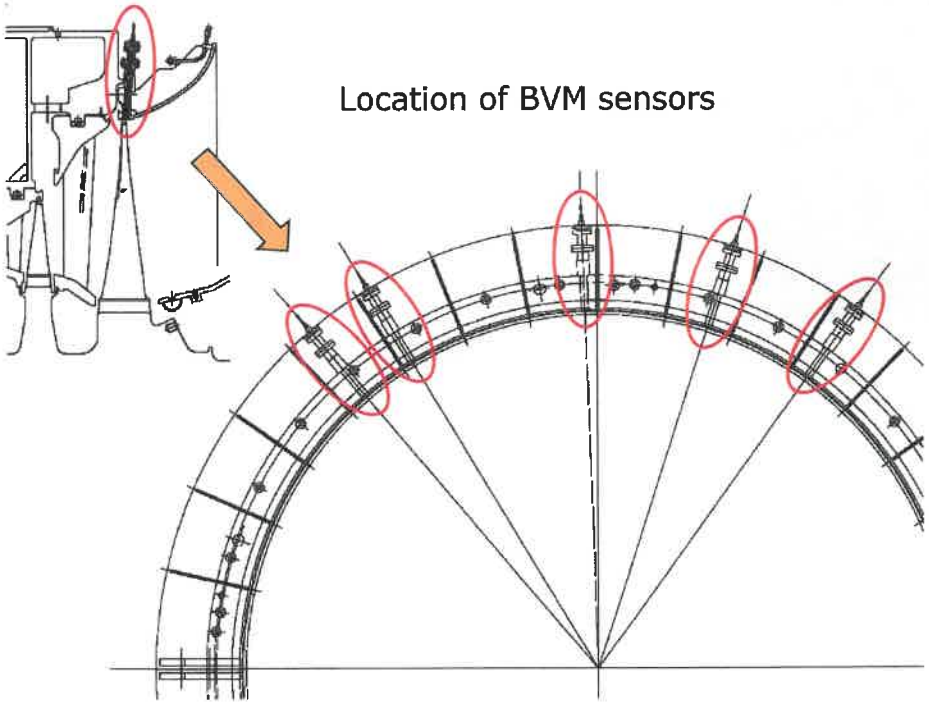
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Field Validation Testing and Long-Term Monitoring

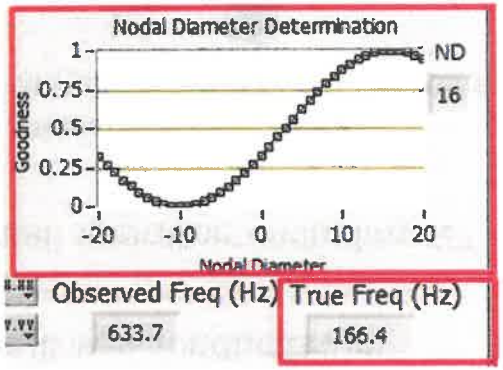
- 5 BVM sensors would be mounted in the circumferential direction on the both side of the flow guide.
- BVM system can measure the amplitude of the high nodal diameter vibration with high accuracy.
- BVM probes would be installed as a permanent monitoring system by modifying the original flow guide for long term monitoring.

Location of BVM sensors



Electromagnetic vibration test in Sep 2017.





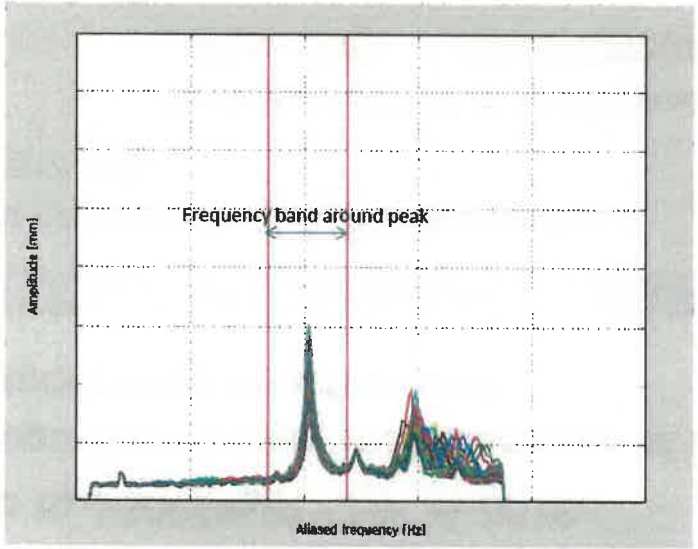
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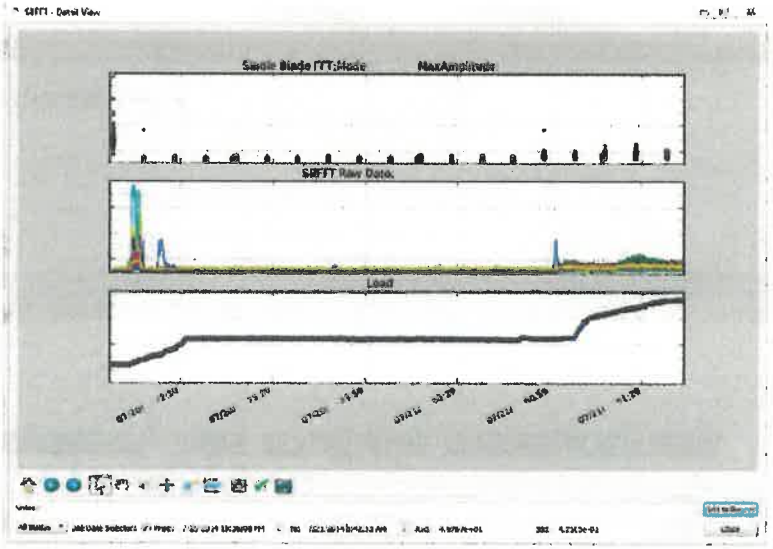
Example of monitoring by BVM

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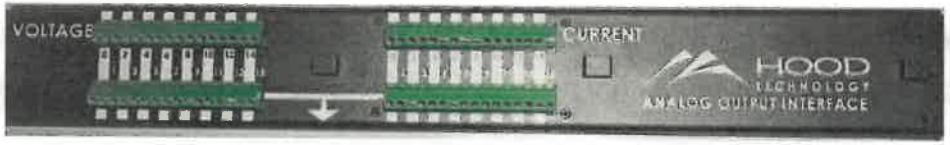
- BVM system can analyze measured data by single-blade spectral analysis (SBFFT).
- MONITOR software then picks the peak (within a frequency band) of the mode, and tracks amplitude and frequency over long period of time.
- BVM system can output analog signals to interface with the plant DCS in real time by augment with analog output module.

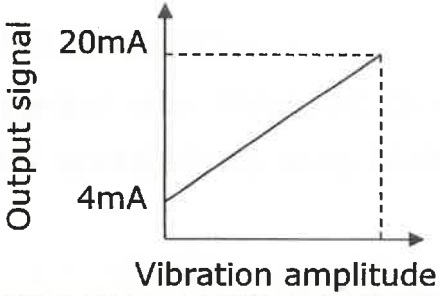


single-blade spectral analysis (SBFFT)



single-blade spectral analysis (SBFFT)





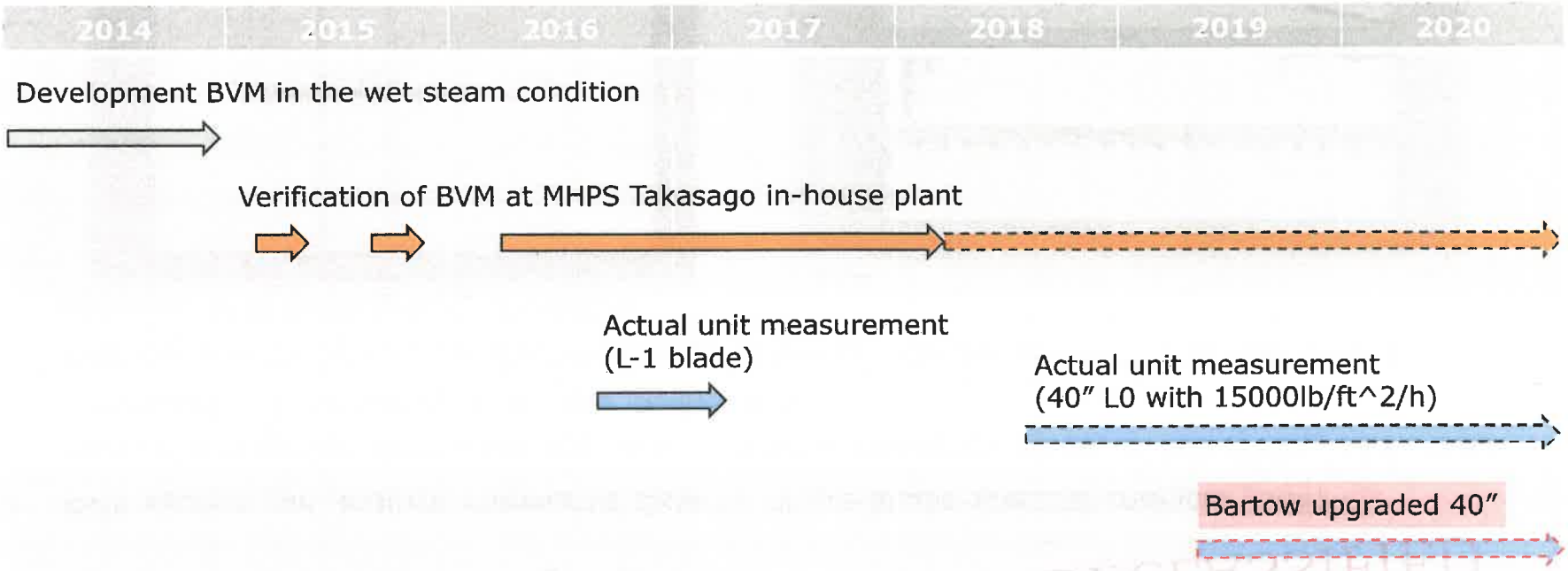
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Development history and measurement experience of BVM

- BVM probe mounted in the wet steam condition has been developed and applied to MHPS Takasago in-house plant (T-Point) from 2016. MHPS has verified the long-term reliability of BVM measurement in actual steam condition.
- MHPS will carry out telemetry and BVM test at a unit that has 40" L0 with Loading up to 15000lb/ft^2/h in 2018.
- Hood Technology, manufacturer of BVM system, has multiple measurement experiences of actual unit.



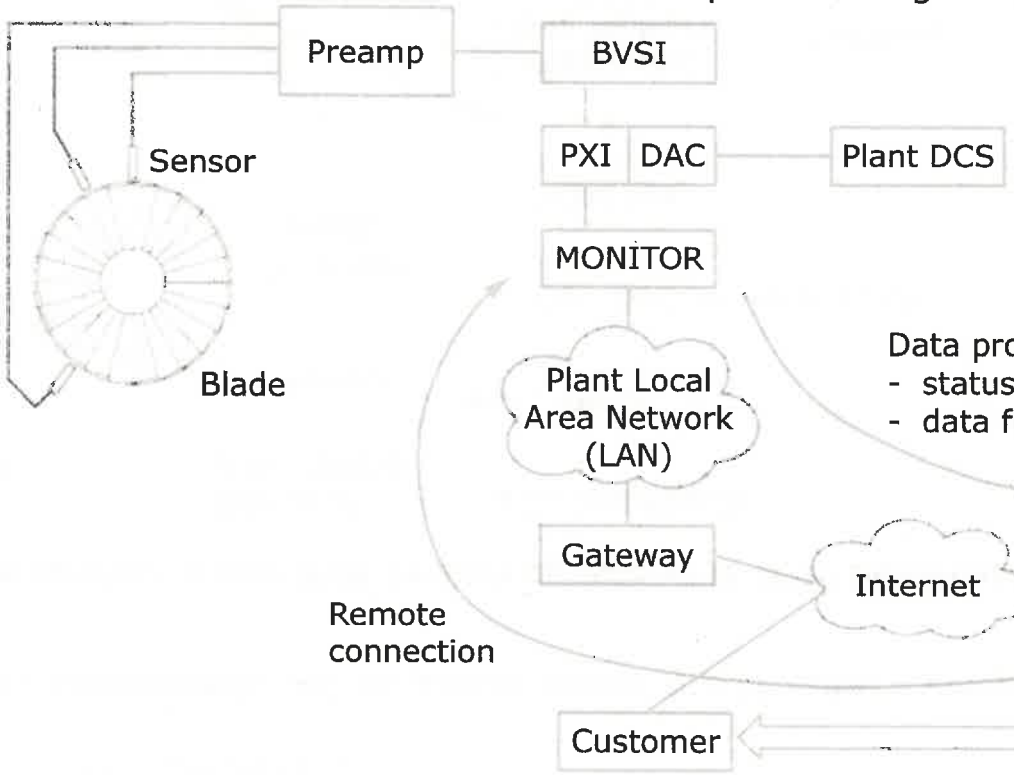
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Long-term Monitoring

- The blade vibration condition (amplitude, frequency, phase etc.) of LSB is measured by the BVM system and measured data is saved on the Hard Disk of the MONITOR computer which will be placed at Bartow site.
- During commissioning period, MONITOR computer placed in the STG Electrical Room is operated by MHPS engineers at site.
- After the commissioning period, MONITOR computer is remote operated by MHPS. Measured data can be downloaded from the MONITOR computer through the internet.



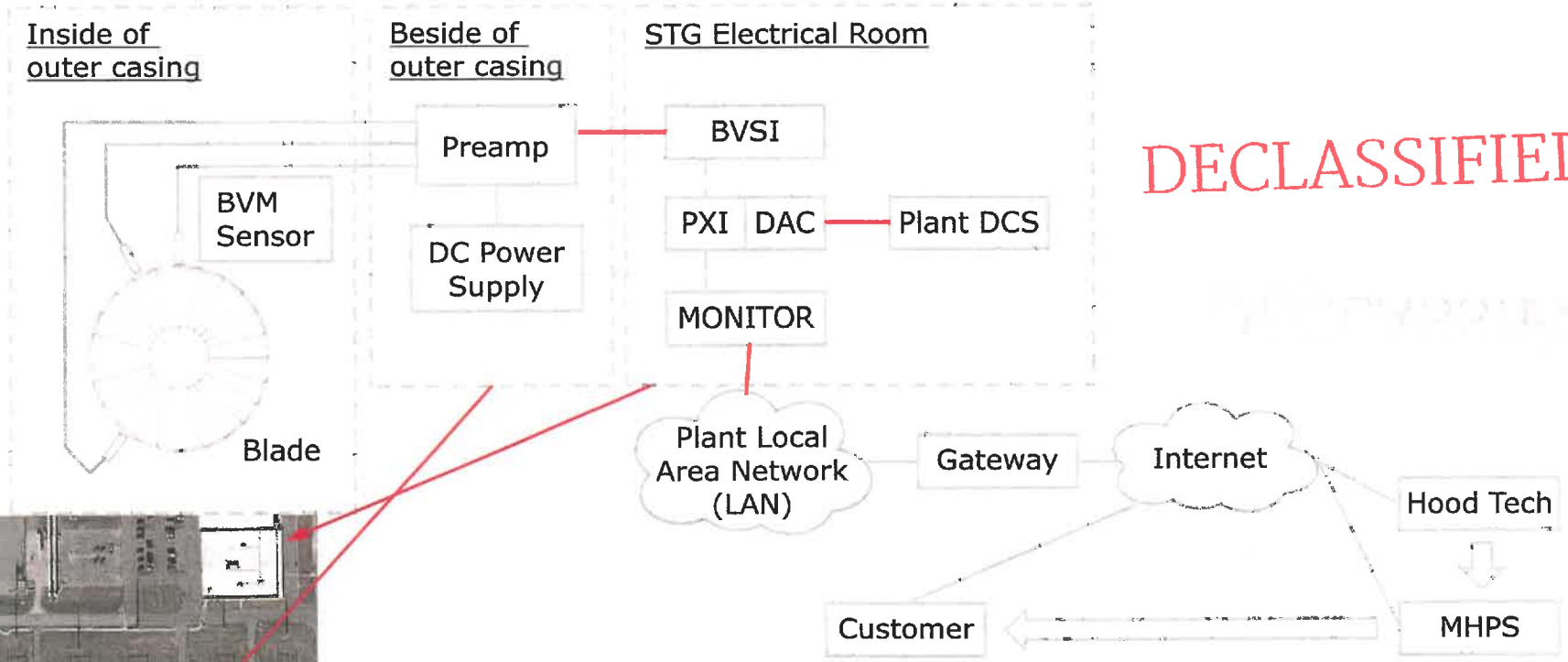
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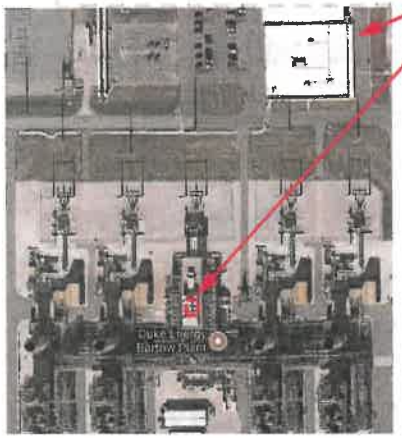
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Long Term Monitoring

- BVM system components will be placed beside the LP outer casing and in the STG electrical room.
- Wiring that connect these BVM system components shall be necessary.



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- MHPS shall verify the amplitude of upgraded 40" L-0 blades by BVM during commissioning period with high load and GT blending operation as a part of field validation testing.
- The long-term monitoring will keep track of the reliability of upgraded 40" blades.

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Future Schedule

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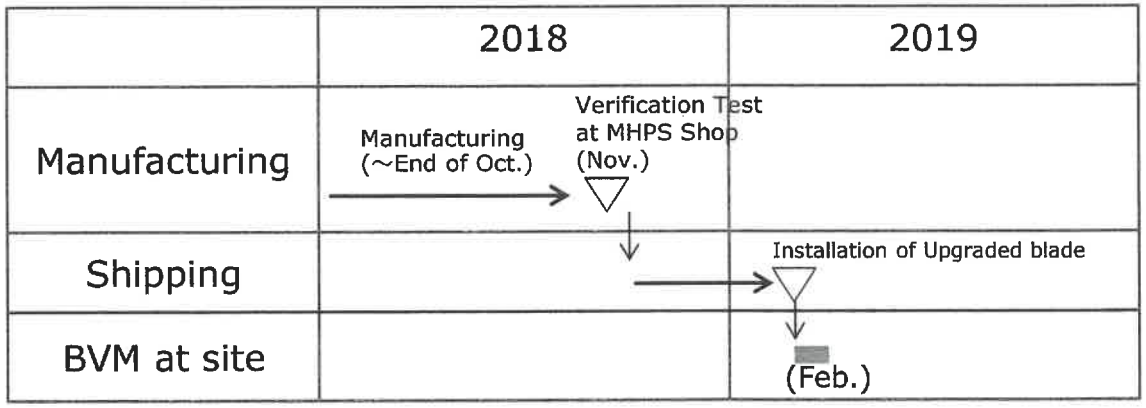
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Schedule

- Upgraded 40" blades will be ready for the next overhaul at Bartow site with verification testing completed at MHPS factory.
  - The Bartow production blade non-synchronous response will be factory tested in Nov. 2018 with electromagnetic excitation simultaneously with both telemetry testing and BVM to confirm the targeted reduction in blade response.
  - This test will also be used to calibrate the BVM system which will be installed for validation testing and long term monitoring at Bartow.



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Conclusion

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- MHPS has worked very closely with Bartow team and has put enormous effort in RCA to understand blade failures mechanism.

- A robust blade design is proposed that addresses issues observed by 40" L0 blades and guarantee 450MW operation without any avoidance zone including:
  - High load operation
  - GT blending operation

- Our knowledge developed at the Bartow site and recent testing experience at the factory and multiple sites provide us high degree of confidence in our upgrade blade design.

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Additional Question from Duke – Feb 20th 2018

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Duke Questions

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1. Duke is requesting a sanitized copy of our presentation.
   [Answer] Please see slides 1-47.

2. Can Duke have copies of the old/new blade design models for the purposes of "show and tell" with our Duke mgmt. and key project stakeholders?
   [Answer] Blade models are not available. The detailed shroud and stub shape comparison can be found on slides 14 -16.

3. Is there any significance regarding the CFD model output for the L-0 exit flows and how they interact with the Bartow Condenser?
   [Answer] The purpose of the CFD analysis performed was to understand the interaction of L-0 blades with Bartow Condenser. Please see slides 52-53. Slide 53 results were presented during RCA review meeting. No significant difference between old and upgrade blade is observed.

4. The % damping vs blade motion chart may not be 100% accurate, but does the graph (attached) show the concept that Mr. Tochitani was trying to present?
   [Answer] Yes it does.

   a. 40" redesign shows calculated promise of more damping possible? Than even was experienced with the 48" 50 hz blade?
      [Answer] Yes, 40" redesign will have more damping than 40" Type3 blade and 48" 50hz blade.

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Duke Questions

b. The shop test data (blue dots) was most likely taken before the blade was installed in the field to the right? Yes/no
[Answer] Yes.

c. We assume the blue dots only went so far to the right because of magnet force limits?
[Answer] Yes.

d. Is the left axis intercept just the internal blade material damping value less than 2% ?
[Answer] Please see slide 21. It would not be found from electromagnetic excitation test whether the left axis intercept is equal to the blade material damping.

e. The right sketch of BVM plot and load vs time showed greatly reduced blade tip motion for the same blade excitation forces, most likely cause was better damping from better contact?
[Answer] Yes.

f. Were type 3 or 48" 50hz type 3 blades ever tested in the shop test rig for damping? To double validate the calculation methods and analysis?
[Answer] 48" 50hz blade, whose shroud contact area was point contacted, was tested in Sep. 2017. The calculation method and analysis were validated.

g. If not tested where would MHI predict they would test?
[Answer] Please see above response "f". Also please see side 7.

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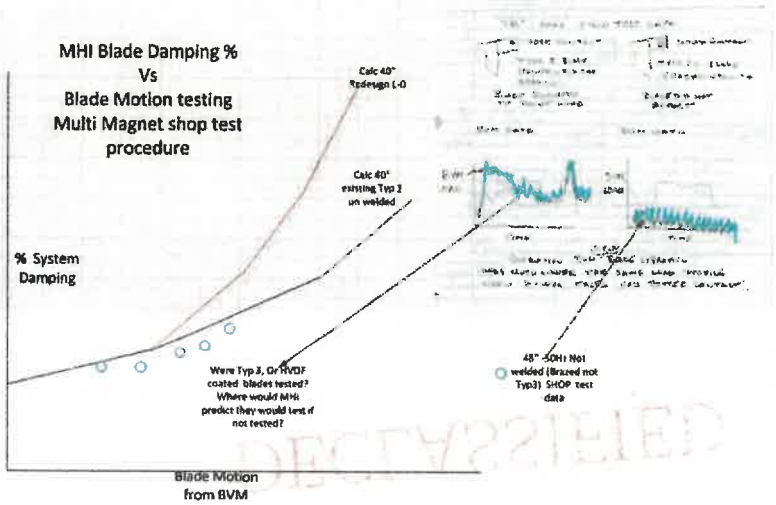
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Duke Questions

5. Have the previously run Bartow period 3 or 4 blades been considered for test in this shop damping test? If Not what was logic for not doing so?
   [Answer] Since the test method was not established at that time, Bartow blades in Period3 or 4 were not considered for damping test. Also due to coating applied at stub and shroud, period 3 or 4 blades damping can not be compared with upgrade blade.

6. As a listening check is there anything we have misunderstood in re -presenting back to MHI what was presented to Duke 2/13/18?
   [Answer] Your understanding is correct. In below image, on two plots on right side, the data is not from BVM, it was taken using strain gauges.

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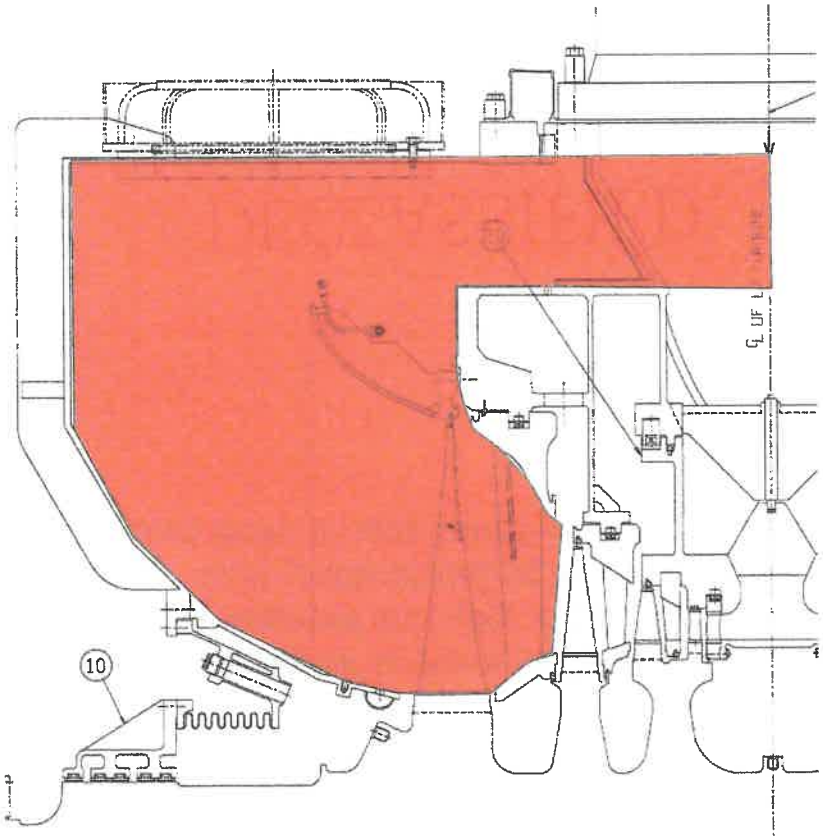


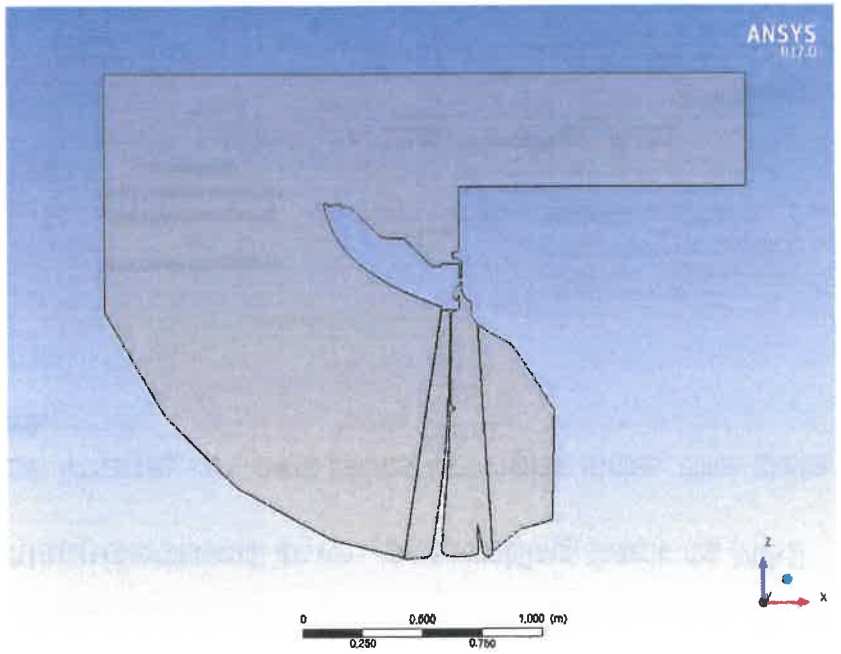
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Aero Dynamic Damping Analysis

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- ✓ Model : From L-0 inlet to diffuser
- ✓ Calculation Type : Unsteady Moving Blade Calculation
- ✓ Output : Aero Dynamic Damping

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-061106-8 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
GateCycle Model ID		8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BARTO	8BART2	8BART2
GateCycle Case ID		B8-1	B8-2	B8-3	B8-4	B8-5	B8-6	B8-7	B8-8	B8-9	B8-10	B8-11	B8-12	B8-13	B8-14X	B8-15
Ambient Temperature		35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Fired/1017 F	Fired/1023 F	Fired/1034 F	Fired/1046 F	Fired/1062 F	Fired/1068 F	Fired/1027 F	Fired/1041 F	Fired/1050 F	Fired/1051 F	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 12-May-06	Siemens 12-May-06	ratio	ratio	ratio	ratio	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	ratio	ratio	ratio
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		406.2 MW	409.3 MW	409.2 MW	408.1 MW	406.4 MW	406.4 MW	409.2 MW	408.4 MW	405.7 MW	406.0 MW	369.7 MW	371.3 MW	370.1 MW	364.8 MW	354.5 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		2,269p/992F	2,270p/997F	2,270p/1,007F	2,268p/1,019F	2,268p/1,031F	2,268p/1,036F	2,268p/1,002F	2,269p/1,015F	2,267p/1,023F	2,269p/1,023F	2,024p/1,015F	2,018p/1,021F	2,010p/1,032F	1,954p/1,048F	1,878p/1,060F
STG Cold Reheat Conditions, psia/F		581p/832F	581p/836F	580p/844F	559p/863F	560p/864F	564p/869F	580p/840F	559p/850F	558p/857F	559p/857F	602p/854F	500p/869F	497p/868F	494p/887F	488p/896F
Cold Reheat Conditions after Conditioning, psia/F		581p/832F	581p/836F	580p/844F	559p/863F	560p/864F	564p/869F	580p/840F	559p/850F	558p/857F	559p/857F	602p/854F	500p/869F	497p/868F	494p/887F	488p/896F
STG Hot Reheat Conditions, psia/F		495p/1,016F	497p/1,020F	496p/1,029F	495p/1,041F	496p/1,050F	501p/1,050F	497p/1,025F	496p/1,037F	495p/1,044F	495p/1,045F	445p/1,027F	443p/1,032F	441p/1,042F	440p/1,060F	438p/1,060F
Condenser Pressure		1.59 In HgA	1.90 In HgA	1.88 In HgA	2.91 In HgA	3.30 In HgA	3.32 In HgA	1.89 In HgA	2.92 In HgA	3.31 In HgA	3.31 In HgA	1.46 In HgA	1.75 In HgA	1.74 In HgA	2.71 In HgA	3.06 In HgA
Stack Temperature		219 F	219 F	217 F	220 F	216 F	216 F	218 F	221 F	221 F	221 F	224 F	225 F	222 F	225 F	224 F
Run Date		7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	8-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Gross CTG Output (each)	kW	228,924	222,820	212,610	200,507	188,378	181,934	217,952	203,567	196,207	196,542	228,924	222,820	212,610	200,507	188,378
Gross CTG Output (total)	kW	915,696	891,280	851,238	802,027	745,512	727,734	871,806	815,466	784,826	782,168	915,696	891,280	851,238	802,027	745,512
Gross CTG Heat Rate (LHV)	Btu/kWh	8,762	8,810	8,925	9,077	9,269	9,329	8,864	9,031	9,136	9,145	8,762	8,810	8,925	9,077	9,269
Gross CTG Heat Rate (HHV)	Btu/kWh	9,597	9,649	9,775	9,942	10,152	10,218	9,709	10,018	10,006	10,016	9,597	9,649	9,775	9,942	10,152
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Stk, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	8,023.33	7,852.18	7,597.28	7,280.05	6,910.17	6,789.16	7,727.71	7,364.46	7,170.19	7,152.93	8,023.33	7,852.18	7,597.28	7,280.05	6,910.17
CTG Heat Input (HHV) (total)	MMBtu/h	8,787.74	8,609.29	8,321.10	7,973.65	7,568.53	7,435.99	8,463.96	8,167.65	7,853.32	7,834.42	8,787.74	8,609.29	8,321.10	7,973.65	7,568.53
Duct Burner Heat Input (LHV) (each)	MMBtu/h	72.00	74.00	76.00	78.00	87.00	96.00	79.00	76.00	78.00	79.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	78.86	81.05	83.24	85.43	95.29	105.15	79.96	84.29	85.43	86.53	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	288.00	296.00	304.00	312.00	348.00	384.00	292.00	304.00	312.00	316.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	315.44	324.20	332.96	341.73	381.16	420.59	319.82	337.16	341.73	346.11	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	405,210	409,330	409,220	408,090	406,420	408,350	409,170	408,430	405,700	405,990	369,980	371,290	370,110	364,770	354,500
STG Output, percent of CTG Output		44.4%	45.9%	48.1%	50.9%	54.5%	56.1%	46.9%	50.1%	51.7%	51.9%	40.4%	41.7%	43.5%	45.5%	47.5%
Gross Plant Output	kW	1,321,906	1,300,610	1,260,458	1,210,117	1,151,932	1,136,114	1,280,976	1,223,896	1,190,526	1,188,158	1,285,676	1,282,570	1,221,348	1,166,797	1,100,012
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,287	6,265	6,269	6,274	6,301	6,314	6,291	6,298	6,285	6,286	6,242	6,218	6,220	6,239	6,282
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,646	6,662	6,666	6,672	6,901	6,915	6,857	6,949	6,864	6,865	6,837	6,812	6,813	6,834	6,880
Plant Heat Input (LHV)	MMBtu/h	8,311.33	8,148.18	7,901.28	7,592.05	7,258.17	7,173.16	8,019.71	7,668.49	7,482.19	7,468.93	8,023.33	7,852.18	7,597.28	7,280.05	6,910.17
Plant Heat Input (HHV)	MMBtu/h	9,103.18	8,924.49	8,654.06	8,315.36	7,949.68	7,856.58	8,783.78	8,504.81	8,195.06	8,180.52	8,787.74	8,609.29	8,321.10	7,973.65	7,568.53
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	31,400	31,230	31,010	30,640	30,320	30,260	31,120	30,720	30,510	30,500	30,340	30,160	29,920	29,450	28,990
Total Auxiliary Power/Losses, percent of gross		2.36%	2.40%	2.46%	2.53%	2.63%	2.66%	2.43%	2.51%	2.56%	2.57%	2.36%	2.36%	2.45%	2.62%	2.63%
Net Plant Output w/ Step-Up Xfmr Losses	kW	1,290,506	1,269,380	1,229,448	1,179,477	1,121,612	1,105,854	1,249,856	1,193,176	1,160,016	1,157,658	1,255,336	1,252,410	1,191,428	1,137,347	1,071,022
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,440	6,419	6,427	6,437	6,471	6,487	6,416	6,427	6,450	6,452	6,393	6,371	6,377	6,401	6,452
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,054	7,031	7,039	7,050	7,088	7,105	7,028	7,128	7,065	7,066	7,002	6,873	6,984	7,011	7,066

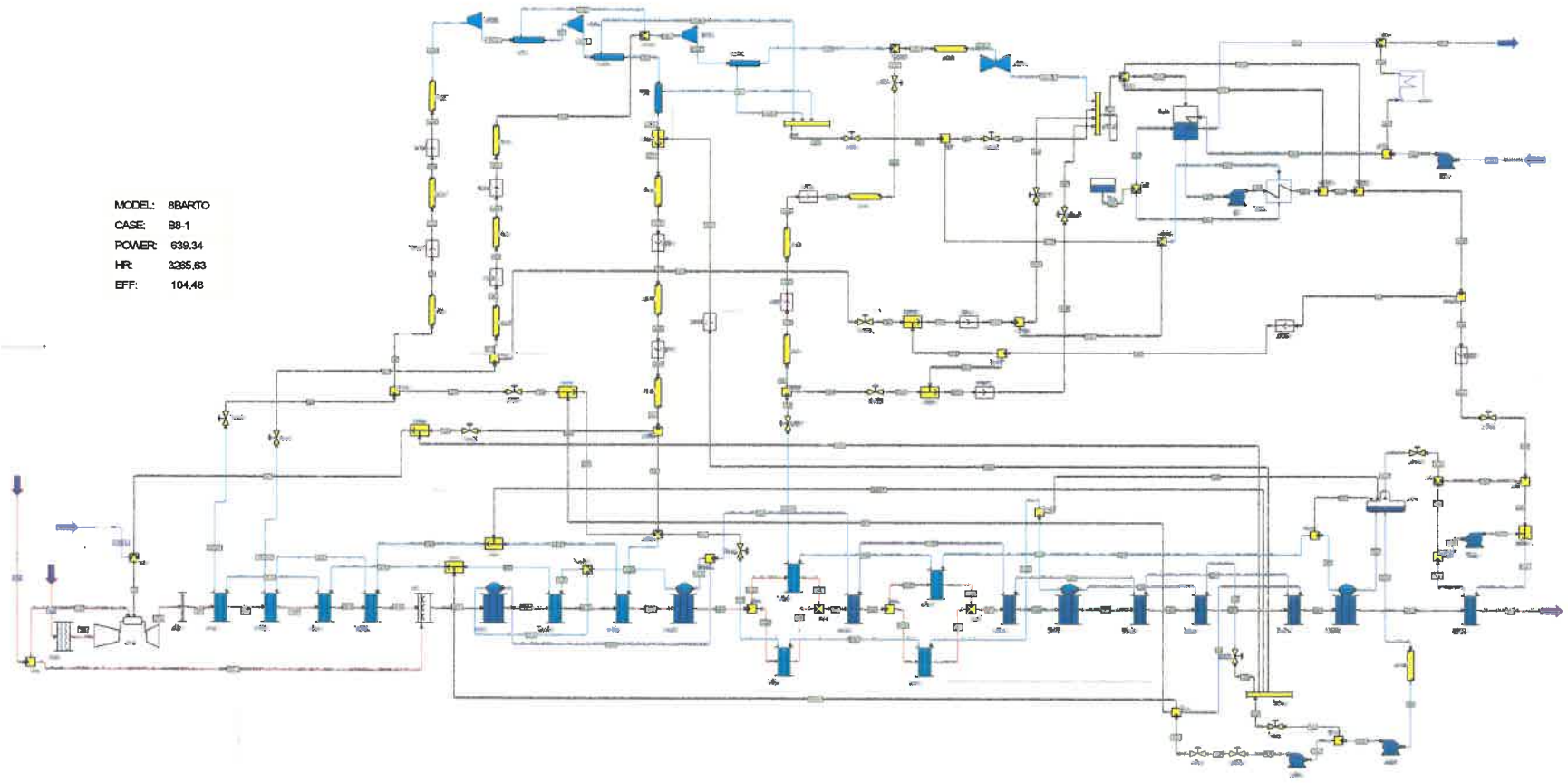
Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat balance information, HP/CRH/HRH pipe calculations, and modified pumps; model uses same condenser as Rev. 7.

Combustion Turbine Generator (each)																	
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	
	WBT, F	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1	76.6	
Compressor Inlet Conditions	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.6	78.3	79.3	35.0	45.0	59.0	74.0	90.0	
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	98.5%	91.4%	86.4%	60.1%	59.9%	59.7%	78.5%	54.8%	
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	5,833	3,865	9,622	13,110	0	0	0	0	0	
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	
	HC, MMBtu/h (LHV)	2,005.8	1,963.0	1,899.3	1,820.0	1,727.5	1,697.3	1,931.9	1,841.1	1,792.5	1,788.2	2,005.8	1,963.0	1,899.3	1,820.0	1,727.5	
	Flow, lb/h	94,794	92,771	89,760	86,012	81,642	80,212	91,301	86,105	84,714	84,510	94,794	92,771	89,760	86,012	81,642	
Fuel LHV	Btu/lb	21,160	21,160	21,160	21,160	21,160	21,160	21,160	20,597	21,160	21,160	21,160	21,160	21,160	21,160	21,160	
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	

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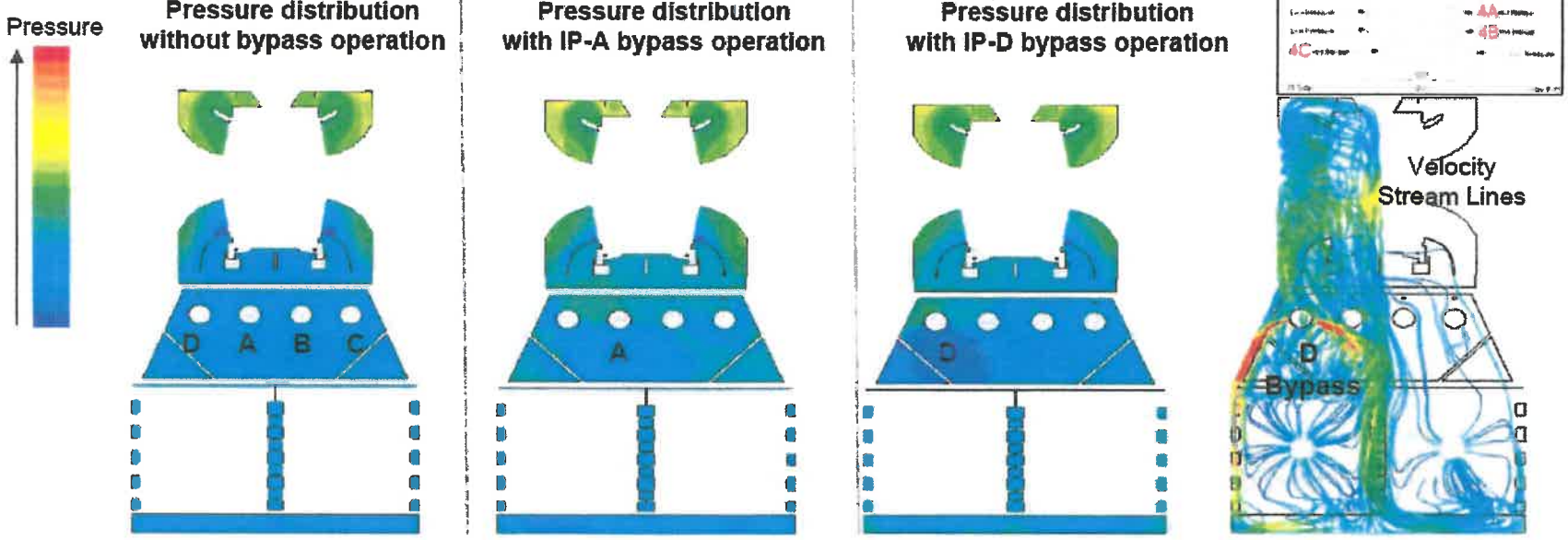
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Bypass Operation Analysis

Does Bypass Operation Provide Stimulus to the blades?



- Increased blade response (1.5X Increase from C or D Bypass) was quantified through Telemetry Testing (Blade response was recorded and shown to be Non-Synchronous Self Excited Vibration (Flutter))
- A and B Bypass operation do not show increased blade response which is consistent with other 2on1 bypass configuration telemetry Tests.
- Bypass configuration within the condenser is unique to Bartow with C and D bypasses located close to the exhaust.
- Condenser heat load at 420MW is at the limit of the condenser specification. High velocities during 3 to 4 GT Bypass Operation

- ✓ Model : From L-0 exit to condenser
- ✓ Calculation Type : Steady Calculation
- ✓ Output : Steady Condition of L-0 exit

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	124,773	121,813	117,256	111,747	105,370	103,283	119,572	113,252	106,685	106,586	122,592	119,634	115,120	109,150	102,998
	Pressure, psia	524.8	524.6	523.5	522.3	523.6	528.3	523.9	523.2	522.1	522.5	469.2	467.7	465.2	463.8	459.2
	Temperature, F	625.7	629.8	637.8	647.3	656.0	662.9	633.9	644.3	650.5	650.6	648.7	653.8	662.7	662.1	661.5
	Enthalpy, Btu/lb	1,312.2	1,314.7	1,319.5	1,325.2	1,331.4	1,334.0	1,317.2	1,323.4	1,327.1	1,327.2	1,326.8	1,332.7	1,338.1	1,349.1	1,354.7
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	9,697	9,692	9,696	10,184	10,281	10,393	9,857	10,085	10,220	10,199	11,778	11,871	12,072	12,751	12,653
	Temperature, F	358.7	358.3	356.5	356.1	354.7	354.3	357.5	356.9	356.1	356.0	357.3	356.8	354.8	354.8	353.6
Steam Injection for Power Augmentation	Flow, lb/h	134,370	131,505	127,192	121,910	115,651	113,646	129,406	123,337	120,065	119,785	134,370	131,605	127,192	[redacted]	115,651
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0	485.0
	Enthalpy, Btu/lb	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	4,342,432	4,265,107	4,124,936	3,957,725	3,794,773	3,747,483	4,194,884	4,003,399	3,866,465	3,852,326	4,342,432	4,265,107	4,124,936	3,957,725	3,794,773
	Pressure, in. H2O	21.37	20.75	19.71	18.45	17.16	16.77	20.23	18.79	18.02	17.96	21.37	20.75	19.71	18.45	17.16
	Temperature, F	1,073.6	1,079.9	1,092.6	1,107.5	1,121.7	1,125.7	1,088.4	1,103.4	1,112.8	1,113.4	1,073.6	1,079.9	1,092.6	[redacted]	1,121.7
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	228,924	222,620	212,810	200,507	186,378	181,034	217,952	203,867	196,207	195,542	228,924	222,620	212,810	200,507	186,378
Gross Heat Rate	Btu/kWh (LHV)	8,782	8,810	8,925	9,077	9,269	9,329	8,854	9,031	9,136	9,145	8,782	8,810	8,925	9,077	9,269

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	569,500	568,157	565,221	561,518	558,105	557,152	556,119	552,715	550,255	550,734	498,663	495,841	491,382	473,269	452,663
(at HRSG terminal point)	Pressure, psia	2,314.0	2,314.0	2,314.7	2,313.0	2,312.7	2,313.3	2,312.5	2,313.7	2,312.2	2,314.5	2,064.6	2,058.1	2,050.5	1,993.0	1,913.2
	Temperature, F	996.3	1,001.2	1,011.1	1,022.6	1,034.6	1,038.2	1,006.1	1,016.8	1,028.3	1,026.8	1,016.9	1,024.6	1,036.5	1,051.1	1,053.3
	Enthalpy, Btu/lb	1,482.0	1,485.3	1,471.9	1,479.6	1,487.3	1,489.7	1,466.6	1,477.0	1,482.0	1,482.1	1,484.9	1,488.7	1,496.9	1,507.5	1,511.1
dP from HP drum to HRSG terminal joint	psi	63.2	63.1	62.9	62.6	62.7	62.5	62.9	62.6	62.5	62.5	57.5	57.2	56.8	55.1	51.0
HP SH #1 Steam Outlet Temperature	Temperature, F	993.9	1,001.6	1,011.7	1,023.2	1,035.1	1,038.6	1,006.6	1,016.4	1,027.0	1,027.2	1,019.4	1,025.1	1,036.0	1,051.6	1,053.8
HP SH #2 Steam Outlet Temperature	Temperature, F	911.5	915.1	922.0	929.9	939.5	942.7	918.2	926.7	932.2	932.3	930.7	944.2	952.3	964.5	942.8
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,021
(from HP Feedwater)	Temperature, F	368.9	368.6	364.7	364.4	363.0	362.6	365.8	365.2	364.4	364.3	366.6	368.0	364.1	364.2	363.6
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.9%
	Final Superheat, F	160.1	152.3	158.3	161.0	165.8	173.0	153.7	158.4	162.0	162.1	177.7	180.6	186.6	195.0	165.2
HP SH #3/4 Steam Outlet Temperature	Temperature, F	809.9	812.2	816.2	820.7	826.6	832.8	813.4	818.1	821.7	821.9	821.1	823.6	827.9	833.3	837.2
HP Evaporator #1 Exit	Flow, lb/h	61,561	62,159	62,829	63,303	64,041	65,343	62,078	62,823	63,274	63,467	66,964	66,976	67,081	64,266	59,909
	Pressure, psia	2,377.2	2,378.0	2,377.5	2,376.5	2,375.3	2,375.7	2,376.5	2,376.3	2,374.7	2,376.9	2,122.1	2,116.3	2,107.3	2,048.2	1,964.2
	Temperature, F	660.8	660.8	660.8	660.7	660.6	660.7	660.7	660.7	660.6	660.7	644.3	643.8	643.3	639.2	633.3
	Enthalpy, Btu/lb	1,104.1	1,104.0	1,104.1	1,104.3	1,104.3	1,104.3	1,104.3	1,104.2	1,104.4	1,104.1	1,128.9	1,127.5	1,128.1	1,132.8	1,139.2
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	329.0	334.4	343.9	354.9	369.3	374.5	337.8	350.5	358.2	358.1	302.7	308.6	314.0	318.5	308.5
HP Evaporator #1 Approach	Temperature, F	11.8	12.4	13.4	14.7	16.2	16.7	12.7	14.2	15.1	15.2	4.6	5.0	5.6	4.9	3.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	487,819	485,998	482,394	478,215	473,471	471,897	484,036	479,693	476,992	477,248	431,878	428,866	424,282	409,001	376,933
	Pressure, psia	2,377.2	2,378.0	2,377.5	2,376.5	2,376.3	2,376.7	2,375.5	2,376.3	2,374.7	2,376.9	2,122.1	2,116.3	2,107.3	2,048.2	1,964.2
	Temperature, F	660.8	660.8	660.8	660.7	660.6	660.7	660.7	660.7	660.6	660.7	644.3	643.8	643.3	639.2	633.3
	Enthalpy, Btu/lb	1,104.1	1,104.0	1,104.1	1,104.3	1,104.3	1,104.3	1,104.3	1,104.2	1,104.4	1,104.1	1,128.9	1,127.5	1,128.1	1,132.8	1,139.2
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	18.4	18.3	18.2	18.2	15.8	15.6	18.4	18.3	18.2	18.2	17.0	16.9	16.6	16.7	15.9
HP Evaporator #2/3/4/5 Approach	Temperature, F	11.8	12.4	13.4	14.7	16.2	16.7	12.7	14.2	15.1	15.2	4.6	5.0	5.6	4.9	3.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	569,500	568,157	565,223	561,518	558,112	557,150	556,115	552,715	550,255	550,734	498,663	495,841	491,383	473,267	435,842
	Temperature, F	649.0	648.4	647.4	646.0	644.4	643.9	648.0	646.5	645.5	645.5	639.7	638.9	637.7	634.3	630.3
HP Economizer #4/5 Outlet Temperature	Temperature, F	571.7	569.0	566.6	562.7	558.3	557.1	568.6	564.1	561.4	561.2	576.2	574.7	572.0	569.9	570.4
HP Economizer #6/7 Outlet Temperature	Temperature, F	481.3	480.0	477.5	475.0	472.2	471.8	479.0	476.1	474.2	474.1	481.5	480.3	477.9	476.9	477.4
HP Economizer #8 Outlet Temperature	Temperature, F	421.3	420.1	417.3	415.2	412.3	411.7	419.0	416.4	414.4	414.4	425.7	424.5	421.7	421.5	423.3
Feedwater to HP Economizer #8	Flow, lb/h	569,500	568,157	565,223	561,518	558,112	557,150	556,115	552,715	550,255	550,734	498,663	495,841	491,383	473,267	435,842
	Pressure, psia	2,479.3	2,479.6	2,478.1	2,474.8	2,473.5	2,473.8	2,476.4	2,476.0	2,473.5	2,476.0	2,200.6	2,192.6	2,183.5	2,119.0	2,024.4
	Temperature, F	368.9	368.6	364.7	364.4	363.0	362.6	365.8	365.2	364.4	364.3	366.5	368.0	364.1	364.2	363.6
	Enthalpy, Btu/lb	343.1	342.7	340.8	340.5	339.0	338.6	341.9	341.2	340.4	340.3	342.2	341.7	339.7	339.7	338.9
HP FW Temperature Increase Across BFP	F	10.9	10.9	10.9	11.0	11.0	11.0	10.9	11.0	11.0	11.0	11.9	12.0	12.1	12.4	12.8
Duct Burner	HC, MMBtu/h (LHV)	72.00	74.00	76.00	78.00	87.00	96.00	73.00	76.00	78.00	79.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	78.66	81.05	83.24	85.43	95.29	105.15	79.98	84.29	85.43	86.53	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	961.2	964.8	972.1	980.7	988.6	983.5	968.6	978.2	963.6	963.8	971.6	975.6	963.4	961.2	955.7
Exit Temperature	Temperature, F	1,017.1	1,023.2	1,033.8	1,048.2	1,062.5	1,068.4	1,026.9	1,041.2	1,049.8	1,051.0	971.6	975.6	963.4	961.2	955.7
HRSG Hot Reheat Steam	Flow, lb/h	514,215	513,168	510,252	507,042	506,750	511,674	511,630	508,492	506,171	506,532	457,058	454,572	450,675	448,477	444,698
(at HRSG terminal point)	Pressure, psia	509.1	508.9	507.8	506.6	506.0	512.6	506.2	507.5	506.5	506.9	465.1	463.6	461.2	460.2	446.2
	Temperature, F	1,017.5	1,022.2	1,031.8	1,043.0	1,052.4	1,052.4	1,027.1	1,039.7	1,048.8	1,047.1	1,028.9	1,034.1	1,044.5	1,052.4	1,052.3
	Enthalpy, Btu/lb	1,530.1	1,532.7	1,536.0	1,544.1	1,549.1	1,549.0	1,535.4	1,542.2	1,546.1	1,546.3	1,537.8	1,540.7	1,545.4	1,550.6	1,550.7
HRSG RH dP -- terminal pt. to terminal pt.	psi	15.8	15.7	15.7	15.7	15.6	15.7	15.7	15.7	15.7	15.7	14.1	14.1	14.0	13.6	13.0
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,017.7	1,022.4	1,032.0	1,043.2	1,052.6	1,052.6	1,027.3	1,039.9	1,047.0	1,047.3	1,029.1	1,034.3	1,044.7	1,052.6	1,052.5
RHTR #3 Steam Outlet Temperature	Temperature, F	937.0	940.3	947.0	954.7	958.6	951.6	943.6	952.2	957.2	957.4	949.6	953.3	960.6	949.8	926.1
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	2,621	8,368	0	0	0	0	0	0	0	13,583	25,399
(from IP Feedwater)	Temperature, F	358.7	358.3	358.5	358.1	354.7	354.3	357.5	358.9	358.1	358.0	357.3	356.8	354.8	354.6	353.6
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.5%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	6.1%
	Final Superheat, F	339.0	341.7	347.0	352.9	349.7	328.5	343.9	350.6	354.7	355.0	341.5	344.8	348.8	290.8	232.6
RHTR #4 Steam Outlet Temperature	Temperature, F	819.3	819.0	818.0	823.8	830.8	833.4	815.0	821.8	825.5	825.9	801.3	803.6	807.7	810.2	809.7
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	881.0	887.2	899.6	914.0	928.7	933.2	893.5	909.3	918.7	918.8	924.2	931.4	944.9	956.6	973.5
	Enthalpy, Btu/lb	1,462.0	1,465.3	1,471.9	1,479.5	1,487.3	1,489.7	1,468.6	1,477.0	1,482.0	1,482.1	1,484.9	1,488.7	1,495.9	1,507.5	1,511.1
Cold Reheat Steam from STG to HRSG	Flow, lb/h	437,198	436,742	440,392	442,245	445,243	446,393	438,958	441,923	442,890	443,830	369,502	369,470	369,556	357,866	343,649
(at HRSG terminal point)	Pressure, psia	524.8	524.6	523.5	522.3	523.6	528.3	523.9	523.2	522.1	522.5	482.2	481.7	485.2	483.8	469.2
	Temperature, F	825.7	829.8	837.8	847.3	858.0	862.9	833.9	844.3	850.5	850.6	848.7	853.6	862.7	862.1	861.5
	Enthalpy, Btu/lb	1,312.2	1,314.7	1,319.5	1,325.2	1,331.4	1,334.0	1,317.2	1,323.4	1,327.1	1,327.2	1,329.6	1,332.7	1,338.1	1,349.1	1,354.7
Cold Reheat Steam, % of HP Steam		76.75%	77.22%	77.91%	78.75%	79.78%	80.12%	77.54%	78.53%	79.05%	79.12%	74.07%	74.51%	75.21%	75.57%	75.88%
HP Steam - Cold Reheat Steam	Flow, lb/h	132,302	129,415	124,629	119,273	112,882	110,759	127,156	120,792	117,376	117,104	129,351	126,370	121,806	115,604	109,213

DEF-19FL-FUEL-002439

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
IP Steam (at HRSG terminal point)	Flow, lb/h	77,108	74,427	69,860	64,797	58,988	56,813	72,575	66,568	53,281	52,902	87,556	85,202	81,021	77,230	76,539
	Pressure, psia	624.6	624.6	623.5	622.3	620.6	620.2	623.9	623.2	622.1	622.5	499.2	497.7	495.2	493.6	496.2
	Temperature, F	641.4	642.6	644.5	646.7	649.4	650.6	643.2	645.9	647.3	647.7	622.4	622.9	623.9	624.8	616.6
	Enthalpy, Btu/lb	1,321.8	1,322.3	1,323.5	1,324.9	1,326.4	1,326.7	1,322.7	1,324.4	1,325.3	1,326.4	1,314.5	1,314.9	1,315.7	1,314.5	1,311.9
IP Evaporator Drum Exit	Flow, lb/h	77,108	74,427	69,860	64,797	58,988	56,813	72,575	66,568	53,281	52,902	87,556	85,202	81,021	77,230	76,539
	Pressure, psia	541.8	540.5	537.6	534.5	533.7	537.6	539.0	536.0	533.8	534.0	493.3	490.5	486.0	482.8	477.6
	Temperature, F	475.4	475.1	474.6	474.0	473.8	474.6	474.9	474.3	473.8	473.9	465.6	465.1	464.1	463.5	462.3
	Enthalpy, Btu/lb	1,204.6	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,205.1	1,205.1	1,205.1	1,205.1	1,205.1
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	25.1	24.6	23.3	22.1	20.5	19.7	24.1	22.8	21.8	21.7	29.7	29.1	28.2	27.4	27.2
IP Approach	Temperature, F	20.8	21.1	22.0	22.5	23.7	24.4	21.4	22.1	22.8	22.8	14.7	14.8	16.4	15.0	15.9
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	77,108	74,427	69,860	64,797	58,988	56,813	72,575	66,568	53,281	52,902	87,556	85,202	81,021	77,230	76,539
	Pressure, psia	541.8	540.5	537.6	534.5	533.7	537.6	539.0	536.0	533.8	534.0	493.3	490.5	486.0	482.8	477.6
	Temperature, F	454.8	454.8	452.6	451.5	450.1	450.2	453.4	452.1	451.2	451.1	450.9	450.3	448.7	448.5	448.5
	Enthalpy, Btu/lb	436.4	434.8	433.1	431.9	430.4	430.5	434.1	432.7	431.6	431.5	431.3	430.6	428.8	428.5	428.5
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	77,108	74,427	69,860	64,797	58,988	56,813	72,575	66,568	53,281	52,902	87,556	85,202	81,021	77,230	76,539
(pressure is preliminary)	Pressure, psia	560.9	565.4	577.2	588.8	582.1	583.9	581.7	572.0	566.3	566.2	566.2	549.2	539.2	531.2	523.9
	Temperature, F	359.3	359.0	357.1	356.8	355.4	355.0	358.2	357.6	356.8	356.7	358.0	357.6	356.5	355.4	354.4
	Enthalpy, Btu/lb	332.2	331.9	329.9	329.6	328.1	327.7	331.1	330.4	329.5	329.4	330.8	330.3	328.2	328.0	327.0
IP FW Temperature Increase Across BFP	F	3.3	3.3	3.3	3.4	3.4	3.4	3.3	3.4	3.4	3.4	3.5	3.5	3.6	3.5	3.6
LP Steam (at HRSG terminal point)	Flow, lb/h	61,160	60,433	58,634	56,167	52,581	50,722	58,888	57,624	50,051	50,750	69,314	68,618	65,098	65,027	63,971
	Pressure, psia	137.4	136.9	134.3	133.8	131.9	131.7	135.8	134.9	133.7	133.5	132.9	131.6	128.7	128.4	126.6
	Temperature, F	663.9	663.7	664.8	663.7	664.4	665.0	664.0	663.3	663.3	663.5	645.2	644.5	645.0	640.0	633.7
	Enthalpy, Btu/lb	1,359.2	1,359.1	1,359.6	1,359.3	1,359.7	1,360.1	1,359.3	1,359.0	1,359.1	1,359.2	1,350.0	1,349.7	1,350.1	1,347.7	1,344.5
LP Evaporator Steam Exit	Flow, lb/h	61,160	60,433	58,634	56,167	52,581	50,722	58,888	57,624	50,051	50,750	69,314	68,618	65,098	65,027	63,971
	Pressure, psia	145.4	144.7	141.4	140.8	138.1	137.5	143.3	142.1	140.6	140.5	142.7	141.8	138.2	137.9	136.1
	Temperature, F	358.0	358.6	358.8	358.5	358.0	357.7	358.6	358.2	358.4	358.3	358.6	358.1	358.0	357.9	356.8
	Enthalpy, Btu/lb	1,194.0	1,193.9	1,193.6	1,193.6	1,193.1	1,193.1	1,193.7	1,193.6	1,193.4	1,193.4	1,193.7	1,193.6	1,193.1	1,193.1	1,192.9
LP Evaporator Water Exit to BFPs	Flow, lb/h	556,202	552,289	545,021	536,486	529,904	532,988	548,524	539,385	533,771	533,836	598,202	592,915	584,453	578,834	566,461
	Pressure, psia	145.4	144.7	141.4	140.8	138.1	137.5	143.3	142.1	140.6	140.5	142.7	141.8	138.2	137.9	136.1
	Temperature, F	356.0	355.6	353.8	353.5	352.0	351.7	354.9	354.2	353.4	353.3	354.6	354.1	352.0	351.9	350.8
	Enthalpy, Btu/lb	328.1	327.7	325.8	325.4	323.9	323.5	326.9	326.2	325.4	325.3	326.6	326.1	323.9	323.7	322.7
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	77,108	74,427	69,860	64,797	58,988	56,813	72,575	66,568	53,281	52,902	87,556	85,202	81,021	77,230	75,639
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	2,521	8,368	0	0	0	0	0	0	0	13,583	25,399
HP FW to HRSG HP Economizer #8	Flow, lb/h	569,506	566,157	565,223	561,518	558,112	557,160	556,115	552,715	550,266	550,734	498,863	495,841	491,363	473,267	435,842
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,021
IP FW to PAG Steam Desuperheater	Flow, lb/h	9,597	9,692	9,636	10,164	10,281	10,383	9,837	10,085	10,220	10,199	11,778	11,871	12,072	12,781	12,853
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	20.5	20.2	19.7	19.9	18.3	18.1	20.0	19.3	18.9	18.8	21.1	20.8	20.3	19.9	19.8
LP Approach	Temperature, F	14.8	15.8	15.0	11.4	11.8	12.9	14.1	10.9	10.3	10.4	8.5	7.2	8.3	5.0	4.7
Condensate Recirculated	Flow, lb/h	136,813	115,595	116,603	64,433	49,206	49,177	115,941	64,085	48,736	48,776	132,234	112,261	112,903	65,023	50,913
	Temperature, F	341.8	342.6	339.3	342.5	340.6	339.1	341.3	343.8	343.5	343.3	346.6	347.3	344.2	347.2	345.4
% of Total LP Economizer Flow		15%	14%	14%	9%	7%	7%	14%	8%	7%	7%	17%	15%	15%	9%	7%
Condensate from LP Economizer	Flow, lb/h	864,144	828,347	816,284	757,023	731,654	732,538	823,410	761,136	738,496	738,429	769,794	773,785	762,450	708,904	681,306
	Temperature, F	341.0	341.8	338.5	341.8	339.9	338.4	340.5	343.0	342.8	342.6	345.5	346.8	343.5	346.5	345.7
	Enthalpy, Btu/lb	312.6	313.5	310.1	313.5	311.6	310.0	312.1	314.8	314.6	314.3	317.7	318.5	315.3	318.5	317.7
Condensate to LP Economizer	Flow, lb/h	864,144	828,347	816,284	757,023	731,654	732,538	823,410	761,136	738,496	738,429	769,794	773,785	762,450	708,904	681,306
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.1	104.1	104.2	104.2	104.2	104.2	104.1	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2
Condensate from Recirculation	Flow, lb/h	136,813	115,595	116,603	64,433	49,206	49,177	115,941	64,085	48,736	48,776	132,234	112,261	112,903	65,023	50,913
	Temperature, F	341.8	342.6	339.3	342.5	340.6	339.1	341.3	343.8	343.5	343.3	346.6	347.3	344.2	347.2	345.4
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	94.8	100.7	100.4	116.3	119.9	120.1	100.6	115.5	120.0	120.0	92.3	96.3	98.0	113.1	117.6
Condensate to HRSG	Flow, lb/h	717,331	712,752	701,682	692,590	682,449	683,361	707,469	697,051	689,759	689,653	667,560	661,523	649,547	641,882	630,394
	Pressure, psia	466.7	467.2	469.8	470.4	472.2	472.0	468.4	469.3	470.5	470.5	476.3	479.1	481.7	481.9	483.8
	Temperature, F	94.8	100.7	100.4	116.3	119.9	120.1	100.6	115.5	120.0	120.0	92.3	96.3	98.0	113.1	117.6
Stack Exit	Flow, lb/h	4,345,834	4,268,604	4,126,526	3,961,411	3,798,884	3,752,000	4,196,334	4,006,936	3,903,091	3,896,060	4,342,432	4,265,107	4,124,936	3,967,725	3,794,773
	Temperature, F	216.8	219.5	216.7	219.8	218.0	216.4	218.4	220.9	220.8	220.6	224.0	225.0	222.3	225.4	224.2

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	8,625	8,646	8,693	8,741	8,783	8,801	8,662	8,723	8,755	8,761	7,831	7,830	7,844	7,876	7,372
HP Turbine Remainder Shaft Power	kW	98,901	99,197	99,777	99,340	99,736	99,447	99,372	99,112	99,489	99,587	96,677	96,670	96,991	78,079	73,696
IP Turbine Shaft Power	kW	108,057	108,315	108,927	109,183	110,323	111,039	108,547	109,063	109,312	109,462	95,402	95,331	95,576	95,684	94,888
LP Turbine Shaft Power	kW	206,723	209,302	207,959	205,944	202,675	203,615	208,726	205,852	203,236	203,275	191,451	193,153	191,465	188,974	184,059
Total Shaft Power	kW	403,661	406,514	406,563	403,468	403,737	405,702	405,644	405,827	403,038	403,323	387,530	389,153	387,942	382,717	362,644
STG Throttle Steam	Flow, lb/h	2,277,908	2,272,628	2,260,885	2,246,071	2,232,419	2,228,807	2,264,454	2,250,862	2,241,066	2,242,937	1,995,459	1,983,963	1,985,447	1,863,076	1,811,450
	Pressure, psia (MAX 2270 psia)	2,269.0	2,269.0	2,269.6	2,268.0	2,267.7	2,268.3	2,267.6	2,268.7	2,267.2	2,266.4	2,024.3	2,017.9	2,010.6	1,954.2	1,875.6
	Temperature, F	992.5	997.4	1,007.4	1,016.9	1,030.8	1,034.6	1,002.4	1,015.1	1,022.7	1,022.9	1,016.3	1,021.0	1,032.0	1,047.7	1,050.0
	Enthalpy, Btu/lb	1,461.0	1,464.3	1,470.9	1,478.5	1,488.3	1,488.7	1,467.6	1,476.0	1,481.0	1,481.1	1,483.9	1,487.7	1,494.9	1,506.6	1,510.1
THV Pressure Loss	psi	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	45.4	40.5	40.4	40.2	39.0	37.4
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	28,618	28,558	28,405	28,215	28,045	28,003	28,451	28,261	28,152	28,179	25,073	24,920	24,894	23,601	22,789
HP Turbine Exit	Flow, lb/h	2,249,378	2,244,073	2,232,471	2,217,656	2,204,357	2,200,801	2,235,997	2,222,581	2,212,913	2,214,757	1,970,376	1,958,438	1,960,748	1,839,283	1,788,663
	Pressure, psia	561.0	560.9	559.8	558.6	559.6	564.3	560.1	559.4	558.4	558.9	501.5	499.9	497.3	494.4	487.9
	Temperature, F (MAX 640 F)	632.0	636.0	644.0	653.3	663.9	668.8	640.1	650.4	656.5	656.6	654.3	659.2	668.2	687.2	696.3
	Enthalpy, Btu/lb	1,313.2	1,315.7	1,320.5	1,326.2	1,332.4	1,335.0	1,318.2	1,324.4	1,328.1	1,328.2	1,330.8	1,333.7	1,339.1	1,350.1	1,355.7
Efficiency (THV inlet to HPT exit)		86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%
Efficiency (THV exit to HPT exit)		87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%	87.06%
Leaks 355 Leakage Flow to SSR	Flow, lb/h	1,813	1,808	1,796	1,782	1,774	1,784	1,801	1,788	1,778	1,779	1,582	1,582	1,565	1,539	1,511
CRH Steam to Steam Seals	Flow, lb/h	38	47	81	107	126	107	84	92	114	113	412	431	471	505	550
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	2,247,628	2,242,217	2,230,595	2,215,967	2,202,456	2,196,710	2,234,131	2,220,701	2,211,021	2,212,866	1,968,375	1,956,426	1,938,712	1,837,239	1,786,602
	Pressure, psia	561.0	560.9	559.8	558.6	559.6	564.3	560.1	559.4	558.4	558.9	501.5	499.9	497.3	494.4	487.9
	Temperature, F	632.0	636.0	644.0	653.3	663.9	668.8	640.1	650.4	656.5	656.6	654.3	659.2	668.2	687.2	696.3
	Enthalpy, Btu/lb	1,313.2	1,315.7	1,320.5	1,326.2	1,332.4	1,335.0	1,318.2	1,324.4	1,328.1	1,328.2	1,330.8	1,333.7	1,339.1	1,350.1	1,355.7
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	358.7	358.3	356.6	356.1	354.7	354.3	357.6	356.9	356.1	356.0	357.3	355.8	354.8	354.8	353.6
Final Cold Reheat Steam after Conditioning	Flow, lb/h	2,247,628	2,242,217	2,230,595	2,215,967	2,202,456	2,196,710	2,234,131	2,220,701	2,211,021	2,212,866	1,968,375	1,956,426	1,938,712	1,837,239	1,786,602
	Pressure, psia	561.0	560.9	559.8	558.6	559.6	564.3	560.1	559.4	558.4	558.9	501.5	499.9	497.3	494.4	487.9
	Temperature, F (MAX 750 F)	632.0	636.0	644.0	653.3	663.9	668.8	640.1	650.4	656.5	656.6	654.3	659.2	668.2	687.2	696.3
	Enthalpy, Btu/lb	1,313.2	1,315.7	1,320.5	1,326.2	1,332.4	1,335.0	1,318.2	1,324.4	1,328.1	1,328.2	1,330.8	1,333.7	1,339.1	1,350.1	1,355.7
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	-190,670	-189,544	-189,586	-187,798	-175,457	-162,412	-188,011	-186,735	-186,336	-188,739	-140,141	-137,739	-136,411	-73,331	-8,251
Reheat System dP	psi	63.5	63.5	63.5	63.5	63.4	63.3	63.4	63.5	63.4	63.5	56.8	56.6	56.4	54.4	51.9
Reheat System dP		11.32%	11.32%	11.35%	11.36%	11.33%	11.22%	11.33%	11.35%	11.36%	11.36%	11.32%	11.32%	11.34%	11.01%	10.64%
Hot Reheat Flow	Flow, lb/h	2,056,958	2,052,673	2,041,009	2,028,169	2,026,999	2,046,297	2,046,120	2,033,967	2,024,685	2,026,127	1,828,234	1,818,686	1,802,301	1,793,908	1,778,350
	Pressure, psia (MAX 584 psia)	497.5	497.4	496.2	495.1	496.4	501.0	496.6	496.0	495.0	495.4	444.8	443.3	440.9	440.0	436.0
	Temperature, F	1,015.0	1,019.8	1,029.4	1,040.6	1,050.0	1,050.0	1,024.7	1,037.3	1,044.4	1,044.7	1,026.5	1,031.8	1,042.2	1,050.0	1,050.0
Differential to HP Temperature	dT, F (MAX +/- 50 F)	22.5	22.3	22.0	21.7	19.2	16.5	22.3	22.2	21.7	21.8	11.2	10.7	10.1	2.3	0.0
	Enthalpy, Btu/lb	1,529.1	1,531.7	1,537.0	1,543.1	1,548.1	1,548.0	1,534.4	1,541.2	1,545.1	1,545.3	1,536.8	1,539.7	1,545.4	1,549.6	1,549.7
INTV Pressure Loss	psi	9.9	9.9	9.9	9.9	9.9	10.0	9.9	9.9	9.9	9.9	8.9	8.9	8.8	8.8	8.7
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	2,056,477	2,051,229	2,039,413	2,026,385	2,025,044	2,074,300	2,074,571	2,062,247	2,052,837	2,054,308	1,853,305	1,843,607	1,826,905	1,817,709	1,801,139
	Pressure, psia	119.5	119.3	118.3	117.9	117.5	118.0	118.8	118.4	117.9	117.9	110.0	109.5	108.3	108.0	106.9
	Temperature, F	646.0	649.6	655.9	664.9	671.0	670.0	653.0	662.8	668.0	668.1	662.9	667.0	674.1	680.7	680.5
	Enthalpy, Btu/lb	1,351.2	1,353.9	1,358.3	1,363.6	1,363.9	1,363.4	1,354.8	1,359.7	1,362.4	1,362.4	1,360.3	1,362.4	1,366.0	1,369.3	1,369.3
Efficiency (INTV inlet to IPT exit)		90.80%	90.89%	90.91%	90.91%	90.81%	90.82%	90.81%	90.81%	90.81%	90.81%	90.76%	90.78%	90.78%	90.78%	90.78%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 455 Leakage Flow to SSR	Flow, lb/h	1,760	1,744	1,724	1,712	1,709	1,709	1,734	1,729	1,708	1,709	1,597	1,587	1,584	1,565	1,539
LP Steam Admitted to STG (total)	Flow, lb/h	244,641	241,732	226,635	224,669	210,328	202,888	235,663	230,494	224,206	223,025	277,255	274,472	260,302	260,107	256,883
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	122.9	122.7	121.8	121.3	120.8	121.3	122.2	121.8	121.2	121.2	113.1	112.6	111.3	111.1	109.9
	Temperature, F	660.2	660.0	661.3	660.2	661.1	661.8	660.4	660.8	660.9	660.1	640.8	640.2	640.9	638.9	629.8
	Enthalpy, Btu/lb	1,356.2	1,356.1	1,356.8	1,356.3	1,356.7	1,356.1	1,356.3	1,356.9	1,356.1	1,356.2	1,349.0	1,348.7	1,349.1	1,348.7	1,343.6
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 108 F)	13.8	10.1	5.0	-5.1	-10.3	-8.6	7.1	-3.4	-8.6	-8.4	-22.4	-27.2	-33.6	-46.2	-51.3
LP Admission CV Pressure Loss	% loss	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.6%	2.6%	2.7%	2.6%	2.7%	2.7%	2.7%	2.6%	2.7%
LP Turbine Inlet Steam	Flow, lb/h	2,328,367	2,321,217	2,294,225	2,279,342	2,263,668	2,275,480	2,308,389	2,291,021	2,275,334	2,275,623	2,128,984	2,118,492	2,085,823	2,076,262	2,055,482
	Pressure, psia	117.7	117.5	116.5	116.2	116.7	116.2	117.1	116.7	116.1	116.1	108.3	107.9	106.6	106.4	105.3
	Temperature, F	647.2	650.4	656.2	664.2	669.9	669.1	653.5	662.2	668.0	667.1	659.8	663.3	669.7	674.9	673.9
	Enthalpy, Btu/lb	1,352.0	1,353.8	1,356.5	1,360.6	1,363.4	1,363.0	1,355.1	1,360.5	1,362.0	1,362.0	1,356.8	1,360.6	1,363.9	1,366.5	1,366.1
LP Turbine Exit	Flow, lb/h	2,328,368	2,321,214	2,294,221	2,279,344	2,263,668	2,275,482	2,308,387	2,291,019	2,275,337	2,275,619	2,128,963	2,118,498	2,085,830	2,076,281	2,055,482
	Pressure, psia	0.780	0.932	0.924	1.426	1.622	1.626	0.928	1.433	1.627	1.627	0.717	0.862	0.863	1.333	1.613
	Pressure, in. HgA	1.597	1.896	1.880	2.907	3.302	3.316	1.890	2.917	3.313	3.313	1.460	1.755	1.756	2.713	3.281
	Temperature, F	93.5	99.4	99.0	113.9	118.4	118.5	99.2	114.0	118.5	118.5	90.8	98.8	98.4	111.5	115.9
ELEP Enthalpy, Btu/lb		1,011.6	1,018.0	1,019.4	1,042.2	1,050.0	1,049.7	1,018.8	1,041.5	1,049.2	1,049.3	1,014.9	1,022.1	1,023.7	1,048.3	1,052.9
UEEP Enthalpy, Btu/lb		1,049.0	1,045.9	1,047.3	1,052.3	1,056.0	1,057.7	1,046.6	1,051.8	1,057.2	1,057.2	1,052.0	1,049.2	1,050.7	1,056.9	1,060.8
Exhaust Loss Btu/lb		37.4	27.9	27.8	10.1	7.9	7.9	27.8	10.2	8.0	8.0	37.1	27.1	27.0	9.6	7.6
Moisture @ UEEP (MIN 1.7%)		5.08%	5.64%	5.50%	5.67%	5.32%	5.35%	5.57%	5.73%	5.40%	5.40%	4.68%	5.21%	5.05%	5.21%	4.96%
LSB, in		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.01%	90.14%	90.20%	90.62%	90.86%	90.79%	90.17%	90.66%	90.76%	90.76%	90.16%	90.31%	90.36%	90.77%	90.86%
LPT Efficiency to UEEP		89.11%	89.05%	89.76%	87.74%	88.50%	88.46%	89.70%	87.70%	88.46%	88.46%	89.46%	89.07%	89.21%	88.04%	88.05%
Annulus Velocity ft/s		1,398.0	1,246.1	1,246.4	835.3	740.1	741.0	1,247.3	836.3	741.1	741.2	1,398.0	1,231.9	1,228.8	816.3	726.6
Volumetric Flow 1000 ft3/min per end		7,757	6,594	6,494	4,274	3,778	3,782	6,690	4,279	3,783	3,783	7,714	6,414	6,396	4,174	3,577
Gross Generator Output	kW	406,211	409,328	409,224	406,089	406,422	408,382	409,175	408,427	405,702	405,992	389,984	391,269	390,105	384,770	364,501
Generator MVA		447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0
Generator pf		0.907	0.914	0.914	0.911	0.944	0.949	0.914	0.912	0.942	0.943	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.52%	98.52%	98.52%	98.52%	98.52%	98.52%	98.52%	98.52%	98.52%	98.52%	98.49%	98.49%	98.49%	98.48%	98.47%

DEF-18FL-FUEL-002441

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

DECLASSIFIED

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 55 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	2,289.1	2,258.4	2,236.5	2,193.0	2,179.3	2,196.2	2,246.1	2,202.4	2,187.8	2,188.1	2,105.6	2,071.9	2,046.2	2,006.6	1,968.7
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	21.0	19.0	16.8	16.9	16.5	16.5	18.9	16.5	16.5	16.5	19.3	17.4	17.2	15.5	15.0
LP Turbine Exit Steam to Condenser	Flow, lb/h	2,328,368	2,321,214	2,294,221	2,279,344	2,263,688	2,275,482	2,308,387	2,291,019	2,275,337	2,275,919	2,128,983	2,116,496	2,085,830	2,078,281	2,055,482
	Pressure, psia	0.786	0.932	0.924	1.428	1.522	1.628	0.928	1.433	1.627	1.627	0.717	0.862	0.853	1.333	1.513
	Pressure, in. HgA	1.597	1.898	1.880	2.907	3.302	3.316	1.890	2.917	3.313	3.313	1.460	1.755	1.736	2.713	3.081
	Temperature, F	93.5	99.4	99.0	113.9	118.4	118.6	99.2	114.0	118.5	118.5	90.8	96.8	96.4	111.5	115.9
	Enthalpy, Btu/lb	1,049.0	1,046.9	1,047.3	1,052.3	1,053.0	1,057.7	1,049.6	1,051.8	1,057.2	1,057.2	1,052.0	1,049.2	1,050.7	1,056.9	1,060.6
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,331.7	1,333.8	1,337.7	1,342.7	1,347.3	1,348.5	1,335.8	1,341.3	1,344.4	1,344.4	1,343.9	1,346.3	1,350.8	1,358.4	1,361.5
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	537,375	529,175	508,838	487,433	462,633	454,384	517,866	493,570	460,115	479,374	537,660	526,010	508,774	487,664	462,495
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,550.1	1,552.7	1,538.8	1,544.1	1,548.1	1,549.0	1,535.4	1,542.2	1,546.1	1,546.3	1,537.9	1,540.7	1,546.4	1,550.6	1,550.7
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,359.2	1,359.1	1,359.8	1,359.3	1,359.7	1,360.1	1,359.3	1,359.0	1,359.1	1,359.2	1,359.0	1,349.7	1,350.1	1,347.7	1,344.6
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	64.1	70.0	69.7	84.6	89.1	89.9	69.9	84.7	89.2	89.2	61.6	67.6	67.3	82.4	86.9
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	64.1	70.0	69.7	84.6	89.1	89.9	69.9	84.7	89.2	89.2	61.6	67.6	67.3	82.4	86.9
Condenser Exit	Flow, lb/h	2,869,343	2,850,980	2,806,659	2,770,377	2,729,601	2,733,466	2,829,853	2,788,189	2,750,052	2,758,593	2,670,222	2,648,108	2,598,204	2,587,625	2,521,577
	Pressure, psia	0.760	0.932	0.924	1.428	1.522	1.628	0.928	1.433	1.627	1.627	0.717	0.862	0.853	1.333	1.513
	Pressure, in HgA (MIN 1.0 in. HgA)	1.587	1.898	1.881	2.907	3.303	3.316	1.890	2.917	3.313	3.313	1.460	1.755	1.736	2.713	3.081
	Temperature, F	93.5	99.4	99.1	113.9	118.4	118.6	99.2	114.0	118.5	118.5	90.8	96.8	96.4	111.5	115.9
	Enthalpy, Btu/lb	61.6	67.4	67.1	81.9	86.4	86.6	67.2	82.0	86.5	86.5	58.9	64.8	64.5	79.5	84.0
Condensate Pump Discharge	Flow, lb/h	2,869,343	2,850,980	2,806,659	2,770,377	2,729,601	2,733,466	2,829,853	2,788,189	2,750,052	2,758,593	2,670,222	2,648,108	2,598,204	2,587,625	2,521,577
	Pressure, psia	466.7	467.2	469.8	470.4	472.2	472.0	468.5	469.3	470.5	470.5	478.3	479.1	481.7	481.9	483.6
	Temperature, F	94.1	100.0	99.7	114.6	119.1	119.3	99.9	114.7	119.2	119.2	91.5	97.5	97.2	112.3	116.8
	Enthalpy, Btu/lb	69.4	69.3	69.0	83.8	88.4	88.5	69.1	83.9	88.4	88.4	60.9	66.8	66.5	81.5	86.0
Condensate after GSC	Flow, lb/h	2,869,343	2,850,980	2,806,659	2,770,377	2,729,601	2,733,466	2,829,853	2,788,189	2,750,052	2,758,593	2,670,222	2,648,108	2,598,204	2,587,625	2,521,577
	Temperature, F	94.6	100.7	100.4	115.3	119.9	120.1	100.6	115.5	120.0	120.0	92.3	98.3	98.0	113.1	117.6
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,869,324	2,851,006	2,806,727	2,770,359	2,729,795	2,733,442	2,829,877	2,788,205	2,750,036	2,758,612	2,670,240	2,648,094	2,598,188	2,587,626	2,521,574
	Temperature, F	94.8	100.7	100.4	115.3	119.9	120.1	100.6	115.5	120.0	120.0	92.3	98.3	98.0	113.1	117.6
Total Circulating Water	Flow, lb/h	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096
	Flow, gpm	389,653	389,785	389,785	389,596	389,532	389,582	389,785	389,596	389,582	389,582	389,653	389,785	389,785	389,596	389,582
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	80.0	86.0	86.0	85.0	90.0	90.0	86.0	85.0	90.0	90.0	80.0	86.0	86.0	85.0	90.0
Circulating Water to Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680
	Flow, gpm	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741	374,619	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	80.1	86.1	86.1	85.1	90.1	90.1	86.1	85.1	90.1	90.1	80.1	86.1	86.1	85.1	90.1
Circulating Water from Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680
	Temperature, F	72.5	80.4	80.2	97.0	102.0	102.0	80.3	97.1	102.0	102.0	71.6	79.3	79.2	96.0	100.9
Total Circulating Water Discharge	Flow, lb/h	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096
	Temperature, F	72.5	80.4	80.2	97.0	102.0	102.0	80.3	97.1	102.0	102.0	71.6	79.4	79.3	96.1	101.0
Circulating Water Temperature Rise	dT, F	12.61	12.38	12.24	12.04	11.97	12.03	12.30	12.09	12.02	12.02	11.56	11.39	11.25	11.08	10.96
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Flow, gpm	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062
	Temperature, F	80.1	86.1	86.1	85.1	90.1	90.1	86.1	85.1	90.1	90.1	80.1	86.1	86.1	85.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Temperature, F	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 1 4x100% PAG Fired Gas Fuel 35 F	Case 2 4x100% PAG Fired Gas Fuel 45 F	Case 3 4x100% PAG Fired Gas Fuel 59 F	Case 4 4x100% PAG Fired Gas Fuel 74 F	Case 5 4x100% PAG Fired Gas Fuel 90 F	Case 6 4x100% PAG Fired Gas Fuel 95 F	Case 7 4x100% PAG Fired Gas Fuel 59 F/EC On	Case 8 4x100% PAG Fired Gas Fuel 74 F/EC On	Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 10 4x100% PAG Fired Gas Fuel 95 F/EC On	Case 11 4x100% PAG Unfired Gas Fuel 35 F	Case 12 4x100% PAG Unfired Gas Fuel 45 F	Case 13 4x100% PAG Unfired Gas Fuel 59 F	Case 14 4x100% PAG Unfired Gas Fuel 74 F	Case 15 4x100% PAG Unfired Gas Fuel 90 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	537,975	528,175	508,838	487,433	462,533	454,364	517,666	493,670	460,115	479,874	537,660	528,010	508,774	487,664	462,495
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	656,202	662,269	645,021	638,486	629,904	632,998	648,524	639,365	633,771	639,836	658,202	662,915	654,453	578,634	566,451
	Pressure, psia	147.7	147.0	143.7	143.1	140.4	139.9	145.6	144.4	142.9	142.8	145.0	144.1	140.5	140.2	138.4
	Temperature, F	356.0	355.6	353.8	353.5	352.0	351.6	354.9	354.2	353.4	353.3	354.5	354.0	352.0	351.9	350.8
	Enthalpy, Btu/lb	328.1	327.7	325.8	325.4	323.9	323.5	326.9	326.2	325.4	325.3	326.6	326.1	323.9	323.7	322.7
IP Bleed (before CV)	Flow, lb/h	86,702	84,111	79,795	74,966	71,792	76,546	82,409	78,649	73,505	73,102	99,339	97,073	93,090	103,557	113,595
	Pressure, psia	1,034.7	1,036.8	1,039.6	1,044.6	1,047.1	1,046.1	1,038.4	1,043.6	1,046.1	1,046.9	1,067.3	1,069.5	1,072.0	1,076.6	1,079.7
	Temperature, F	358.7	358.3	356.5	356.1	354.7	354.3	357.5	356.9	356.1	356.0	357.3	356.8	354.8	354.6	353.6
	Enthalpy, Btu/lb	332.2	331.9	329.9	329.6	328.1	327.7	331.1	330.4	329.6	329.4	330.8	330.3	328.2	328.0	327.0
IP FW Control Valve Exit Pressure	Pressure, psia	500.0	585.4	577.2	568.6	562.1	563.9	581.7	572.0	566.3	566.2	555.2	549.2	539.2	531.2	523.9
	CV dP, psi	444.7	451.4	462.4	476.0	485.0	481.2	456.7	471.5	479.8	479.7	512.1	520.4	532.8	544.5	555.0
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,380.3	3,384.2	3,393.0	3,401.8	3,409.9	3,409.4	3,389.1	3,398.3	3,404.5	3,404.1	3,471.6	3,477.0	3,486.2	3,502.7	3,522.1
	CV dP, psi	900.9	904.6	914.9	927.0	936.4	935.8	912.7	922.2	931.0	928.1	1,270.9	1,284.1	1,302.7	1,383.8	1,497.7
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	569,500	568,157	565,223	561,518	558,112	557,150	566,115	562,715	560,266	560,734	498,863	495,841	491,363	473,267	452,863
	Pressure, psia	2,479.3	2,479.6	2,478.1	2,474.8	2,473.5	2,473.6	2,476.4	2,476.0	2,473.6	2,476.0	2,200.6	2,192.9	2,183.5	2,119.0	2,024.4
	Temperature, F	366.9	366.6	364.7	364.4	363.0	362.6	365.8	365.2	364.4	364.3	366.6	366.0	364.1	364.2	363.6
	Enthalpy, Btu/lb	343.1	342.7	340.8	340.5	339.0	338.6	341.9	341.2	340.4	340.3	342.2	341.7	339.7	339.7	338.9
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	569,500	568,157	565,221	561,518	558,105	557,152	566,113	562,715	560,266	560,734	498,863	495,841	491,362	473,259	452,863
	Pressure, psia	2,314.0	2,314.0	2,314.7	2,313.0	2,312.7	2,313.3	2,312.5	2,313.7	2,312.2	2,314.5	2,064.6	2,058.1	2,050.5	1,993.0	1,913.2
	Temperature, F	996.3	1,001.2	1,011.1	1,022.6	1,034.5	1,038.2	1,008.1	1,018.8	1,026.3	1,026.6	1,018.9	1,024.6	1,035.5	1,051.1	1,053.3
	Enthalpy, Btu/lb	1,462.0	1,466.3	1,471.9	1,479.5	1,487.3	1,489.7	1,468.6	1,477.0	1,482.0	1,482.1	1,484.9	1,488.7	1,495.9	1,507.5	1,511.1
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	2,314.0	2,314.0	2,314.7	2,313.0	2,312.7	2,313.3	2,312.5	2,313.7	2,312.2	2,314.5	2,064.6	2,058.1	2,050.5	1,993.0	1,913.2
	Temperature, F	996.3	1,001.2	1,011.1	1,022.6	1,034.5	1,038.2	1,008.1	1,018.8	1,026.3	1,026.6	1,018.9	1,024.6	1,035.5	1,051.1	1,053.3
	Enthalpy, Btu/lb	1,462.0	1,466.3	1,471.9	1,479.5	1,487.3	1,489.7	1,468.6	1,477.0	1,482.0	1,482.1	1,484.9	1,488.7	1,495.9	1,507.5	1,511.1
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	366.9	366.6	364.7	364.4	363.0	362.6	365.8	365.2	364.4	364.3	366.6	366.0	364.1	364.2	363.6
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	881.0	887.2	899.5	914.0	928.7	933.2	893.5	909.3	918.7	918.8	924.2	931.4	944.9	966.6	973.5
	Enthalpy, Btu/lb	1,462.0	1,466.3	1,471.9	1,479.5	1,487.3	1,489.7	1,468.6	1,477.0	1,482.0	1,482.1	1,484.9	1,488.7	1,495.9	1,507.5	1,511.1
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	514,215	513,168	510,252	507,042	504,750	511,574	511,530	508,492	506,171	506,532	457,058	454,672	450,575	448,477	444,568
	Pressure, psia	509.1	508.9	507.6	506.6	506.0	512.6	508.2	507.5	506.5	506.9	455.1	453.8	451.2	450.2	446.2
	Temperature, F	1,017.5	1,022.2	1,031.8	1,043.0	1,052.4	1,052.4	1,027.1	1,039.7	1,046.8	1,047.1	1,026.9	1,034.1	1,044.5	1,052.4	1,052.3
	Enthalpy, Btu/lb	1,530.1	1,532.7	1,538.0	1,544.1	1,549.1	1,549.0	1,535.4	1,542.2	1,546.1	1,546.3	1,537.6	1,540.7	1,546.4	1,550.6	1,550.7
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.8	100.7	100.4	116.3	119.9	120.1	100.6	116.5	120.0	120.0	92.3	98.3	98.0	113.1	117.6
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,001.2	1,006.1	1,016.1	1,027.6	1,037.2	1,037.0	1,011.2	1,024.2	1,031.5	1,031.9	1,015.8	1,021.2	1,032.0	1,040.1	1,040.2
	Enthalpy, Btu/lb	1,530.1	1,532.7	1,538.0	1,544.1	1,549.1	1,549.0	1,535.4	1,542.2	1,546.1	1,546.3	1,537.6	1,540.7	1,546.4	1,550.6	1,550.7
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	61,160	60,433	58,834	56,167	52,581	50,722	58,868	57,824	56,051	55,756	69,314	68,618	65,096	65,027	63,971
	Pressure, psia	137.4	136.9	134.3	133.8	131.9	131.7	135.8	134.9	133.7	133.6	132.3	131.8	128.7	128.4	126.8
	Temperature, F	663.9	663.7	664.8	663.7	664.4	665.0	664.0	663.3	663.3	663.5	645.2	644.5	645.0	640.0	633.7
	Enthalpy, Btu/lb	1,359.2	1,359.1	1,359.8	1,359.3	1,359.7	1,360.1	1,359.3	1,359.0	1,359.1	1,359.2	1,360.0	1,349.7	1,350.1	1,347.7	1,344.8
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	137.4	136.9	134.3	133.8	131.9	131.7	135.8	134.9	133.7	133.6	132.3	131.8	128.7	128.4	126.8
	Temperature, F	663.9	663.7	664.8	663.7	664.4	665.0	664.0	663.3	663.3	663.5	645.2	644.5	645.0	640.0	633.7
	Enthalpy, Btu/lb	1,359.2	1,359.1	1,359.8	1,359.3	1,359.7	1,360.1	1,359.3	1,359.0	1,359.1	1,359.2	1,360.0	1,349.7	1,350.1	1,347.7	1,344.8
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.8	100.7	100.4	116.3	119.9	120.1	100.6	116.5	120.0	120.0	92.3	98.3	98.0	113.1	117.6
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	137.4	136.9	134.3	133.8	131.9	131.7	135.8	134.9	133.7	133.6	132.3	131.8	128.7	128.4	126.8
	Temperature, F	663.9	663.7	664.8	663.7	664.4	665.0	664.0	663.3	663.3	663.5	645.2	644.5	645.0	640.0	633.7
	Enthalpy, Btu/lb	1,359.2	1,359.1	1,359.8	1,359.3	1,359.7	1,360.1	1,359.3	1,359.0	1,359.1	1,359.2	1,360.0	1,349.7	1,350.1	1,347.7	1,344.8
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
GateCycle Model ID		8BART2	8BART2	8BARTO	8BART2	8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2
GateCycle Case ID		B8-16	B8-17	B8-18	B8-19	B8-20	B8-151	B8-152	B8-153	B8-154	B8-155	B8-156	B8-157	B8-158	B8-159	B8-160
Ambient Temperature		95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%/augm	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%
CTG Inlet Air Cooler		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/duct burner Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Fired/1001 F	Fired/1003 F	Fired/1014 F	Fired/1030 F	Fired/1050 F	Fired/1053 F	Fired/1007 F	Fired/1025 F	Fired/1038 F	Fired/1038 F
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		ratio	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		361.7 MW	371.6 MW	368.5 MW	360.8 MW	360.2 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,854p/1,050F	2,019p/1,026F	2,004p/1,041F	1,928p/1,050F	1,923p/1,050F	2,060p/1,007F	2,048p/1,014F	2,054p/1,022F	2,071p/1,034F	2,089p/1,045F	2,079p/1,049F	2,048p/1,019F	2,067p/1,032F	2,090p/1,037F	2,091p/1,038F
STG Cold Reheat Conditions, psia/F		485p/898F	500p/883F	497p/878F	494p/893F	494p/893F	507p/887F	501p/892F	500p/897F	500p/705F	503p/714F	505p/719F	500p/896F	500p/704F	503p/707F	503p/708F
Cold Reheat Conditions after Conditioning, psia/F		485p/898F	500p/883F	497p/878F	494p/893F	494p/893F	507p/887F	501p/892F	500p/897F	500p/705F	503a/714F	505p/719F	500p/896F	500p/704F	503p/707F	503p/708F
STG Hot Reheat Conditions, psia/F		434p/1,050F	443p/1,037F	441p/1,050F	440p/1,050F	440p/1,050F	548p/1,015F	543p/1,021F	542p/1,029F	541p/1,042F	544p/1,050F	546p/1,050F	542p/1,025F	541p/1,039F	544p/1,046F	543p/1,047F
Condenser Pressure		3.07 In HgA	1.75 In HgA	2.72 In HgA	3.11 In HgA	3.10 In HgA	1.77 In HgA	2.08 In HgA	2.06 In HgA	3.15 In HgA	3.68 In HgA	3.58 In HgA	2.07 In HgA	3.18 In HgA	3.59 In HgA	3.59 In HgA
Stack Temperature		223 F	224 F	227 F	226 F	226 F	226 F	227 F	224 F	227 F	224 F	222 F	226 F	226 F	227 F	227 F
Run Date		8-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Gross CTG Output (each)	kW	181,934	217,962	203,867	199,267	195,542	207,123	201,614	192,471	181,068	168,833	164,881	197,137	184,229	177,293	176,696
Gross CTG Output (total)	kW	727,734	871,808	815,468	784,828	782,168	828,492	806,456	769,884	724,272	674,532	659,524	788,548	736,916	709,172	706,784
Gross CTG Heat Rate (LHV)	Btu/kWh	9,529	8,864	9,031	9,136	9,145	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,484
Gross CTG Heat Rate (HHV)	Btu/kWh	10,216	9,709	10,016	10,095	10,016	10,060	9,993	10,117	10,311	10,529	10,592	10,166	10,364	10,521	10,529
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Stk, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	6,789.16	7,727.71	7,364.49	7,170.19	7,152.93	7,515.25	7,358.11	7,111.42	6,818.30	6,484.28	6,378.25	7,242.02	6,908.38	6,727.21	6,710.21
CTG Heat Input (HHV) (total)	MMBtu/h	7,435.99	8,463.96	8,167.65	7,853.32	7,834.42	8,334.66	8,059.14	7,788.95	7,467.90	7,102.06	6,985.94	8,031.63	7,659.58	7,460.87	7,442.01
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	50.60	47.50	51.40	57.10	73.40	79.80	46.70	63.90	51.70	51.70
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	56.12	52.03	56.30	62.54	80.39	87.40	51.79	69.45	56.43	56.43
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	202.40	190.00	205.60	228.40	293.60	319.20	186.80	214.40	246.80	246.80
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	224.47	208.10	225.19	250.16	321.57	349.61	207.17	237.78	273.72	273.72
Gross STG Output	kW	361,730	371,940	368,470	360,550	360,200	420,000	419,960	420,020	420,020	420,030	419,990	420,010	420,010	420,020	419,980
STG Output, percent of CTG Output		48.3%	42.6%	45.2%	45.9%	46.1%	50.7%	52.1%	54.6%	58.0%	62.3%	63.7%	53.3%	57.0%	59.2%	59.4%
Gross Plant Output	kW	1,079,464	1,243,448	1,183,938	1,145,378	1,142,368	1,248,492	1,226,416	1,189,904	1,144,292	1,094,562	1,079,504	1,208,558	1,156,926	1,129,192	1,126,764
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,289	6,215	6,220	6,260	6,261	6,182	6,155	6,149	6,156	6,192	6,204	6,147	6,156	6,176	6,174
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,889	6,807	6,899	6,857	6,858	6,855	6,741	6,735	6,745	6,782	6,795	6,817	6,826	6,850	6,848
Plant Heat Input (LHV)	MMBtu/h	6,789.16	7,727.71	7,364.49	7,170.19	7,152.93	7,717.65	7,548.11	7,317.02	7,046.70	6,777.86	6,697.45	7,428.82	7,120.76	6,974.01	6,957.01
Plant Heat Input (HHV)	MMBtu/h	7,435.99	8,463.96	8,167.65	7,853.32	7,834.42	8,559.33	8,267.24	8,014.14	7,718.06	7,423.63	7,335.55	8,239.00	7,897.36	7,734.68	7,715.73
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	28,820	30,880	29,640	29,280	29,280	30,090	29,900	29,740	29,500	29,310	29,220	29,810	29,540	29,460	29,460
Total Auxiliary Power/Losses, percent of gross		2.67%	2.42%	2.50%	2.56%	2.56%	2.41%	2.44%	2.50%	2.58%	2.68%	2.71%	2.47%	2.55%	2.61%	2.61%
Net Plant Output w/ Step-Up Xfmr Losses	kW	1,050,644	1,213,568	1,154,298	1,116,098	1,113,108	1,218,402	1,196,516	1,160,164	1,114,792	1,065,252	1,050,284	1,178,748	1,127,386	1,099,732	1,097,314
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,462	6,369	6,380	6,424	6,426	6,334	6,308	6,307	6,321	6,363	6,377	6,302	6,316	6,342	6,340
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,078	6,975	7,076	7,036	7,039	7,025	6,909	6,908	6,923	6,969	6,984	6,990	7,005	7,033	7,031

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0
	Relative Humidity	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%
	WBT, F	76.6	51.4	69.1	75.6	76.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6
Compressor Inlet Conditions	Temperature, F	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3
	Relative Humidity	43.8%	92.8%	96.5%	91.4%	88.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.4%
Inlet Air Cooler Status		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Saturation Efficiency		0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	0	5,633	3,605	9,022	13,110	0	0	0	0	0	0	6,631	3,506	9,022	13,119
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,697.3	1,931.9	1,841.1	1,792.6	1,788.2	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.8	1,681.8	1,677.6
	Flow, lb/h	80,212	91,301	86,165	84,714	84,510	88,908	86,934	84,020	80,556	76,610	75,357	85,640	82,624	80,481	80,277
Fuel LHV	Btu/lb	21,166	21,166	20,897	21,166	21,166	20,897	21,166	21,166	21,166	21,166	21,166	20,897	20,897	20,897	20,897
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	101,112	117,467	111,114	107,194	103,912	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	458.9	457.6	465.1	464.1	463.6	578.7	573.2	571.6	570.8	574.4	576.9	572.1	571.2	573.7	573.6
	Temperature, F	693.2	657.8	670.9	687.5	687.7	681.6	687.2	692.8	700.7	709.5	714.9	691.0	699.2	702.4	703.1
	Enthalpy, Btu/lb	1,355.6	1,335.1	1,342.7	1,352.1	1,352.3	1,341.7	1,345.2	1,348.6	1,353.2	1,358.1	1,361.0	1,347.5	1,352.3	1,354.0	1,354.4
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	12,534	11,952	12,223	12,802	12,873	0	0	0	0	0	0	0	0	0	0
	Temperature, F	353.0	356.6	355.0	354.6	354.7	366.3	365.6	363.9	363.0	361.4	360.9	364.8	363.7	362.9	362.8
Steam Injection for Power Augmentation	Flow, lb/h	113,648	129,409	123,337	120,085	119,785	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	485.0	485.0	485.0	485.0	485.0	655.6	662.1	668.3	676.7	685.9	691.3	668.2	676.2	678.3	679.0
	Enthalpy, Btu/lb	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,341.7	1,345.2	1,348.6	1,353.2	1,358.1	1,361.0	1,347.5	1,352.3	1,354.0	1,354.4
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,747,463	4,194,884	4,003,299	3,899,405	3,892,326	4,201,488	4,127,393	4,069,011	3,838,934	3,674,902	3,630,468	4,059,590	3,875,058	3,775,057	3,768,327
	Pressure, In. H2O	16.77	20.23	18.79	18.02	17.96	19.73	19.17	18.29	17.09	15.96	15.56	18.89	17.96	18.69	18.59
	Temperature, F	1,125.7	1,066.4	1,103.4	1,112.8	1,113.4	1,072.9	1,079.8	1,090.9	1,103.0	1,123.4	1,127.2	1,087.0	1,105.0	1,115.0	1,116.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	181,934	217,952	203,867	196,207	195,542	207,123	201,614	192,471	181,068	166,633	164,881	187,137	184,229	177,293	176,696
Gross Heat Rate	Btu/kWh (LHV)	9,329	8,854	9,031	9,138	9,145	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494

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DEP-19FL-FUEL-002445

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	447,205	494,915	487,645	485,673	484,894	507,796	502,563	502,787	504,523	506,342	502,891	501,973	503,963	506,675	506,514
(at HRSG terminal point)	Pressure, psia	1,960.6	2,059.1	2,043.9	1,964.5	1,961.7	2,109.2	2,086.1	2,094.3	2,112.0	2,129.9	2,120.3	2,086.4	2,107.8	2,131.5	2,131.7
	Temperature, F	1,053.3	1,029.6	1,044.3	1,053.4	1,053.4	1,010.9	1,017.5	1,025.8	1,037.5	1,048.6	1,052.6	1,022.6	1,036.1	1,040.8	1,041.6
	Enthalpy, Btu/lb	1,511.6	1,491.9	1,501.7	1,509.7	1,509.8	1,478.6	1,483.3	1,488.4	1,495.4	1,501.8	1,504.7	1,486.6	1,493.9	1,495.9	1,497.4
dP from HP drum to HRSG terminal point	psi	49.6	57.1	56.5	53.8	53.6	58.1	57.7	57.7	57.9	58.0	57.8	57.7	57.8	58.2	58.2
HP SH #1 Steam Outlet Temperature	Temperature, F	1,053.8	1,030.1	1,044.8	1,053.9	1,053.9	1,011.4	1,018.1	1,026.3	1,038.1	1,049.1	1,053.2	1,023.2	1,036.6	1,041.4	1,042.2
HP SH #2 Steam Outlet Temperature	Temperature, F	935.0	947.3	958.1	956.6	956.6	930.4	935.7	941.3	948.4	956.1	959.5	938.4	946.2	949.3	949.8
HP Steam Desuperheating Flow	Flow, lb/h	22,214	0	0	4,385	5,221	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	363.1	365.3	364.4	364.6	364.5	375.5	374.8	373.1	372.2	370.5	370.1	374.0	372.9	372.0	371.8
	% of inlet steam	5.2%	0.0%	0.0%	1.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	142.3	181.9	188.4	185.3	183.3	178.9	182.5	186.6	188.4	195.2	200.2	182.8	186.3	187.2	187.4
HP SH #3/4 Steam Outlet Temperature	Temperature, F	838.3	824.6	830.3	834.1	834.3	824.7	827.3	830.9	834.9	840.0	847.3	827.8	832.5	835.1	835.3
HP Evaporator #1 Exit	Flow, lb/h	57,483	67,078	66,762	62,230	62,037	69,446	68,959	69,940	71,377	73,579	73,516	69,015	70,675	72,454	72,497
	Pressure, psia	1,940.1	2,116.2	2,100.3	2,018.3	2,015.3	2,158.3	2,143.8	2,152.0	2,169.9	2,188.0	2,178.1	2,140.1	2,165.5	2,189.7	2,190.0
	Temperature, F	631.6	643.9	642.6	637.1	636.9	646.7	645.8	646.3	647.5	648.7	648.1	645.9	647.2	648.8	648.8
	Enthalpy, Btu/lb	1,140.9	1,127.4	1,128.7	1,135.1	1,135.3	1,123.9	1,125.1	1,124.4	1,122.9	1,121.4	1,122.3	1,124.9	1,123.3	1,121.3	1,121.2
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	304.1	310.0	310.0	312.0	311.6	327.2	330.4	329.4	352.6	369.1	372.4	333.6	346.1	356.6	356.1
HP Evaporator #1 Approach	Temperature, F	2.5	5.3	6.0	4.2	4.1	5.5	5.6	6.7	8.4	10.4	10.5	6.0	7.9	9.4	9.6
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	367,514	427,836	420,885	399,083	397,838	438,348	433,805	432,849	433,146	432,760	429,374	432,958	433,308	436,221	436,019
	Pressure, psia	1,940.1	2,116.2	2,100.3	2,018.3	2,015.3	2,158.3	2,143.8	2,152.0	2,169.9	2,188.0	2,178.1	2,140.1	2,165.5	2,189.7	2,190.0
	Temperature, F	631.6	643.9	642.6	637.1	636.9	646.7	645.8	646.3	647.5	648.7	648.1	645.9	647.2	648.8	648.8
	Enthalpy, Btu/lb	1,140.9	1,127.4	1,128.7	1,135.1	1,135.3	1,123.9	1,125.1	1,124.4	1,122.9	1,121.4	1,122.3	1,124.9	1,123.3	1,121.3	1,121.2
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	18.7	17.0	16.9	16.6	16.5	18.0	18.0	17.8	17.8	17.4	17.2	18.0	17.9	17.8	17.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	2.5	5.3	6.0	4.2	4.1	5.5	5.6	6.7	8.4	10.4	10.5	6.0	7.9	9.4	9.6
HP Economizer #1/2/3 Outlet	Flow, lb/h	424,997	494,915	487,647	461,292	459,673	507,796	502,564	502,788	504,523	506,339	502,891	501,973	503,963	506,675	506,516
	Temperature, F	629.1	636.6	636.8	633.0	632.8	641.2	640.1	639.7	638.1	638.3	637.5	639.0	639.3	639.4	639.4
HP Economizer #4/5 Outlet Temperature	Temperature, F	570.4	573.5	570.0	570.3	570.3	576.8	576.3	572.6	568.6	564.1	563.3	574.2	569.8	567.0	566.8
HP Economizer #6/7 Outlet Temperature	Temperature, F	477.2	479.4	476.6	477.5	477.5	493.4	492.0	489.6	486.6	483.6	483.2	491.6	487.6	485.8	485.6
HP Economizer #8 Outlet Temperature	Temperature, F	423.6	423.3	420.8	422.6	422.7	434.4	433.2	430.4	427.2	423.6	423.1	432.0	428.3	425.9	425.8
Feedwater to HP Economizer #8	Flow, lb/h	424,997	494,915	487,647	461,292	459,673	507,796	502,564	502,788	504,523	506,339	502,891	501,973	503,963	506,675	506,516
	Pressure, psia	1,997.3	2,193.6	2,175.5	2,085.7	2,082.1	2,239.7	2,223.5	2,231.8	2,250.2	2,268.8	2,257.8	2,225.6	2,245.7	2,271.4	2,271.5
	Temperature, F	363.1	365.3	364.4	364.6	364.5	375.5	374.8	373.1	372.2	370.5	370.1	374.0	372.8	372.0	371.8
	Enthalpy, Btu/lb	338.4	340.9	340.0	340.0	340.0	351.6	350.9	349.2	348.2	346.5	346.0	350.1	348.9	348.0	347.9
HP FW Temperature Increase Across BFP	F	12.9	12.0	12.1	12.5	12.6	11.9	12.0	12.0	11.9	11.9	11.9	12.0	12.0	11.9	11.9
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	50.60	47.50	51.40	57.10	73.40	79.80	48.70	53.60	61.70	61.70
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	56.12	52.93	56.30	62.54	80.39	87.40	51.79	59.45	68.43	68.43
Inlet Temperature	Temperature, F	961.6	979.4	988.5	975.3	974.7	958.6	963.3	969.6	978.9	981.6	977.8	987.3	977.2	982.1	982.7
Exit Temperature	Temperature, F	961.6	979.4	988.5	975.3	974.7	1,009.6	1,008.2	1,013.9	1,029.9	1,049.6	1,052.9	1,007.9	1,024.5	1,037.7	1,038.4
HRSG Hot Reheat Steam	Flow, lb/h	442,432	483,979	449,338	446,073	446,815	508,810	501,994	508,662	506,359	507,441	509,226	509,860	506,273	507,344	506,957
(at HRSG terminal point)	Pressure, psia	444.0	483.7	461.2	450.7	450.4	561.1	555.7	554.2	563.5	567.1	568.8	554.7	563.9	566.3	566.1
	Temperature, F	1,052.3	1,039.1	1,052.3	1,052.3	1,052.3	1,017.1	1,023.2	1,031.7	1,044.2	1,052.5	1,052.6	1,028.6	1,041.8	1,048.5	1,049.3
	Enthalpy, Btu/lb	1,550.8	1,543.4	1,550.6	1,550.6	1,550.6	1,526.5	1,532.0	1,536.5	1,543.5	1,547.9	1,547.8	1,534.9	1,542.2	1,545.8	1,546.2
HRSG RH dP -- terminal pt. to terminal pt.	psi	12.9	14.1	13.9	13.4	13.3	17.6	17.4	17.4	17.3	17.3	17.1	17.4	17.3	17.4	17.4
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,052.6	1,039.3	1,052.5	1,052.5	1,052.5	1,017.4	1,023.4	1,031.9	1,044.4	1,052.7	1,052.7	1,028.8	1,042.1	1,048.7	1,049.5
RHTR #3 Steam Outlet Temperature	Temperature, F	920.3	956.6	963.9	939.2	938.4	934.4	938.9	945.0	952.7	963.2	949.1	942.5	951.8	956.5	957.0
Reheat Steam Desuperheating Flow	Flow, lb/h	27,571	0	1,664	20,206	20,513	0	0	0	0	8,046	12,647	0	0	0	0
(from IP Feedwater)	Temperature, F	363.0	365.0	365.0	354.8	354.7	366.3	365.6	363.9	363.0	361.4	360.9	364.8	363.7	362.9	362.8
	% of inlet steam	5.6%	0.0%	0.3%	4.7%	4.8%	0.0%	0.0%	0.0%	0.0%	1.1%	2.3%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	221.0	345.9	344.9	269.8	268.2	327.6	331.2	336.6	344.2	330.9	329.6	333.7	342.0	346.6	347.3
RHTR #4 Steam Outlet Temperature	Temperature, F	801.7	805.4	810.8	808.3	808.0	809.4	811.8	815.9	824.4	833.1	835.4	814.1	822.2	827.5	827.9
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	974.7	937.3	965.8	970.6	971.0	912.3	921.3	930.7	943.9	958.1	961.6	927.3	941.2	948.8	947.7
	Enthalpy, Btu/lb	1,511.8	1,421.9	1,501.7	1,509.7	1,509.8	1,476.6	1,483.3	1,488.4	1,495.4	1,501.8	1,504.7	1,486.6	1,493.9	1,495.9	1,497.4
Cold Reheat Steam from STG to HRSG	Flow, lb/h	339,940	370,737	309,885	352,101	351,624	500,904	495,743	495,906	497,686	499,487	496,078	495,155	497,155	501,765	501,020
(at HRSG terminal point)	Pressure, psia	459.9	467.6	465.1	464.1	463.8	578.7	573.2	571.5	570.8	574.4	575.9	572.1	571.2	573.7	573.6
	Temperature, F	693.2	667.6	670.9	687.5	687.7	681.8	687.2	692.8	700.7	709.6	714.9	691.0	699.2	702.4	703.1
	Enthalpy, Btu/lb	1,355.8	1,335.1	1,342.7	1,352.1	1,352.3	1,341.7	1,345.2	1,348.6	1,353.2	1,358.1	1,361.0	1,347.5	1,352.3	1,354.0	1,354.4
Cold Reheat Steam, % of HP Steam		76.01%	74.91%	75.85%	76.61%	75.64%	98.64%	98.64%	98.64%	98.55%	98.55%	98.64%	98.64%	98.65%	98.65%	98.64%
HP Steam - Cold Reheat Steam	Flow, lb/h	107,265	124,178	117,759	113,572	113,270	6,902	6,820	6,820	6,835	6,855	6,814	6,866	6,830	6,889	6,894

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

								35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	74,919	83,241	77,901	76,766	76,678	67,907	66,250	62,695	57,672	51,904	50,501	54,690	59,120	55,558	55,340
	Pressure, psia	468.9	467.6	465.1	464.0	463.6	578.7	573.2	571.6	570.8	574.4	575.9	572.1	571.2	573.7	573.5
	Temperature, F	615.0	623.6	624.6	620.0	619.6	637.7	637.4	639.2	642.3	646.8	645.7	638.1	641.4	644.4	644.5
	Enthalpy, Btu/lb	1,311.2	1,315.4	1,316.2	1,313.5	1,313.4	1,315.3	1,315.5	1,316.8	1,316.7	1,320.6	1,320.4	1,316.1	1,318.2	1,319.8	1,319.6
IP Evaporator Drum Exit	Flow, lb/h	74,919	83,241	77,901	76,766	76,678	67,907	66,250	62,695	57,672	51,904	50,501	54,690	59,120	55,558	55,340
	Pressure, psia	475.0	469.6	464.5	462.9	462.6	590.7	584.7	581.9	579.6	581.5	582.7	583.1	580.5	581.9	581.6
	Temperature, F	461.8	464.9	463.8	463.5	463.4	484.6	483.5	483.0	482.5	482.9	483.1	483.2	482.7	483.0	482.9
	Enthalpy, Btu/lb	1,205.1	1,205.1	1,205.1	1,205.1	1,205.1	1,204.0	1,204.1	1,204.1	1,204.2	1,204.1	1,204.1	1,204.1	1,204.2	1,204.1	1,204.1
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	27.1	28.7	27.6	27.4	27.4	24.9	24.6	23.5	22.2	20.3	19.8	24.3	22.7	21.6	21.5
IP Approach	Temperature, F	18.6	15.2	15.6	14.5	14.5	16.6	16.6	17.7	19.0	21.0	21.6	17.1	18.6	19.8	19.9
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	74,919	83,241	77,901	76,766	76,678	67,907	66,250	62,695	57,672	51,904	50,501	54,690	59,120	55,558	55,340
	Pressure, psia	475.0	469.6	464.5	462.9	462.6	590.7	584.7	581.9	579.6	581.5	582.7	583.1	580.5	581.9	581.6
	Temperature, F	448.2	449.7	448.3	448.9	448.9	467.9	466.8	465.2	463.5	461.9	461.6	465.1	464.2	463.2	463.0
	Enthalpy, Btu/lb	428.3	429.9	428.3	429.0	429.0	450.6	449.3	447.5	445.6	443.6	443.4	448.5	448.3	445.1	445.0
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	74,919	83,241	77,901	76,766	76,678	67,907	66,250	62,695	57,672	51,904	50,501	54,690	59,120	55,558	55,340
	Pressure, psia	520.5	545.7	533.6	530.6	530.2	628.2	620.4	613.9	608.7	603.5	603.5	617.2	609.0	607.0	606.6
	Temperature, F	353.8	358.7	355.8	355.6	355.5	367.0	366.3	364.6	363.7	362.1	361.8	365.5	364.3	363.8	363.5
	Enthalpy, Btu/lb	326.4	329.5	326.5	328.3	328.2	340.4	339.8	337.9	338.9	336.2	334.7	338.8	337.6	336.7	336.6
IP FW Temperature Increase Across BFP	F	3.6	3.5	3.5	3.5	3.5	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
LP Steam (at HRSG terminal point)	Flow, lb/h	68,266	67,000	65,670	65,451	65,339	67,621	67,024	65,409	61,412	56,680	55,133	65,416	62,822	60,359	60,142
	Pressure, psia	125.9	130.6	129.0	128.6	128.5	151.2	149.8	147.2	145.9	143.8	143.2	148.8	146.8	145.8	145.7
	Temperature, F	632.1	645.1	643.9	637.6	637.3	648.1	646.9	646.6	649.4	651.7	651.6	647.6	648.7	650.7	650.8
	Enthalpy, Btu/lb	1,343.6	1,350.1	1,349.3	1,346.3	1,346.2	1,350.3	1,349.8	1,350.8	1,351.3	1,352.6	1,352.6	1,350.2	1,350.9	1,352.0	1,352.0
LP Evaporator Steam Exit	Flow, lb/h	68,266	67,000	65,670	65,451	65,339	67,621	67,024	65,409	61,412	56,680	55,133	65,416	62,822	60,359	60,142
	Pressure, psia	135.0	140.4	138.6	138.3	138.1	160.0	158.5	155.2	153.6	150.4	149.5	157.0	154.7	153.2	153.0
	Temperature, F	360.2	353.3	352.3	352.1	352.0	383.5	382.8	381.1	380.2	358.6	358.2	362.0	360.9	360.1	360.0
	Enthalpy, Btu/lb	1,192.8	1,188.4	1,193.2	1,193.2	1,193.1	1,195.5	1,195.4	1,195.0	1,194.9	1,194.5	1,194.4	1,195.2	1,195.0	1,194.8	1,194.8
LP Evaporator Water Exit to BFPs	Flow, lb/h	562,244	560,109	570,325	575,550	574,956	575,899	568,812	565,465	562,193	564,256	558,033	565,080	563,098	564,231	563,854
	Pressure, psia	135.0	140.4	138.6	138.3	138.1	160.0	158.5	155.2	153.6	150.4	149.5	157.0	154.7	153.2	153.0
	Temperature, F	360.2	353.3	352.9	352.1	352.0	383.5	382.8	381.1	380.2	358.6	358.2	362.0	360.9	360.1	360.0
	Enthalpy, Btu/lb	322.0	325.2	324.2	324.0	323.9	336.1	335.3	333.5	332.6	330.9	330.4	334.5	333.3	332.4	332.3
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	74,919	83,241	77,901	76,766	76,678	67,907	66,250	62,695	57,672	51,904	50,501	54,690	59,120	55,558	55,340
IP FW to HRSG RH Desuperheater	Flow, lb/h	27,871	0	1,564	29,206	20,613	0	0	0	0	6,046	12,647	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	424,997	404,915	487,647	461,292	459,573	507,796	502,564	502,766	504,523	506,339	502,891	501,973	503,983	508,675	508,516
HP FW to HRSG HP Desuperheater	Flow, lb/h	22,214	0	0	4,365	5,221	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	12,534	11,952	12,223	12,892	12,873	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	19.7	20.6	19.9	19.9	19.9	19.6	19.5	19.1	18.4	17.7	17.5	19.4	19.6	18.2	18.2
LP Approach	Temperature, F	5.0	7.7	4.6	4.1	4.1	8.0	8.7	8.1	5.7	7.1	8.1	7.3	5.1	5.3	5.4
Condensate Recirculated	Flow, lb/h	51,091	112,623	64,881	50,539	50,577	104,024	87,223	86,357	46,070	33,660	33,888	87,702	45,724	32,938	32,999
	Temperature, F	345.4	345.9	348.0	348.3	348.2	356.0	356.5	353.4	354.9	351.8	350.4	355.1	356.1	355.1	354.9
% of Total LP Economizer Flow		8%	15%	9%	7%	7%	14%	12%	12%	7%	5%	5%	12%	7%	5%	5%
Condensate from LP Economizer	Flow, lb/h	678,562	769,627	769,819	691,493	690,918	747,370	723,104	717,260	689,685	654,644	656,078	719,811	671,687	657,636	657,011
	Temperature, F	344.6	346.2	347.3	347.7	347.6	356.3	356.6	352.7	354.2	351.2	349.8	354.4	355.4	354.6	354.3
	Enthalpy, Btu/lb	316.7	317.1	319.3	319.7	319.6	327.6	328.2	325.0	326.6	323.5	321.9	326.8	327.8	326.9	326.7
Condensate to LP Economizer	Flow, lb/h	678,562	769,627	769,819	691,493	690,918	747,370	723,104	717,260	689,685	654,644	656,078	719,811	671,687	657,636	657,011
	Temperature, F	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0
	Enthalpy, Btu/lb	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2
Condensate from Recirculation	Flow, lb/h	51,091	112,623	64,881	50,539	50,577	104,024	87,223	86,357	46,070	33,660	33,888	87,702	45,724	32,938	32,999
	Temperature, F	345.4	345.9	348.0	348.3	348.2	356.0	356.5	353.4	354.9	351.8	350.4	355.1	356.1	355.1	354.9
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	117.5	98.2	113.2	117.9	117.9	98.8	104.0	103.7	118.4	123.0	123.6	103.9	118.5	123.2	123.1
Condensate to HRSG	Flow, lb/h	626,471	657,103	644,938	640,954	640,342	643,346	635,880	628,893	623,615	620,984	621,190	632,110	625,943	624,699	624,012
	Pressure, psia	484.9	480.1	481.2	481.6	481.7	483.0	484.1	485.6	485.2	485.2	485.2	484.9	484.7	484.4	484.6
	Temperature, F	117.5	98.2	113.2	117.9	117.9	98.8	104.0	103.7	118.4	123.0	123.6	103.9	118.5	123.2	123.1
Stack Exit	Flow, lb/h	3,747,463	4,194,864	4,003,299	3,899,405	3,892,326	4,203,910	4,129,635	4,011,440	3,841,633	3,678,371	3,634,269	4,061,825	3,677,631	3,778,910	3,771,280
	Temperature, F	223.2	223.6	226.5	226.5	226.3	226.3	227.2	224.4	226.6	223.6	221.9	226.0	227.6	227.1	226.9

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	7,290	7,853	7,849	7,572	7,590	7,610	7,786	7,858	7,970	8,061	8,054	7,815	7,943	8,056	8,061
HP Turbine Remainder Shaft Power	kW	72,526	80,921	80,037	76,365	76,209	71,689	71,523	72,439	73,998	75,103	74,526	71,946	73,615	74,995	75,054
IP Turbine Shaft Power	kW	94,481	95,728	95,803	95,727	95,691	119,056	118,173	118,649	119,294	121,982	121,669	119,395	119,113	120,258	120,282
LP Turbine Shaft Power	kW	182,914	192,841	189,648	186,463	186,316	227,926	226,744	227,321	226,019	222,023	221,965	228,116	226,000	222,979	222,887
Total Shaft Power	kW	349,923	369,490	366,280	358,555	358,217	418,451	418,440	418,429	418,311	418,208	418,190	418,457	418,326	418,233	418,183
STG Throttle Steam	Flow, lb/h	1,788,822	1,979,661	1,950,578	1,862,691	1,859,575	2,031,183	2,010,253	2,011,146	2,018,091	2,025,368	2,011,685	2,007,894	2,015,931	2,034,701	2,034,657
	Pressure, psia (MAX 2270 psia)	1,653.6	2,019.0	2,004.8	1,926.3	1,923.6	2,059.6	2,045.8	2,053.8	2,071.2	2,088.6	2,079.3	2,048.1	2,067.0	2,090.3	2,090.6
	Temperature, F	1,050.0	1,026.1	1,040.8	1,050.0	1,050.0	1,007.3	1,014.0	1,022.2	1,034.0	1,045.1	1,049.2	1,019.1	1,031.6	1,037.3	1,038.1
	Enthalpy, Btu/lb	1,510.8	1,490.9	1,500.7	1,506.7	1,506.8	1,477.6	1,482.3	1,487.4	1,494.4	1,500.8	1,503.7	1,485.5	1,492.9	1,495.0	1,495.4
THV Pressure Loss	psi	37.0	40.4	40.1	38.5	38.4	40.8	40.6	40.7	41.1	41.5	41.3	40.6	41.0	41.5	41.5
		2.00%	2.00%	2.00%	2.00%	2.00%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%
Leak 1 Leakage Flow to HRH	Flow, lb/h	22,506	24,874	24,511	23,424	23,398	25,665	25,398	25,400	25,480	25,572	25,404	25,365	25,457	25,585	25,579
HP Turbine Exit	Flow, lb/h	1,766,291	1,954,790	1,926,058	1,839,244	1,836,186	2,005,518	1,984,853	1,985,739	1,992,611	1,999,891	1,986,105	1,982,531	1,990,475	2,009,016	2,008,968
	Pressure, psia	485.1	500.0	497.1	493.9	493.6	506.6	501.2	599.8	599.5	603.4	604.7	600.2	599.9	602.6	602.6
	Temperature, F (MAX 640 F)	598.0	563.3	576.3	592.5	592.7	566.6	591.9	597.5	705.4	714.3	719.5	695.7	703.9	707.2	707.6
	Enthalpy, Btu/lb	1,356.8	1,336.1	1,343.7	1,353.1	1,353.3	1,342.7	1,346.2	1,349.5	1,354.2	1,359.1	1,362.0	1,348.5	1,353.3	1,355.0	1,355.4
Efficiency (THV inlet to HPT exit)		86.94%	85.99%	86.99%	86.96%	86.96%	85.80%	85.80%	85.81%	85.82%	85.82%	85.81%	85.80%	85.82%	85.83%	85.83%
Efficiency (THV exit to HPT exit)		87.05%	87.06%	87.06%	87.05%	87.05%	87.03%	87.04%	87.04%	87.04%	87.04%	87.04%	87.03%	87.04%	87.04%	87.04%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,501	1,578	1,557	1,533	1,532	1,904	1,880	1,870	1,861	1,864	1,863	1,873	1,863	1,869	1,868
CRH Steam to Steam Seals	Flow, lb/h	509	442	482	509	511	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	1,764,221	1,952,770	1,924,016	1,837,202	1,834,143	2,003,613	1,982,973	1,983,869	1,990,750	1,997,938	1,984,302	1,980,658	1,988,612	2,007,146	2,006,500
	Pressure, psia	485.1	500.0	497.1	493.9	493.6	506.6	501.2	599.8	599.5	603.4	604.7	600.2	599.9	602.6	602.6
	Temperature, F	598.0	563.3	576.3	592.5	592.7	566.6	591.9	597.5	705.4	714.3	719.5	695.7	703.9	707.2	707.6
	Enthalpy, Btu/lb	1,356.8	1,336.1	1,343.7	1,353.1	1,353.3	1,342.7	1,346.2	1,349.5	1,354.2	1,359.1	1,362.0	1,348.5	1,353.3	1,355.0	1,355.4
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	353.0	356.0	355.0	354.8	354.7	356.3	356.6	353.9	363.0	361.4	360.9	354.8	353.7	352.9	352.6
Final Cold Reheat Steam after Conditioning	Flow, lb/h	1,764,221	1,952,770	1,924,016	1,837,202	1,834,143	2,003,613	1,982,973	1,983,869	1,990,750	1,997,938	1,984,302	1,980,658	1,988,612	2,007,146	2,006,500
	Pressure, psia	485.1	500.0	497.1	493.9	493.6	506.6	501.2	599.8	599.5	603.4	604.7	600.2	599.9	602.6	602.6
	Temperature, F (MAX 750 F)	598.0	563.3	576.3	592.5	592.7	566.6	591.9	597.5	705.4	714.3	719.5	695.7	703.9	707.2	707.6
	Enthalpy, Btu/lb	1,356.8	1,336.1	1,343.7	1,353.1	1,353.3	1,342.7	1,346.2	1,349.5	1,354.2	1,359.1	1,362.0	1,348.5	1,353.3	1,355.0	1,355.4
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	5,507	-136,853	-126,868	-40,908	-38,885	271,927	265,005	250,780	230,887	231,825	252,904	259,782	236,480	222,230	221,325
Reheat System dP	psi	51.2	56.6	56.1	53.6	53.4	58.5	58.1	59.3	58.7	59.0	58.6	58.1	58.6	59.2	59.2
Reheat System dP		10.56%	11.32%	11.29%	10.83%	10.82%	9.64%	9.69%	9.71%	9.79%	9.78%	9.69%	9.66%	9.76%	9.82%	9.82%
Hot Reheat Flow	Flow, lb/h	1,769,728	1,815,917	1,797,351	1,796,294	1,795,259	2,275,240	2,247,976	2,234,649	2,221,438	2,229,762	2,236,906	2,239,440	2,225,091	2,229,376	2,227,829
	Pressure, psia (MAX 684 psia)	433.9	443.4	440.9	440.4	440.2	548.4	543.1	541.8	540.9	544.4	545.1	542.1	541.3	543.6	543.4
	Temperature, F	1,050.0	1,030.8	1,050.0	1,050.0	1,050.0	1,014.6	1,029.7	1,029.2	1,041.7	1,050.0	1,050.0	1,026.1	1,039.4	1,046.1	1,046.9
Differential to HP Temperature	dT, F (MAX +/- 50 F)	0.0	10.7	9.2	0.0	0.0	7.3	6.6	7.0	7.7	4.9	9.9	7.0	7.8	8.6	8.7
	Enthalpy, Btu/lb	1,549.8	1,542.4	1,549.6	1,549.6	1,549.6	1,527.5	1,531.9	1,535.6	1,542.5	1,546.5	1,546.5	1,533.9	1,541.2	1,544.8	1,545.2
INTV Pressure Loss	psi	8.7	8.9	8.8	8.8	8.8	11.0	10.9	10.8	10.8	10.9	10.9	10.8	10.8	10.9	10.9
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	1,762,238	1,840,791	1,821,861	1,819,718	1,818,647	2,300,905	2,273,376	2,260,049	2,246,918	2,255,335	2,262,310	2,264,805	2,250,546	2,255,062	2,253,508
	Pressure, psia	109.3	109.2	108.4	108.2	108.1	131.6	130.4	129.3	128.7	128.5	128.6	129.8	129.1	129.1	129.0
	Temperature, F	680.3	670.4	680.8	680.9	680.8	646.8	650.7	656.2	665.7	670.5	669.6	664.5	664.3	668.7	669.3
	Enthalpy, Btu/lb	1,369.2	1,364.1	1,369.3	1,369.4	1,369.4	1,360.3	1,362.9	1,365.8	1,369.6	1,369.0	1,368.7	1,364.9	1,359.9	1,362.1	1,362.4
Efficiency (INTV inlet to IPT exit)		90.76%	90.76%	90.78%	90.76%	90.76%	90.80%	90.81%	90.81%	90.81%	90.82%	90.82%	90.81%	90.81%	90.81%	90.81%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,531	1,580	1,560	1,556	1,557	1,930	1,907	1,866	1,859	1,861	1,862	1,865	1,875	1,872	1,873
LP Steam Admitted to STG (total)	Flow, lb/h	253,071	267,999	262,280	261,805	261,956	270,464	268,097	253,837	245,846	226,718	220,532	261,665	251,290	241,435	240,667
(upstream of LP admission CV)	Pressure, psia (MIN 76.2 psia)	109.3	112.3	111.4	111.3	111.2	135.4	134.1	133.0	132.4	132.1	132.1	133.5	132.8	132.5	132.7
	Temperature, F	628.0	640.6	639.2	633.3	633.1	644.2	643.0	644.9	645.7	648.3	648.3	643.6	645.0	647.1	647.2
	Enthalpy, Btu/lb	1,342.8	1,349.1	1,348.3	1,345.3	1,345.2	1,349.3	1,348.6	1,349.8	1,350.3	1,351.6	1,351.6	1,349.2	1,349.9	1,351.0	1,351.0
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)	-52.6	-29.9	-42.0	-48.0	-48.2	-1.9	-8.1	-11.8	-20.4	-22.6	-22.0	-11.2	-19.8	-22.0	-22.5
LP Admission CV Pressure Loss	% loss	2.6%	2.7%	2.8%	2.8%	2.7%	2.6%	2.7%	2.8%	2.8%	2.8%	2.7%	2.7%	2.7%	2.7%	2.7%
LP Turbine Inlet Steam	Flow, lb/h	2,043,777	2,107,210	2,082,581	2,079,965	2,078,446	2,566,460	2,539,586	2,511,800	2,490,695	2,480,192	2,480,980	2,524,575	2,499,962	2,494,625	2,492,294
	Pressure, psia	104.7	107.6	106.8	106.6	106.5	129.7	128.4	127.4	126.6	126.6	126.6	127.9	127.2	127.2	127.1
	Temperature, F	673.6	656.4	676.3	674.6	674.6	645.1	649.6	654.6	663.5	668.2	667.7	653.1	662.1	666.4	666.9
	Enthalpy, Btu/lb	1,366.0	1,362.2	1,366.7	1,366.4	1,366.3	1,360.2	1,362.6	1,365.2	1,369.6	1,369.0	1,361.7	1,364.3	1,368.0	1,361.0	1,361.3
LP Turbine Exit	Flow, lb/h	2,043,777	2,107,214	2,082,577	2,079,966	2,078,443	2,566,458	2,539,565	2,511,799	2,490,695	2,480,194	2,480,980	2,524,575	2,499,962	2,494,625	2,492,293
	Pressure, psia	1.507	0.850	1.396	1.525	1.526	0.867	1.021	1.011	1.648	1.758	1.758	1.016	1.652	1.765	1.764
	Pressure, in. HgA	3.069	1.750	2.719	3.106	3.104	1.768	2.079	2.059	3.151	3.576	3.579	2.069	3.190	3.594	3.592
	Temperature, F	115.8	96.7	111.8	116.2	116.2	97.0	102.4	102.1	116.7	121.3	121.3	102.2	116.8	121.6	121.4
ELEP Enthalpy, Btu/lb		1,053.0	1,022.8	1,046.3	1,052.8	1,052.8	1,010.5	1,017.2	1,018.4	1,040.9	1,048.4	1,048.3	1,019.0	1,040.6	1,047.9	1,048.0
UEEP Enthalpy, Btu/lb		1,060.5	1,049.9	1,056.0	1,060.5	1,060.5	1,047.8	1,045.1	1,048.4	1,051.3	1,056.5	1,056.4	1,046.0	1,051.0	1,056.0	1,056.2
Exhaust Loss Btu/lb		7.8	27.1	9.6	7.7	7.7	37.2	28.0	28.0	10.4	5.1	5.1	28.0	10.4	5.1	5.1
Moisture @ UEEP (MIN 1.7%)		4.95%	5.14%	5.21%	4.96%	4.95%	5.37%	5.85%	5.72%	5.09%	4.69%	4.90%	5.76%	5.03%	4.64%	4.63%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.88%	90.34%	90.77%	90.89%	90.88%	89.98%	90.09%	90.15%	90.16%	90.75%	90.74%	90.13%	90.57%	90.73%	90.73%
LPT Efficiency to UEEP		85.65%	83.13%	86.04%	86.65%	86.65%	86.11%	82.57%	82.67%	87.63%	88.40%	88.40%	82.83%	87.61%	89.37%	89.38%
Annulus Velocity ft/s		719.1	1,251.0	817.1	723.3	723.2	1,368.0	1,250.0	1,249.5	843.8	749.7	749.7	1,249.8	844.3	750.5	750.4
Volumetric Flow 1000 ft3/min per end		3,969	5,401	4,178	3,991	3,990	7,727	6,516	6,512	4,319	3,826	3,826	6,514	4,321	3,832	3,831
Gross Generator Output	kW	351,729	371,645	368,465	360,550	360,203	419,907	419,963	420,024	420,017	420,026	419,981	420,009	420,007	420,025	419,981
Generator MVA		430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5
Closed Cycle Cooling Water	Temperature, F	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.938	0.938	0.938	0.938	0.976	0.976	0.938	0.938	0.976	0.976
Generator Efficiency		98.48%	98.49%	98.49%	98.48%	98.48%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%

CONFIDENTIAL

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,978.0	2,064.8	2,015.4	2,010.9	2,009.5	2,627.9	2,478.1	2,455.0	2,410.1	2,401.5	2,402.0	2,456.0	2,417.9	2,413.8	2,411.9
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	14.9	17.4	15.5	15.2	15.2	23.2	20.6	20.6	18.5	18.1	18.1	20.7	18.6	18.2	18.2
LP Turbine Exit Steam to Condenser	Flow, lb/h	2,043,777	2,107,214	2,082,677	2,079,966	2,078,443	2,699,458	2,639,585	2,611,799	2,490,595	2,480,194	2,480,980	2,524,575	2,499,962	2,494,625	2,492,203
	Pressure, psia	1.807	0.859	1.338	1.625	1.625	0.857	1.021	1.011	1.548	1.758	1.758	1.016	1.552	1.765	1.764
	Pressure, In. HgA	3.060	1.750	2.719	3.106	3.104	1.766	2.079	2.059	3.151	3.578	3.579	2.069	3.160	3.594	3.592
	Temperature, F	115.8	90.7	111.6	116.2	116.2	97.0	102.4	102.1	116.7	121.3	121.3	102.2	116.8	121.5	121.4
	Enthalpy, Btu/lb	1,060.6	1,049.9	1,056.0	1,060.5	1,060.5	1,047.5	1,045.1	1,046.4	1,051.3	1,056.5	1,056.4	1,048.0	1,051.0	1,055.0	1,056.2
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	2,034	1,987	1,956	1,930	1,925	1,924	1,958	1,939	1,941	1,938
	Enthalpy, Btu/lb	1,362.1	1,348.4	1,354.8	1,360.2	1,360.2	1,346.5	1,349.6	1,352.7	1,357.4	1,361.1	1,362.4	1,351.7	1,356.8	1,358.8	1,358.9
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	454,505	517,611	493,553	480,243	479,310	83	152	11	37	20	57	91	64	26	66
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser (total, both units)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,550.8	1,543.4	1,550.6	1,550.6	1,550.6	1,528.5	1,532.0	1,536.6	1,543.5	1,547.9	1,547.8	1,534.9	1,542.2	1,545.8	1,546.2
LP Steam Bypassed to Condenser (total, both units)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,343.6	1,350.1	1,349.3	1,348.3	1,348.2	1,350.3	1,349.8	1,350.8	1,351.3	1,352.5	1,352.8	1,350.2	1,350.9	1,352.0	1,352.0
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	86.7	87.5	82.4	87.1	87.1	87.9	73.3	73.0	87.7	92.3	92.3	73.2	87.8	92.4	92.4
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	86.7	87.5	82.4	87.1	87.1	87.9	73.3	73.0	87.7	92.3	92.3	73.2	87.8	92.4	92.4
Condenser Exit	Flow, lb/h	2,501,582	2,628,426	2,579,730	2,563,808	2,561,353	2,573,376	2,543,504	2,515,666	2,494,461	2,483,939	2,484,761	2,528,434	2,503,765	2,498,392	2,496,038
	Pressure, psia	1.507	0.859	1.338	1.625	1.625	0.857	1.021	1.011	1.548	1.758	1.758	1.016	1.552	1.765	1.764
	Pressure, In HgA (MIN 1.0 In. HgA)	3.069	1.750	2.719	3.106	3.104	1.766	2.079	2.059	3.151	3.578	3.579	2.069	3.160	3.594	3.592
	Temperature, F	115.8	90.7	111.6	116.2	116.2	97.0	102.4	102.1	116.7	121.3	121.3	102.2	116.8	121.5	121.4
	Enthalpy, Btu/lb	83.8	84.7	79.8	84.2	84.2	85.0	70.4	70.1	84.8	89.3	89.3	70.3	84.9	89.5	89.4
Condensate Pump Discharge	Flow, lb/h	2,501,582	2,628,426	2,579,730	2,563,808	2,561,353	2,573,376	2,543,504	2,515,666	2,494,461	2,483,939	2,484,761	2,528,434	2,503,765	2,498,392	2,496,038
	Pressure, psia	484.9	480.1	481.2	481.6	481.7	483.0	484.1	485.6	485.2	485.2	485.2	484.9	484.7	484.4	484.6
	Temperature, F	116.6	97.4	112.4	117.0	117.0	97.7	103.2	102.9	117.6	122.2	122.2	103.0	117.7	122.3	122.3
	Enthalpy, Btu/lb	86.9	86.7	81.6	86.3	86.3	87.1	72.5	72.2	86.8	91.4	91.4	72.3	86.9	91.5	91.5
Condensate after GSC	Flow, lb/h	2,501,582	2,628,425	2,579,730	2,563,808	2,561,353	2,573,376	2,543,504	2,515,666	2,494,461	2,483,939	2,484,761	2,528,434	2,503,765	2,498,392	2,496,038
	Temperature, F	117.6	98.2	113.2	117.9	117.9	98.6	104.0	103.7	118.4	123.0	123.0	103.9	118.5	123.2	123.1
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,501,584	2,628,413	2,579,750	2,563,815	2,561,367	2,573,383	2,543,522	2,515,672	2,494,461	2,483,937	2,484,781	2,528,438	2,503,771	2,498,394	2,496,049
	Temperature, F	117.6	98.2	113.2	117.9	117.9	98.6	104.0	103.7	118.4	123.0	123.0	103.9	118.5	123.2	123.1
Total Circulating Water	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	198,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Flow, gpm	389,662	389,785	389,656	389,682	389,682	389,853	389,755	389,755	389,656	389,682	389,682	389,785	389,656	389,682	389,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	88.0	86.0	90.0	90.0	68.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0
Circulating Water to Condenser (after CWP)	Flow, lb/h	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Flow, gpm	374,593	374,741	374,619	374,593	374,593	374,819	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593
	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	88.1	86.1	90.1	90.1	80.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Temperature, F	100.9	79.3	96.1	101.0	101.0	79.6	81.6	81.4	98.2	103.2	103.2	81.5	96.2	103.2	103.2
Total Circulating Water Discharge	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Temperature, F	100.9	79.3	96.1	101.1	101.1	79.6	81.6	81.4	98.2	103.1	103.1	81.4	96.2	103.2	103.2
Circulating Water Temperature Rise	dT, F	10.92	11.35	11.11	11.09	11.09	13.75	13.50	13.36	13.17	13.14	13.14	13.44	13.21	13.20	13.19
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Flow, gpm	15,062	15,013	15,049	15,062	15,062	15,069	15,013	15,013	15,046	15,062	15,062	15,013	15,049	15,062	15,062
	Temperature, F	90.1	88.1	86.1	90.1	90.1	80.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Temperature, F	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	59	74	90	95
Case Name		Case 16 4x100% PAG Unfired Gas Fuel 95 F	Case 17 4x100% PAG Unfired Gas Fuel 59 F/EC On	Case 18 4x100% PAG Unfired Gas Fuel 74 F/EC On	Case 19 4x100% PAG Unfired Gas Fuel 90 F/EC On	Case 20 4x100% PAG Unfired Gas Fuel 95 F/EC On	Case 151 4x100% Fired Gas Fuel 35 F	Case 152 4x100% Fired Gas Fuel 45 F	Case 153 4x100% Fired Gas Fuel 59 F	Case 154 4x100% Fired Gas Fuel 74 F	Case 155 4x100% Fired Gas Fuel 90 F	Case 156 4x100% Fired Gas Fuel 95 F	Case 157 4x100% Fired Gas Fuel 59 F/EC On	Case 158 4x100% Fired Gas Fuel 74 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 160 4x100% Fired Gas Fuel 95 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	464,505	517,611	493,553	469,243	479,310	83	152	11	37	20	57	91	64	25	95
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	562,244	560,109	579,325	575,560	574,966	575,099	556,812	555,455	562,193	564,286	560,033	556,660	563,096	564,231	563,654
	Pressure, psia	137.3	142.7	140.9	140.6	140.4	162.3	160.8	157.5	155.6	152.7	151.8	159.3	157.0	155.5	155.2
	Temperature, F	350.2	353.2	362.3	352.1	352.8	363.5	362.9	361.1	360.2	358.6	358.2	362.0	360.9	360.1	360.0
	Enthalpy, Btu/lb	322.0	325.2	324.2	324.0	323.9	336.1	335.3	333.5	332.6	330.9	330.4	334.5	333.9	332.4	332.3
IP Bleed (before CV)	Flow, lb/h	115,039	95,194	91,670	109,673	110,062	67,903	66,248	62,667	57,671	57,947	63,142	64,667	59,116	55,556	56,937
	Pressure, psia	1,061.1	1,070.3	1,074.8	1,076.5	1,076.7	1,068.7	1,091.2	1,091.0	1,091.5	1,088.5	1,087.4	1,091.4	1,091.5	1,090.4	1,090.4
	Temperature, F	353.0	356.0	356.0	364.8	354.7	366.3	365.6	363.9	363.0	361.4	360.9	364.6	363.7	362.9	362.6
	Enthalpy, Btu/lb	326.4	329.5	328.5	328.3	328.2	340.4	339.6	337.9	336.9	335.2	334.7	338.8	337.8	336.7	336.6
IP FW Control Valve Exit Pressure	Pressure, psia	525.5	545.7	533.6	530.8	530.2	628.2	620.4	613.9	606.7	603.5	603.5	617.2	609.0	607.0	606.6
	CV dP, psi	566.6	524.6	541.1	545.9	546.5	460.6	470.9	477.1	484.8	488.2	488.9	474.2	482.8	483.3	483.9
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,528.2	3,479.8	3,491.2	3,528.3	3,509.1	3,469.9	3,477.7	3,490.3	3,481.3	3,460.1	3,452.2	3,479.7	3,469.8	3,477.4	3,477.7
	CV dP, psi	1,539.9	1,286.2	1,315.8	1,422.6	1,427.0	1,230.2	1,254.2	1,248.6	1,231.1	1,211.4	1,224.4	1,264.1	1,236.1	1,206.0	1,206.2
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	447,211	464,916	487,647	466,677	464,894	507,796	502,564	502,788	504,523	506,339	502,891	501,973	503,983	508,675	508,514
	Pressure, psia	1,997.3	2,193.6	2,175.5	2,085.7	2,082.1	2,239.7	2,223.6	2,231.8	2,250.2	2,258.8	2,257.8	2,225.6	2,246.7	2,271.4	2,271.5
	Temperature, F	363.1	365.3	364.4	364.6	354.5	375.5	374.8	373.1	372.2	370.5	370.1	374.0	372.8	372.0	371.8
	Enthalpy, Btu/lb	338.4	340.9	340.0	340.0	340.0	351.6	350.9	349.2	348.2	346.5	346.0	350.1	348.9	348.0	347.9
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	447,205	464,915	487,645	466,673	464,894	507,796	502,563	502,787	504,523	506,342	502,891	501,973	503,983	508,675	508,514
	Pressure, psia	1,890.6	2,059.1	2,043.9	1,964.5	1,961.7	2,100.2	2,086.1	2,094.3	2,112.0	2,129.9	2,120.3	2,088.4	2,107.8	2,131.5	2,131.7
	Temperature, F	1,053.3	1,029.6	1,044.3	1,053.4	1,053.4	1,010.9	1,017.5	1,025.8	1,037.5	1,046.6	1,052.6	1,022.6	1,035.1	1,040.8	1,041.6
	Enthalpy, Btu/lb	1,511.8	1,491.9	1,501.7	1,509.7	1,509.6	1,478.6	1,483.3	1,488.4	1,495.4	1,501.6	1,504.7	1,486.5	1,493.9	1,496.9	1,497.4
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1,890.6	2,059.1	2,043.9	1,964.5	1,961.7	2,100.2	2,086.1	2,094.3	2,112.0	2,129.9	2,120.3	2,088.4	2,107.8	2,131.5	2,131.7
	Temperature, F	1,053.3	1,029.6	1,044.3	1,053.4	1,053.4	1,010.9	1,017.5	1,025.8	1,037.5	1,046.6	1,052.6	1,022.6	1,035.1	1,040.8	1,041.6
	Enthalpy, Btu/lb	1,511.8	1,491.9	1,501.7	1,509.7	1,509.6	1,478.6	1,483.3	1,488.4	1,495.4	1,501.6	1,504.7	1,486.5	1,493.9	1,496.9	1,497.4
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	363.1	365.3	364.4	364.6	354.5	375.5	374.8	373.1	372.2	370.5	370.1	374.0	372.8	372.0	371.8
HP Steam Bypassed to Cold Reheat – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	974.7	937.3	955.8	970.8	971.0	912.3	921.3	930.7	943.9	956.1	961.5	927.3	941.2	946.8	947.7
	Enthalpy, Btu/lb	1,511.8	1,491.9	1,501.7	1,509.7	1,509.8	1,478.6	1,483.3	1,488.4	1,495.4	1,501.6	1,504.7	1,486.5	1,493.9	1,496.9	1,497.4
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	442,432	453,979	449,336	449,073	448,815	568,810	551,994	550,652	556,359	557,441	559,228	556,860	556,273	557,344	556,957
	Pressure, psia	444.0	453.7	451.2	450.7	450.4	561.1	555.7	554.2	553.5	557.1	556.8	554.7	553.9	556.3	556.1
	Temperature, F	1,052.3	1,030.1	1,052.3	1,052.3	1,052.3	1,017.1	1,023.2	1,031.7	1,044.2	1,052.5	1,052.5	1,028.6	1,041.8	1,048.5	1,049.3
	Enthalpy, Btu/lb	1,550.6	1,543.4	1,550.6	1,550.6	1,550.6	1,528.5	1,532.0	1,536.6	1,543.5	1,547.9	1,547.8	1,534.9	1,542.2	1,545.6	1,546.2
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	444.0	453.7	451.2	450.7	450.4	561.1	555.7	554.2	553.5	557.1	556.8	554.7	553.9	556.3	556.1
	Temperature, F	1,052.3	1,030.1	1,052.3	1,052.3	1,052.3	1,017.1	1,023.2	1,031.7	1,044.2	1,052.5	1,052.5	1,028.6	1,041.8	1,048.5	1,049.3
	Enthalpy, Btu/lb	1,550.6	1,543.4	1,550.6	1,550.6	1,550.6	1,528.5	1,532.0	1,536.6	1,543.5	1,547.9	1,547.8	1,534.9	1,542.2	1,545.6	1,546.2
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	117.5	96.2	113.2	117.9	117.9	98.6	104.0	103.7	118.4	123.0	123.0	103.9	118.5	123.2	123.1
HRH Steam Bypassed to Condenser – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,040.3	1,026.4	1,040.0	1,040.0	1,040.0	998.0	1,004.6	1,013.5	1,029.5	1,034.9	1,034.8	1,010.3	1,024.0	1,030.8	1,031.7
	Enthalpy, Btu/lb	1,550.6	1,543.4	1,550.6	1,550.6	1,550.6	1,528.5	1,532.0	1,536.6	1,543.5	1,547.9	1,547.8	1,534.9	1,542.2	1,545.6	1,546.2
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	63,268	67,000	65,670	65,451	65,339	67,621	67,024	63,409	61,412	60,880	58,133	65,416	62,822	60,359	60,142
	Pressure, psia	125.9	136.5	129.0	126.8	126.6	151.2	149.8	147.2	145.9	143.8	143.2	148.6	146.8	145.6	145.7
	Temperature, F	632.1	645.1	643.3	637.5	637.3	646.1	646.9	648.6	649.4	651.7	651.6	647.6	648.7	650.7	650.8
	Enthalpy, Btu/lb	1,343.8	1,350.1	1,349.3	1,346.3	1,346.2	1,350.3	1,349.8	1,350.6	1,351.3	1,352.6	1,352.6	1,350.2	1,350.9	1,352.0	1,352.0
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	125.9	136.5	129.0	126.8	126.6	151.2	149.8	147.2	145.9	143.8	143.2	148.6	146.8	145.6	145.7
	Temperature, F	632.1	645.1	643.3	637.5	637.3	646.1	646.9	648.6	649.4	651.7	651.6	647.6	648.7	650.7	650.8
	Enthalpy, Btu/lb	1,343.8	1,350.1	1,349.3	1,346.3	1,346.2	1,350.3	1,349.8	1,350.6	1,351.3	1,352.6	1,352.6	1,350.2	1,350.9	1,352.0	1,352.0
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	117.5	96.2	113.2	117.9	117.9	98.6	104.0	103.7	118.4	123.0	123.0	103.9	118.5	123.2	123.1
LP Steam Bypassed to Condenser – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	125.9	136.5	129.0	126.8	126.6	151.2	149.8	147.2	145.9	143.8	143.2	148.6	146.8	145.6	145.7
	Temperature, F	632.1	645.1	643.3	637.5	637.3	646.1	646.9	648.6	649.4	651.7	651.6	647.6	648.7	650.7	650.8
	Enthalpy, Btu/lb	1,343.8	1,350.1	1,349.3	1,346.3	1,346.2	1,350.3	1,349.8	1,350.6	1,351.3	1,352.6	1,352.6	1,350.2	1,350.9	1,352.0	1,352.0
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

ST KW @87 F
#NAME?
87
#NAME?
74

HP Pressure
#NAME?

	35	45	59		90	95									
Case Name	Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
GateCycle Model ID	8BARTO	8BART2	8BARTO	8BARTO	8BART2	8BARTO	8BART2	8BARTO	8BART2	8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2
GateCycle Case ID	B8-21	B8-22	B8-23	B8-24	B8-25	B8-26	B8-27	B8-28	B8-29	B8-30	B8-31	B8-32	B8-33	B8-34	B8-35
Ambient Temperature	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/56%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/56%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/56%RH
Atmospheric Pressure	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	3@100%/augm	3@100%/augm	3@100%/augm	3@100%/augm	3@100%/augm
CTG Inlet Air Cooler	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Fired/1163 F	Fired/1192 F	Fired/1209 F	Fired/1233 F	Fired/1259 F
CTG Model	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 12-May-06	Siemens 12-May-06	ratio	ratio	ratio
HRSG Performance Reference	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output	393.7 MW	395.1 MW	393.1 MW	389.8 MW	378.2 MW	375.0 MW	395.8 MW	391.7 MW	385.7 MW	386.4 MW	388.0 MW	390.8 MW	391.1 MW	391.4 MW	389.8 MW
STG Performance Reference	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F	1,891p/1,018F	1,887p/1,024F	1,882p/1,034F	1,880p/1,048F	1,810p/1,050F	1,789p/1,050F	1,892p/1,030F	1,887p/1,044F	1,859p/1,050F	1,858p/1,050F	2,269p/998F	2,269p/1,002F	2,269p/1,013F	2,270p/1,027F	2,263p/1,044F
STG Cold Reheat Conditions, psia/F	566p/701F	562p/706F	558p/713F	553p/723F	543p/731F	539p/732F	562p/709F	556p/720F	552p/728F	552p/728F	575p/842F	577p/846F	576p/855F	577p/858F	577p/863F
Cold Reheat Conditions after Conditioning, psia/F	565p/701F	562p/706F	558p/713F	553p/723F	543p/731F	539p/732F	562p/709F	556p/720F	552p/728F	552p/728F	575p/842F	577p/846F	576p/855F	577p/858F	577p/863F
STG Hot Reheat Conditions, psia/F	511p/1,021F	508p/1,026F	504p/1,035F	499p/1,046F	492p/1,050F	489p/1,050F	508p/1,032F	502p/1,046F	499p/1,050F	499p/1,050F	487p/1,011F	487p/1,017F	486p/1,027F	486p/1,039F	487p/1,050F
Condenser Pressure	1.87 In HgA	1.98 In HgA	1.95 In HgA	2.99 In HgA	3.37 In HgA	3.35 In HgA	1.97 In HgA	3.01 In HgA	3.41 In HgA	3.41 In HgA	1.48 In HgA	1.76 In HgA	1.75 In HgA	2.74 In HgA	3.13 In HgA
Stack Temperature	231 F	232 F	229 F	232 F	230 F	229 F	230 F	233 F	233 F	232 F	199 F	200 F	197 F	200 F	199 F
Run Date	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06
Performance Summary															
Number of CTG/HRSG Units Operating	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3
Gross CTG Output (each) kW	207,123	201,614	192,471	181,068	188,633	184,881	197,137	184,229	177,293	176,696	226,924	222,620	212,810	200,507	184,378
Gross CTG Output (total) kW	826,492	806,456	769,884	724,272	674,532	659,624	788,548	736,916	709,172	706,784	566,772	556,460	538,429	501,521	550,134
Gross CTG Heat Rate (LHV) Btu/kWh	9,071	9,124	9,237	9,414	9,613	9,671	9,164	9,372	9,486	9,494	8,752	8,810	8,925	9,077	9,260
Gross CTG Heat Rate (HHV) Btu/kWh	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	9,597	9,649	9,775	9,942	10,152
Fuel Gas Temperature to CTG, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Stk, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total) MMBtu/h	7,515.25	7,358.11	7,111.42	6,818.30	6,484.28	6,378.26	7,242.02	6,906.38	6,727.21	6,710.21	6,017.50	5,889.13	5,697.95	5,460.04	5,182.62
CTG Heat Input (HHV) (total) MMBtu/h	8,334.86	8,059.14	7,788.95	7,467.90	7,102.06	6,985.94	8,031.83	7,659.58	7,460.87	7,442.01	6,590.81	6,450.21	6,240.93	5,960.24	5,678.32
Duct Burner Heat Input (LHV) (each) MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	278.00	280.00	283.00	289.00	299.00
Duct Burner Heat Input (HHV) (each) MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	304.40	308.88	309.96	318.53	327.40
Duct Burner Heat Input (LHV) (total) MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	834.00	840.00	849.00	867.00	897.00
Duct Burner Heat Input (HHV) (total) MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	913.46	920.03	929.86	949.56	982.46
Gross STG Output kW	393,990	395,100	393,070	389,760	378,210	374,970	395,550	391,650	385,720	385,410	388,020	390,840	391,140	391,410	389,769
STG Output, percent of CTG Output	47.5%	49.0%	51.1%	53.8%	56.1%	56.9%	50.2%	53.1%	54.4%	54.5%	68.5%	70.2%	61.3%	65.1%	69.7%
Gross Plant Output kW	1,222,182	1,201,556	1,162,954	1,114,032	1,052,742	1,034,464	1,184,098	1,128,566	1,094,892	1,092,194	1,074,792	1,059,300	1,029,569	992,931	948,894
Gross Cycle Heat Rate (LHV) Btu/kWh	6,149	6,124	6,115	6,120	6,159	6,166	6,116	6,120	6,144	6,144	6,375	6,352	6,359	6,372	6,407
Gross Cycle Heat Rate (HHV) Btu/kWh	6,820	6,707	6,698	6,703	6,746	6,753	6,793	6,787	6,814	6,814	6,982	6,958	6,965	6,979	7,017
Plant Heat Input (LHV) MMBtu/h	7,515.25	7,358.11	7,111.42	6,818.30	6,484.28	6,378.26	7,242.02	6,906.38	6,727.21	6,710.21	6,551.50	6,729.13	6,546.99	6,327.04	6,079.62
Plant Heat Input (HHV) MMBtu/h	8,334.86	8,059.14	7,788.95	7,467.90	7,102.06	6,985.94	8,031.83	7,659.58	7,460.87	7,442.01	7,504.27	7,370.24	7,170.71	6,929.84	6,658.85
Calculations Based on High-Side of Generator Step-Up Transformers															
Total Auxiliary Power/Losses kW	29,440	29,300	29,100	28,800	28,370	28,250	29,230	28,880	28,660	28,640	29,800	29,810	29,400	29,020	28,670
Total Auxiliary Power/Losses, percent of gross	2.41%	2.44%	2.50%	2.59%	2.69%	2.73%	2.47%	2.55%	2.62%	2.62%	2.77%	2.80%	2.86%	2.92%	3.02%
Net Plant Output w/ Step-Up Xfmr Losses kW	1,192,742	1,172,256	1,133,854	1,085,232	1,024,372	1,006,244	1,154,868	1,099,686	1,066,232	1,063,554	1,044,992	1,029,490	1,000,169	963,911	920,224
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses Btu/kWh	6,301	6,277	6,272	6,283	6,333	6,339	6,271	6,280	6,309	6,309	6,557	6,535	6,548	6,564	6,607
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses Btu/kWh	6,988	6,876	6,869	6,881	6,933	6,943	6,955	6,965	6,997	6,997	7,181	7,158	7,170	7,189	7,236

Revision History:
Rev. 8, 9/1/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)															
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%
	WBT, F	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1	76.6
Compressor Inlet Conditions	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	62.0	86.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.6%	60.1%	59.9%	59.7%	78.5%	54.8%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	8,831	3,605	9,622	13,119	0	0	0	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	2,005.8	1,963.0	1,899.3	1,820.0	1,727.5
	Flow, lb/h	89,908	88,934	84,020	80,556	76,610	75,357	85,940	82,024	80,481	80,277	94,794	92,771	89,760	86,012	81,642
Fuel LHV	Btu/lb	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	21,160	21,160	21,160	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-5 BJScrivner
1997 Steam Tables

ST KW @67 F #NAME? 87 #NAME? 74 | HP Pressure #NAME? 90 | 95

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Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	124,361	121,342	116,738	111,098	104,492
	Pressure, psia	539.6	536.7	532.1	527.1	518.6	515.2	536.3	530.3	527.0	526.8	530.5	530.0	526.9	529.3	529.9
	Temperature, F	696.7	701.2	708.3	716.5	726.3	727.6	705.1	716.0	723.3	723.7	634.0	639.0	646.1	660.3	675.7
	Enthalpy, Btu/lb	1,352.9	1,355.5	1,359.8	1,365.9	1,370.8	1,371.6	1,357.7	1,364.3	1,368.6	1,368.8	1,316.7	1,319.7	1,325.3	1,332.4	1,341.3
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	10,069	10,183	10,454	10,813	11,159
	Temperature, F	365.3	364.5	362.7	361.5	360.0	359.3	363.8	362.2	361.5	361.4	344.0	344.0	342.5	343.1	342.2
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	134,370	131,505	127,192	121,910	115,651
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	676.0	681.1	689.0	700.3	709.4	711.0	685.2	697.4	706.4	705.8	485.0	485.0	485.0	485.0	485.0
	Enthalpy, Btu/lb	1,352.6	1,355.5	1,359.8	1,365.9	1,370.8	1,371.6	1,357.7	1,364.3	1,368.6	1,368.8	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,050,590	3,875,056	3,775,057	3,758,327	4,342,432	4,285,107	4,124,936	3,957,726	3,794,773
	Pressure, in. H2O	19.73	19.17	18.29	17.09	15.90	15.56	18.69	17.39	16.59	16.59	21.37	20.75	19.71	18.45	17.16
	Temperature, F	1,072.9	1,079.6	1,090.9	1,108.0	1,123.4	1,127.2	1,087.0	1,105.9	1,115.0	1,116.0	1,073.6	1,079.9	1,092.6	1,107.5	1,121.7
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	207,123	201,614	192,471	181,068	168,533	164,861	197,137	184,229	177,293	176,596	228,924	222,820	212,610	200,507	188,378
Gross Heat Rate	Btu/kWh (LHV)	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,485	9,494	8,762	8,810	8,925	9,077	9,269

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

ST KW @67 F
#NAME?
at
#NAME?

HP Pressure
#NAME?

		35	45	59	74	90	95									
Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	461,643	459,347	456,093	452,753	434,621	429,270	459,494	455,352	446,903	446,055	757,533	754,951	750,860	746,775	737,005
(at HRSG terminal point)	Pressure, psia	1,928.2	1,924.4	1,918.9	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,865.5	1,892.2	2,338.6	2,338.1	2,338.2	2,339.6	2,331.8
	Temperature, F	1,021.7	1,027.6	1,037.0	1,050.9	1,053.3	1,053.3	1,032.9	1,047.7	1,053.3	1,053.3	1,000.9	1,006.9	1,018.1	1,032.2	1,048.6
	Enthalpy, Btu/lb	1,490.9	1,494.6	1,500.8	1,509.5	1,513.1	1,513.6	1,497.9	1,507.3	1,511.6	1,511.7	1,464.3	1,468.3	1,475.7	1,485.0	1,498.0
dP from HP drum to HRSG terminal point	psi	53.8	53.6	53.3	52.9	48.9	47.7	53.6	53.1	51.8	51.4	113.0	112.8	112.6	112.5	112.2
HP SH #1 Steam Outlet Temperature	Temperature, F	1,022.2	1,028.1	1,037.5	1,051.3	1,053.8	1,053.7	1,033.4	1,048.2	1,053.8	1,053.8	1,002.1	1,008.0	1,019.1	1,033.2	1,049.8
HP SH #2 Steam Outlet Temperature	Temperature, F	941.8	948.2	958.0	962.1	940.4	933.0	949.2	959.4	956.5	954.8	944.3	949.8	959.5	972.8	990.5
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	16,091	20,756	0	0	4,723	5,913	0	0	0	0	0
(from HP Feedwater)	Temperature, F	376.2	374.5	372.7	371.5	370.4	369.8	373.7	372.2	371.6	371.6	361.4	361.4	349.9	350.5	349.6
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	3.6%	5.1%	0.0%	0.0%	1.1%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	188.2	190.7	194.8	198.9	157.7	145.4	191.2	196.3	188.2	183.9	219.5	224.8	233.4	248.3	267.1
HP SH #3/4 Steam Outlet Temperature	Temperature, F	824.8	824.1	827.6	831.6	834.4	835.3	824.9	829.5	831.8	831.6	883.2	888.5	897.1	910.1	930.5
HP Evaporator #1 Exit	Flow, lb/h	56,612	59,892	59,892	59,960	55,129	53,844	59,892	60,040	56,173	57,892	125,624	126,360	127,851	129,401	131,426
	Pressure, psia	1,962.0	1,978.0	1,972.2	1,969.7	1,894.4	1,872.1	1,983.0	1,977.9	1,947.2	1,943.6	2,451.8	2,450.9	2,450.8	2,452.1	2,444.0
	Temperature, F	634.6	634.3	633.9	633.7	628.2	626.5	634.6	634.3	632.1	631.8	665.3	665.2	665.2	665.3	664.8
	Enthalpy, Btu/lb	1,137.8	1,138.1	1,138.6	1,139.8	1,144.2	1,145.8	1,137.8	1,138.2	1,140.4	1,140.7	1,096.6	1,096.7	1,096.7	1,096.6	1,097.4
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	303.6	307.8	314.1	323.2	314.2	311.6	311.2	321.0	319.7	319.0	475.0	483.7	498.9	519.4	543.2
HP Evaporator #1 Approach	Temperature, F	0.6	1.0	1.5	2.5	0.8	0.4	1.4	2.4	1.9	1.8	27.0	27.9	29.5	33.0	38.4
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	401,931	399,956	396,291	392,793	363,295	354,669	399,603	395,312	384,002	382,263	632,008	628,589	622,829	616,374	605,579
	Pressure, psia	1,962.0	1,978.0	1,972.2	1,969.7	1,894.4	1,872.1	1,983.0	1,977.9	1,947.2	1,943.6	2,451.8	2,450.9	2,450.8	2,452.1	2,444.0
	Temperature, F	634.6	634.3	633.9	633.7	628.2	626.5	634.6	634.3	632.1	631.8	665.3	665.2	665.2	665.3	664.8
	Enthalpy, Btu/lb	1,137.8	1,138.1	1,138.6	1,139.8	1,144.2	1,145.8	1,137.8	1,138.2	1,140.4	1,140.7	1,096.6	1,096.7	1,096.7	1,096.6	1,097.4
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	18.4	18.3	18.2	18.2	17.4	17.1	18.3	18.3	18.0	18.0	17.9	17.7	17.5	17.4	17.0
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.6	1.0	1.5	2.5	0.8	0.4	1.4	2.4	1.9	1.8	27.0	27.9	29.5	33.0	38.4
HP Economizer #1/2/3 Outlet	Flow, lb/h	461,642	459,347	456,093	452,753	418,424	408,513	459,494	455,352	442,175	440,155	757,533	754,949	750,860	746,775	737,005
	Temperature, F	633.9	633.3	632.3	631.2	627.4	626.2	633.2	631.9	630.2	630.0	658.3	657.3	655.7	652.9	648.5
HP Economizer #4/5 Outlet Temperature	Temperature, F	576.0	576.5	574.2	571.0	570.9	570.7	575.5	571.9	571.2	571.3	535.6	533.6	529.9	527.7	525.9
HP Economizer #6/7 Outlet Temperature	Temperature, F	493.2	491.8	488.6	486.7	488.5	488.2	490.9	487.7	487.1	487.2	456.6	456.4	452.9	451.2	449.2
HP Economizer #8 Outlet Temperature	Temperature, F	437.7	436.2	433.7	430.7	431.7	431.9	434.9	431.6	431.4	431.5	394.1	393.3	390.9	389.0	388.2
Feedwater to HP Economizer #8	Flow, lb/h	461,642	459,347	456,093	452,753	418,424	408,513	459,494	455,352	442,175	440,155	757,533	754,949	750,860	746,775	737,005
	Pressure, psia	2,049.3	2,044.7	2,038.0	2,034.5	1,950.0	1,925.0	2,049.8	2,043.4	2,009.2	2,004.9	2,631.5	2,629.4	2,627.3	2,626.2	2,614.1
	Temperature, F	375.2	374.5	372.7	371.5	370.4	369.8	373.7	372.2	371.6	371.5	361.4	361.4	349.9	350.5	349.6
	Enthalpy, Btu/lb	351.0	350.3	348.5	347.3	345.9	345.3	349.5	348.0	347.3	347.2	327.2	327.2	325.7	326.3	325.4
HP FW Temperature Increase Across BFP	F	12.8	12.8	12.9	12.9	13.3	13.5	12.8	12.9	13.1	13.1	10.2	10.2	10.2	10.2	10.2
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	278.00	280.00	283.00	289.00	299.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	304.49	306.66	309.96	316.53	327.49
Inlet Temperature	Temperature, F	962.7	966.9	973.6	983.7	968.7	964.6	971.0	981.7	978.2	977.2	971.0	975.6	984.1	995.2	1,004.3
Exit Temperature	Temperature, F	962.7	966.9	973.6	983.7	968.7	964.6	971.0	981.7	978.2	977.2	1,182.7	1,192.1	1,209.4	1,232.7	1,259.4
HRSG Hot Reheat Steam	Flow, lb/h	528,826	524,670	518,465	511,093	503,154	499,737	523,227	514,569	510,976	510,822	672,757	670,735	666,843	664,420	662,775
(at HRSG terminal point)	Pressure, psia	528.3	526.3	515.9	511.1	503.4	500.0	519.9	514.1	511.2	511.0	503.5	502.9	501.9	502.3	502.9
	Temperature, F	1,023.0	1,028.7	1,037.9	1,051.6	1,052.4	1,052.4	1,034.2	1,048.8	1,052.4	1,052.4	1,014.2	1,019.3	1,029.4	1,041.7	1,052.6
	Enthalpy, Btu/lb	1,532.7	1,535.9	1,541.0	1,548.6	1,549.3	1,549.3	1,538.9	1,547.0	1,549.1	1,549.1	1,526.5	1,531.3	1,538.8	1,543.4	1,549.4
HRSG RH dP – terminal pt. to terminal pt.	psi	16.5	16.3	16.2	16.0	15.4	15.2	16.3	16.1	15.8	15.8	27.1	27.0	27.0	27.0	27.0
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,023.2	1,028.9	1,038.1	1,051.7	1,052.6	1,052.6	1,034.4	1,049.0	1,052.6	1,052.6	1,014.5	1,019.7	1,029.8	1,042.0	1,053.0
RHTR #3 Steam Outlet Temperature	Temperature, F	939.1	943.3	949.9	959.6	938.4	933.2	947.0	957.3	956.3	954.9	945.1	949.4	957.4	967.5	974.2
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	11,564	13,754	0	0	6,237	6,926	0	0	0	0	3,695
(from IP Feedwater)	Temperature, F	365.3	364.5	362.7	361.5	360.0	359.3	363.8	362.2	361.5	361.4	344.0	344.0	342.5	343.1	342.2
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	2.4%	2.8%	0.0%	0.0%	1.2%	1.4%	0.0%	0.0%	0.0%	0.0%	0.6%
	Final Superheat, F	325.9	329.1	334.1	341.2	292.1	282.1	331.6	339.4	315.8	312.6	377.4	381.1	388.0	396.8	395.1
RHTR #4 Steam Outlet Temperature	Temperature, F	800.1	802.7	806.6	813.0	807.4	806.6	805.2	811.7	811.6	811.2	849.3	853.0	859.6	868.5	878.6
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	935.5	942.7	954.2	970.5	977.2	978.2	948.7	966.3	974.5	974.7	886.9	892.9	906.8	924.3	945.1
	Enthalpy, Btu/lb	1,499.9	1,494.6	1,500.8	1,509.5	1,513.1	1,513.6	1,497.9	1,507.3	1,511.6	1,511.7	1,464.3	1,468.3	1,475.7	1,485.0	1,498.0
Cold Reheat Steam from STG to HRSG	Flow, lb/h	455,283	453,092	449,874	446,570	428,553	423,367	453,234	449,139	440,806	439,967	622,985	623,457	623,834	624,630	622,572
(at HRSG terminal point)	Pressure, psia	539.8	538.7	532.1	527.1	518.8	515.2	536.3	530.3	527.0	526.8	530.6	530.0	528.9	529.3	529.9
	Temperature, F	696.7	701.2	708.3	718.5	726.3	727.9	705.1	716.0	723.3	723.7	634.0	639.0	648.1	660.3	675.7
	Enthalpy, Btu/lb	1,352.8	1,355.5	1,359.8	1,365.9	1,370.8	1,371.8	1,357.7	1,364.3	1,368.6	1,368.8	1,316.7	1,319.7	1,325.3	1,332.4	1,341.3
Cold Reheat Steam, % of HP Steam		98.64%	98.64%	98.64%	98.63%	98.63%	98.63%	98.64%	98.64%	98.64%	98.63%	82.24%	82.56%	83.10%	83.76%	84.47%
HP Steam - Cold Reheat Steam	Flow, lb/h	6,279	6,255	6,219	6,183	5,968	5,902	6,260	6,213	6,097	6,102	134,548	131,494	126,846	121,146	114,433

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DEF-18FL-FUEL-002453

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC501-091106-8 BJScrivner
1997 Steam Tables

					ST KW @87 F #NAME?	HP Pressure #NAME?									
					87 #NAME?										
		35	45	59	74	90	95								
Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
IP Steam (at HRSG terminal point)	Flow, lb/h	73,563	71,579	68,581	64,433	63,037	62,617	69,993	65,430	63,936	63,927	49,773	47,277	43,007	39,790	36,507
	Pressure, psia	539.7	536.7	532.1	527.1	518.8	515.2	536.3	530.3	527.0	526.8	539.5	536.0	526.9	529.3	529.9
	Temperature, F	624.7	625.0	625.6	626.9	621.6	620.0	625.9	627.1	626.4	626.1	664.1	665.4	667.6	669.3	670.4
	Enthalpy, Btu/lb	1,310.4	1,310.9	1,311.6	1,312.7	1,310.2	1,309.5	1,311.4	1,312.6	1,311.6	1,311.7	1,334.5	1,335.3	1,336.6	1,337.6	1,338.2
IP Evaporator Drum Exit	Flow, lb/h	73,563	71,579	68,581	64,433	63,037	62,617	69,993	65,430	63,936	63,927	49,773	47,277	43,007	39,790	36,507
	Pressure, psia	554.7	550.9	545.4	539.0	530.3	526.6	549.9	542.4	538.7	538.5	537.7	536.5	534.3	534.0	533.9
	Temperature, F	477.9	477.2	479.1	474.9	473.1	472.4	477.0	476.5	474.8	474.8	474.6	474.4	473.9	473.9	473.9
	Enthalpy, Btu/lb	1,204.5	1,204.5	1,204.6	1,204.7	1,204.6	1,204.8	1,204.6	1,204.6	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	27.8	27.3	26.6	25.6	25.6	25.4	26.9	25.9	25.6	25.6	18.4	14.8	13.7	12.9	12.0
IP Approach	Temperature, F	11.9	12.1	12.6	13.5	12.2	11.9	12.6	13.3	13.1	13.0	32.5	32.9	34.2	35.1	36.7
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	73,563	71,579	68,581	64,433	63,037	62,617	69,993	65,430	63,936	63,927	49,773	47,277	43,007	39,790	36,507
	Pressure, psia	654.7	650.9	645.4	639.0	630.3	626.6	649.9	642.4	638.7	638.5	637.7	636.5	634.3	634.0	633.9
	Temperature, F	466.0	465.0	463.3	461.4	460.9	460.6	464.4	462.2	461.7	461.7	442.1	441.5	439.8	438.8	437.1
	Enthalpy, Btu/lb	448.3	447.2	445.3	443.1	442.6	442.2	448.6	444.0	443.5	443.5	421.4	420.7	418.8	417.7	415.9
	% Steam In Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	73,563	71,579	68,581	64,433	63,037	62,617	69,993	65,430	63,936	63,927	49,773	47,277	43,007	39,790	36,507
	Pressure, psia	696.6	692.5	686.8	679.7	668.6	664.4	689.7	677.2	671.9	671.7	668.0	664.8	649.5	647.0	644.8
	Temperature, F	366.6	365.2	363.5	362.2	360.8	360.1	364.5	363.0	362.2	362.2	344.5	344.6	343.0	343.8	342.7
	Enthalpy, Btu/lb	339.3	338.5	338.6	339.3	339.7	339.9	337.7	338.1	338.3	338.2	316.7	316.7	316.1	316.8	314.8
IP FW Temperature Increase Across BFP	F	3.6	3.6	3.6	3.7	3.7	3.7	3.6	3.6	3.7	3.7	3.2	3.3	3.3	3.3	3.3
LP Steam (at HRSG terminal point)	Flow, lb/h	73,086	72,021	68,886	67,102	65,524	64,815	70,361	68,150	67,133	67,092	33,827	34,090	30,281	31,796	29,061
	Pressure, psia	147.3	146.0	143.1	141.1	138.5	137.3	144.9	142.3	141.1	141.0	117.9	116.9	115.2	115.9	115.0
	Temperature, F	634.4	634.0	634.5	634.9	628.3	626.7	634.9	634.3	632.0	631.7	660.2	679.8	680.4	679.6	679.4
	Enthalpy, Btu/lb	1,343.6	1,343.5	1,344.0	1,343.9	1,341.1	1,340.4	1,344.0	1,343.9	1,342.8	1,342.7	1,368.6	1,368.4	1,368.7	1,368.3	1,368.3
LP Evaporator Steam Exit	Flow, lb/h	73,086	72,021	68,886	67,102	65,524	64,815	70,361	68,150	67,133	67,092	33,827	34,090	30,281	31,796	29,061
	Pressure, psia	157.7	156.2	152.7	150.3	147.4	146.1	154.7	151.7	150.3	150.2	119.9	119.9	117.6	118.6	117.2
	Temperature, F	362.4	361.6	359.8	358.6	357.1	356.4	360.9	359.3	358.5	358.5	341.2	341.2	339.8	340.4	339.5
	Enthalpy, Btu/lb	1,195.3	1,195.1	1,194.8	1,194.5	1,194.2	1,194.1	1,195.0	1,194.7	1,194.5	1,194.5	1,190.7	1,190.7	1,190.4	1,190.5	1,190.3
LP Evaporator Water Exit to BFPs	Flow, lb/h	535,103	530,925	524,680	517,187	509,111	505,538	529,491	520,787	517,068	516,919	817,314	812,984	804,142	796,379	788,365
	Pressure, psia	157.7	156.2	152.7	150.3	147.4	146.1	154.7	151.7	150.3	150.2	119.9	119.9	117.6	118.6	117.2
	Temperature, F	362.4	361.6	359.8	358.6	357.1	356.4	360.9	359.3	358.6	358.5	341.2	341.2	339.8	340.4	339.5
	Enthalpy, Btu/lb	334.9	334.1	332.2	330.8	329.2	328.5	333.3	331.6	330.8	330.8	312.6	312.6	311.0	311.7	310.6
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	73,563	71,579	68,581	64,433	63,037	62,617	69,993	65,430	63,936	63,927	49,773	47,277	43,007	39,790	36,507
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	11,564	13,754	0	0	8,237	8,928	0	0	0	0	3,695
HP FW to HRSG HP Economizer #8	Flow, lb/h	461,642	459,347	456,093	452,753	418,424	408,513	459,464	455,352	442,175	440,156	757,533	754,949	750,680	746,775	737,065
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	18,991	20,758	0	0	4,723	5,913	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	10,009	10,183	10,454	10,813	11,159
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	20.3	19.9	19.6	18.9	18.8	18.7	19.8	19.1	19.0	19.0	19.5	19.1	18.7	18.0	17.4
LP Approach	Temperature, F	3.6	2.5	3.4	0.8	0.9	1.2	3.1	0.6	0.2	0.3	33.4	31.8	33.3	28.6	26.7
Condensate Recirculated	Flow, lb/h	101,496	85,618	88,452	46,914	35,625	36,001	86,054	46,572	34,783	34,803	205,819	173,518	175,301	98,718	76,844
	Temperature, F	359.3	359.5	358.7	358.0	358.4	355.4	358.1	359.0	358.6	358.5	308.6	310.3	307.1	312.9	311.2
% of Total LP Economizer Flow		14%	12%	13%	7%	6%	6%	13%	7%	6%	6%	19%	17%	17%	11%	9%
Condensate from LP Economizer	Flow, lb/h	709,742	688,595	680,024	631,244	610,301	606,499	685,919	635,551	618,984	616,827	1,056,766	1,019,940	1,009,657	926,895	904,318
	Temperature, F	358.6	358.9	358.1	357.4	356.8	354.8	357.5	358.4	358.0	357.9	307.6	309.4	306.2	311.5	310.6
	Enthalpy, Btu/lb	331.2	331.5	328.6	330.0	328.3	327.5	330.0	331.9	330.6	330.5	277.9	279.7	276.5	282.0	280.9
Condensate to LP Economizer	Flow, lb/h	709,742	688,595	680,024	631,244	610,301	606,499	685,919	635,551	618,984	618,827	1,056,766	1,019,940	1,009,657	926,895	904,318
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2
Condensate from Recirculation	Flow, lb/h	101,496	85,618	88,452	46,914	35,625	36,001	86,054	46,572	34,783	34,803	205,819	173,518	175,301	98,718	76,844
	Temperature, F	359.3	359.5	358.7	358.0	358.4	355.4	358.1	359.0	358.6	358.5	308.6	310.3	307.1	312.9	311.2
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	96.8	102.5	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.9	96.3	113.6	116.2
Condensate to HRSG	Flow, lb/h	608,244	602,949	593,572	584,330	574,676	570,468	599,865	588,980	584,221	584,024	851,147	846,422	834,356	828,177	817,474
	Pressure, psia	490.5	491.0	492.9	493.3	494.7	495.6	491.8	492.3	492.8	492.9	494.6	494.8	495.7	493.2	497.3
	Temperature, F	96.8	102.5	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.6	96.3	113.6	116.2
Stack Exit	Flow, lb/h	4,201,488	4,127,300	4,009,911	3,838,934	3,674,902	3,630,488	4,059,590	3,875,056	3,775,057	3,768,327	4,355,570	4,278,339	4,136,318	3,971,362	3,808,903
	Temperature, F	230.9	231.6	229.1	231.8	230.0	226.9	230.3	232.7	232.5	232.3	198.8	199.7	197.3	200.4	199.1

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

					ST kW @87 F	HP Pressure									
					#NAME?	#NAME?									
					67										
		35	45	59	#NAME?	90	95								
					74										

Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	7,228	7,237	7,255	7,297	7,025	6,949	7,279	7,314	7,217	7,207	8,620	8,647	8,699	8,765	8,804
HP Turbine Remainder Shaft Power	kW	58,577	58,839	59,235	67,005	63,629	62,699	66,324	67,065	65,626	65,645	87,230	87,622	88,159	88,838	89,046
IP Turbine Shaft Power	kW	110,171	109,874	109,634	109,315	107,798	107,118	110,213	109,761	109,368	109,347	110,137	110,214	110,768	111,223	112,117
LP Turbine Shaft Power	kW	216,865	216,127	215,888	212,044	205,533	203,942	217,707	213,412	209,165	209,061	187,913	190,377	189,438	188,505	185,699
Total Shaft Power	kW	392,413	393,831	391,757	388,965	376,960	373,759	394,245	390,259	384,361	384,062	385,260	388,112	388,363	388,563	385,862
STG Throttle Steam	Flow, lb/h	1,846,170	1,837,390	1,824,372	1,811,911	1,736,083	1,717,078	1,837,975	1,821,408	1,787,610	1,784,273	2,272,599	2,254,663	2,252,041	2,237,325	2,211,016
	Pressure, psia (MAX 2270 psia)	1,890.9	1,887.2	1,881.8	1,879.6	1,809.8	1,789.1	1,892.0	1,887.4	1,855.8	1,855.8	2,269.5	2,268.7	2,268.8	2,270.2	2,262.6
	Temperature, F	1,018.2	1,024.2	1,033.7	1,047.5	1,050.0	1,050.0	1,029.5	1,044.3	1,050.0	1,050.0	996.0	1,002.0	1,013.2	1,027.4	1,044.0
	Enthalpy, Btu/lb	1,469.9	1,493.8	1,499.8	1,508.5	1,512.1	1,512.6	1,499.9	1,509.3	1,510.6	1,510.7	1,483.3	1,487.3	1,474.7	1,484.0	1,495.0
THV Pressure Loss	psi	37.5	37.4	37.3	37.9	35.8	35.4	37.5	37.4	36.8	36.8	46.3	46.3	46.4	46.4	45.2
		1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	2.00%	2.00%	2.00%	2.00%	2.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	23,341	23,226	23,054	22,881	21,977	21,715	23,230	23,014	22,594	22,569	28,578	28,477	28,315	28,191	27,865
HP Turbine Exit	Flow, lb/h	1,822,830	1,814,163	1,801,319	1,788,139	1,716,114	1,695,363	1,814,743	1,798,394	1,765,036	1,761,720	2,244,021	2,226,382	2,223,726	2,209,193	2,183,211
	Pressure, psia	565.3	562.2	557.8	552.9	543.2	539.2	562.0	556.1	552.3	552.0	578.0	577.4	576.4	576.9	577.2
	Temperature, F (MAX 840 F)	701.2	705.6	712.6	722.8	730.5	731.7	709.4	720.4	727.6	727.9	641.5	646.5	655.5	667.5	682.6
	Enthalpy, Btu/lb	1,353.8	1,356.5	1,360.8	1,366.9	1,371.8	1,372.6	1,358.7	1,365.3	1,369.6	1,369.8	1,317.7	1,320.7	1,326.3	1,333.4	1,342.3
Efficiency (THV Inlet to HPT exit)		85.78%	85.79%	85.79%	85.85%	85.77%	85.77%	85.79%	85.80%	85.79%	85.79%	86.97%	86.97%	86.97%	86.97%	86.97%
Efficiency (THV exit to HPT exit)		87.03%	87.03%	87.03%	87.03%	87.02%	87.03%	87.04%	87.03%	87.03%	87.03%	87.06%	87.06%	87.06%	87.06%	87.06%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,755	1,741	1,720	1,695	1,657	1,644	1,735	1,707	1,689	1,687	1,860	1,852	1,839	1,827	1,812
CRH Steam to Steam Seals	Flow, lb/h	24	54	103	157	224	250	68	130	163	165	128	139	159	183	209
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	1,821,052	1,812,389	1,799,466	1,786,279	1,714,233	1,693,469	1,812,939	1,796,557	1,763,184	1,759,857	2,242,036	2,234,392	2,221,718	2,207,183	2,181,190
	Pressure, psia	565.3	562.2	557.8	552.9	543.2	539.2	562.0	556.1	552.3	552.0	578.0	577.4	576.4	576.9	577.2
	Temperature, F	701.2	705.6	712.6	722.8	730.5	731.7	709.4	720.4	727.6	727.9	641.5	646.5	655.5	667.5	682.6
	Enthalpy, Btu/lb	1,353.8	1,356.5	1,360.8	1,366.9	1,371.8	1,372.6	1,358.7	1,365.3	1,369.6	1,369.8	1,317.7	1,320.7	1,326.3	1,333.4	1,342.3
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	365.3	364.5	362.7	361.5	360.0	359.3	363.6	362.2	361.5	361.4	344.0	344.0	342.6	343.1	342.2
Final Cold Reheat Steam after Conditioning	Flow, lb/h	1,821,052	1,812,389	1,799,466	1,786,279	1,714,233	1,693,469	1,812,939	1,796,557	1,763,184	1,759,857	2,242,036	2,234,392	2,221,718	2,207,183	2,181,190
	Pressure, psia	565.3	562.2	557.8	552.9	543.2	539.2	562.0	556.1	552.3	552.0	578.0	577.4	576.4	576.9	577.2
	Temperature, F (MAX 750 F)	701.2	705.6	712.6	722.8	730.5	731.7	709.4	720.4	727.6	727.9	641.5	646.5	655.5	667.5	682.6
	Enthalpy, Btu/lb	1,353.8	1,356.5	1,360.8	1,366.9	1,371.8	1,372.6	1,358.7	1,365.3	1,369.6	1,369.8	1,317.7	1,320.7	1,326.3	1,333.4	1,342.3
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	294,253	286,313	274,324	257,793	296,386	305,479	279,967	261,720	280,720	283,419	-223,765	-222,180	-221,190	-213,922	-192,665
Reheat System dP	psi	53.9	53.8	53.6	53.4	51.3	50.6	53.9	53.7	52.7	52.8	90.7	90.7	90.7	90.8	90.5
Reheat System dP		9.54%	9.56%	9.60%	9.66%	9.44%	9.38%	9.59%	9.65%	9.55%	9.63%	15.70%	15.71%	15.74%	15.74%	15.67%
Hot Reheat Flow	Flow, lb/h	2,116,305	2,098,682	2,073,819	2,044,012	2,012,617	1,998,948	2,092,905	2,058,277	2,043,904	2,043,288	2,018,271	2,012,294	2,000,928	1,993,261	1,988,325
	Pressure, psia (MAX 584 psia)	511.4	508.5	504.2	499.5	491.9	488.6	508.1	502.4	499.5	499.4	487.2	486.7	485.7	486.1	486.7
	Temperature, F	1,029.5	1,026.3	1,035.6	1,049.2	1,050.0	1,050.0	1,031.6	1,046.4	1,050.0	1,050.0	1,011.6	1,016.7	1,026.8	1,039.0	1,050.0
Differential to HP Temperature	dT, F (MAX +/- 50 F)	2.3	2.1	1.8	1.5	0.0	0.0	2.3	2.0	0.0	0.0	15.6	14.7	13.8	11.8	6.0
	Enthalpy, Btu/lb	1,531.7	1,534.9	1,540.0	1,547.6	1,548.2	1,548.3	1,537.0	1,546.0	1,548.1	1,548.1	1,527.5	1,530.3	1,535.8	1,542.4	1,548.4
INTV Pressure Loss	psi	10.2	10.2	10.1	10.0	9.8	9.8	10.2	10.0	10.0	10.0	9.8	9.8	9.7	9.7	9.8
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	2,138,646	2,121,008	2,096,673	2,065,893	2,034,504	2,020,663	2,116,136	2,081,296	2,066,496	2,065,839	2,046,849	2,040,881	2,028,843	2,021,392	2,016,130
	Pressure, psia	124.9	124.0	122.5	121.1	119.1	118.2	123.6	122.0	121.1	121.1	109.3	109.3	108.5	108.8	108.5
	Temperature, F	864.9	859.3	865.9	875.7	877.2	877.1	863.2	874.6	877.4	877.3	828.0	832.3	839.2	849.6	857.6
	Enthalpy, Btu/lb	1,355.4	1,357.7	1,361.0	1,366.8	1,366.9	1,366.9	1,359.6	1,365.5	1,366.9	1,366.9	1,342.6	1,345.0	1,348.5	1,353.7	1,357.7
Efficiency (INTV Inlet to IPT exit)		90.78%	90.79%	90.79%	90.79%	90.80%	90.80%	90.79%	90.79%	90.79%	90.79%	90.86%	90.86%	90.86%	90.86%	90.86%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,822	1,808	1,777	1,748	1,719	1,708	1,758	1,762	1,748	1,747	1,914	1,910	1,902	1,900	1,879
LP Steam Admitted to STG (total)	Flow, lb/h	292,946	286,083	275,543	268,499	262,096	259,281	281,443	272,600	268,631	268,296	101,482	102,099	90,844	96,387	87,184
(upstream of LP admission CV)	Pressure, psia (MIN 75.2 psia)	128.4	127.6	125.9	124.5	122.5	121.6	127.1	125.4	124.5	124.5	112.4	112.4	111.5	111.9	111.6
	Temperature, F	630.0	629.7	630.4	629.9	624.3	622.7	630.7	630.1	627.9	627.6	577.7	577.3	578.0	577.2	577.0
	Enthalpy, Btu/lb	1,342.6	1,342.5	1,343.0	1,342.8	1,340.1	1,339.4	1,343.0	1,342.9	1,341.8	1,341.7	1,367.6	1,367.4	1,367.7	1,367.3	1,367.3
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 100 F)	-28.3	-30.1	-35.9	-47.2	-53.4	-54.6	-33.0	-44.9	-49.9	-50.1	49.4	44.6	38.4	37.2	19.0
LP Admission CV Pressure Loss	% loss	2.8%	2.7%	2.7%	2.8%	2.7%	2.8%	2.8%	2.7%	2.7%	2.8%	2.7%	2.7%	2.8%	2.8%	2.7%
LP Turbine Inlet Steam	Flow, lb/h	2,429,179	2,408,186	2,370,839	2,333,554	2,294,971	2,278,218	2,395,783	2,352,129	2,333,281	2,332,298	2,146,717	2,141,160	2,118,094	2,115,189	2,101,735
	Pressure, psia	123.0	122.2	120.8	119.3	117.3	116.5	121.8	120.1	119.3	119.3	107.7	107.8	106.8	107.2	106.9
	Temperature, F	651.6	655.5	661.5	671.0	670.9	670.7	656.1	669.2	671.4	671.4	630.1	634.2	640.7	650.7	658.2
	Enthalpy, Btu/lb	1,353.6	1,356.9	1,358.9	1,363.8	1,363.9	1,363.8	1,357.7	1,362.6	1,364.0	1,364.0	1,344.0	1,346.0	1,349.3	1,354.3	1,356.1
LP Turbine Exit	Flow, lb/h	2,429,168	2,408,188	2,370,840	2,333,551	2,294,970	2,278,214	2,395,784	2,352,126	2,333,280	2,332,297	2,146,718	2,141,163	2,118,106	2,115,186	2,101,733
	Pressure, psia	0.819	0.971	0.959	2.936	1.663	1.644	0.968	1.477	1.674	1.674	0.719	0.867	0.860	1.346	1.638
	Pressure, in. HgA	1.667	1.978	1.952	2.936	3.386	3.346	1.970	3.007	3.409	3.408	1.464	1.765	1.751	2.744	3.127
	Temperature, F	95.1	100.7	100.3	114.9	119.1	116.9	100.6	116.1	119.6	119.6	90.9	97.0	96.7	111.9	116.6
ELEP Enthalpy, Btu/lb		1,012.3	1,019.0	1,020.5	1,043.7	1,050.4	1,050.5	1,019.9	1,043.1	1,050.2	1,050.2	1,008.3	1,016.5	1,017.2	1,040.6	1,049.0
UEEP Enthalpy, Btu/lb		1,049.5	1,046.6	1,048.2	1,053.6	1,058.3	1,058.4	1,047.6	1,053.3	1,058.2	1,058.2	1,045.3	1,042.7	1,044.2	1,050.2	1,056.6
Exhaust Loss Btu/lb		37.2	27.8	27.7	10.1	7.9	7.9	27.8	10.1	7.9	7.9	37.0	27.1	27.0	9.7	7.7
Moisture @ UEEP (MIN 1.7%)		5.11%	5.62%	5.46%	5.57%	5.32%	5.33%	5.53%	5.63%	5.35%	5.35%	5.33%	5.65%	5.69%	5.78%	5.85%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.04%	90.18%	90.24%	89.83%	90.81%	90.81%	90.21%	90.86%	90.80%	90.80%	89.97%	90.01%	90.08%	89.83%	90.72%
LPT Efficiency to UEEP		89.23%	89.74%	89.86%	87.83%	88.52%	88.52%	89.06%	87.79%	88.51%	88.51%	79.95%	82.63%	82.76%	87.74%	88.46%
Annulus Velocity ft/s		1,368.0	1,245.8	1,244.1	633.9	737.2	735.9	1,245.3	835.2	740.1	740.1	1,398.6	1,231.2	1,229.0	817.7	723.3
Volumetric Flow 1000 ft3/min per end		7,734	6,491	6,462	4,266	3,783	3,759	6,469	4,273	3,778	3,778	7,766	6,411	6,399	4,182	3,691
Gross Generator Output	kW	393,594	395,104	393,072	389,760	378,214	374,973	395,554	391,650	385,722	385,407	388,018	390,845	391,143	391,407	389,784
Generator MVA		447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.905
Generator Efficiency		98.51%	98.51%	98.51%	98.51%	98.50%	98.49%	98.51%	98.51%	98.50%	98.50%	98.51%	98.51%	98.51%	98.51%	98.51%

DEF-19FL-FUEL-002455

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

ST KW @87 F
#NAME?
87
#NAME?
74

HP Pressure
#NAME?

		35	45	59	74	90	95									
Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	2,368.8	2,357.8	2,326.5	2,258.1	2,231.3	2,215.7	2,346.1	2,284.4	2,267.1	2,256.2	2,111.6	2,086.2	2,066.9	2,039.6	2,029.6
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	22.0	19.8	19.6	17.4	16.9	16.7	19.7	17.5	17.1	17.1	19.4	17.5	17.4	15.7	15.3
LP Turbine Exit Steam to Condenser	Flow, lb/h	2,429,168	2,406,166	2,370,640	2,333,591	2,294,970	2,278,214	2,395,784	2,352,126	2,333,296	2,332,297	2,146,718	2,141,153	2,116,196	2,116,186	2,101,733
	Pressure, psia	0.819	0.971	0.959	1.468	1.653	1.644	0.968	1.477	1.674	1.674	0.719	0.867	0.860	1.348	1.536
	Pressure, in. HgA	1.667	1.978	1.952	2.989	3.365	3.346	1.970	3.007	3.409	3.408	1.464	1.765	1.751	2.744	3.127
	Temperature, F	95.1	100.7	100.3	114.9	119.1	118.9	100.6	115.1	119.6	119.6	90.9	97.0	96.7	111.9	116.5
	Enthalpy, Btu/lb	1,049.5	1,049.8	1,048.2	1,053.8	1,058.3	1,058.4	1,047.8	1,053.3	1,058.2	1,058.2	1,046.3	1,042.7	1,044.2	1,050.2	1,056.6
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,354.6	1,357.1	1,360.9	1,366.7	1,369.5	1,369.9	1,359.2	1,365.4	1,368.3	1,368.4	1,329.0	1,331.6	1,336.1	1,342.4	1,349.0
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	193	13	53	155	116	164	24	178	32	181	403,124	394,619	381,414	365,740	347,073
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,632.7	1,635.9	1,641.0	1,648.6	1,649.3	1,649.3	1,636.9	1,647.0	1,649.1	1,649.1	1,626.5	1,631.3	1,629.8	1,643.4	1,649.4
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,343.6	1,343.5	1,344.0	1,343.8	1,341.1	1,340.4	1,344.0	1,343.9	1,342.8	1,342.7	1,368.6	1,368.4	1,368.7	1,368.3	1,368.3
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	66.2	71.8	71.4	86.0	90.3	90.1	71.7	86.2	90.7	90.7	61.8	67.9	67.7	82.8	87.5
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	66.2	71.8	71.4	86.0	90.3	90.1	71.7	86.2	90.7	90.7	61.8	67.9	67.7	82.8	87.5
Condenser Exit	Flow, lb/h	2,432,962	2,411,802	2,374,293	2,337,300	2,298,686	2,281,978	2,399,408	2,355,904	2,336,912	2,336,078	2,553,442	2,539,275	2,503,120	2,464,526	2,452,406
	Pressure, psia	0.819	0.971	0.959	1.468	1.653	1.644	0.968	1.477	1.674	1.674	0.719	0.867	0.860	1.348	1.536
	Pressure, in HgA (MIN 1.0 in. HgA)	1.667	1.978	1.952	2.989	3.366	3.348	1.970	3.007	3.409	3.408	1.464	1.765	1.751	2.744	3.127
	Temperature, F	95.1	100.7	100.3	114.9	119.1	118.9	100.6	115.1	119.6	119.6	90.9	97.0	96.7	111.9	116.5
	Enthalpy, Btu/lb	63.1	68.8	68.3	82.9	87.1	86.9	68.6	83.1	87.6	87.5	58.0	65.0	64.7	79.9	84.5
Condensate Pump Discharge	Flow, lb/h	2,432,962	2,411,802	2,374,293	2,337,300	2,298,686	2,281,978	2,399,408	2,355,904	2,336,912	2,336,078	2,553,442	2,539,275	2,503,120	2,464,526	2,452,406
	Pressure, psia	490.5	491.0	492.9	493.3	494.7	495.5	491.6	492.9	492.8	492.9	484.6	484.5	486.2	486.2	487.3
	Temperature, F	95.9	101.6	101.2	115.6	120.1	119.9	101.5	116.0	120.5	120.5	91.7	97.7	97.5	112.7	117.3
	Enthalpy, Btu/lb	65.3	70.9	70.5	85.1	89.3	89.1	70.8	85.3	89.8	89.8	61.0	67.1	66.8	82.0	86.6
Condensate after GSC	Flow, lb/h	2,432,962	2,411,802	2,374,293	2,337,300	2,298,686	2,281,978	2,399,408	2,355,904	2,336,912	2,336,078	2,553,442	2,539,275	2,503,120	2,464,526	2,452,406
	Temperature, F	96.8	102.6	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.6	98.3	113.6	118.2
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,432,978	2,411,799	2,374,289	2,337,321	2,298,704	2,281,993	2,399,461	2,355,920	2,336,885	2,336,095	2,553,442	2,539,266	2,503,097	2,464,530	2,452,421
	Temperature, F	96.8	102.6	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.6	98.3	113.6	118.2
Total Circulating Water	Flow, lb/h	196,597,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,597,952	199,501,072	199,501,072	198,978,496	198,800,096
	Flow, gpm	389,863	389,785	389,785	389,699	389,682	389,682	389,785	389,696	389,682	389,682	389,653	389,785	389,785	389,699	389,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0	68.0	68.0	85.0	90.0
Circulating Water to Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680
	Flow, gpm	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741	374,619	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1
Circulating Water from Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680
	Temperature, F	73.1	80.9	80.7	97.4	102.2	102.2	80.8	97.5	102.4	102.4	71.6	79.4	79.3	96.2	101.1
Total Circulating Water Discharge	Flow, lb/h	196,597,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,597,952	199,501,072	199,501,072	198,978,496	198,800,096
	Temperature, F	73.1	80.9	80.7	97.4	102.2	102.2	80.8	97.5	102.4	102.4	71.6	79.5	79.4	96.2	101.2
Circulating Water Temperature Rise	dT, F	13.08	12.88	12.71	12.43	12.25	12.16	12.82	12.51	12.43	12.43	11.59	11.45	11.36	11.24	11.19
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Flow, gpm	15,006	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,006	15,013	15,013	15,049	15,062
	Temperature, F	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Temperature, F	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

ST KW @67 F
#NAME?
h?
#NAME?

HP Pressure
#NAME?

		35	45	59	74	90	95									
Case Name		Case 21 4x100% Unfired Gas Fuel 35 F	Case 22 4x100% Unfired Gas Fuel 45 F	Case 23 4x100% Unfired Gas Fuel 59 F	Case 24-GUAR 4x100% Unfired Gas Fuel 74 F	Case 25 4x100% Unfired Gas Fuel 90 F	Case 26 4x100% Unfired Gas Fuel 95 F	Case 27 4x100% Unfired Gas Fuel 59 F/EC On	Case 28 4x100% Unfired Gas Fuel 74 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 30 4x100% Unfired Gas Fuel 95 F/EC On	Case 31 3x100% PAG Fired Gas Fuel 35 F	Case 32 3x100% PAG Fired Gas Fuel 45 F	Case 33 3x100% PAG Fired Gas Fuel 59 F	Case 34 3x100% PAG Fired Gas Fuel 74 F	Case 35 3x100% PAG Fired Gas Fuel 90 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	193	13	53	155	116	154	24	178	32	181	403,124	394,513	361,414	365,740	347,073
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	535,103	530,926	524,680	517,187	509,111	506,535	529,491	520,787	517,068	515,919	817,314	812,364	804,142	798,379	788,365
	Pressure, psia	160.0	158.5	155.0	152.6	149.7	148.4	157.0	154.0	152.6	152.5	122.2	122.2	119.9	120.9	119.5
	Temperature, F	362.4	361.6	359.8	358.6	357.1	356.4	360.9	359.3	358.6	358.5	341.2	341.2	339.8	340.4	339.5
	Enthalpy, Btu/lb	334.9	334.1	332.2	330.8	329.2	328.5	333.3	331.6	330.8	330.8	312.6	312.6	311.0	311.7	310.8
IP Bleed (before CV)	Flow, lb/h	73,561	71,578	68,586	64,434	74,596	76,369	69,997	65,435	70,171	70,851	59,781	57,435	53,451	50,604	51,360
	Pressure, psia	1,108.3	1,107.3	1,107.8	1,109.5	1,111.0	1,111.6	1,107.0	1,108.9	1,109.5	1,109.5	868.9	894.1	901.8	909.8	917.0
	Temperature, F	365.3	364.6	362.7	361.5	360.0	359.3	363.8	362.2	361.5	361.4	344.0	344.0	342.5	343.1	342.2
	Enthalpy, Btu/lb	339.3	338.5	336.6	335.3	333.7	333.0	337.7	336.1	335.3	335.2	316.7	316.7	315.1	315.8	314.8
IP FW Control Valve Exit Pressure	Pressure, psia	596.6	592.5	583.6	572.7	562.6	558.4	569.7	577.2	571.9	571.7	558.0	554.8	549.5	547.0	544.8
	CV dP, psi	507.7	514.7	524.2	536.7	548.4	553.2	537.3	531.7	537.6	537.8	331.0	339.3	352.3	362.8	372.2
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,522.2	3,525.0	3,532.0	3,538.1	3,553.9	3,558.9	3,527.0	3,534.4	3,541.9	3,542.5	3,053.9	3,072.3	3,089.4	3,101.4	3,121.2
	CV dP, psi	1,472.9	1,481.3	1,494.0	1,509.9	1,803.9	1,833.9	1,477.4	1,491.0	1,532.7	1,537.6	422.4	443.0	461.1	475.2	507.9
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	461,642	459,347	456,093	452,753	434,515	429,269	459,494	456,352	446,898	446,068	757,533	754,949	750,680	745,775	737,005
	Pressure, psia	2,049.3	2,044.7	2,038.0	2,034.5	1,950.0	1,925.0	2,049.5	2,043.4	2,009.2	2,004.9	2,631.5	2,629.4	2,627.3	2,626.2	2,614.1
	Temperature, F	375.2	374.5	372.7	371.5	370.4	369.8	373.7	372.2	371.6	371.5	351.4	351.4	349.9	350.5	349.6
	Enthalpy, Btu/lb	351.0	350.3	348.5	347.2	346.9	346.3	349.5	348.0	347.3	347.2	327.2	327.2	325.7	326.3	325.4
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	461,643	459,347	456,093	452,753	434,521	429,270	459,494	456,352	446,903	446,068	757,533	754,951	750,680	745,775	737,005
	Pressure, psia	1,928.2	1,924.4	1,918.9	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,895.5	1,892.2	2,338.8	2,338.1	2,338.2	2,339.6	2,331.8
	Temperature, F	1,021.7	1,027.6	1,037.0	1,050.9	1,053.3	1,053.3	1,032.9	1,047.7	1,053.3	1,053.3	1,000.9	1,008.9	1,018.1	1,032.2	1,048.8
	Enthalpy, Btu/lb	1,490.9	1,494.8	1,500.8	1,509.5	1,513.1	1,513.6	1,497.9	1,507.3	1,511.6	1,511.7	1,464.3	1,468.3	1,475.7	1,485.0	1,498.0
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1,928.2	1,924.4	1,918.9	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,895.5	1,892.2	2,338.8	2,338.1	2,338.2	2,339.6	2,331.8
	Temperature, F	1,021.7	1,027.6	1,037.0	1,050.9	1,053.3	1,053.3	1,032.9	1,047.7	1,053.3	1,053.3	1,000.9	1,008.9	1,018.1	1,032.2	1,048.8
	Enthalpy, Btu/lb	1,490.9	1,494.8	1,500.8	1,509.5	1,513.1	1,513.6	1,497.9	1,507.3	1,511.6	1,511.7	1,464.3	1,468.3	1,475.7	1,485.0	1,498.0
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	375.2	374.6	372.7	371.5	370.4	369.8	373.7	372.2	371.6	371.6	351.4	351.4	349.9	350.5	349.6
HP Steam Bypassed to Cold Reheat -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	935.5	942.7	954.2	970.5	977.2	979.2	948.7	966.3	974.5	974.7	885.3	892.9	906.8	924.3	945.1
	Enthalpy, Btu/lb	1,480.9	1,484.8	1,500.8	1,509.5	1,513.1	1,513.6	1,497.9	1,507.3	1,511.6	1,511.7	1,464.3	1,468.3	1,475.7	1,486.0	1,496.0
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	528,826	524,670	518,455	511,003	503,154	499,737	523,227	514,599	510,976	510,822	872,757	870,735	866,843	864,420	862,775
	Pressure, psia	523.3	520.3	515.9	511.1	503.4	500.0	519.9	514.1	511.2	511.0	503.5	502.9	501.9	502.3	502.9
	Temperature, F	1,023.0	1,028.7	1,037.9	1,051.6	1,052.4	1,052.4	1,034.2	1,048.6	1,052.4	1,052.4	1,014.2	1,019.3	1,029.4	1,041.7	1,052.6
	Enthalpy, Btu/lb	1,532.7	1,535.9	1,541.0	1,548.6	1,549.3	1,549.3	1,538.9	1,547.0	1,549.1	1,549.1	1,528.5	1,531.3	1,536.8	1,543.4	1,549.4
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	523.3	520.3	515.9	511.1	503.4	500.0	519.9	514.1	511.2	511.0	503.5	502.9	501.9	502.3	502.9
	Temperature, F	1,023.0	1,028.7	1,037.9	1,051.6	1,052.4	1,052.4	1,034.2	1,048.6	1,052.4	1,052.4	1,014.2	1,019.3	1,029.4	1,041.7	1,052.6
	Enthalpy, Btu/lb	1,532.7	1,535.9	1,541.0	1,548.6	1,549.3	1,549.3	1,538.9	1,547.0	1,549.1	1,549.1	1,528.5	1,531.3	1,536.8	1,543.4	1,549.4
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	98.6	102.5	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.6	98.3	113.6	118.2
HRH Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,006.1	1,012.2	1,021.9	1,036.2	1,037.5	1,037.5	1,017.9	1,033.2	1,037.1	1,037.1	998.0	1,003.4	1,013.9	1,026.5	1,037.7
	Enthalpy, Btu/lb	1,532.7	1,535.9	1,541.0	1,548.6	1,549.3	1,549.3	1,538.9	1,547.0	1,549.1	1,549.1	1,528.5	1,531.3	1,536.8	1,543.4	1,549.4
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	73,086	72,021	68,686	67,102	65,524	64,815	70,361	68,150	67,193	67,052	39,827	34,030	30,281	31,796	29,081
	Pressure, psia	147.3	146.0	143.1	141.1	138.5	137.3	144.9	142.3	141.1	141.0	117.0	116.9	115.2	115.9	116.0
	Temperature, F	634.4	634.0	634.5	634.0	628.3	626.7	634.9	634.3	632.0	631.7	680.2	679.8	680.4	679.6	679.4
	Enthalpy, Btu/lb	1,343.6	1,343.5	1,344.0	1,343.8	1,341.1	1,340.4	1,344.0	1,343.9	1,342.8	1,342.7	1,368.6	1,368.4	1,368.7	1,368.3	1,368.3
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	147.3	146.0	143.1	141.1	138.5	137.3	144.9	142.3	141.1	141.0	117.0	116.9	115.2	115.9	116.0
	Temperature, F	634.4	634.0	634.5	634.0	628.3	626.7	634.9	634.3	632.0	631.7	680.2	679.8	680.4	679.6	679.4
	Enthalpy, Btu/lb	1,343.6	1,343.5	1,344.0	1,343.8	1,341.1	1,340.4	1,344.0	1,343.9	1,342.8	1,342.7	1,368.6	1,368.4	1,368.7	1,368.3	1,368.3
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	98.6	102.5	102.1	116.7	121.0	120.8	102.4	116.9	121.4	121.4	92.5	98.6	98.3	113.6	118.2
LP Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	147.3	146.0	143.1	141.1	138.5	137.3	144.9	142.3	141.1	141.0	117.0	116.9	115.2	115.9	116.0
	Temperature, F	634.4	634.0	634.5	634.0	628.3	626.7	634.9	634.3	632.0	631.7	680.2	679.8	680.4	679.6	679.4
	Enthalpy, Btu/lb	1,343.6	1,343.5	1,344.0	1,343.8	1,341.1	1,340.4	1,344.0	1,343.9	1,342.8	1,342.7	1,368.6	1,368.4	1,368.7	1,368.3	1,368.3
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

DEF-19FL-FUEL-002457

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

35 45 59 74 90 95

Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 35 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
GateCycle Model ID		8BART0	8BART2	8BART0	8BART2	8BART2	8BART0	8BART2	8BART2	8BART0	8BART2	8BART0	8BART2	8BART0	8BART2	8BART2
GateCycle Case ID		B8-36	B8-37	B8-38	B8-39	B8-40	B8-41	B8-42	B8-43	B8-44	B8-45	B8-46	B8-47	B8-48	B8-49	B8-50
Ambient Temperature		95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH
Atmospheric Pressure		14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia	14,690 psia
Number of CTG/HRSG Units Operating		3@100%/augm	3@100%/augm	3@100%/augm	3@100%/augm	3@100%/augm	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%
CTG Inlet Air Cooler		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Fired/1273 F	Fired/1199 F	Fired/1223 F	Fired/1239 F	Fired/1240 F	Fired/1210 F	Fired/1226 F	Fired/1243 F	Fired/1259 F	Fired/1305 F	Fired/1313 F	Fired/1232 F	Fired/1260 F	Fired/1281 F	Fired/1283 F
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		retlo	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 12-May-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		393.0 MW	391.1 MW	389.9 MW	389.4 MW	389.3 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW	420.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		2,271p/1,040F	2,269p/1,007F	2,268p/1,022F	2,270p/1,032F	2,268p/1,039F	2,250p/997F	2,232p/1,006F	2,233p/1,016F	2,239p/1,031F	2,252p/1,048F	2,248p/1,050F	2,231p/1,011F	2,237p/1,027F	2,268p/1,036F	2,263p/1,037F
STG Cold Reheat Conditions, psia/F		583p/688F	577p/651F	577p/664F	577p/671F	577p/672F	650p/671F	643p/678F	641p/687F	640p/698F	642p/712F	643p/715F	642p/683F	640p/696F	643p/702F	643p/703F
Cold Reheat Conditions after Conditioning, psia/F		583p/688F	577p/651F	577p/664F	577p/671F	577p/672F	650p/671F	643p/678F	641p/687F	640p/698F	642p/712F	643p/715F	642p/683F	640p/696F	643p/702F	643p/703F
STG Hot Reheat Conditions, psia/F		493p/1,050F	486p/1,021F	486p/1,036F	486p/1,043F	486p/1,044F	558p/1,008F	552p/1,014F	550p/1,024F	548p/1,038F	550p/1,060F	551p/1,050F	551p/1,020F	549p/1,035F	551p/1,043F	551p/1,044F
Condenser Pressure		3.16 in HgA	1.76 in HgA	2.75 in HgA	3.14 in HgA	3.14 in HgA	1.67 in HgA	1.97 in HgA	1.96 in HgA	3.02 in HgA	3.43 in HgA	3.43 in HgA	1.97 in HgA	3.03 in HgA	3.45 in HgA	3.45 in HgA
Stack Temperature		198 F	199 F	201 F	201 F	201 F	200 F	201 F	198 F	201 F	199 F	198 F	200 F	202 F	202 F	202 F
Run Date		8-Sep-06	6-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Gross CTG Output (each)	kW	181,934	217,952	203,867	190,207	189,542	207,123	201,814	192,471	181,068	168,633	164,861	197,137	184,229	177,293	176,696
Gross CTG Output (total)	kW	545,801	653,856	611,601	568,621	568,626	621,369	604,842	577,413	543,204	505,899	494,583	591,411	552,687	531,879	530,088
Gross CTG Heat Rate (LHV)	Btu/kWh	9,329	8,864	9,031	9,136	9,145	9,671	9,124	9,237	9,414	9,813	9,671	9,184	9,372	9,466	9,464
Gross CTG Heat Rate (HHV)	Btu/kWh	10,218	9,709	10,016	10,008	10,018	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	5,091.87	5,795.78	5,523.37	5,377.64	5,364.70	5,636.44	5,518.66	5,333.56	5,113.72	4,863.21	4,783.69	5,431.52	5,179.78	5,045.40	5,032.66
CTG Heat Input (HHV) (total)	MMBtu/h	5,575.99	6,347.97	6,125.74	5,889.99	5,875.81	6,251.14	6,044.36	5,841.71	5,600.93	5,326.55	5,239.46	6,023.87	5,744.06	5,595.65	5,581.51
Duct Burner Heat Input (LHV) (each)	MMBtu/h	313.00	280.00	285.00	290.00	290.00	312.80	307.10	311.00	317.00	334.20	340.70	306.30	313.50	323.30	323.40
Duct Burner Heat Input (HHV) (each)	MMBtu/h	342.82	305.68	316.68	317.63	317.63	346.91	336.36	340.83	347.20	366.04	373.19	339.70	347.69	358.66	358.67
Duct Burner Heat Input (LHV) (total)	MMBtu/h	939.00	840.00	855.00	870.00	870.00	938.40	921.30	933.00	951.00	1,002.60	1,022.10	918.90	940.50	969.90	970.20
Duct Burner Heat Input (HHV) (total)	MMBtu/h	1,028.46	920.03	948.25	952.89	952.89	1,040.74	1,009.08	1,021.89	1,041.61	1,098.12	1,119.46	1,019.11	1,043.07	1,076.68	1,076.01
Gross STG Output	kW	392,970	391,100	390,920	389,410	389,260	426,020	420,010	419,960	420,000	420,020	420,010	420,010	419,980	420,000	420,010
STG Output, percent of CTG Output		72.0%	59.8%	63.9%	68.5%	68.4%	67.6%	69.4%	72.7%	77.3%	83.0%	84.9%	71.0%	76.0%	79.0%	79.2%
Gross Plant Output	kW	938,771	1,044,956	1,002,521	958,031	958,885	1,041,389	1,024,852	997,393	963,204	925,919	914,653	1,011,421	972,667	951,879	950,098
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,424	6,350	6,382	6,388	6,389	6,314	6,284	6,263	6,296	6,335	6,348	6,279	6,292	6,319	6,318
Gross Cycle Heat Rate (HHV)	Btu/kWh	7,036	6,955	7,056	6,997	6,997	7,002	6,882	6,862	6,896	6,939	6,952	6,963	6,978	7,009	7,007
Plant Heat Input (LHV)	MMBtu/h	6,030.87	6,635.78	6,378.37	6,247.64	6,234.70	6,674.84	6,439.88	6,266.56	6,064.72	5,865.81	5,805.79	6,350.42	6,120.28	6,015.30	6,002.86
Plant Heat Input (HHV)	MMBtu/h	6,605.45	7,268.00	7,073.99	6,842.88	6,828.70	7,291.88	7,053.43	6,863.61	6,642.53	6,424.67	6,358.93	7,042.99	6,787.75	6,671.33	6,657.52
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	28,670	29,510	29,080	28,890	28,870	29,910	29,030	28,850	28,556	28,350	28,280	28,940	28,600	28,520	28,510
Total Auxiliary Power/Losses, percent of gross		3.05%	2.82%	2.90%	2.96%	2.96%	2.81%	2.83%	2.89%	2.96%	3.06%	3.09%	2.86%	2.94%	3.00%	3.00%
Net Plant Output w/ Step-Up Xfmr Losses	kW	910,101	1,015,446	973,441	929,141	947,015	1,012,079	995,822	968,543	934,654	897,569	886,373	982,481	944,067	923,359	921,588
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,627	6,535	6,552	6,682	6,584	6,466	6,467	6,470	6,489	6,535	6,550	6,464	6,483	6,515	6,514
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,256	7,157	7,267	7,210	7,211	7,205	7,083	7,087	7,107	7,158	7,174	7,169	7,190	7,225	7,224

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0
	Relative Humidity	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%
	WBT, F	75.6	51.4	69.1	75.6	75.6	30.9	39.3	51.4	69.1	75.6	75.6	51.4	69.1	75.6	75.6
Compressor Inlet Conditions	Temperature, F	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3
	Relative Humidity	43.8%	92.8%	96.5%	91.4%	88.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.4%
Inlet Air Cooler Status		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Saturation Efficiency		0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	0	5,833	3,605	9,622	13,110	0	0	0	0	0	0	5,831	3,605	9,622	13,119
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,697.3	1,931.9	1,841.1	1,792.5	1,788.2	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6
	Flow, lb/h	80,212	91,301	86,105	84,714	84,510	88,908	86,934	84,020	80,556	76,610	75,357	85,640	82,624	80,481	80,277
Fuel LHV	Btu/lb	21,160	21,160	20,897	21,160	21,160	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95				
Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 35 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	102,999	119,120	112,655	109,151	108,890	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	536.2	529.7	529.1	529.5	529.1	567.8	561.4	560.2	567.6	559.4	560.3	560.2	568.2	560.4	560.2
	Temperature, F	661.2	643.1	656.3	664.4	665.1	665.0	671.8	680.3	692.3	705.6	708.5	676.3	689.1	695.6	698.4
	Enthalpy, Btu/lb	1,344.1	1,322.2	1,330.0	1,334.7	1,335.2	1,329.8	1,334.3	1,339.5	1,346.6	1,354.3	1,356.9	1,337.0	1,344.7	1,348.4	1,348.9
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	11,247	10,289	10,882	10,904	10,926	0	0	0	0	0	0	0	0	0	0
	Temperature, F	342.2	343.9	343.6	343.3	343.2	352.2	351.8	350.5	350.0	349.6	349.3	351.2	351.1	350.8	350.7
Steam Injection for Power Augmentation	Flow, lb/h	113,648	129,409	123,337	120,055	119,785	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	485.0	485.0	485.0	485.0	485.0	633.9	642.1	651.6	664.7	678.6	681.8	647.1	661.2	668.0	668.8
	Enthalpy, Btu/lb	1,242.2	1,242.2	1,242.2	1,242.2	1,242.2	1,329.8	1,334.3	1,339.5	1,346.6	1,354.3	1,356.9	1,337.0	1,344.7	1,348.4	1,348.9
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,747,483	4,194,884	4,003,299	3,899,405	3,892,326	4,231,488	4,127,390	4,009,011	3,828,934	3,674,902	3,630,488	4,059,590	3,876,066	3,776,057	3,768,327
	Pressure, in. H2O	16.77	20.23	18.79	18.02	17.96	19.73	19.17	18.29	17.05	15.90	15.56	18.89	17.99	16.89	16.89
	Temperature, F	1,125.7	1,086.4	1,103.4	1,112.8	1,113.4	1,072.9	1,079.8	1,090.9	1,108.0	1,123.4	1,127.2	1,067.0	1,105.0	1,115.0	1,116.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	181,934	217,962	203,867	199,207	195,542	207,123	201,614	192,471	181,008	168,633	164,881	197,137	184,229	177,293	176,696
Gross Heat Rate	Btu/kWh (LHV)	9,329	8,864	9,031	9,136	9,145	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,485	9,494

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DEF-19FL-FUEL-002459

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Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 35 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	738,239	752,950	746,926	743,937	743,205	747,635	738,255	734,656	731,252	730,073	727,731	735,941	732,210	734,642	734,315
(at HRSG terminal point)	Pressure, psia	2,340.7	2,338.6	2,337.6	2,336.2	2,337.8	2,317.9	2,299.7	2,300.5	2,298.6	2,320.1	2,315.9	2,298.8	2,305.5	2,321.4	2,321.5
	Temperature, F	1,053.5	1,011.9	1,027.3	1,036.7	1,037.6	1,002.2	1,010.4	1,021.1	1,036.2	1,052.2	1,054.7	1,016.9	1,032.2	1,040.8	1,041.5
	Enthalpy, Btu/lb	1,498.6	1,471.6	1,481.6	1,488.0	1,488.6	1,465.8	1,471.9	1,478.9	1,488.6	1,498.6	1,500.3	1,475.5	1,488.0	1,491.0	1,491.6
dP from HP drum to HRSG terminal point	psi	112.6	112.6	112.4	112.3	112.4	112.2	111.4	111.4	111.3	111.9	111.4	111.2	111.2	111.7	111.7
HP SH #1 Steam Outlet Temperature	Temperature, F	1,054.5	1,012.9	1,028.4	1,037.8	1,038.6	1,003.3	1,011.4	1,022.1	1,037.2	1,053.2	1,055.7	1,017.0	1,033.2	1,041.6	1,042.5
HP SH #2 Steam Outlet Temperature	Temperature, F	996.0	953.6	967.5	976.6	977.7	949.0	957.1	967.3	983.9	997.6	999.0	961.2	976.1	983.9	984.7
HP Steam Desuperheating Flow	Flow, lb/h	1	0	0	0	0	0	0	0	0	0	3,300	0	0	0	0
(from HP Feedwater)	Temperature, F	349.6	350.8	351.1	350.7	350.8	350.8	350.4	350.1	350.2	357.2	356.9	356.8	356.7	356.4	356.9
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	275.1	227.4	240.4	249.8	251.0	233.7	242.6	252.6	265.1	284.0	285.9	245.5	259.3	266.3	267.1
HP SH #3/4 Steam Outlet Temperature	Temperature, F	930.0	891.1	904.0	913.6	914.7	885.2	903.9	914.0	926.8	946.6	955.4	908.7	921.0	929.0	929.8
HP Evaporator #1 Exit	Flow, lb/h	133,676	126,612	128,181	129,553	129,589	126,023	125,126	125,530	128,383	132,503	133,050	126,072	127,266	129,893	129,967
	Pressure, psia	2,453.3	2,450.6	2,450.0	2,451.5	2,450.2	2,430.1	2,411.1	2,412.1	2,417.9	2,432.0	2,427.3	2,410.0	2,416.6	2,433.1	2,433.1
	Temperature, F	665.4	665.2	665.2	665.3	665.2	664.0	662.8	662.9	663.3	664.1	663.8	662.6	663.2	664.2	664.2
	Enthalpy, Btu/lb	1,098.5	1,098.6	1,098.6	1,098.7	1,098.6	1,098.9	1,100.8	1,100.7	1,100.1	1,098.7	1,099.1	1,100.9	1,100.2	1,098.6	1,098.6
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	564.5	489.6	511.0	526.5	526.5	510.2	518.1	531.9	564.8	585.6	592.2	522.1	547.1	564.9	566.0
HP Evaporator #1 Approach	Temperature, F	38.3	28.6	31.7	34.1	34.2	27.6	27.8	30.3	34.3	39.2	39.7	28.8	33.1	36.5	36.7
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	604,557	626,339	618,744	614,385	613,617	621,612	613,136	609,126	602,868	597,675	591,382	610,868	604,944	604,778	604,947
	Pressure, psia	2,453.3	2,450.6	2,450.0	2,451.5	2,450.2	2,430.1	2,411.1	2,412.1	2,417.9	2,432.0	2,427.3	2,410.0	2,416.6	2,433.1	2,433.1
	Temperature, F	665.4	665.2	665.2	665.3	665.2	664.0	662.8	662.9	663.3	664.1	663.8	662.6	663.2	664.2	664.2
	Enthalpy, Btu/lb	1,098.5	1,098.6	1,098.6	1,098.7	1,098.6	1,098.9	1,100.8	1,100.7	1,100.1	1,098.7	1,099.1	1,100.9	1,100.2	1,098.6	1,098.6
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	16.7	17.7	17.6	17.4	17.4	19.1	19.9	18.8	18.7	18.3	18.0	19.1	18.9	18.6	16.7
HP Evaporator #2/3/4/5 Approach	Temperature, F	38.3	28.6	31.7	34.1	34.2	27.6	27.8	30.3	34.3	39.2	39.7	28.8	33.1	36.5	36.7
HP Economizer #1/2/3 Outlet	Flow, lb/h	738,232	752,951	746,926	743,938	743,206	747,635	738,263	734,656	731,251	730,076	724,432	735,940	732,210	734,642	734,314
	Temperature, F	627.1	536.7	563.5	581.2	581.0	636.4	635.0	632.6	629.0	624.9	624.1	634.0	630.1	627.7	627.5
HP Economizer #4/5 Outlet Temperature	Temperature, F	526.0	532.0	528.3	527.1	527.0	539.8	537.2	535.9	538.7	532.0	531.8	536.6	534.2	533.3	533.2
HP Economizer #6/7 Outlet Temperature	Temperature, F	448.1	454.3	452.0	450.7	450.6	465.7	464.5	462.6	460.4	457.9	457.6	463.6	461.1	459.7	459.6
HP Economizer #8 Outlet Temperature	Temperature, F	387.8	392.3	390.9	389.8	389.7	402.2	401.4	399.3	397.8	395.4	395.0	400.4	398.6	397.9	397.9
Feedwater to HP Economizer #8	Flow, lb/h	738,232	752,951	746,925	743,938	743,206	747,635	738,263	734,656	731,251	730,076	724,432	735,940	732,210	734,642	734,314
	Pressure, psia	2,624.1	2,628.1	2,624.7	2,624.6	2,623.2	2,605.2	2,581.9	2,581.1	2,585.5	2,599.0	2,591.7	2,579.7	2,584.8	2,602.2	2,602.1
	Temperature, F	349.6	350.8	351.1	350.7	350.6	350.8	350.4	350.1	350.2	357.2	356.9	356.8	356.7	356.4	356.9
	Enthalpy, Btu/lb	325.3	326.6	326.8	326.5	326.4	335.9	335.4	334.1	334.2	333.2	332.8	334.8	334.7	334.4	334.9
HP FW Temperature Increase Across BFP	F	10.1	10.2	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Duct Burner	HC, MMBtu/h (LHV)	313.00	280.00	285.00	290.00	290.00	312.80	307.10	311.00	317.00	334.20	340.70	306.30	313.60	323.30	323.40
	HC, MMBtu/h (HHV)	342.82	306.68	316.08	317.63	317.63	346.91	338.36	340.63	347.20	356.04	373.16	339.70	347.69	358.65	358.67
Inlet Temperature	Temperature, F	1,002.5	979.5	991.5	998.8	999.4	967.1	973.0	981.5	993.7	1,003.6	1,001.2	977.6	990.6	997.7	998.4
Exit Temperature	Temperature, F	1,272.9	1,199.8	1,222.9	1,239.4	1,240.6	1,219.5	1,225.1	1,243.1	1,269.3	1,305.3	1,312.7	1,281.7	1,280.4	1,281.5	1,282.8
HRSG Hot Reheat Steam	Flow, lb/h	671,092	689,156	666,103	663,622	663,077	774,111	753,794	758,321	752,213	751,443	752,869	760,679	753,931	764,547	764,099
(at HRSG terminal point)	Pressure, psia	509.1	502.6	502.1	502.4	502.1	576.6	576.4	568.3	568.7	568.5	569.6	569.2	567.4	569.4	569.3
	Temperature, F	1,052.7	1,024.2	1,037.8	1,046.7	1,046.4	1,016.5	1,017.2	1,028.8	1,046.8	1,062.7	1,062.7	1,022.7	1,037.7	1,046.6	1,046.4
	Enthalpy, Btu/lb	1,542.2	1,533.9	1,541.4	1,545.7	1,545.0	1,524.4	1,528.3	1,533.5	1,541.2	1,547.7	1,547.7	1,531.3	1,539.5	1,543.8	1,544.2
HRSG RH dP – terminal pt. to terminal pt.	psi	27.1	27.0	27.0	27.0	27.1	31.3	31.0	30.9	30.8	30.9	30.7	30.9	30.8	31.0	31.0
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,053.0	1,024.5	1,038.2	1,046.1	1,046.7	1,016.9	1,017.6	1,027.1	1,041.2	1,053.1	1,053.1	1,023.1	1,038.0	1,045.9	1,046.8
RHTR #3 Steam Outlet Temperature	Temperature, F	958.8	952.9	954.0	970.8	971.4	943.4	949.2	957.5	969.4	977.6	973.4	953.4	966.2	973.1	973.8
Reheat Steam Desuperheating Flow	Flow, lb/h	10,069	0	0	0	0	0	0	0	0	3,432	7,947	0	0	0	0
(from IP Feedwater)	Temperature, F	342.2	343.3	343.6	343.3	343.2	352.2	351.8	350.5	350.6	349.6	349.3	351.2	351.1	350.8	350.7
	% of inlet steam	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	1.1%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	378.3	383.9	393.4	399.5	400.0	373.3	376.4	386.2	397.1	399.6	399.0	381.9	393.8	400.6	401.2
RHTR #4 Steam Outlet Temperature	Temperature, F	882.8	855.7	865.1	871.2	871.6	858.7	863.6	871.0	881.5	894.1	895.9	868.9	878.4	885.6	886.1
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	950.4	899.1	918.4	929.9	931.1	888.2	899.6	912.8	931.2	950.0	953.2	906.5	925.3	935.7	936.8
	Enthalpy, Btu/lb	1,498.6	1,471.6	1,481.8	1,488.0	1,488.6	1,465.8	1,471.9	1,478.9	1,488.6	1,498.6	1,500.3	1,475.5	1,488.0	1,491.0	1,491.6
Cold Reheat Steam from STG to HRSG	Flow, lb/h	626,992	623,994	624,218	624,731	624,331	737,507	728,279	724,709	721,362	720,191	717,886	726,982	722,299	724,705	724,384
(at HRSG terminal point)	Pressure, psia	530.2	529.7	529.1	529.6	529.1	607.8	601.4	599.2	597.6	599.4	600.3	600.2	598.2	600.4	600.2
	Temperature, F	681.2	643.1	656.3	664.4	665.1	665.0	671.8	680.3	692.3	705.6	708.5	676.3	689.1	695.6	696.4
	Enthalpy, Btu/lb	1,344.1	1,322.2	1,330.0	1,334.7	1,335.2	1,329.8	1,334.3	1,339.5	1,346.6	1,354.3	1,356.9	1,337.0	1,344.7	1,348.4	1,348.9
Cold Reheat Steam, % of HP Steam		84.78%	82.83%	83.57%	83.98%	84.01%	98.65%	98.65%	98.65%	98.69%	98.65%	98.65%	98.85%	98.65%	98.65%	98.65%
HP Steam - Cold Reheat Steam	Flow, lb/h	112,347	126,256	122,719	119,205	118,875	10,128	9,968	9,947	9,890	9,882	9,846	9,959	9,911	9,937	9,931

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IP Steam (at HRSG terminal point)	Flow, lb/h	35,123	45,464	40,886	38,890	38,747	36,606	35,508	33,613	30,850	27,818	27,052	34,693	31,633	29,841	29,714
	Pressure, psia	536.2	529.7	529.1	529.5	529.1	537.8	601.4	599.2	597.6	599.4	600.4	600.2	598.2	600.4	600.2
	Temperature, F	671.5	668.3	668.7	669.6	669.6	673.0	672.2	673.1	674.7	676.5	676.9	672.5	674.3	676.1	676.1
	Enthalpy, Btu/lb	1,336.6	1,335.9	1,337.3	1,337.9	1,337.9	1,334.5	1,334.5	1,335.2	1,336.2	1,337.2	1,337.0	1,334.8	1,336.0	1,336.9	1,336.9
IP Evaporator Drum Exit	Flow, lb/h	35,123	45,464	40,886	38,890	38,747	36,606	35,508	33,613	30,850	27,818	27,052	34,693	31,633	29,841	29,714
	Pressure, psia	539.8	535.7	534.0	533.9	533.6	611.3	604.7	602.2	600.0	601.4	602.3	603.3	600.8	602.8	602.6
	Temperature, F	475.0	474.2	473.9	473.9	473.8	488.3	487.1	486.6	486.3	486.6	486.7	486.8	486.4	486.7	486.7
	Enthalpy, Btu/lb	1,204.7	1,204.7	1,204.7	1,204.7	1,204.7	1,203.7	1,203.6	1,203.8	1,203.9	1,203.8	1,203.8	1,203.8	1,203.8	1,203.8	1,203.8
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	11.8	14.4	13.2	12.7	12.7	12.6	12.3	11.8	11.1	10.1	9.9	12.2	11.3	10.8	10.8
IP Approach	Temperature, F	37.9	33.4	34.4	35.4	35.4	35.8	35.8	37.2	38.6	41.1	41.7	36.3	37.9	39.4	39.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	35,123	45,464	40,886	38,890	38,747	36,606	35,508	33,613	30,850	27,818	27,052	34,693	31,633	29,841	29,714
	Pressure, psia	539.8	535.7	534.0	533.9	533.6	611.3	604.7	602.2	600.0	601.4	602.3	603.3	600.8	602.8	602.6
	Temperature, F	437.1	440.8	439.4	438.5	438.4	452.5	451.3	449.6	447.7	445.4	445.0	450.5	448.5	447.8	447.2
	Enthalpy, Btu/lb	415.9	420.0	418.5	417.4	417.3	433.1	431.7	429.7	427.7	425.2	424.7	430.6	428.6	427.3	427.1
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	35,123	45,464	40,886	38,890	38,747	36,606	35,508	33,613	30,850	27,818	27,052	34,693	31,633	29,841	29,714
(pressure is preliminary)	Pressure, psia	550.0	562.6	547.7	546.3	545.9	622.3	615.0	611.5	609.3	607.8	608.9	613.2	609.1	610.1	609.8
	Temperature, F	342.7	343.9	344.1	343.8	343.7	362.8	362.2	361.0	361.1	360.2	360.2	361.6	361.6	361.3	361.2
	Enthalpy, Btu/lb	314.8	316.0	316.3	316.0	315.9	325.9	324.9	323.6	323.7	322.7	322.9	324.3	324.2	323.9	323.8
IP FW Temperature Increase Across BFP	F	3.2	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
LP Steam (at HRSG terminal point)	Flow, lb/h	26,572	32,416	33,317	32,312	32,152	32,274	33,210	29,887	30,754	26,793	25,047	31,729	32,068	30,410	30,197
	Pressure, psia	116.3	118.2	116.5	116.2	116.0	131.2	130.4	128.7	128.7	127.7	127.3	129.6	129.3	129.2	129.0
	Temperature, F	680.2	680.1	679.3	679.4	679.3	680.4	678.7	679.4	679.2	680.4	680.2	679.1	678.9	680.2	680.2
	Enthalpy, Btu/lb	1,368.7	1,368.6	1,368.1	1,368.2	1,368.2	1,367.8	1,367.1	1,367.5	1,367.4	1,368.1	1,368.0	1,367.3	1,367.2	1,367.9	1,367.9
LP Evaporator Steam Exit	Flow, lb/h	26,572	32,416	33,317	32,312	32,152	32,274	33,210	29,887	30,754	26,793	25,047	31,729	32,068	30,410	30,197
	Pressure, psia	117.2	118.9	119.4	118.9	118.7	133.7	132.9	130.8	131.0	129.4	128.8	131.9	131.8	131.3	131.2
	Temperature, F	339.6	340.6	340.9	340.6	340.5	349.5	349.0	347.8	347.9	347.0	346.6	348.5	348.4	348.1	348.0
	Enthalpy, Btu/lb	1,190.3	1,190.5	1,190.7	1,190.6	1,190.6	1,192.5	1,192.5	1,192.2	1,192.2	1,192.0	1,192.0	1,192.4	1,192.3	1,192.3	1,192.3
LP Evaporator Water Exit to BFPs	Flow, lb/h	764,670	808,698	798,491	793,731	792,878	764,238	773,775	758,259	762,103	761,328	762,732	770,632	763,844	764,482	764,026
	Pressure, psia	117.2	118.9	119.4	118.9	118.7	133.7	132.9	130.8	131.0	129.4	128.8	131.9	131.8	131.3	131.2
	Temperature, F	339.6	340.6	340.9	340.6	340.5	349.5	349.0	347.8	347.9	347.0	346.6	348.5	348.4	348.1	348.0
	Enthalpy, Btu/lb	310.7	311.9	312.2	311.9	311.8	321.2	320.8	319.5	319.6	318.8	318.2	320.2	320.1	319.8	319.7
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	35,123	45,464	40,886	38,890	38,747	36,606	35,508	33,613	30,850	27,818	27,052	34,693	31,633	29,841	29,714
IP FW to HRSG RH Desuperheater	Flow, lb/h	10,069	0	0	0	0	0	0	0	0	3,432	7,947	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	738,232	762,951	746,926	743,938	743,208	747,635	738,263	734,656	731,251	730,078	724,432	735,940	732,210	734,642	734,314
HP FW to HRSG HP Desuperheater	Flow, lb/h	1	0	0	0	0	0	0	0	0	0	3,300	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	11,247	10,289	10,682	10,904	10,925	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	17.2	19.0	18.2	17.8	17.8	18.2	17.9	17.5	16.8	16.2	16.0	17.7	17.0	16.7	16.6
LP Approach	Temperature, F	30.3	32.4	27.9	27.1	27.2	33.2	31.0	32.6	29.3	29.4	30.5	31.7	27.7	27.5	27.5
Condensate Recirculated	Flow, lb/h	77,007	174,260	98,203	76,038	76,103	166,982	141,201	143,104	75,893	56,821	57,333	142,020	75,366	55,563	55,644
	Temperature, F	309.6	308.9	313.5	313.9	313.8	316.9	316.7	315.8	320.0	316.0	316.5	317.3	321.1	321.0	320.9
% of Total LP Economizer Flow		9%	17%	11%	8%	8%	17%	15%	15%	9%	7%	7%	15%	9%	7%	7%
Condensate from LP Economizer	Flow, lb/h	898,273	1,015,427	930,036	902,087	901,130	985,555	948,250	941,262	868,758	844,939	845,137	944,407	871,319	850,504	849,919
	Temperature, F	305.8	308.0	312.7	313.2	313.0	316.0	317.8	316.0	319.3	317.3	316.8	316.5	320.4	320.3	320.1
	Enthalpy, Btu/lb	279.3	278.3	283.3	283.7	283.6	288.6	288.5	288.6	290.1	288.0	288.5	287.2	291.2	291.2	291.0
Condensate to LP Economizer	Flow, lb/h	898,273	1,015,427	930,036	902,087	901,130	985,555	948,250	941,262	868,758	844,939	845,137	944,407	871,319	850,504	849,919
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2
Condensate from Recirculation	Flow, lb/h	77,007	174,260	98,203	76,038	76,103	166,982	141,201	143,104	75,893	56,821	57,333	142,020	75,366	55,563	55,644
	Temperature, F	309.6	308.9	313.5	313.9	313.8	316.9	316.7	315.8	320.0	316.0	316.5	317.3	321.1	321.0	320.9
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	118.4	98.5	113.6	118.3	118.3	96.8	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.8
Condensate to HRSG	Flow, lb/h	821,266	841,166	831,833	826,048	825,038	818,572	807,048	798,158	792,865	788,118	787,804	802,387	795,954	794,941	794,274
	Pressure, psia	486.7	485.6	485.6	486.0	486.2	489.8	490.5	491.9	491.2	491.4	491.5	491.3	490.7	490.4	490.5
	Temperature, F	118.4	98.5	113.6	118.3	118.3	96.8	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.8
Stack Exit	Flow, lb/h	3,762,255	4,208,117	4,016,938	3,913,110	3,908,031	4,216,467	4,141,904	4,023,709	3,853,915	3,690,666	3,648,560	4,074,248	3,890,068	3,790,628	3,783,803
	Temperature, F	197.6	198.6	201.4	201.6	201.3	199.6	200.6	198.4	201.1	199.1	197.8	199.7	202.0	201.8	201.8

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 35 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	8,652	8,667	8,735	8,784	8,778	8,463	8,457	8,487	8,562	8,697	8,692	8,462	8,556	8,653	8,657
HP Turbine Remainder Shaft Power	kW	89,147	87,779	86,526	89,001	88,999	78,853	78,561	79,261	80,373	81,615	81,380	78,859	80,077	81,131	81,185
IP Turbine Shaft Power	kW	113,785	110,516	110,072	111,365	111,339	126,401	125,270	125,603	125,829	127,210	127,627	125,431	125,887	126,702	126,728
LP Turbine Shaft Power	kW	187,148	190,054	188,711	188,183	188,041	212,789	214,007	212,889	211,478	208,762	208,573	213,517	211,921	209,780	209,706
Total Shaft Power	kW	398,058	396,948	388,103	386,529	386,379	417,623	417,636	417,753	417,679	417,588	417,680	417,808	417,885	417,616	417,620
STG Throttle Steam	Flow, lb/h	2,214,717	2,258,851	2,240,778	2,231,611	2,229,618	2,242,904	2,214,797	2,203,957	2,193,757	2,190,218	2,189,194	2,207,823	2,198,630	2,203,927	2,202,945
	Pressure, psia (MAX 2270 psia)	2,271.3	2,266.6	2,266.3	2,269.8	2,268.5	2,249.8	2,231.9	2,232.6	2,236.5	2,251.6	2,247.6	2,231.0	2,237.4	2,262.9	2,262.9
	Temperature, F	1,048.8	1,006.9	1,022.5	1,031.9	1,032.8	997.3	1,005.5	1,010.2	1,031.5	1,047.5	1,050.0	1,011.1	1,027.4	1,035.8	1,036.6
	Enthalpy, Btu/lb	1,467.8	1,470.6	1,468.6	1,467.9	1,467.9	1,464.6	1,470.9	1,477.9	1,487.6	1,487.6	1,490.3	1,474.5	1,485.0	1,490.0	1,490.0
THV Pressure Loss	psi	45.4	45.3	45.9	46.3	45.3	44.7	44.3	44.3	44.5	44.7	44.6	44.3	44.4	44.8	44.8
		2.00%	2.00%	2.00%	2.06%	2.00%	1.99%	1.99%	1.99%	1.99%	1.99%	1.99%	1.99%	1.99%	1.99%	1.99%
Leak 1 Leakage Flow to HRH	Flow, lb/h	27,858	28,403	28,175	28,962	28,933	28,317	27,981	27,820	27,683	27,636	27,553	27,869	27,726	27,811	27,799
HP Turbine Exit	Flow, lb/h	2,186,860	2,230,448	2,212,609	2,203,743	2,201,684	2,214,586	2,186,846	2,176,145	2,166,076	2,162,574	2,155,626	2,179,959	2,168,904	2,176,116	2,175,148
	Pressure, psia	583.3	577.1	578.6	577.0	576.7	649.6	643.1	641.1	639.7	641.9	642.6	641.9	640.3	642.9	642.7
	Temperature, F (MAX 840 F)	688.1	650.5	663.5	671.5	672.3	671.4	678.1	686.6	698.5	711.7	714.5	682.6	696.3	701.8	702.5
	Enthalpy, Btu/lb	1,345.1	1,323.2	1,331.0	1,335.7	1,336.2	1,330.6	1,335.3	1,340.5	1,347.7	1,355.3	1,356.9	1,338.0	1,345.7	1,349.4	1,349.9
Efficiency (THV inlet to HPT exit)		86.90%	86.97%	86.97%	86.97%	86.97%	86.83%	86.83%	86.83%	86.84%	86.83%	86.84%	86.83%	86.84%	86.84%	86.84%
Efficiency (THV exit to HPT exit)		87.06%	87.06%	87.06%	87.06%	87.05%	87.04%	87.04%	87.03%	87.04%	87.03%	87.04%	87.04%	87.04%	87.04%	87.04%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,826	1,847	1,830	1,823	1,821	2,084	2,034	2,017	1,998	1,990	1,990	2,024	2,004	2,005	2,003
CRH Steam to Steam Seals	Flow, lb/h	181	161	175	188	192	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	2,184,873	2,228,449	2,210,603	2,201,732	2,199,571	2,212,522	2,184,812	2,174,128	2,164,078	2,160,583	2,153,636	2,177,935	2,166,900	2,174,113	2,173,145
	Pressure, psia	583.3	577.1	578.6	577.0	576.7	649.6	643.1	641.1	639.7	641.9	642.6	641.9	640.3	642.9	642.7
	Temperature, F	688.1	650.5	663.5	671.5	672.3	671.4	678.1	686.6	698.5	711.7	714.5	682.6	696.3	701.8	702.5
	Enthalpy, Btu/lb	1,345.1	1,323.2	1,331.0	1,335.7	1,336.2	1,330.6	1,335.3	1,340.5	1,347.7	1,355.3	1,356.9	1,338.0	1,345.7	1,349.4	1,349.9
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	342.2	343.3	343.6	343.3	343.2	352.2	351.8	350.5	350.6	349.8	349.3	351.2	351.1	350.8	350.7
Final Cold Reheat Steam after Conditioning	Flow, lb/h	2,184,873	2,228,449	2,210,603	2,201,732	2,199,571	2,212,522	2,184,812	2,174,128	2,164,078	2,160,583	2,153,636	2,177,935	2,166,900	2,174,113	2,173,145
	Pressure, psia	583.3	577.1	578.6	577.0	576.7	649.6	643.1	641.1	639.7	641.9	642.6	641.9	640.3	642.9	642.7
	Temperature, F (MAX 750 F)	688.1	650.5	663.5	671.5	672.3	671.4	678.1	686.6	698.5	711.7	714.5	682.6	696.3	701.8	702.5
	Enthalpy, Btu/lb	1,345.1	1,323.2	1,331.0	1,335.7	1,336.2	1,330.6	1,335.3	1,340.5	1,347.7	1,355.3	1,356.9	1,338.0	1,345.7	1,349.4	1,349.9
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	-171,627	-220,981	-215,295	-210,867	-210,341	109,812	105,570	100,636	92,592	93,747	105,028	104,101	94,892	89,529	89,150
Reheat System dP	psi	90.7	90.7	90.7	90.8	90.8	91.9	91.2	91.2	91.3	91.7	91.5	91.1	91.3	91.9	91.9
Reheat System dP		15.56%	15.72%	15.73%	15.74%	15.75%	14.14%	14.17%	14.22%	14.27%	14.29%	14.24%	14.19%	14.25%	14.29%	14.29%
Hot Reheat Flow	Flow, lb/h	2,013,245	2,007,468	1,995,309	1,990,865	1,989,230	2,322,335	2,291,382	2,274,964	2,256,640	2,254,330	2,258,666	2,282,036	2,261,792	2,263,640	2,262,295
	Pressure, psia (MAX 584 psia)	492.7	488.4	485.9	486.2	485.9	557.9	552.0	549.9	548.4	550.2	551.2	550.8	549.0	551.0	550.9
	Temperature, F	1,050.0	1,021.5	1,035.2	1,043.1	1,043.7	1,007.7	1,014.4	1,024.0	1,038.4	1,050.0	1,050.0	1,020.0	1,034.9	1,042.8	1,043.7
Differential to HP Temperature	dT, F (MAX +/- 50 F)	1.2	14.8	12.7	11.2	10.9	10.4	8.9	7.7	6.5	2.5	0.0	8.9	7.8	7.0	6.9
	Enthalpy, Btu/lb	1,548.2	1,532.9	1,540.4	1,544.7	1,545.0	1,523.4	1,527.3	1,532.5	1,540.2	1,548.7	1,546.7	1,530.3	1,538.5	1,542.6	1,543.2
HNTV Pressure Loss	psi	9.9	9.7	9.7	9.7	9.7	11.2	11.1	11.0	11.0	11.0	11.1	11.0	11.0	11.0	11.0
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.01%	2.01%	2.00%	2.00%	2.00%	2.00%
HP Turbine Exit	Flow, lb/h	2,041,101	2,035,671	2,023,483	2,018,927	2,017,263	2,350,851	2,319,342	2,302,784	2,284,323	2,281,966	2,286,219	2,309,906	2,289,517	2,291,451	2,290,093
	Pressure, psia	109.4	108.9	109.0	108.9	108.9	124.1	123.0	122.9	121.9	121.6	121.6	122.5	122.2	122.4	122.3
	Temperature, F	656.7	635.6	647.1	653.2	653.6	622.5	628.4	635.2	646.8	658.2	654.7	632.4	644.7	650.6	651.1
	Enthalpy, Btu/lb	1,357.2	1,346.7	1,352.4	1,355.5	1,355.7	1,336.1	1,342.1	1,345.6	1,351.5	1,355.7	1,355.5	1,344.2	1,350.4	1,353.3	1,353.6
Efficiency (INTV inlet to IPT exit)		90.87%	90.86%	90.86%	90.86%	90.86%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,592	1,602	1,595	1,589	1,587	1,839	1,817	1,797	1,785	1,774	1,773	1,807	1,792	1,799	1,798
LP Steam Admitted to STG (total)	Flow, lb/h	79,717	97,247	99,950	96,936	96,455	96,823	99,030	99,902	92,261	80,378	76,141	96,186	99,186	91,231	90,591
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	112.5	112.0	112.1	112.0	111.9	127.5	126.5	125.5	125.3	125.1	126.0	126.0	125.7	125.9	126.0
	Temperature, F	677.9	677.7	676.8	676.9	676.9	676.0	676.3	677.1	676.6	676.2	678.0	676.7	676.5	677.6	677.8
	Enthalpy, Btu/lb	1,367.7	1,367.6	1,367.1	1,367.2	1,367.2	1,366.8	1,366.1	1,366.5	1,366.4	1,367.1	1,367.0	1,366.3	1,366.2	1,366.9	1,366.9
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)	20.9	41.7	29.4	23.4	22.9	55.1	47.5	41.5	29.5	22.5	22.9	43.9	31.4	20.9	20.3
LP Admission CV Pressure Loss	% loss	2.7%	2.8%	2.7%	2.7%	2.8%	2.7%	2.6%	2.7%	2.8%	2.8%	2.7%	2.8%	2.7%	2.7%	2.8%
LP Turbine Inlet Steam	Flow, lb/h	2,119,226	2,131,516	2,121,838	2,114,274	2,112,131	2,445,636	2,417,155	2,396,648	2,374,600	2,360,571	2,359,687	2,403,285	2,383,923	2,383,893	2,378,886
	Pressure, psia	107.7	107.3	107.4	107.3	107.2	122.2	121.2	120.2	120.1	119.8	119.7	120.7	120.4	120.6	120.5
	Temperature, F	657.3	637.3	648.3	654.0	654.6	624.4	630.1	638.5	647.8	655.8	655.2	633.9	645.7	651.3	651.9
	Enthalpy, Btu/lb	1,357.6	1,347.6	1,353.1	1,356.0	1,356.2	1,340.2	1,343.1	1,346.4	1,352.1	1,356.1	1,356.8	1,345.1	1,351.0	1,353.8	1,354.1
LP Turbine Exit	Flow, lb/h	2,119,223	2,131,510	2,121,842	2,114,273	2,112,131	2,445,632	2,417,153	2,396,648	2,374,601	2,360,572	2,359,689	2,403,285	2,383,918	2,383,889	2,378,894
	Pressure, psia	1.645	0.864	1.350	1.641	1.540	0.819	0.970	0.961	1.483	1.685	1.664	0.955	1.487	1.695	1.694
	Pressure, in. HgA	3.145	1.759	2.749	3.138	3.136	1.668	1.974	1.957	3.019	3.431	3.429	1.955	3.027	3.451	3.449
	Temperature, F	116.7	96.9	111.9	116.6	116.6	95.1	100.7	100.4	115.2	119.8	119.8	100.5	115.3	120.0	120.0
ELEP Enthalpy, Btu/lb		1,046.6	1,016.3	1,040.0	1,047.9	1,046.0	1,006.1	1,013.3	1,014.8	1,038.1	1,046.4	1,046.3	1,014.2	1,037.6	1,046.2	1,045.4
UEEP Enthalpy, Btu/lb		1,056.3	1,043.4	1,049.6	1,056.6	1,056.7	1,043.3	1,041.0	1,042.6	1,048.2	1,054.4	1,054.2	1,041.9	1,047.7	1,053.2	1,053.4
Exhaust Loss Btu/lb		7.7	27.1	9.7	7.7	7.7	37.2	27.8	27.7	10.2	8.0	8.0	27.7	10.2	8.0	8.0
Moisture @ UEEP (MIN 1.7%)		5.41%	5.77%	5.84%	5.47%	5.46%	5.70%	5.17%	5.01%	5.12%	5.73%	5.74%	5.96%	5.18%	5.65%	5.84%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.71%	90.65%	90.60%	90.58%	90.58%	89.75%	89.91%	89.98%	90.46%	90.65%	90.64%	89.95%	90.42%	90.60%	90.63%
LPT Efficiency to UEEP		88.44%	82.69%	87.71%	88.41%	88.41%	79.75%	82.34%	82.46%	87.52%	88.32%	88.31%	82.41%	87.49%	88.26%	88.26%
Annulus Velocity ft/s		724.9	1,230.3	818.3	724.4	724.2	1,398.0	1,245.1	1,244.2	835.8	741.4	741.3	1,244.7	836.4	742.7	742.5
Volumetric Flow 1000 ft3/min per end		3,899	5,466	4,186	3,897	3,896	7,753	6,469	6,464	4,276	3,785	3,784	6,466	4,280	3,791	3,791
Gross Generator Output	kW	392,071	391,097	380,922	380,415	380,281	420,022	420,012	419,977	419,998	420,021	420,009	420,007	419,978	420,003	420,013
Generator MVA		436.5	447.8	447.8	436.5	436.5	447.8	447.8	447.8	447.8	436.5	436.5	447.8	447.8	436.5	436.5
Closed Cycle Cooling Water	Temperature, F	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0
Generator pf		0.913	0.900	0.900	0.905	0.904	0.938	0.938	0.938	0.938	0.976	0.976	0.938	0.938	0.976	0.976
Generator Efficiency		98.51%	98.51%	98.51%	98.51%	98.51%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%	98.53%

DEF-19FL-FUEL-002462

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

							35	45	59	74	90	95	-			
Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 35 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	2,045.6	2,077.8	2,044.5	2,038.6	2,038.8	2,400.0	2,353.1	2,331.6	2,294.4	2,284.4	2,283.2	2,342.2	2,301.7	2,300.7	2,299.2
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	15.5	17.5	15.7	15.4	15.4	22.0	19.6	19.6	17.7	17.3	17.2	19.7	17.7	17.4	17.4
LP Turbine Exit Steam to Condenser	Flow, lb/h	2,119,223	2,131,510	2,121,842	2,114,273	2,112,131	2,445,532	2,417,193	2,390,548	2,374,801	2,360,572	2,359,569	2,403,285	2,383,918	2,380,889	2,378,894
	Pressure, psia	1.545	0.864	1.350	1.541	1.540	0.819	0.970	0.961	1.483	1.685	1.684	0.965	1.487	1.695	1.694
	Pressure, in. HgA	3.145	1.759	2.749	3.138	3.135	1.668	1.974	1.957	3.019	3.431	3.429	1.965	3.027	3.451	3.449
	Temperature, F	116.7	99.9	111.9	116.6	116.6	95.1	100.7	100.4	115.2	119.8	119.8	100.5	115.3	120.0	120.0
	Enthalpy, Btu/lb	1,056.3	1,043.4	1,049.8	1,055.6	1,055.7	1,043.3	1,041.0	1,042.6	1,048.2	1,054.4	1,054.2	1,041.9	1,047.7	1,053.2	1,053.4
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	2,103	2,051	2,014	1,983	1,964	1,963	2,031	1,999	1,994	1,991
	Enthalpy, Btu/lb	1,350.4	1,333.7	1,343.5	1,344.4	1,344.8	1,334.7	1,338.5	1,342.9	1,349.5	1,355.5	1,356.2	1,341.0	1,347.9	1,351.3	1,351.6
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	340,970	368,370	370,064	360,282	359,378	161	124	9	18	14	36	39	131	123	120
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,549.2	1,533.9	1,541.4	1,545.7	1,546.0	1,524.4	1,528.3	1,533.5	1,541.2	1,547.7	1,547.7	1,531.3	1,539.5	1,543.8	1,544.2
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,368.7	1,368.8	1,368.1	1,368.2	1,368.2	1,367.8	1,367.1	1,367.5	1,367.4	1,368.1	1,368.0	1,367.3	1,367.2	1,367.9	1,367.9
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	87.7	87.8	82.9	87.5	87.5	66.1	71.7	71.4	66.3	90.9	90.9	71.6	86.4	91.1	91.0
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	87.7	87.8	82.9	87.5	87.5	66.1	71.7	71.4	66.3	90.9	90.9	71.6	86.4	91.1	91.0
Condenser Exit	Flow, lb/h	2,463,793	2,523,480	2,495,506	2,476,135	2,475,108	2,449,695	2,421,128	2,394,470	2,378,996	2,364,350	2,363,388	2,407,155	2,387,845	2,384,805	2,382,805
	Pressure, psia	1.545	0.864	1.350	1.541	1.540	0.819	0.970	0.961	1.483	1.685	1.684	0.965	1.487	1.695	1.694
	Pressure, in HgA (MIN 1.0 in. HgA)	3.145	1.759	2.749	3.137	3.135	1.668	1.974	1.957	3.019	3.431	3.429	1.965	3.027	3.451	3.449
	Temperature, F	116.7	96.9	111.9	116.6	116.6	95.1	100.7	100.4	115.2	119.8	119.8	100.5	115.3	120.0	120.0
	Enthalpy, Btu/lb	84.7	84.9	80.0	84.6	84.8	63.2	68.7	68.4	63.2	87.8	87.8	68.5	83.3	88.0	88.0
Condensate Pump Discharge	Flow, lb/h	2,463,793	2,523,480	2,495,506	2,476,135	2,475,108	2,449,695	2,421,128	2,394,470	2,378,996	2,364,350	2,363,388	2,407,155	2,387,845	2,384,805	2,382,805
	Pressure, psia	488.7	485.6	485.6	488.0	488.2	488.6	490.5	491.9	491.2	491.4	491.5	491.3	490.7	490.4	490.5
	Temperature, F	117.5	97.6	112.8	117.4	117.4	95.9	101.5	101.2	116.1	120.7	120.7	101.4	116.2	120.9	120.9
	Enthalpy, Btu/lb	86.6	87.0	82.0	86.7	86.7	65.3	70.8	70.6	65.4	90.0	90.0	70.7	85.5	90.2	90.1
Condensate after GSC	Flow, lb/h	2,463,793	2,523,480	2,495,506	2,476,135	2,475,108	2,449,695	2,421,128	2,394,470	2,378,996	2,364,350	2,363,388	2,407,155	2,387,845	2,384,805	2,382,805
	Temperature, F	118.4	98.5	113.6	118.3	118.3	96.8	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.8
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,463,793	2,523,480	2,495,506	2,476,144	2,475,197	2,449,716	2,421,144	2,394,473	2,378,997	2,364,354	2,363,412	2,407,160	2,387,851	2,384,823	2,382,823
	Temperature, F	118.4	98.5	113.6	118.3	118.3	96.8	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.8
Total Circulating Water	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Flow, gpm	389,682	389,785	389,696	389,682	389,682	389,853	389,785	389,785	389,696	389,682	389,682	389,785	389,696	389,682	389,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	68.0	85.0	90.0	90.0	68.0	68.0	68.0	65.0	90.0	90.0	68.0	85.0	90.0	90.0
Circulating Water to Condenser	Flow, lb/h	191,116,680	191,816,624	191,294,048	191,116,680	191,116,680	192,013,504	191,816,624	191,816,624	191,294,048	191,116,680	191,116,680	191,816,624	191,294,048	191,116,680	191,116,680
	Flow, gpm	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	68.1	85.1	90.1	90.1	68.1	68.1	68.1	65.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,116,680	191,816,624	191,294,048	191,116,680	191,116,680	192,013,504	191,816,624	191,816,624	191,294,048	191,116,680	191,116,680	191,816,624	191,294,048	191,116,680	191,116,680
	Temperature, F	101.2	79.4	96.2	101.2	101.2	79.1	80.9	80.8	97.6	102.5	102.5	80.8	97.5	102.5	102.5
Total Circulating Water Discharge	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Temperature, F	101.3	79.4	96.3	101.2	101.2	79.1	80.9	80.7	97.6	102.5	102.5	80.8	97.5	102.5	102.5
Circulating Water Temperature Rise	dT, F	11.26	11.42	11.26	11.24	11.23	13.09	12.85	12.74	12.47	12.52	12.62	12.79	12.66	12.61	12.60
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Flow, gpm	15,062	15,013	15,049	15,062	15,062	15,030	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062
	Temperature, F	90.1	68.1	85.1	90.1	90.1	68.1	68.1	68.1	65.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Temperature, F	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.5	80.3	97.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

							36	45	59	74	90	95			
Case Name		Case 36 3x100% PAG Fired Gas Fuel 95 F	Case 37 3x100% PAG Fired Gas Fuel 59 F/EC On	Case 38 3x100% PAG Fired Gas Fuel 74 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 40 3x100% PAG Fired Gas Fuel 95 F/EC On	Case 41 3x100% Fired Gas Fuel 36 F	Case 42 3x100% Fired Gas Fuel 45 F	Case 43 3x100% Fired Gas Fuel 59 F	Case 44-GUAR 3x100% Fired Gas Fuel 74 F	Case 45 3x100% Fired Gas Fuel 90 F	Case 46 3x100% Fired Gas Fuel 95 F	Case 47 3x100% Fired Gas Fuel 59 F/EC On	Case 48 3x100% Fired Gas Fuel 74 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 50 3x100% Fired Gas Fuel 95 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	340,970	368,370	370,004	360,262	358,378	161	124	9	13	14	38	39	131	123	120
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	794,670	805,668	768,491	763,731	762,878	764,238	773,775	788,289	762,103	761,326	762,732	770,632	763,644	764,462	764,026
	Pressure, psia	119.6	121.2	121.7	121.2	121.0	136.0	136.2	133.1	133.3	131.7	131.1	134.2	134.1	133.6	133.5
	Temperature, F	339.5	340.9	340.9	340.6	340.6	349.5	349.0	347.8	347.9	347.0	346.6	348.5	348.4	348.1	348.0
	Enthalpy, Btu/lb	310.7	311.9	312.2	311.9	311.8	321.2	320.8	319.5	319.6	318.6	318.2	320.2	320.1	319.8	319.7
IP Bleed (before CV)	Flow, lb/h	56,437	55,748	51,556	49,793	49,671	36,893	35,512	33,813	30,891	31,260	35,090	34,692	31,634	29,840	29,711
	Pressure, psia	916.9	897.5	907.9	912.6	913.2	927.4	937.0	941.2	946.8	946.9	945.3	939.5	945.6	944.8	945.2
	Temperature, F	342.2	343.3	343.6	343.3	343.2	362.2	361.8	360.5	360.6	349.8	349.3	351.2	351.1	350.8	350.7
	Enthalpy, Btu/lb	314.8	316.0	316.3	316.0	315.9	326.3	324.9	323.6	323.7	322.7	322.3	324.3	324.2	323.9	323.8
IP FW Control Valve Exit Pressure	Pressure, psia	550.8	552.6	547.7	546.3	546.9	622.3	615.0	611.5	607.9	607.6	606.3	613.2	609.1	610.1	609.8
	CV dP, psi	366.9	344.8	360.2	366.1	367.3	305.1	322.0	329.7	339.0	339.1	337.0	326.3	336.5	334.7	335.3
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,113.5	3,079.5	3,007.1	3,105.0	3,107.9	3,098.8	3,120.9	3,132.1	3,141.7	3,145.0	3,147.0	3,127.5	3,138.4	3,135.2	3,136.1
	CV dP, psi	456.6	451.4	472.4	461.2	464.6	493.6	539.0	551.0	566.3	546.1	555.3	547.6	553.6	552.9	554.0
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	736,233	752,951	746,925	743,938	743,206	747,635	758,263	734,656	731,251	730,078	727,732	735,940	732,210	734,642	734,314
	Pressure, psia	2,624.1	2,626.1	2,624.7	2,624.8	2,623.2	2,605.2	2,581.9	2,581.1	2,585.5	2,599.0	2,591.7	2,579.7	2,584.6	2,602.2	2,602.1
	Temperature, F	349.6	350.8	351.1	350.7	350.6	359.8	359.4	358.1	358.2	357.2	356.9	358.8	358.7	358.4	358.3
	Enthalpy, Btu/lb	326.3	326.8	326.8	326.5	326.4	335.9	335.4	334.1	334.2	333.2	332.8	334.6	334.7	334.4	334.3
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	736,239	752,950	746,925	743,937	743,205	747,635	758,266	734,656	731,252	730,073	727,731	735,941	732,210	734,642	734,315
	Pressure, psia	2,346.7	2,338.0	2,337.6	2,339.2	2,337.8	2,317.9	2,299.7	2,300.6	2,306.6	2,320.1	2,315.9	2,298.8	2,305.5	2,321.4	2,321.5
	Temperature, F	1,053.5	1,011.9	1,027.3	1,036.7	1,037.6	1,002.2	1,010.4	1,021.1	1,036.2	1,052.2	1,054.7	1,015.9	1,032.2	1,040.6	1,041.5
	Enthalpy, Btu/lb	1,496.8	1,471.6	1,481.8	1,488.0	1,488.6	1,465.5	1,471.9	1,478.9	1,488.6	1,496.6	1,500.3	1,475.5	1,486.0	1,491.0	1,491.6
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	2,346.7	2,338.0	2,337.6	2,339.2	2,337.8	2,317.9	2,299.7	2,300.6	2,306.6	2,320.1	2,315.9	2,298.8	2,305.5	2,321.4	2,321.5
	Temperature, F	1,053.5	1,011.9	1,027.3	1,036.7	1,037.6	1,002.2	1,010.4	1,021.1	1,036.2	1,052.2	1,054.7	1,015.9	1,032.2	1,040.6	1,041.5
	Enthalpy, Btu/lb	1,496.8	1,471.6	1,481.8	1,488.0	1,488.6	1,465.5	1,471.9	1,478.9	1,488.6	1,496.6	1,500.3	1,475.5	1,486.0	1,491.0	1,491.6
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	348.6	350.8	351.1	350.7	350.6	359.8	359.4	358.1	358.2	357.2	356.9	358.8	358.7	358.4	358.3
HP Steam Bypassed to Cold Reheat – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	950.4	899.1	918.4	929.9	931.1	898.2	899.6	912.8	931.2	950.0	953.2	908.6	926.3	935.7	936.8
	Enthalpy, Btu/lb	1,496.8	1,471.6	1,481.8	1,488.0	1,488.6	1,465.5	1,471.9	1,478.9	1,488.6	1,496.6	1,500.3	1,475.5	1,486.0	1,491.0	1,491.6
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	671,082	689,156	685,103	683,622	683,077	774,111	783,794	758,321	752,213	751,443	752,889	760,079	753,931	754,647	754,098
	Pressure, psia	569.1	562.6	562.1	562.4	562.1	576.5	579.4	568.3	566.7	566.5	569.6	569.2	567.4	569.4	569.3
	Temperature, F	1,052.7	1,024.2	1,037.8	1,045.7	1,046.4	1,010.5	1,017.2	1,026.8	1,040.8	1,052.7	1,052.7	1,022.7	1,037.7	1,045.6	1,046.4
	Enthalpy, Btu/lb	1,549.2	1,533.9	1,541.4	1,545.7	1,546.0	1,524.4	1,528.3	1,533.5	1,541.2	1,547.7	1,547.7	1,531.3	1,539.5	1,543.8	1,544.2
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	569.1	562.6	562.1	562.4	562.1	576.5	579.4	568.3	566.7	566.5	569.6	569.2	567.4	569.4	569.3
	Temperature, F	1,052.7	1,024.2	1,037.8	1,045.7	1,046.4	1,010.5	1,017.2	1,026.8	1,040.8	1,052.7	1,052.7	1,022.7	1,037.7	1,045.6	1,046.4
	Enthalpy, Btu/lb	1,549.2	1,533.9	1,541.4	1,545.7	1,546.0	1,524.4	1,528.3	1,533.5	1,541.2	1,547.7	1,547.7	1,531.3	1,539.5	1,543.8	1,544.2
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	116.4	98.5	113.6	118.3	118.3	98.6	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.6
HRH Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,037.5	1,008.4	1,022.5	1,030.7	1,031.3	999.3	997.6	1,007.7	1,022.3	1,034.5	1,034.5	1,003.4	1,019.0	1,027.1	1,028.0
	Enthalpy, Btu/lb	1,549.2	1,533.9	1,541.4	1,545.7	1,546.0	1,524.4	1,528.3	1,533.5	1,541.2	1,547.7	1,547.7	1,531.3	1,539.5	1,543.8	1,544.2
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	26,572	32,416	33,317	32,312	32,152	32,274	33,210	29,887	30,754	26,793	28,047	31,729	32,066	30,410	30,197
	Pressure, psia	116.3	116.2	116.5	116.2	116.0	131.2	130.4	126.7	126.7	127.7	127.3	129.6	129.3	129.2	129.0
	Temperature, F	680.2	680.1	679.3	679.4	679.3	680.4	678.7	679.4	679.2	680.4	680.2	679.1	678.9	680.2	680.2
	Enthalpy, Btu/lb	1,368.7	1,368.6	1,368.1	1,368.2	1,368.2	1,367.6	1,367.1	1,367.6	1,367.4	1,368.1	1,368.0	1,367.3	1,367.2	1,367.9	1,367.9
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	116.3	116.2	116.5	116.2	116.0	131.2	130.4	126.7	126.7	127.7	127.3	129.6	129.3	129.2	129.0
	Temperature, F	680.2	680.1	679.3	679.4	679.3	680.4	678.7	679.4	679.2	680.4	680.2	679.1	678.9	680.2	680.2
	Enthalpy, Btu/lb	1,368.7	1,368.6	1,368.1	1,368.2	1,368.2	1,367.6	1,367.1	1,367.6	1,367.4	1,368.1	1,368.0	1,367.3	1,367.2	1,367.9	1,367.9
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	116.4	98.5	113.6	118.3	118.3	98.6	102.4	102.1	117.0	121.6	121.6	102.2	117.1	121.8	121.6
LP Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	116.3	116.2	116.5	116.2	116.0	131.2	130.4	126.7	126.7	127.7	127.3	129.6	129.3	129.2	129.0
	Temperature, F	680.2	680.1	679.3	679.4	679.3	680.4	678.7	679.4	679.2	680.4	680.2	679.1	678.9	680.2	680.2
	Enthalpy, Btu/lb	1,368.7	1,368.6	1,368.1	1,368.2	1,368.2	1,367.6	1,367.1	1,367.6	1,367.4	1,368.1	1,368.0	1,367.3	1,367.2	1,367.9	1,367.9
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
GateCycle Model ID		8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2
GateCycle Case ID		B8-51	B8-52	B8-53	B8-54	B8-55	B8-56	B8-57	B8-58	B8-59	B8-60	B8-61	B8-62	B8-63	B8-64	B8-65
Ambient Temperature		35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/70%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/70%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/70%RH	90 F/55%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	2@100%	2@100%	2@100%	2@100%	2@100%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Fired/1132 F	Fired/1140 F	Fired/1151 F	Fired/1159 F	Fired/1168 F
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		299.7 MW	299.9 MW	298.2 MW	293.1 MW	284.0 MW	281.8 MW	300.2 MW	294.9 MW	289.7 MW	289.5 MW	245.9 MW	245.9 MW	244.7 MW	240.0 MW	234.8 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,464p/1,028F	1,460p/1,035F	1,455p/1,044F	1,445p/1,050F	1,400p/1,050F	1,385p/1,050F	1,483p/1,040F	1,453p/1,050F	1,438p/1,050F	1,433p/1,050F	1,322p/1,004F	1,318p/1,010F	1,313p/1,019F	1,308p/1,033F	1,295p/1,047F
STG Cold Reheat Conditions, psia/F		451p/721F	448p/726F	444p/733F	440p/738F	432p/741F	428p/742F	448p/736F	442p/738F	439p/739F	439p/739F	423p/711F	421p/716F	418p/723F	414p/734F	408p/746F
Cold Reheat Conditions after Conditioning, psia/F		451p/721F	448p/726F	444p/733F	440p/738F	432p/741F	428p/742F	448p/736F	442p/738F	439p/739F	439p/739F	423p/711F	421p/716F	418p/723F	414p/734F	408p/746F
STG Hot Reheat Conditions, psia/F		390p/1,026F	387p/1,032F	384p/1,041F	380p/1,049F	374p/1,050F	371p/1,050F	387p/1,037F	382p/1,048F	380p/1,050F	379p/1,050F	328p/998F	326p/1,003F	324p/1,012F	320p/1,026F	315p/1,038F
Condenser Pressure		1.28 In HgA	1.66 In HgA	1.64 In HgA	2.44 In HgA	2.77 In HgA	2.76 In HgA	1.65 In HgA	2.45 In HgA	2.80 In HgA	2.80 In HgA	1.09 In HgA	1.34 In HgA	1.32 In HgA	2.14 In HgA	2.44 In HgA
Stack Temperature		220 F	221 F	219 F	222 F	220 F	219 F	220 F	223 F	223 F	223 F	193 F	194 F	193 F	196 F	196 F
Run Date		8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		3	3	3	3	3	3	3	3	3	3	2	2	2	2	2
Gross CTG Output (each)	kW	207,123	201,614	192,471	181,068	168,833	164,881	197,137	184,229	177,293	176,896	207,123	201,614	192,471	181,068	168,833
Gross CTG Output (total)	kW	621,369	604,842	577,413	543,204	506,499	494,643	591,411	552,687	531,879	530,688	414,246	403,228	384,942	362,136	337,666
Gross CTG Heat Rate (LHV)	Btu/kWh	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,071	9,124	9,237	9,414	9,613
Gross CTG Heat Rate (HHV)	Btu/kWh	10,060	9,993	10,117	10,311	10,529	10,592	10,166	10,394	10,521	10,529	10,060	9,993	10,117	10,311	10,529
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Stk, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	5,636.44	5,518.56	5,333.56	5,113.72	4,863.21	4,783.69	5,431.52	5,179.78	5,045.40	5,032.66	3,757.63	3,679.05	3,555.71	3,409.15	3,242.14
CTG Heat Input (HHV) (total)	MMBtu/h	6,251.14	6,044.36	5,841.71	5,609.93	5,326.55	5,239.46	6,023.87	5,744.66	5,595.65	5,581.51	4,167.43	4,029.57	3,894.48	3,733.95	3,551.03
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.00	175.00	175.00	175.00	175.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	194.06	191.67	191.67	191.67	191.67
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	350.00	350.00	350.00	350.00	350.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	388.17	383.35	383.35	383.35	383.35
Gross STG Output	kW	299,859	299,919	298,240	293,110	284,040	281,570	300,200	294,900	289,700	289,480	245,900	245,900	244,670	239,990	234,840
STG Output, percent of CTG Output		48.2%	49.6%	51.7%	54.0%	56.1%	56.9%	50.8%	53.4%	54.5%	54.6%	59.4%	61.0%	63.6%	66.3%	69.5%
Gross Plant Output	kW	921,019	904,762	875,653	836,314	789,939	776,213	891,611	847,587	821,579	819,988	660,176	649,128	629,612	602,126	572,195
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,120	6,100	6,091	6,116	6,156	6,163	6,092	6,111	6,141	6,141	6,222	6,207	6,203	6,243	6,279
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,787	6,681	6,671	6,697	6,743	6,750	6,756	6,778	6,811	6,810	6,901	6,798	6,794	6,838	6,877
Plant Heat Input (LHV)	MMBtu/h	5,636.44	5,518.56	5,333.56	5,113.72	4,863.21	4,783.69	5,431.52	5,179.78	5,045.40	5,032.66	4,107.63	4,029.05	3,905.71	3,759.15	3,592.14
Plant Heat Input (HHV)	MMBtu/h	6,251.14	6,044.36	5,841.71	5,609.93	5,326.55	5,239.46	6,023.87	5,744.66	5,595.65	5,581.51	4,555.60	4,412.92	4,277.82	4,117.30	3,934.38
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	25,530	25,420	25,270	25,020	24,710	24,620	25,350	25,080	24,920	24,910	22,830	22,730	22,590	22,370	22,150
Total Auxiliary Power/Losses, percent of gross		2.77%	2.81%	2.89%	2.99%	3.13%	3.17%	2.84%	2.96%	3.03%	3.04%	3.49%	3.60%	3.59%	3.72%	3.87%
Net Plant Output w/ Step-Up Xfmr Losses	kW	895,489	879,332	850,383	811,294	765,229	751,593	866,261	822,507	796,659	795,068	637,346	626,398	607,012	579,756	549,966
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,294	6,276	6,272	6,303	6,356	6,365	6,270	6,298	6,333	6,333	6,445	6,432	6,434	6,484	6,532
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,981	6,874	6,870	6,904	6,961	6,971	6,954	6,984	7,024	7,024	7,148	7,045	7,047	7,102	7,154

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0
	Relative Humidity	60.1%	59.9%	59.7%	76.5%	54.8%	43.8%	59.7%	76.5%	54.8%	43.8%	60.1%	59.9%	59.7%	76.5%	54.8%
	WBT, F	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1	76.6
Compressor Inlet Conditions	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0
	Relative Humidity	60.1%	59.9%	59.7%	76.5%	54.8%	43.8%	92.8%	96.5%	91.4%	86.4%	60.1%	59.9%	59.7%	76.5%	54.8%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	5,631	3,805	9,622	13,119	0	0	0	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	1,678.8	1,839.5	1,777.9	1,704.6	1,621.1
	Flow, lb/h	89,908	88,034	84,920	80,556	76,610	75,367	86,640	82,524	80,481	80,277	80,908	88,034	84,920	80,556	76,610
Fuel LHV	Btu/lb	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	20,897	21,160	21,160	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

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Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	424.6	422.0	418.2	413.9	408.7	403.6	421.5	416.4	413.4	413.2	384.0	381.6	378.7	375.0	369.1
	Temperature, F	717.0	721.6	729.0	733.4	738.9	737.9	725.6	733.3	734.6	734.9	704.8	709.0	717.2	728.4	732.7
	Enthalpy, Btu/lb	1,370.8	1,373.4	1,377.7	1,380.3	1,382.6	1,383.3	1,376.9	1,380.1	1,381.0	1,381.1	1,366.4	1,369.1	1,373.4	1,379.6	1,386.0
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	347.4	346.7	344.9	344.1	342.5	341.8	345.9	345.3	344.1	344.1	324.5	324.5	323.2	323.5	322.4
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	709.4	714.4	722.3	727.2	731.4	732.7	718.9	726.8	728.5	728.7	701.2	706.3	714.3	725.0	737.9
	Enthalpy, Btu/lb	1,370.8	1,373.4	1,377.7	1,380.3	1,382.6	1,383.3	1,376.9	1,380.1	1,381.0	1,381.1	1,366.4	1,369.1	1,373.4	1,379.6	1,386.0
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	4,201,468	4,127,390	4,009,011	3,838,934	3,674,902	3,630,468	4,059,590	3,875,066	3,775,057	3,768,327	4,201,468	4,127,390	4,009,011	3,838,934	3,674,902
	Pressure, in. H2O	19.73	19.17	18.29	17.09	15.90	15.56	18.69	17.39	16.59	16.59	19.73	19.17	18.29	17.09	15.90
	Temperature, F	1,072.9	1,079.8	1,090.9	1,108.0	1,123.4	1,127.2	1,087.9	1,105.0	1,116.0	1,116.0	1,072.9	1,079.8	1,090.9	1,108.0	1,123.4
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	207,123	201,614	192,471	181,068	168,633	164,681	197,137	184,229	177,293	176,996	207,123	201,614	192,471	181,068	168,633
Gross Heat Rate	Btu/kWh (LHV)	9,071	9,124	9,237	9,414	9,613	9,671	9,164	9,372	9,486	9,494	9,071	9,124	9,237	9,414	9,613

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	469,107	466,671	463,024	458,549	443,907	438,887	466,619	461,437	456,556	454,825	638,827	635,415	630,284	624,263	614,354
(at HRSG terminal point)	Pressure, psia	1,509.0	1,505.1	1,499.5	1,489.0	1,443.2	1,427.4	1,503.1	1,497.8	1,479.5	1,477.2	1,490.9	1,397.1	1,391.5	1,386.4	1,372.5
	Temperature, F	1,032.4	1,038.4	1,048.1	1,053.8	1,053.7	1,053.7	1,044.2	1,053.8	1,053.7	1,053.7	1,009.4	1,015.4	1,024.9	1,038.8	1,052.8
	Enthalpy, Btu/lb	1,510.0	1,513.8	1,519.7	1,523.4	1,524.6	1,525.0	1,517.2	1,523.1	1,523.6	1,523.7	1,499.5	1,503.2	1,509.0	1,517.4	1,529.0
dP from HP drum to HRSG terminal point	psi	74.6	74.3	73.8	71.0	65.6	64.1	74.2	72.1	69.2	68.8	138.4	137.9	137.1	136.2	134.6
HP SH #1 Steam Outlet Temperature	Temperature, F	1,013.1	1,039.1	1,048.8	1,054.4	1,054.4	1,054.3	1,044.9	1,054.4	1,054.4	1,054.4	1,010.7	1,016.7	1,026.2	1,040.1	1,053.9
HP SH #2 Steam Outlet Temperature	Temperature, F	965.2	969.6	977.1	984.8	936.2	928.5	973.8	969.9	953.0	951.2	991.8	997.4	1,006.2	1,019.0	1,032.2
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	11,504	27,996	32,013	0	7,715	18,389	19,445	0	0	0	0	0
(from HP Feedwater)	Temperature, F	357.8	357.2	356.4	354.7	353.4	352.9	356.4	355.8	354.6	354.7	333.6	333.7	332.4	332.7	331.7
	% of Inlet steam	0.0%	0.0%	0.0%	2.6%	6.7%	7.9%	0.0%	1.7%	4.2%	4.5%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	250.2	253.3	257.9	220.8	163.9	148.9	254.9	232.8	198.4	192.7	308.5	313.4	320.8	330.4	343.2
HP SH #3/4 Steam Outlet Temperature	Temperature, F	852.1	854.8	859.0	860.9	857.7	856.8	856.7	860.4	859.1	858.8	905.3	909.8	916.8	925.8	937.2
HP Evaporator #1 Exit	Flow, lb/h	58,456	58,528	58,623	58,977	52,820	51,866	58,714	57,854	56,459	56,244	88,562	88,858	89,242	89,890	90,006
	Pressure, psia	1,583.6	1,579.4	1,573.3	1,559.9	1,508.8	1,491.5	1,582.3	1,569.8	1,548.6	1,546.0	1,539.3	1,535.0	1,528.6	1,522.5	1,507.0
	Temperature, F	603.5	603.2	602.7	601.5	597.0	595.5	603.4	602.4	600.5	600.3	599.7	599.4	598.8	598.3	596.9
	Enthalpy, Btu/lb	1,164.2	1,164.5	1,164.8	1,165.6	1,166.6	1,166.5	1,164.3	1,165.0	1,166.3	1,166.4	1,166.8	1,167.0	1,167.4	1,167.7	1,168.5
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	340.3	344.5	351.1	351.9	342.0	336.3	348.3	352.8	348.1	347.3	490.2	497.1	507.9	523.6	540.1
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	9.3	10.3	11.9	13.4
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	410,651	408,143	404,401	399,569	383,091	385,269	407,905	396,087	381,679	380,136	550,266	546,559	541,043	534,373	524,349
	Pressure, psia	1,583.6	1,579.4	1,573.3	1,559.9	1,508.8	1,491.5	1,582.3	1,569.8	1,548.6	1,546.0	1,539.3	1,535.0	1,528.6	1,522.5	1,507.0
	Temperature, F	603.5	603.2	602.7	601.5	597.0	595.5	603.4	602.4	600.5	600.3	599.7	599.4	598.8	598.3	596.9
	Enthalpy, Btu/lb	1,164.2	1,164.5	1,164.8	1,165.6	1,166.6	1,166.5	1,164.3	1,165.0	1,166.3	1,166.4	1,166.8	1,167.0	1,167.4	1,167.7	1,168.5
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	21.5	21.3	21.2	20.7	19.8	19.4	21.4	21.0	20.5	20.5	20.8	20.6	20.3	20.1	19.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	9.3	10.3	11.9	13.4
HP Economizer #1/2/3 Outlet	Flow, lb/h	469,107	466,671	463,024	447,146	415,911	406,875	466,619	453,722	437,167	435,380	638,827	635,417	630,285	624,263	614,356
	Temperature, F	603.5	603.2	602.7	601.5	597.0	595.5	603.4	602.4	600.5	600.3	591.1	590.1	588.5	586.3	583.5
HP Economizer #4/5 Outlet Temperature	Temperature, F	556.1	554.5	552.1	550.6	550.1	549.7	553.5	551.0	550.9	550.9	519.7	517.8	515.1	510.9	505.6
HP Economizer #6/7 Outlet Temperature	Temperature, F	471.0	469.6	467.2	465.7	465.1	464.7	468.5	466.3	466.1	466.1	438.6	437.4	435.2	432.4	429.2
HP Economizer #8 Outlet Temperature	Temperature, F	417.1	415.7	413.1	412.1	412.6	412.5	414.4	412.7	412.7	412.8	380.2	379.4	377.2	376.6	376.1
Feedwater to HP Economizer #8	Flow, lb/h	469,107	466,671	463,024	447,146	415,911	406,875	466,619	453,722	437,167	435,380	638,827	635,417	630,285	624,263	614,356
	Pressure, psia	1,653.1	1,648.2	1,641.0	1,623.2	1,563.6	1,543.9	1,651.1	1,635.0	1,609.1	1,606.1	1,667.1	1,661.5	1,653.1	1,644.6	1,625.3
	Temperature, F	357.8	357.2	356.4	354.7	353.4	352.9	356.4	355.8	354.6	354.7	333.6	333.7	332.4	332.7	331.7
	Enthalpy, Btu/lb	332.3	331.8	329.7	329.1	327.6	327.0	330.8	330.2	329.1	329.0	307.2	307.3	306.0	306.3	305.2
HP FW Temperature Increase Across BFP	F	13.2	13.2	13.3	13.4	13.7	13.8	13.2	13.3	13.5	13.5	11.6	11.6	11.7	11.7	11.8
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.00	175.00	175.00	175.00	175.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	194.09	191.67	191.67	191.67	191.67
Inlet Temperature	Temperature, F	971.1	976.5	982.5	982.5	957.6	953.3	979.9	984.2	977.3	976.3	989.8	994.9	1,002.9	1,015.9	1,025.5
Exit Temperature	Temperature, F	971.1	976.5	982.5	982.5	957.6	953.3	979.9	984.2	977.3	976.3	1,132.1	1,139.8	1,151.4	1,168.6	1,185.2
HRSG Hot Reheat Steam	Flow, lb/h	534,823	530,452	523,907	516,922	508,348	504,884	528,779	520,263	516,380	516,220	681,839	676,607	668,796	659,078	645,621
(at HRSG terminal point)	Pressure, psia	402.7	400.3	396.7	392.5	386.2	383.5	399.8	396.0	392.3	392.1	348.4	348.5	343.6	340.3	334.9
	Temperature, F	1,028.1	1,034.0	1,043.3	1,051.8	1,052.5	1,052.5	1,039.8	1,050.9	1,052.5	1,052.5	1,003.5	1,008.2	1,015.1	1,028.4	1,041.2
	Enthalpy, Btu/lb	1,536.8	1,542.1	1,547.2	1,551.6	1,552.4	1,552.4	1,545.2	1,551.3	1,552.2	1,552.2	1,525.6	1,528.6	1,533.5	1,540.7	1,547.8
HRSG RH dP -- terminal pt. to terminal pt.	psi	21.9	21.8	21.5	21.3	20.5	20.3	21.7	21.4	21.1	21.1	35.5	35.3	35.0	34.7	34.1
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,028.4	1,034.3	1,043.6	1,052.0	1,052.7	1,052.7	1,040.0	1,051.2	1,052.7	1,052.7	1,003.0	1,008.6	1,016.5	1,028.8	1,041.6
RHTR #3 Steam Outlet Temperature	Temperature, F	947.9	952.9	959.1	966.7	949.0	934.9	956.3	960.1	951.6	950.3	947.0	951.8	959.2	970.2	981.1
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	7,557	9,721	0	0	2,909	3,520	0	0	0	0	0
(from IP Feedwater)	Temperature, F	347.4	346.7	344.9	344.1	342.5	341.8	345.9	345.3	344.1	344.1	324.5	324.5	323.2	323.6	322.4
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	1.5%	2.0%	0.0%	0.0%	0.6%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	355.2	358.4	363.5	364.6	328.7	318.9	361.2	364.9	350.8	347.9	415.9	420.1	426.7	436.2	446.2
RHTR #4 Steam Outlet Temperature	Temperature, F	864.4	867.0	871.2	871.2	864.7	862.8	869.7	872.2	868.9	868.5	854.3	858.0	863.8	872.3	880.8
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0
	Temperature, F	971.5	976.5	982.5	982.5	957.6	953.3	979.9	984.2	977.3	976.3	951.7	958.7	969.6	985.4	1,001.5
	Enthalpy, Btu/lb	1,510.0	1,513.8	1,519.7	1,523.4	1,524.6	1,525.0	1,517.2	1,523.1	1,523.6	1,523.7	1,499.5	1,503.2	1,509.0	1,517.4	1,526.0
Cold Reheat Steam from STG to HRSG	Flow, lb/h	462,426	460,017	456,411	452,084	437,620	432,558	459,864	454,840	449,030	448,307	629,474	626,102	621,029	615,084	605,267
(at HRSG terminal point)	Pressure, psia	424.6	422.0	418.2	413.9	408.7	403.8	421.5	418.4	413.4	413.2	364.0	361.8	356.7	375.0	369.1
	Temperature, F	717.9	721.8	728.0	733.4	736.9	737.9	726.0	733.3	734.6	734.9	704.8	709.6	717.2	728.4	739.7
	Enthalpy, Btu/lb	1,370.8	1,373.4	1,377.7	1,380.3	1,382.6	1,383.3	1,375.9	1,380.1	1,381.0	1,381.1	1,359.4	1,359.1	1,373.4	1,379.6	1,386.0
Cold Reheat Steam, % of HP Steam		98.55%	98.57%	98.57%	98.57%	98.66%	98.68%	98.57%	98.57%	98.57%	98.57%	98.54%	98.53%	98.59%	98.59%	98.52%
HP Steam - Cold Reheat Steam	Flow, lb/h	6,681	6,654	6,614	6,565	6,369	6,329	6,655	6,597	6,527	6,518	9,363	9,314	9,255	9,179	9,089

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-B BJScrivner
1997 Steam Tables

Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
IP Steam (at HRSG terminal point)	Flow, lb/h	72,398	70,436	67,497	64,839	63,160	62,585	68,915	65,424	64,442	64,392	52,365	50,505	47,767	43,990	40,333
	Pressure, psia	424.6	422.0	418.2	413.9	408.7	403.8	421.5	416.4	413.4	413.2	384.0	381.9	378.7	375.0	369.1
	Temperature, F	661.1	661.2	661.5	660.7	658.2	654.7	661.9	661.5	659.6	659.4	607.5	607.6	607.7	608.2	607.7
	Enthalpy, Btu/lb	1,305.6	1,305.9	1,306.3	1,306.2	1,304.2	1,303.5	1,306.3	1,306.5	1,305.6	1,305.5	1,312.5	1,312.7	1,313.0	1,313.6	1,313.6
IP Evaporator Drum Exit	Flow, lb/h	72,398	70,436	67,497	64,839	63,160	62,585	68,915	65,424	64,442	64,392	52,365	50,505	47,767	43,990	40,333
	Pressure, psia	442.8	439.4	434.3	428.9	421.3	416.2	438.2	431.7	428.3	428.1	394.7	391.9	387.8	382.6	375.8
	Temperature, F	464.7	463.9	462.8	461.5	449.7	449.0	463.7	462.2	451.4	451.3	443.3	442.8	441.5	440.4	438.6
	Enthalpy, Btu/lb	1,205.2	1,205.2	1,205.2	1,205.2	1,205.1	1,205.1	1,205.2	1,205.2	1,205.2	1,205.2	1,205.0	1,205.0	1,204.9	1,204.9	1,204.8
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	28.8	28.3	27.6	27.1	26.9	26.8	28.0	27.2	27.2	27.1	19.7	19.2	18.5	17.4	15.4
IP Approach	Temperature, F	9.8	9.8	10.4	10.2	9.2	9.0	10.2	10.2	9.9	9.8	22.3	22.5	23.3	23.8	24.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	72,398	70,436	67,497	64,839	63,160	62,585	68,915	65,424	64,442	64,392	52,365	50,505	47,767	43,990	40,333
	Pressure, psia	442.8	439.4	434.3	428.9	421.3	416.2	438.2	431.7	428.3	428.1	394.7	391.9	387.8	382.6	375.8
	Temperature, F	445.2	444.2	442.4	441.3	440.5	440.0	443.5	442.0	441.5	441.5	421.0	420.1	418.3	416.6	413.9
	Enthalpy, Btu/lb	424.6	423.7	421.7	420.5	419.6	419.1	422.9	421.2	420.7	420.7	398.1	397.1	395.1	393.2	390.3
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	72,398	70,436	67,497	64,839	63,160	62,585	68,915	65,424	64,442	64,392	52,365	50,505	47,767	43,990	40,333
	Pressure, psia	485.3	479.6	471.4	463.1	453.7	450.1	478.8	466.5	462.0	461.8	416.5	412.2	405.9	398.2	388.8
	Temperature, F	348.3	347.7	345.8	345.1	343.5	342.8	348.8	346.3	345.1	345.0	326.5	326.5	324.2	324.5	323.5
	Enthalpy, Btu/lb	320.6	319.9	317.9	317.2	315.5	314.8	319.9	318.4	317.2	317.1	298.7	298.7	295.4	295.7	294.5
IP FW Temperature Increase Across BFP	F	3.7	3.7	3.7	3.8	3.8	3.8	3.7	3.7	3.8	3.8	3.4	3.6	3.5	3.5	3.5
LP Steam (at HRSG terminal point)	Flow, lb/h	67,626	66,815	63,901	63,379	61,752	61,011	66,282	63,880	63,464	63,366	42,220	42,280	39,412	40,082	37,563
	Pressure, psia	114.3	113.4	111.0	109.9	107.7	106.7	112.4	111.8	109.9	109.8	86.3	86.3	86.3	85.5	84.7
	Temperature, F	611.0	610.4	610.5	608.3	603.4	601.8	611.1	609.2	606.8	606.5	617.3	616.5	616.2	614.9	613.4
	Enthalpy, Btu/lb	1,334.0	1,333.7	1,334.0	1,332.9	1,330.6	1,329.9	1,334.1	1,333.3	1,332.2	1,332.1	1,339.0	1,338.6	1,338.5	1,337.9	1,337.2
LP Evaporator Steam Exit	Flow, lb/h	67,626	66,815	63,901	63,379	61,752	61,011	66,282	63,880	63,464	63,366	42,220	42,280	39,412	40,082	37,563
	Pressure, psia	126.6	124.4	121.3	120.1	117.6	116.5	123.0	122.0	120.1	120.0	92.2	92.3	90.6	91.0	89.5
	Temperature, F	344.6	344.0	342.1	341.3	339.7	339.0	343.1	342.5	341.3	341.3	322.0	322.0	320.6	321.0	319.9
	Enthalpy, Btu/lb	1,191.5	1,191.4	1,190.9	1,190.8	1,190.4	1,190.2	1,191.2	1,191.0	1,190.8	1,190.7	1,186.0	1,186.0	1,185.7	1,185.7	1,185.5
LP Evaporator Water Exit to BFPs	Flow, lb/h	541,503	537,104	530,520	523,486	514,732	511,196	535,433	526,858	522,905	522,738	691,194	688,923	678,048	668,253	654,666
	Pressure, psia	126.6	124.4	121.3	120.1	117.6	116.5	123.0	122.0	120.1	120.0	92.2	92.3	90.6	91.0	89.5
	Temperature, F	344.6	344.0	342.1	341.3	339.7	339.0	343.1	342.5	341.3	341.3	322.0	322.0	320.6	321.0	319.9
	Enthalpy, Btu/lb	316.2	315.4	313.5	312.7	311.0	310.3	314.6	313.9	312.7	312.6	292.5	292.6	291.2	291.5	290.4
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	72,398	70,436	67,497	64,839	63,160	62,585	68,915	65,424	64,442	64,392	52,365	50,505	47,767	43,990	40,333
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	7,667	9,721	0	0	2,909	3,520	0	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	469,107	466,071	463,024	447,145	415,911	406,676	466,619	453,722	437,167	435,380	638,827	635,417	630,265	624,263	614,356
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	11,504	27,996	32,013	0	7,715	18,389	19,446	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	20.1	19.7	19.4	18.9	18.7	18.6	19.6	19.0	19.0	18.9	20.5	20.1	19.6	18.8	18.0
LP Approach	Temperature, F	5.8	4.5	5.4	2.3	2.2	2.6	5.1	2.2	1.8	1.6	20.9	18.9	20.2	15.5	15.1
Condensate Recirculated	Flow, lb/h	134,555	114,829	115,497	69,280	56,076	56,313	115,314	68,941	55,530	55,568	218,910	186,357	187,299	114,615	94,221
	Temperature, F	339.0	339.6	336.7	339.1	337.5	336.5	338.1	340.4	339.6	339.7	301.4	303.3	300.7	305.5	304.6
% of Total LP Economizer Flow		19%	16%	16%	11%	9%	9%	16%	10%	9%	9%	23%	20%	21%	14%	12%
Condensate from LP Economizer	Flow, lb/h	743,735	718,793	709,959	656,177	632,607	626,664	716,075	659,723	641,936	641,712	952,357	914,599	904,808	823,202	786,522
	Temperature, F	336.5	339.0	336.2	336.6	337.0	336.0	337.6	339.9	339.3	339.2	300.7	302.6	300.1	305.0	304.3
	Enthalpy, Btu/lb	310.1	310.7	307.8	310.3	308.7	307.6	309.2	311.6	311.1	310.9	271.0	273.0	270.4	276.5	274.8
Condensate to LP Economizer	Flow, lb/h	743,735	718,793	709,959	656,177	632,607	626,664	716,075	659,723	641,936	641,712	952,357	914,599	904,808	823,202	786,522
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3
Condensate from Recirculation	Flow, lb/h	134,555	114,829	115,497	69,280	56,076	56,313	115,314	68,941	55,530	55,568	218,910	186,357	187,299	114,615	94,221
	Temperature, F	339.0	339.6	336.7	339.1	337.5	336.5	338.1	340.4	339.6	339.7	301.4	303.3	300.7	305.5	304.6
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	89.2	95.4	95.1	110.5	115.0	114.8	95.3	110.6	115.3	115.3	84.7	91.4	91.2	107.0	111.6
Condensate to HRSG	Flow, lb/h	609,180	603,963	594,461	586,898	576,531	572,351	600,761	590,782	586,406	586,144	733,446	728,242	717,509	708,386	692,301
	Pressure, psia	518.6	518.7	519.9	519.4	520.2	520.7	519.1	518.9	519.0	519.0	532.6	532.5	533.3	532.6	533.2
	Temperature, F	89.2	95.4	95.1	110.5	115.0	114.8	95.3	110.6	115.3	115.3	84.7	91.4	91.2	107.0	111.6
Stack Exit	Flow, lb/h	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,875,069	3,775,057	3,758,327	4,209,863	4,135,061	4,017,281	3,847,204	3,663,172
	Temperature, F	220.3	221.2	218.9	221.9	220.3	219.3	220.0	222.9	222.7	222.5	193.3	194.5	192.6	196.1	195.4

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	5,663	5,666	5,671	5,649	5,472	5,412	5,693	5,681	5,611	5,592	5,049	5,051	5,054	5,066	5,051
HP Turbine Remainder Shaft Power	kW	50,309	50,451	50,667	50,602	48,570	47,912	50,799	50,682	50,089	49,971	43,504	43,599	43,761	44,064	44,075
IP Turbine Shaft Power	kW	84,992	84,707	84,462	83,840	82,563	82,034	84,925	84,902	83,782	83,762	73,621	73,353	73,154	72,742	72,055
LP Turbine Shaft Power	kW	153,966	154,073	152,400	157,044	152,275	151,040	153,772	158,971	155,117	155,036	128,300	128,443	127,241	122,822	116,122
Total Shaft Power	kW	298,969	299,231	297,599	292,385	288,408	286,986	299,497	294,156	288,987	288,771	245,424	245,394	244,147	239,417	234,251
STG Throttle Steam	Flow, lb/h	1,407,320	1,400,012	1,389,072	1,375,947	1,331,722	1,316,582	1,399,557	1,384,310	1,366,668	1,364,474	1,277,653	1,270,831	1,260,588	1,248,526	1,228,709
	Pressure, psia (MAX 2270 psia)	1,464.3	1,460.6	1,455.0	1,444.8	1,400.4	1,385.0	1,463.4	1,453.3	1,433.4	1,433.4	1,321.5	1,317.9	1,312.6	1,307.7	1,294.5
	Temperature, F	1,025.5	1,034.6	1,044.3	1,060.0	1,060.0	1,060.0	1,040.4	1,060.0	1,060.0	1,060.0	1,003.6	1,009.7	1,019.3	1,033.3	1,047.4
	Enthalpy, Btu/lb	1,509.9	1,512.8	1,518.7	1,522.4	1,523.6	1,524.0	1,516.2	1,522.1	1,522.6	1,522.7	1,499.5	1,502.2	1,508.0	1,516.4	1,525.0
THV Pressure Loss	psi	28.9	28.9	28.8	28.6	27.7	27.4	28.9	28.8	28.4	28.3	26.1	26.0	25.9	25.6	25.6
		1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.96%	1.97%	1.97%	1.97%	1.97%	1.97%
Leak 1 Leakage Flow to HRH	Flow, lb/h	17,512	17,717	17,575	17,406	16,857	16,667	17,709	17,512	17,292	17,265	16,200	16,111	15,979	15,823	15,568
HP Turbine Exit	Flow, lb/h	1,389,509	1,382,295	1,371,498	1,358,540	1,314,895	1,299,993	1,381,848	1,366,796	1,349,376	1,347,209	1,261,462	1,254,715	1,244,586	1,232,705	1,213,140
	Pressure, psia	450.6	448.0	444.2	439.8	431.5	428.3	447.7	442.5	439.9	438.8	423.1	420.9	417.7	414.1	408.0
	Temperature, F (MAX 840 F)	721.4	726.0	733.4	737.7	741.1	742.1	730.4	737.7	738.9	739.2	710.6	715.4	723.0	734.1	745.3
	Enthalpy, Btu/lb	1,371.8	1,374.4	1,378.7	1,381.3	1,383.6	1,384.3	1,376.9	1,381.1	1,382.0	1,382.1	1,367.4	1,370.1	1,374.4	1,380.6	1,387.0
Efficiency (THV Inlet to HPT exit)		85.74%	85.75%	85.75%	85.75%	85.73%	85.73%	85.74%	85.75%	85.74%	85.74%	85.69%	85.69%	85.69%	85.70%	85.70%
Efficiency (THV exit to HPT exit)		87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.01%	87.01%	87.01%	87.02%	87.01%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,374	1,363	1,346	1,329	1,302	1,291	1,350	1,336	1,326	1,325	1,295	1,285	1,271	1,252	1,227
CRH Steam to Steam Seals	Flow, lb/h	890	883	921	956	1,007	1,027	894	938	960	962	1,206	1,224	1,255	1,287	1,337
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	1,387,275	1,380,060	1,369,230	1,356,255	1,312,558	1,297,675	1,379,594	1,364,522	1,347,089	1,344,922	1,258,951	1,252,209	1,242,052	1,230,165	1,210,578
	Pressure, psia	450.6	448.0	444.2	439.8	431.5	428.3	447.7	442.5	439.9	438.8	423.1	420.9	417.7	414.1	408.0
	Temperature, F	721.4	726.0	733.4	737.7	741.1	742.1	730.4	737.7	738.9	739.2	710.6	715.4	723.0	734.1	745.3
	Enthalpy, Btu/lb	1,371.8	1,374.4	1,378.7	1,381.3	1,383.6	1,384.3	1,376.9	1,381.1	1,382.0	1,382.1	1,367.4	1,370.1	1,374.4	1,380.6	1,387.0
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	347.4	348.7	344.9	344.1	342.5	341.8	345.0	345.3	344.1	344.1	324.5	324.5	323.2	323.6	322.4
Final Cold Reheat Steam after Conditioning	Flow, lb/h	1,387,275	1,380,060	1,369,230	1,356,255	1,312,558	1,297,675	1,379,594	1,364,522	1,347,089	1,344,922	1,258,951	1,252,209	1,242,052	1,230,165	1,210,578
	Pressure, psia	450.6	448.0	444.2	439.8	431.5	428.3	447.7	442.5	439.9	438.8	423.1	420.9	417.7	414.1	408.0
	Temperature, F (MAX 750 F)	721.4	726.0	733.4	737.7	741.1	742.1	730.4	737.7	738.9	739.2	710.6	715.4	723.0	734.1	745.3
	Enthalpy, Btu/lb	1,371.8	1,374.4	1,378.7	1,381.3	1,383.6	1,384.3	1,376.9	1,381.1	1,382.0	1,382.1	1,367.4	1,370.1	1,374.4	1,380.6	1,387.0
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	217,194	211,307	202,492	194,512	212,481	216,916	205,742	196,269	202,051	203,738	104,727	101,006	95,530	87,986	80,666
Reheat System dP	psi	61.0	60.8	60.6	59.9	57.9	57.3	60.8	60.3	59.6	59.4	94.9	94.6	94.2	93.7	92.8
Reheat System dP		13.53%	13.56%	13.61%	13.63%	13.43%	13.37%	13.50%	13.63%	13.55%	13.53%	22.44%	22.48%	22.54%	22.62%	22.76%
Hot Reheat Flow	Flow, lb/h	1,604,469	1,591,356	1,571,722	1,550,767	1,525,039	1,514,591	1,585,336	1,560,790	1,549,140	1,548,661	1,363,678	1,353,214	1,337,583	1,318,152	1,291,243
	Pressure, psia (MAX 564 psia)	382.6	387.3	383.8	379.8	373.6	371.0	386.8	382.1	379.5	379.4	328.1	326.3	323.6	320.5	315.4
	Temperature, F	1,025.6	1,031.5	1,040.8	1,049.3	1,060.0	1,060.0	1,037.3	1,048.5	1,060.0	1,060.0	997.5	1,003.2	1,012.2	1,025.5	1,038.3
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-2.9	-3.1	-3.5	-0.7	0.0	0.0	-3.2	-1.5	0.0	0.0	-6.1	-6.5	-7.1	-7.8	-9.0
	Enthalpy, Btu/lb	1,537.8	1,541.1	1,548.2	1,550.8	1,551.4	1,551.4	1,544.2	1,550.3	1,551.2	1,551.2	1,524.6	1,527.6	1,532.5	1,539.7	1,548.6
INTV Pressure Loss	psi	7.6	7.7	7.7	7.6	7.5	7.4	7.7	7.6	7.6	7.6	6.8	6.8	6.6	6.4	6.3
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	1,622,281	1,609,073	1,589,296	1,568,173	1,541,895	1,531,258	1,604,045	1,578,302	1,566,433	1,565,928	1,379,678	1,369,326	1,353,571	1,333,974	1,306,810
	Pressure, psia	84.0	83.3	82.1	81.2	80.6	80.9	83.0	81.8	81.2	81.1	74.4	74.0	73.1	72.6	71.2
	Temperature, F	557.7	562.4	569.1	576.0	576.4	576.3	566.5	575.4	575.7	575.6	621.9	626.6	633.0	644.2	653.9
	Enthalpy, Btu/lb	1,356.8	1,361.0	1,364.4	1,367.9	1,368.2	1,368.2	1,363.1	1,367.6	1,368.2	1,368.2	1,342.1	1,344.4	1,347.6	1,353.2	1,358.1
Efficiency (INTV inlet to IPT exit)		90.80%	90.80%	90.80%	90.80%	90.80%	90.80%	90.80%	90.80%	90.80%	90.80%	90.85%	90.85%	90.85%	90.85%	90.85%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,366	1,354	1,332	1,316	1,291	1,282	1,347	1,324	1,314	1,313	1,099	1,091	1,075	1,061	1,036
LP Steam Admitted to STG (total)	Flow, lb/h	202,679	200,448	197,704	190,137	185,265	183,033	195,847	191,839	190,983	190,079	84,436	84,560	83,825	80,166	75,126
(upstream of LP admission CV)	Pressure, psia (MIN 76.2 psia)	96.8	96.0	94.7	93.5	92.1	91.4	95.6	93.7	93.7	93.7	79.2	79.2	78.3	78.3	78.9
	Temperature, F	606.6	606.0	606.3	604.1	599.2	597.7	606.6	605.0	602.5	602.4	614.2	613.4	613.3	611.9	610.5
	Enthalpy, Btu/lb	1,333.0	1,332.7	1,333.0	1,331.9	1,329.6	1,328.9	1,333.1	1,332.3	1,331.2	1,331.1	1,336.0	1,337.6	1,337.5	1,336.9	1,336.2
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 196 F)	-61.5	-58.7	-53.1	-72.3	-77.5	-78.9	-60.1	-79.4	-74.4	-74.6	-7.7	-13.2	-19.7	-32.3	-49.4
LP Admission CV Pressure Loss	% loss	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	4.1%	2.7%	2.7%	4.9%	5.4%	6.5%	7.5%	9.0%
LP Turbine Inlet Steam	Flow, lb/h	1,423,794	1,408,155	1,779,669	1,756,995	1,725,859	1,713,010	1,768,545	1,768,617	1,755,481	1,754,692	1,463,218	1,452,795	1,431,322	1,413,079	1,380,991
	Pressure, psia	92.8	91.9	90.8	89.9	88.3	87.8	91.6	90.4	89.8	89.8	79.3	72.9	72.9	71.6	70.2
	Temperature, F	651.8	655.9	662.1	668.1	667.9	667.7	659.8	667.6	668.4	668.4	621.3	625.7	631.7	642.2	651.4
	Enthalpy, Btu/lb	1,355.8	1,357.6	1,361.0	1,364.0	1,364.1	1,364.0	1,359.8	1,363.8	1,364.2	1,364.2	1,341.8	1,344.0	1,347.1	1,352.3	1,356.9
LP Turbine Exit	Flow, lb/h	1,423,792	1,408,162	1,779,667	1,756,994	1,725,857	1,713,009	1,768,543	1,768,615	1,755,479	1,754,690	1,463,213	1,452,792	1,431,318	1,413,074	1,380,988
	Pressure, psia	0.628	0.764	0.756	1.197	1.359	1.353	0.761	1.202	1.374	1.373	0.630	0.656	0.650	1.052	1.201
	Pressure, in. HgA	1.279	1.555	1.539	2.437	2.766	2.755	1.550	2.447	2.796	2.796	1.080	1.335	1.324	2.143	2.445
	Temperature, F	86.6	92.8	92.5	107.8	112.2	112.0	92.7	107.9	112.5	112.5	81.3	86.0	87.7	103.4	107.9
ELEP Enthalpy, Btu/lb		1,014.0	1,023.3	1,025.0	1,048.8	1,053.0	1,054.2	1,024.3	1,048.6	1,055.7	1,056.7	1,010.5	1,021.5	1,023.1	1,048.9	1,058.6
UEEP Enthalpy, Btu/lb		1,049.5	1,048.2	1,049.7	1,057.3	1,053.0	1,053.1	1,049.1	1,057.1	1,052.7	1,052.7	1,042.6	1,042.3	1,043.7	1,050.2	1,055.0
Exhaust Loss Btu/lb		35.6	24.9	24.7	8.5	7.0	7.0	24.8	8.5	7.0	7.0	32.1	20.9	20.8	7.9	5.4
Moisture @ UEEP (MIN 1.7%)		4.73%	5.13%	4.96%	4.91%	4.55%	4.53%	5.04%	4.94%	4.80%	4.80%	5.15%	5.48%	5.54%	4.83%	4.17%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.16%	90.33%	90.40%	90.80%	90.93%	90.93%	90.37%	90.79%	90.92%	90.92%	89.97%	90.16%	90.23%	90.70%	90.92%
LPT Efficiency to UEEP		80.77%	83.56%	83.75%	88.36%	88.87%	88.87%	83.58%	88.34%	88.88%	88.86%	81.25%	84.32%	84.49%	88.51%	88.95%
Annulus Velocity ft/s		1,368.9	1,183.3	1,178.7	767.8	672.5	670.5	1,161.9	769.4	677.0	676.9	1,341.0	1,098.5	1,092.7	668.3	667.5
Volumetric Flow 1000 ft3/min per end		7,488	6,146	6,120	3,920	3,429	3,419	6,138	3,929	3,452	3,452	7,016	5,682	5,650	3,552	3,098
Gross Generator Output	kW	299,651	299,914	298,242	293,111	284,035	281,574	300,204	294,895	289,705	289,462	245,931	245,903	244,557	239,988	234,840
Generator MVA		447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.36%	98.37%	98.36%	98.35%	98.32%	98.32%	98.37%	98.35%	98.34%	98.34%	98.19%	98.19%	98.18%	98.16%	98.14%

CONFIDENTIAL

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

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Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,817.1	1,787.8	1,762.9	1,727.0	1,698.7	1,688.6	1,780.1	1,737.8	1,726.7	1,725.9	1,455.9	1,435.6	1,416.7	1,384.0	1,358.4
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	16.7	15.0	14.8	13.3	12.8	12.7	15.0	13.4	13.0	13.0	13.3	12.1	11.9	10.7	10.3
LP Turbine Exit Steam to Condenser	Flow, lb/h	1,820,792	1,806,162	1,779,667	1,756,994	1,725,857	1,713,009	1,798,543	1,768,015	1,755,479	1,754,690	1,463,213	1,452,792	1,431,316	1,413,074	1,380,885
	Pressure, psia	0.628	0.764	0.755	1.197	1.359	1.353	0.751	1.202	1.374	1.373	0.530	0.656	0.650	1.052	1.201
	Pressure, in. HgA	1.279	1.555	1.539	2.437	2.768	2.755	1.550	2.447	2.796	2.796	1.080	1.335	1.324	2.143	2.445
	Temperature, F	86.5	92.8	92.5	107.8	112.2	112.0	92.7	107.9	112.5	112.5	81.3	88.0	87.7	103.4	107.9
	Enthalpy, Btu/lb	1,049.8	1,048.2	1,046.7	1,057.3	1,053.0	1,053.1	1,049.1	1,057.1	1,052.7	1,052.7	1,042.8	1,042.3	1,043.7	1,056.2	1,056.0
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,366.8	1,369.4	1,373.4	1,376.4	1,378.1	1,378.5	1,371.7	1,376.1	1,377.0	1,377.1	1,359.6	1,362.3	1,369.4	1,372.6	1,378.7
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	132	111	104	85	120	129	122	116	124	126	63	60	68	79	86
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser (total, both units)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,536.8	1,542.1	1,547.2	1,561.8	1,552.4	1,552.4	1,545.2	1,551.3	1,552.2	1,552.2	1,525.6	1,528.6	1,533.5	1,540.7	1,547.6
LP Steam Bypassed to Condenser (total, both units)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,334.0	1,333.7	1,334.0	1,332.9	1,338.6	1,329.9	1,334.1	1,333.3	1,332.2	1,332.1	1,339.0	1,338.6	1,338.5	1,337.9	1,337.2
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	58.6	64.6	64.6	79.9	84.3	84.2	64.6	80.0	84.6	84.9	54.2	60.9	60.7	76.4	81.0
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	58.6	64.6	64.6	79.9	84.3	84.2	64.6	80.0	84.6	84.9	54.2	60.9	60.7	76.4	81.0
Condenser Exit	Flow, lb/h	1,827,624	1,811,674	1,783,371	1,760,680	1,729,578	1,716,737	1,802,265	1,772,330	1,759,202	1,758,416	1,466,877	1,456,472	1,435,005	1,416,753	1,384,585
	Pressure, psia	0.628	0.764	0.755	1.197	1.359	1.353	0.751	1.202	1.374	1.373	0.530	0.656	0.650	1.052	1.201
	Pressure, in HgA (MIN 1.0 in. HgA)	1.279	1.555	1.539	2.437	2.768	2.755	1.550	2.447	2.797	2.796	1.080	1.335	1.324	2.143	2.445
	Temperature, F	86.5	92.8	92.5	107.8	112.2	112.0	92.7	107.9	112.5	112.5	81.3	88.0	87.7	103.4	107.9
	Enthalpy, Btu/lb	54.7	60.9	60.5	75.8	80.2	80.0	60.8	75.9	80.5	80.5	49.4	56.0	55.8	71.4	75.9
Condensate Pump Discharge	Flow, lb/h	1,827,624	1,811,674	1,783,371	1,760,680	1,729,578	1,716,737	1,802,265	1,772,330	1,759,202	1,758,416	1,466,877	1,456,472	1,435,005	1,416,753	1,384,585
	Pressure, psia	518.5	518.7	519.0	519.4	520.2	520.7	519.1	519.9	519.0	519.0	532.5	532.5	533.3	532.6	533.2
	Temperature, F	58.0	64.2	63.9	109.3	113.7	113.6	64.1	109.4	114.0	114.0	83.3	89.9	89.7	105.5	110.0
	Enthalpy, Btu/lb	57.4	63.7	63.4	78.6	83.1	82.9	63.6	78.8	83.4	83.4	52.8	59.4	59.2	74.9	79.4
Condensate after GSC	Flow, lb/h	1,827,624	1,811,674	1,783,371	1,760,680	1,729,578	1,716,737	1,802,265	1,772,330	1,759,202	1,758,416	1,466,877	1,456,472	1,435,005	1,416,753	1,384,585
	Temperature, F	59.2	65.4	65.1	110.5	115.0	114.8	65.3	110.6	115.3	115.3	84.7	91.4	91.2	107.0	111.6
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,827,540	1,811,591	1,783,384	1,760,693	1,729,594	1,716,754	1,802,281	1,772,347	1,759,218	1,758,431	1,466,893	1,456,484	1,435,018	1,416,773	1,384,601
	Temperature, F	59.2	65.4	65.1	110.5	115.0	114.8	65.3	110.6	115.3	115.3	84.7	91.4	91.2	107.0	111.6
Total Circulating Water	Flow, lb/h	199,997,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,997,952	199,501,072	199,501,072	198,978,496	198,800,096
	Flow, gpm	389,853	388,785	388,785	388,696	388,682	388,682	388,785	388,696	388,682	388,682	388,853	388,785	388,785	388,696	388,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	80.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	80.0	68.0	68.0	85.0	90.0
Circulating Water to Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,660	191,115,660	191,816,624	191,294,048	191,115,660	191,115,660	192,013,504	191,816,624	191,816,624	191,294,048	191,115,660
	Flow, gpm	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741	374,619	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	80.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	80.1	68.1	68.1	85.1	90.1
Circulating Water from Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,660	191,115,660	191,816,624	191,294,048	191,115,660	191,115,660	192,013,504	191,816,624	191,816,624	191,294,048	191,115,660
	Temperature, F	70.0	77.8	77.7	94.5	99.3	99.3	77.8	94.6	99.5	99.5	88.0	75.9	75.8	92.7	97.6
Total Circulating Water Discharge	Flow, lb/h	199,997,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,997,952	199,501,072	199,501,072	198,978,496	198,800,096
	Temperature, F	70.1	77.9	77.6	94.6	99.5	99.4	77.9	94.7	99.6	99.6	88.2	76.1	76.0	92.6	97.7
Circulating Water Temperature Rise	dT, F	10.05	9.90	9.77	9.60	9.46	9.40	9.66	9.61	9.60	9.60	8.17	8.07	7.97	7.86	7.74
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Flow, gpm	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,060	15,013	15,013	15,049	15,062
	Temperature, F	80.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	80.1	68.1	68.1	85.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427
	Temperature, F	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
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Case Name		Case 51 3x100% Unfired Gas Fuel 35 F	Case 52 3x100% Unfired Gas Fuel 45 F	Case 53 3x100% Unfired Gas Fuel 59 F	Case 54 3x100% Unfired Gas Fuel 74 F	Case 55 3x100% Unfired Gas Fuel 90 F	Case 56 3x100% Unfired Gas Fuel 95 F	Case 57 3x100% Unfired Gas Fuel 59 F/EC On	Case 58 3x100% Unfired Gas Fuel 74 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 60 3x100% Unfired Gas Fuel 95 F/EC On	Case 61 2x100% Fired Gas Fuel 35 F	Case 62 2x100% Fired Gas Fuel 45 F	Case 63 2x100% Fired Gas Fuel 59 F	Case 64 2x100% Fired Gas Fuel 74 F	Case 65 2x100% Fired Gas Fuel 90 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	132	111	104	85	120	129	122	115	124	126	63	80	88	79	88
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	541,593	537,104	530,520	523,486	514,732	511,198	535,403	528,658	522,905	522,738	591,194	585,923	578,048	568,253	554,088
	Pressure, psia	127.8	126.7	123.6	122.4	119.6	118.8	125.3	124.3	122.4	122.3	94.5	94.6	92.9	93.3	91.9
	Temperature, F	344.6	344.0	342.1	341.3	339.7	339.0	343.1	342.5	341.3	341.3	322.0	322.0	320.7	321.0	319.9
	Enthalpy, Btu/lb	316.2	315.4	313.5	312.7	311.0	310.3	314.6	313.9	312.7	312.6	292.6	292.6	291.2	291.5	290.4
IP Bleed (before CV)	Flow, lb/h	72,396	70,433	67,496	64,836	70,625	72,310	66,914	65,421	67,340	67,913	52,357	50,606	47,764	43,991	40,333
	Pressure, psia	1,085.3	1,086.6	1,087.8	1,090.1	1,092.2	1,093.0	1,086.6	1,089.7	1,090.3	1,090.3	987.0	990.6	995.3	1,001.8	1,009.8
	Temperature, F	347.4	346.7	344.9	344.1	342.5	341.8	345.9	345.3	344.1	344.1	324.5	324.5	323.2	323.5	322.4
	Enthalpy, Btu/lb	329.6	319.9	317.9	317.2	315.5	314.8	319.0	318.4	317.2	317.1	296.7	296.7	295.4	295.7	294.6
IP PW Control Valve Exit Pressure	Pressure, psia	485.3	479.6	471.4	463.1	453.7	450.1	476.8	466.5	462.0	461.8	416.6	412.2	405.9	398.2	388.8
	CV dP, psi	600.0	607.0	616.4	626.9	638.5	642.9	609.8	623.2	626.2	628.5	570.6	578.6	589.4	603.5	621.0
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,528.2	3,532.3	3,539.2	3,545.6	3,559.9	3,565.0	3,539.8	3,541.3	3,547.8	3,548.4	3,331.3	3,338.2	3,350.1	3,361.9	3,381.1
	CV dP, psi	1,875.0	1,884.1	1,898.1	1,922.4	1,966.3	2,021.1	1,882.7	1,905.4	1,938.7	1,942.3	1,664.2	1,676.6	1,697.1	1,717.3	1,755.7
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	469,107	466,671	463,024	458,650	443,907	438,688	466,519	461,437	455,556	454,825	538,827	535,417	530,285	524,263	514,355
	Pressure, psia	1,963.1	1,648.2	1,641.0	1,623.2	1,563.6	1,543.9	1,651.1	1,635.0	1,609.1	1,606.1	1,667.1	1,661.5	1,653.1	1,644.6	1,625.3
	Temperature, F	357.8	357.2	355.4	354.7	353.4	352.9	356.4	355.8	354.8	354.7	333.6	333.7	332.4	332.7	331.7
	Enthalpy, Btu/lb	332.3	331.6	329.7	329.1	327.8	327.0	330.6	330.2	329.1	329.0	307.2	307.3	306.0	306.3	305.2
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	469,107	466,671	463,024	458,649	443,907	438,687	466,519	461,437	455,556	454,825	538,827	535,416	530,284	524,263	514,354
	Pressure, psia	1,509.0	1,505.1	1,499.5	1,489.0	1,443.2	1,427.4	1,508.1	1,497.8	1,479.5	1,477.2	1,409.9	1,397.1	1,391.5	1,388.4	1,372.5
	Temperature, F	1,032.4	1,036.4	1,048.1	1,053.8	1,053.7	1,053.7	1,044.2	1,053.8	1,053.7	1,053.7	1,009.4	1,015.4	1,024.9	1,038.8	1,052.8
	Enthalpy, Btu/lb	1,510.0	1,513.8	1,519.7	1,523.4	1,524.6	1,525.0	1,517.2	1,523.1	1,523.8	1,523.7	1,499.5	1,503.2	1,509.0	1,517.4	1,526.0
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1,509.0	1,505.1	1,499.5	1,489.0	1,443.2	1,427.4	1,508.1	1,497.8	1,479.5	1,477.2	1,409.9	1,397.1	1,391.5	1,388.4	1,372.5
	Temperature, F	1,032.4	1,036.4	1,048.1	1,053.8	1,053.7	1,053.7	1,044.2	1,053.8	1,053.7	1,053.7	1,009.4	1,015.4	1,024.9	1,038.8	1,052.8
	Enthalpy, Btu/lb	1,510.0	1,513.8	1,519.7	1,523.4	1,524.6	1,525.0	1,517.2	1,523.1	1,523.8	1,523.7	1,499.5	1,503.2	1,509.0	1,517.4	1,526.0
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	357.8	357.2	356.4	354.7	353.4	352.9	356.4	355.8	354.8	354.7	333.6	333.7	332.4	332.7	331.7
HP Steam Bypassed to Cold Reheat -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	971.5	976.5	989.6	996.5	996.9	996.8	984.9	996.1	997.0	997.1	951.7	958.7	968.5	985.4	1,001.5
	Enthalpy, Btu/lb	1,510.0	1,513.8	1,519.7	1,523.4	1,524.6	1,525.0	1,517.2	1,523.1	1,523.8	1,523.7	1,499.5	1,503.2	1,509.0	1,517.4	1,526.0
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	534,823	530,462	523,907	515,922	505,345	504,864	528,779	520,263	516,380	516,220	661,639	656,607	648,795	639,076	645,921
	Pressure, psia	402.7	400.3	396.7	392.6	386.2	383.5	399.8	395.0	392.3	392.1	348.4	346.5	343.6	340.3	334.9
	Temperature, F	1,028.1	1,034.0	1,043.3	1,051.8	1,052.5	1,052.5	1,039.8	1,050.9	1,052.5	1,052.5	1,006.5	1,006.2	1,015.1	1,026.4	1,041.2
	Enthalpy, Btu/lb	1,536.8	1,542.1	1,547.2	1,551.8	1,552.4	1,552.4	1,545.2	1,551.3	1,552.2	1,552.2	1,525.6	1,528.6	1,533.5	1,540.7	1,547.6
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	402.7	400.3	396.7	392.6	386.2	383.5	399.8	395.0	392.3	392.1	348.4	346.5	343.6	340.3	334.9
	Temperature, F	1,028.1	1,034.0	1,043.3	1,051.8	1,052.5	1,052.5	1,039.8	1,050.9	1,052.5	1,052.5	1,006.5	1,006.2	1,015.1	1,026.4	1,041.2
	Enthalpy, Btu/lb	1,536.8	1,542.1	1,547.2	1,551.8	1,552.4	1,552.4	1,545.2	1,551.3	1,552.2	1,552.2	1,525.6	1,528.6	1,533.5	1,540.7	1,547.6
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	89.2	95.4	95.1	110.5	115.0	114.6	95.3	110.5	115.3	115.3	84.7	91.4	91.2	107.0	111.6
HRH Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,017.7	1,023.9	1,033.5	1,042.3	1,043.4	1,043.5	1,029.7	1,041.4	1,043.1	1,043.1	992.5	998.3	1,007.6	1,021.2	1,034.4
	Enthalpy, Btu/lb	1,536.8	1,542.1	1,547.2	1,551.8	1,552.4	1,552.4	1,545.2	1,551.3	1,552.2	1,552.2	1,525.6	1,528.6	1,533.5	1,540.7	1,547.6
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	67,626	66,615	63,901	63,379	61,752	61,011	66,282	63,880	63,454	63,360	42,220	42,260	39,412	40,082	37,563
	Pressure, psia	114.3	113.4	111.0	109.9	107.7	106.7	112.4	111.6	109.9	109.8	88.3	88.3	85.3	85.5	84.7
	Temperature, F	611.0	610.4	610.5	608.3	603.4	601.8	611.1	609.2	606.8	606.6	617.3	616.5	616.2	614.9	613.4
	Enthalpy, Btu/lb	1,334.0	1,333.7	1,334.0	1,332.9	1,330.5	1,329.9	1,334.1	1,333.3	1,332.2	1,332.1	1,339.9	1,338.6	1,338.5	1,337.9	1,337.2
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	114.3	113.4	111.0	109.9	107.7	106.7	112.4	111.6	109.9	109.8	88.3	88.3	85.3	85.5	84.7
	Temperature, F	611.0	610.4	610.5	608.3	603.4	601.8	611.1	609.2	606.8	606.6	617.3	616.5	616.2	614.9	613.4
	Enthalpy, Btu/lb	1,334.0	1,333.7	1,334.0	1,332.9	1,330.5	1,329.9	1,334.1	1,333.3	1,332.2	1,332.1	1,339.9	1,338.6	1,338.5	1,337.9	1,337.2
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	89.2	95.4	95.1	110.5	115.0	114.6	95.3	110.5	115.3	115.3	84.7	91.4	91.2	107.0	111.6
LP Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	114.3	113.4	111.0	109.9	107.7	106.7	112.4	111.6	109.9	109.8	88.3	88.3	85.3	85.5	84.7
	Temperature, F	611.0	610.4	610.5	608.3	603.4	601.8	611.1	609.2	606.8	606.6	617.3	616.5	616.2	614.9	613.4
	Enthalpy, Btu/lb	1,334.0	1,333.7	1,334.0	1,332.9	1,330.5	1,329.9	1,334.1	1,333.3	1,332.2	1,332.1	1,339.9	1,338.6	1,338.5	1,337.9	1,337.2
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
GateCycle Model ID		8BARTO	8BART2	8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BARTO	8BART2	8BARTO	8BART2	8BART2
GateCycle Case ID		B8-66	B8-67	B8-68	B8-69	B8-70	B8-71	B8-72	B8-73	B8-74	B8-75	B8-76	B8-77	B8-78	B8-79	B8-80
Ambient Temperature		95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%
CTG Inlet Air Cooler		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Fired/1190 F	Fired/1146 F	Fired/1165 F	Fired/1175 F	Fired/1176 F	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		233.5 MW	246.0 MW	241.0 MW	237.7 MW	237.6 MW	200.4 MW	199.5 MW	198.5 MW	192.8 MW	187.4 MW	186.1 MW	199.9 MW	193.9 MW	190.5 MW	190.6 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,268p/1,050F	1,319p/1,015F	1,313p/1,030F	1,308p/1,039F	1,308p/1,039F	1,032p/1,004F	1,029p/1,010F	1,024p/1,019F	1,019p/1,033F	1,004p/1,048F	997p/1,050F	1,030p/1,016F	1,024p/1,030F	1,020p/1,038F	1,020p/1,039F
STG Cold Reheat Conditions, psia/F		406p/747F	420p/720F	416p/732F	414p/738F	413p/739F	342p/722F	340p/727F	337p/734F	334p/745F	328p/759F	326p/759F	340p/731F	336p/742F	334p/749F	334p/749F
Cold Reheat Conditions after Conditioning, psia/F		406p/747F	420p/720F	416p/732F	414p/738F	413p/739F	342p/722F	340p/727F	337p/734F	334p/746F	328p/750F	326p/759F	340p/731F	336p/742F	334p/749F	334p/749F
STG Hot Reheat Conditions, psia/F		313p/1,041F	326p/1,009F	322p/1,023F	320p/1,031F	320p/1,031F	267p/995F	266p/1,001F	263p/1,010F	260p/1,023F	256p/1,035F	254p/1,038F	266p/1,006F	262p/1,020F	260p/1,028F	260p/1,029F
Condenser Pressure		2.44 in HgA	1.33 in HgA	2.15 in HgA	2.47 in HgA	2.47 in HgA	1.00 in HgA	1.21 in HgA	1.20 in HgA	1.97 in HgA	2.25 in HgA	2.25 in HgA	1.21 in HgA	1.98 in HgA	2.27 in HgA	2.27 in HgA
Stack Temperature		195 F	194 F	197 F	197 F	197 F	209 F	210 F	208 F	211 F	210 F	210 F	209 F	212 F	212 F	212 F
Run Date		7-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Gross CTG Output (each)	kW	164,881	197,137	184,229	177,293	176,896	207,123	201,614	192,471	181,068	166,833	164,881	197,137	184,229	177,293	176,896
Gross CTG Output (total)	kW	329,762	394,274	368,458	354,586	353,792	414,246	403,228	384,942	362,136	333,666	329,762	394,274	368,458	354,586	353,792
Gross CTG Heat Rate (LHV)	Btu/kWh	9,671	9,184	9,372	9,486	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494
Gross CTG Heat Rate (HHV)	Btu/kWh	10,592	10,186	10,394	10,521	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	3,189.13	3,621.01	3,453.19	3,363.80	3,355.10	3,757.83	3,679.05	3,555.71	3,409.15	3,242.14	3,189.13	3,621.01	3,453.19	3,363.80	3,355.10
CTG Heat Input (HHV) (total)	MMBtu/h	3,492.97	4,015.92	3,829.79	3,730.43	3,721.01	4,167.43	4,029.57	3,894.48	3,733.95	3,551.03	3,492.97	4,015.92	3,829.79	3,730.43	3,721.01
Duct Burner Heat Input (LHV) (each)	MMBtu/h	175.00	175.00	175.00	175.00	175.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	191.67	194.09	194.09	194.09	194.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	350.00	350.00	350.00	350.00	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	383.35	388.17	388.17	388.17	388.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	253,530	246,010	241,020	237,670	237,540	200,400	199,520	198,510	192,820	187,430	186,100	199,910	193,860	190,490	190,450
STG Output, percent of CTG Output		76.8%	62.4%	65.4%	67.0%	67.2%	48.4%	49.5%	51.6%	53.2%	56.1%	56.4%	50.7%	52.5%	53.7%	53.9%
Gross Plant Output	kW	583,292	640,284	609,478	592,256	591,032	614,646	603,048	583,452	554,956	524,096	515,862	594,184	562,338	545,076	543,842
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,283	6,202	6,240	6,270	6,269	6,113	6,101	6,094	6,143	6,179	6,162	6,094	6,141	6,171	6,169
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,682	6,678	6,921	6,954	6,953	6,760	6,662	6,675	6,728	6,768	6,771	6,759	6,810	6,844	6,842
Plant Heat Input (LHV)	MMBtu/h	3,666.13	3,971.01	3,803.19	3,713.80	3,705.10	3,757.83	3,679.05	3,555.71	3,409.15	3,242.14	3,189.13	3,621.01	3,453.19	3,363.80	3,355.10
Plant Heat Input (HHV)	MMBtu/h	3,875.32	4,404.09	4,217.96	4,118.60	4,109.16	4,167.43	4,029.57	3,894.48	3,733.95	3,551.03	3,492.97	4,015.92	3,829.79	3,730.43	3,721.01
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	22,080	22,080	22,430	22,300	22,290	21,810	21,530	21,420	21,240	21,040	20,990	21,490	21,280	21,180	21,170
Total Auxiliary Power/Losses, percent of gross		3.92%	3.64%	3.68%	3.77%	3.77%	3.52%	3.57%	3.67%	3.83%	4.01%	4.07%	3.62%	3.78%	3.89%	3.89%
Net Plant Output w/ Step-Up Xfmr Losses	kW	541,212	617,004	587,048	569,956	568,742	593,036	581,518	562,032	533,716	503,056	494,872	572,694	541,058	523,896	522,672
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,539	6,439	6,478	6,516	6,515	6,336	6,327	6,327	6,388	6,447	6,444	6,323	6,382	6,420	6,419
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,162	7,131	7,185	7,226	7,225	7,027	6,929	6,929	6,996	7,061	7,068	7,012	7,078	7,121	7,119

Revision History:
Rev. 8, 9/11/06 – GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																	
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	
	Relative Humidity	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	
	WBT, F	78.6	51.4	69.1	76.6	78.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	
Compressor Inlet Conditions	Temperature, F	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3	
	Relative Humidity	43.8%	92.6%	96.5%	91.4%	68.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.6%	96.5%	91.4%	68.4%	
Inlet Air Cooler Status		Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	
Saturation Efficiency		0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	
Water Evaporation Rate	Flow, lb/h	0	5,831	3,905	9,222	13,119	0	0	0	0	0	0	5,831	3,905	9,222	13,119	
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	
	HC, MMBtu/h (LHV)	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	1,878.9	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	
	Flow, lb/h	75,357	86,640	82,624	80,481	80,277	89,908	88,034	84,020	80,556	76,610	75,357	86,640	82,624	80,481	80,277	
Fuel LHV	Btu/lb	21,160	20,897	20,897	20,897	20,897	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	366.6	381.3	378.9	374.4	374.2	312.7	310.7	307.8	304.5	298.9	296.7	310.3	306.3	304.0	303.8
	Temperature, F	741.9	713.9	725.8	732.5	733.2	717.4	722.0	729.3	740.0	745.4	745.4	726.2	737.7	744.1	744.7
	Enthalpy, Btu/lb	1,387.3	1,371.5	1,376.2	1,381.9	1,382.3	1,377.1	1,379.6	1,383.6	1,389.5	1,392.6	1,392.7	1,381.9	1,388.1	1,391.6	1,392.0
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	322.0	323.9	324.0	323.6	323.5	331.2	330.9	329.5	329.1	327.8	327.2	330.2	329.6	328.9	328.9
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	312.7	310.7	307.8	304.5	298.9	296.7	310.3	306.3	304.0	303.8
	Temperature, F	740.3	710.7	723.2	730.2	730.9	717.4	722.0	729.3	740.0	745.4	745.4	726.2	737.7	744.1	744.7
	Enthalpy, Btu/lb	1,387.3	1,371.5	1,376.2	1,381.9	1,382.3	1,377.1	1,379.6	1,383.6	1,389.5	1,392.6	1,392.7	1,381.9	1,388.1	1,391.6	1,392.0
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,630,486	4,059,590	3,875,066	3,775,057	3,768,327	4,201,466	4,127,300	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,875,066	3,775,057	3,768,327
	Pressure, in. H2O	15.56	16.59	17.39	16.69	16.59	19.73	19.17	18.29	17.09	15.90	15.56	16.69	17.39	16.69	16.59
	Temperature, F	1,127.2	1,087.0	1,105.0	1,115.0	1,116.0	1,072.9	1,079.8	1,090.9	1,103.0	1,123.4	1,127.2	1,087.0	1,105.0	1,115.0	1,116.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	184,681	197,137	184,229	177,293	176,696	207,123	201,614	192,471	181,068	168,633	164,881	197,137	184,229	177,293	176,696
Gross Heat Rate	Btu/kWh (LHV)	9,671	9,184	9,372	9,488	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,488	9,494

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	619,574	634,539	627,447	623,197	622,925	494,855	492,001	487,732	483,039	473,215	469,070	491,579	485,913	482,450	482,241
(at HRSG terminal point)	Pressure, psia	1,365.6	1,396.3	1,381.8	1,366.9	1,366.8	1,094.6	1,093.9	1,085.5	1,080.8	1,064.8	1,057.2	1,092.2	1,085.9	1,081.5	1,081.5
	Temperature, F	1,055.4	1,026.8	1,035.7	1,044.0	1,044.8	1,068.9	1,014.7	1,023.8	1,037.4	1,050.9	1,054.7	1,020.1	1,034.5	1,042.6	1,043.4
	Enthalpy, Btu/lb	1,527.7	1,506.4	1,515.4	1,526.5	1,521.0	1,508.4	1,511.9	1,517.3	1,525.2	1,533.4	1,535.8	1,514.9	1,523.4	1,528.2	1,528.6
dP from HP drum to HRSG terminal point	psi	133.7	137.8	136.7	136.0	136.0	107.0	106.5	105.7	104.9	103.1	102.3	106.4	105.4	104.8	104.7
HP SH #1 Steam Outlet Temperature	Temperature, F	1,056.5	1,022.1	1,036.9	1,045.2	1,046.0	1,069.9	1,015.7	1,024.8	1,038.3	1,051.9	1,055.6	1,021.1	1,035.5	1,043.5	1,044.3
HP SH #2 Steam Outlet Temperature	Temperature, F	1,034.2	1,002.2	1,015.9	1,023.5	1,024.3	982.5	967.7	965.9	1,007.9	1,020.2	1,023.8	992.4	1,005.2	1,012.3	1,013.1
HP Steam Desuperheating Flow	Flow, lb/h	1,193	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	331.3	333.0	333.2	332.8	332.7	342.0	341.7	340.4	340.1	338.8	338.4	341.0	340.6	339.9	339.8
	% of Inlet steam	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	344.0	316.0	326.7	333.0	333.5	299.3	299.5	274.4	299.8	299.9	299.2	271.4	278.6	282.7	283.0
HP SH #3/4 Steam Outlet Temperature	Temperature, F	941.0	912.4	922.5	928.3	928.9	830.8	833.5	837.6	843.7	850.9	853.3	835.5	842.0	845.6	846.0
HP Evaporator #1 Exit	Flow, lb/h	89,904	89,098	89,580	89,817	89,878	58,341	58,411	58,497	58,642	58,483	58,581	58,580	58,710	58,738	58,787
	Pressure, psia	1,499.3	1,538.1	1,528.1	1,522.9	1,522.7	1,201.6	1,197.4	1,191.2	1,185.7	1,167.9	1,159.5	1,198.7	1,191.3	1,186.4	1,186.3
	Temperature, F	596.2	599.4	598.8	598.3	598.3	567.4	567.0	566.3	565.7	563.8	562.9	567.1	566.3	565.8	565.8
	Enthalpy, Btu/lb	1,189.0	1,187.0	1,187.4	1,187.7	1,187.7	1,184.1	1,184.3	1,184.6	1,184.9	1,185.6	1,186.0	1,184.3	1,184.6	1,184.8	1,184.8
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	544.1	502.8	519.7	529.3	530.1	379.4	383.8	390.9	401.6	411.9	414.7	388.1	399.4	405.7	406.2
HP Evaporator #1 Approach	Temperature, F	13.6	9.9	11.6	12.5	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	519,478	545,441	537,660	533,380	533,046	436,514	433,590	429,235	424,396	414,733	410,709	432,999	427,203	423,712	423,473
	Pressure, psia	1,499.3	1,538.1	1,528.1	1,522.9	1,522.7	1,201.6	1,197.4	1,191.2	1,185.7	1,167.9	1,159.5	1,198.7	1,191.3	1,186.4	1,186.3
	Temperature, F	596.2	599.4	598.8	598.3	598.3	567.4	567.0	566.3	565.7	563.8	562.9	567.1	566.3	565.8	565.8
	Enthalpy, Btu/lb	1,189.0	1,187.0	1,187.4	1,187.7	1,187.7	1,184.1	1,184.3	1,184.6	1,184.9	1,185.6	1,186.0	1,184.3	1,184.6	1,184.8	1,184.8
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	19.4	20.8	20.3	20.1	20.1	21.7	21.5	21.2	21.0	20.5	20.3	21.5	21.2	21.1	21.1
HP Evaporator #2/3/4/5 Approach	Temperature, F	13.6	9.9	11.6	12.5	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	609,380	634,539	627,446	623,197	622,924	494,855	492,001	487,732	483,039	473,215	469,070	491,579	485,913	482,450	482,241
	Temperature, F	582.6	589.6	587.1	585.7	585.6	567.4	567.0	566.3	565.7	563.8	562.9	567.1	566.3	565.8	565.8
HP Economizer #4/5 Outlet Temperature	Temperature, F	505.6	516.5	512.0	509.5	509.3	526.2	524.6	522.2	519.7	514.8	513.7	523.6	519.7	517.6	517.3
HP Economizer #6/7 Outlet Temperature	Temperature, F	428.3	436.4	433.3	431.5	431.4	442.8	441.2	438.9	435.1	432.6	431.6	440.2	437.0	435.2	435.0
HP Economizer #8 Outlet Temperature	Temperature, F	372.4	378.2	376.4	375.0	374.9	383.9	382.7	380.5	388.1	385.4	384.6	391.5	388.9	387.3	387.2
Feedwater to HP Economizer #8	Flow, lb/h	609,360	634,539	627,446	623,197	622,924	494,855	492,001	487,732	483,039	473,215	469,070	491,579	485,913	482,450	482,241
	Pressure, psia	1,615.7	1,662.2	1,651.5	1,644.6	1,644.3	1,276.7	1,273.6	1,266.1	1,259.2	1,238.4	1,228.8	1,274.7	1,265.7	1,259.7	1,259.5
	Temperature, F	331.3	333.0	333.2	332.8	332.7	342.0	341.7	340.4	340.1	338.8	338.4	341.0	340.6	339.9	339.8
	Enthalpy, Btu/lb	304.7	306.6	306.6	306.3	306.2	316.2	314.9	313.6	313.2	311.9	311.4	314.2	313.6	313.0	312.9
HP FW Temperature Increase Across BFP	F	11.8	11.6	11.7	11.7	11.7	13.4	13.4	13.5	13.8	13.8	13.9	13.4	13.6	13.6	13.6
Duct Burner	HC, MMBtu/h (LHV)	176.00	176.00	176.00	176.00	176.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	191.67	194.09	194.09	194.09	194.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	1,028.4	999.8	1,012.7	1,019.8	1,020.5	977.4	982.1	989.5	1,000.9	1,010.9	1,013.3	986.9	998.9	1,005.5	1,006.2
Exit Temperature	Temperature, F	1,190.2	1,146.1	1,164.6	1,174.9	1,175.9	977.4	982.1	989.5	1,000.9	1,010.9	1,013.3	986.9	998.9	1,005.5	1,006.2
HRSG Hot Reheat Steam	Flow, lb/h	640,973	674,301	663,143	656,759	656,294	555,099	550,464	543,533	535,124	523,105	518,716	546,543	538,900	533,271	532,869
(at HRSG terminal point)	Pressure, psia	332.8	346.0	342.0	339.7	339.6	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.0	275.9
	Temperature, F	1,044.0	1,011.5	1,025.7	1,033.5	1,034.3	998.1	1,003.6	1,012.4	1,025.6	1,037.7	1,040.9	1,009.0	1,023.0	1,030.7	1,031.5
	Enthalpy, Btu/lb	1,549.2	1,531.5	1,539.2	1,543.4	1,543.9	1,528.1	1,529.1	1,533.8	1,540.9	1,547.5	1,549.2	1,531.9	1,539.5	1,543.6	1,544.1
HRSG RH dP -- terminal pt. to terminal pt.	psi	33.9	35.3	34.9	34.6	34.6	28.8	28.6	28.3	28.0	27.4	27.2	28.5	28.1	27.9	27.9
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,044.4	1,011.9	1,026.1	1,033.9	1,034.7	998.6	1,004.0	1,012.8	1,025.9	1,038.1	1,041.2	1,009.3	1,023.3	1,031.0	1,031.8
RHTR #3 Steam Outlet Temperature	Temperature, F	969.1	956.0	967.8	974.3	974.9	930.5	934.6	941.7	951.8	960.9	963.2	938.9	949.7	955.7	956.3
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	322.0	323.9	324.0	323.8	323.5	331.2	330.9	329.5	329.1	327.8	327.2	330.2	329.6	328.9	328.9
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	448.4	423.5	433.8	439.5	440.0	385.3	388.7	394.1	401.9	408.2	409.5	391.7	400.2	404.9	405.3
RHTR #4 Steam Outlet Temperature	Temperature, F	862.4	861.2	870.4	875.5	876.0	804.3	807.1	811.6	818.5	823.1	823.9	810.6	817.3	821.3	821.7
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	1,004.7	984.6	991.6	991.9	992.0	968.5	974.9	985.1	1,000.0	1,015.3	1,019.8	986.7	998.5	1,005.5	1,006.4
	Enthalpy, Btu/lb	1,527.7	1,508.4	1,515.4	1,520.5	1,521.0	1,508.4	1,511.9	1,517.3	1,525.2	1,533.4	1,535.8	1,514.9	1,523.4	1,528.2	1,528.6
Cold Reheat Steam from STG to HRSG	Flow, lb/h	601,554	625,233	616,233	614,031	613,761	487,233	484,414	480,191	475,562	467,215	463,859	483,990	478,384	474,970	474,764
(at HRSG terminal point)	Pressure, psia	366.8	381.3	378.9	374.4	374.2	312.7	310.7	307.8	304.5	298.9	296.7	310.3	306.3	304.0	303.8
	Temperature, F	741.8	713.9	725.8	732.5	733.2	717.4	722.0	729.3	740.0	746.4	748.4	726.2	737.7	744.1	744.7
	Enthalpy, Btu/lb	1,387.3	1,371.5	1,379.2	1,381.9	1,382.3	1,377.1	1,379.6	1,383.6	1,389.5	1,392.6	1,392.7	1,381.9	1,388.1	1,391.6	1,392.0
Cold Reheat Steam - % of HP Steam		96.52%	96.53%	96.53%	96.53%	96.53%	98.46%	98.46%	98.45%	98.45%	98.73%	98.89%	98.46%	98.45%	98.45%	98.45%
HP Steam - Cold Reheat Steam	Flow, lb/h	9,020	9,305	9,214	9,167	9,164	7,622	7,586	7,541	7,487	6,009	5,211	7,588	7,529	7,480	7,477

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	39,419	40,069	44,910	42,727	42,532	57,866	55,050	53,342	50,573	55,891	54,859	54,654	50,507	58,302	58,105
	Pressure, psia	368.8	381.3	376.9	374.4	374.2	312.7	310.7	307.8	304.6	298.9	296.7	310.3	306.3	304.0	303.8
	Temperature, F	607.1	608.1	608.6	608.7	608.7	572.0	571.9	571.7	572.0	570.7	570.0	572.5	572.4	572.4	572.4
	Enthalpy, Btu/lb	1,313.6	1,313.1	1,313.7	1,313.9	1,314.0	1,298.2	1,298.4	1,298.5	1,298.9	1,298.7	1,298.5	1,298.6	1,299.0	1,299.2	1,299.2
IP Evaporator Drum Exit	Flow, lb/h	39,419	40,069	44,910	42,727	42,532	57,866	55,050	53,342	50,573	55,891	54,859	54,654	50,507	58,302	58,105
	Pressure, psia	373.2	390.8	385.0	381.8	381.6	333.8	330.9	326.8	321.4	314.1	311.5	329.7	323.6	320.2	320.0
	Temperature, F	437.9	442.4	440.9	440.1	440.0	427.3	426.5	425.2	423.7	421.6	420.8	426.1	424.4	423.4	423.3
	Enthalpy, Btu/lb	1,204.6	1,205.0	1,204.9	1,204.9	1,204.9	1,204.2	1,204.1	1,204.0	1,203.9	1,203.7	1,203.7	1,204.1	1,204.0	1,203.9	1,203.9
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	16.1	18.9	17.7	17.1	17.1	27.6	27.2	26.5	25.5	24.5	24.2	26.9	25.8	25.3	25.2
IP Approach	Temperature, F	24.8	23.6	23.6	24.1	24.1	6.5	6.5	7.1	7.5	7.9	7.9	7.0	7.4	7.7	7.8
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	39,419	40,069	44,910	42,727	42,532	57,866	55,050	53,342	50,573	55,891	54,859	54,654	50,507	58,302	58,105
	Pressure, psia	373.2	390.8	385.0	381.8	381.6	333.8	330.9	326.8	321.4	314.1	311.5	329.7	323.6	320.2	320.0
	Temperature, F	413.1	418.3	417.3	416.9	416.9	420.8	419.8	418.1	416.2	413.7	412.9	419.1	417.0	415.7	415.5
	Enthalpy, Btu/lb	389.4	396.2	394.0	392.8	392.5	397.8	396.7	394.8	392.8	390.0	389.1	395.9	393.6	392.1	392.0
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	39,419	40,069	44,910	42,727	42,532	57,866	55,050	53,342	50,573	55,891	54,859	54,654	50,507	58,302	58,105
(pressure is preliminary)	Pressure, psia	385.8	409.9	401.1	396.3	396.0	370.2	365.4	358.3	349.4	338.9	335.3	362.7	352.8	347.1	346.7
	Temperature, F	328.0	324.8	325.0	324.8	324.5	332.4	332.0	330.7	330.3	329.0	328.5	331.3	330.8	330.1	330.0
	Enthalpy, Btu/lb	294.1	295.0	296.2	296.7	295.6	303.5	303.4	302.0	301.6	300.2	299.6	302.7	302.0	301.4	301.3
IP FW Temperature Increase Across BFP	F	3.5	3.5	3.5	3.5	3.5	3.8	3.8	3.8	3.9	3.9	3.9	3.8	3.8	3.9	3.9
LP Steam (at HRSG terminal point)	Flow, lb/h	36,506	40,787	41,050	40,141	39,948	55,412	55,717	52,955	52,134	49,277	48,226	54,295	53,094	51,745	51,556
	Pressure, psia	84.4	86.8	85.9	85.6	85.5	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4
	Temperature, F	612.7	616.9	615.4	614.8	614.8	582.8	582.2	581.6	580.7	578.6	577.9	582.6	581.3	580.7	580.7
	Enthalpy, Btu/lb	1,336.8	1,338.8	1,338.1	1,337.6	1,337.6	1,321.5	1,321.2	1,321.1	1,320.6	1,319.7	1,319.3	1,321.4	1,320.8	1,320.6	1,320.6
LP Evaporator Steam Exit	Flow, lb/h	36,506	40,787	41,050	40,141	39,948	55,412	55,717	52,955	52,134	49,277	48,226	54,295	53,094	51,745	51,556
	Pressure, psia	89.0	91.4	91.6	91.0	90.9	101.1	100.8	98.7	98.1	96.2	95.5	99.5	98.8	97.9	97.7
	Temperature, F	319.5	321.4	321.5	321.1	321.0	328.6	328.2	326.9	326.5	325.0	324.5	327.6	326.9	326.3	326.2
	Enthalpy, Btu/lb	1,185.3	1,185.6	1,185.9	1,185.8	1,185.7	1,187.7	1,187.6	1,187.2	1,187.1	1,186.6	1,186.7	1,187.4	1,187.3	1,187.1	1,187.1
LP Evaporator Water Exit to BFPs	Flow, lb/h	549,989	583,606	572,355	566,924	565,457	562,718	556,047	551,070	542,607	530,482	525,944	556,231	546,414	540,747	540,342
	Pressure, psia	89.0	91.4	91.6	91.0	90.9	101.1	100.8	98.7	98.1	96.2	95.5	99.5	98.8	97.9	97.7
	Temperature, F	319.5	321.4	321.5	321.1	321.0	328.6	328.2	326.9	326.5	325.0	324.5	327.5	326.9	326.3	326.2
	Enthalpy, Btu/lb	289.9	291.9	292.0	291.5	291.5	299.4	299.0	297.6	297.2	295.7	295.1	298.8	297.6	297.0	296.9
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	39,419	40,069	44,910	42,727	42,532	57,866	55,050	53,342	50,573	55,891	54,859	54,654	50,507	58,302	58,105
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	609,380	634,539	627,446	623,197	622,924	494,855	492,001	487,732	483,039	473,216	469,070	491,579	486,913	482,450	482,241
HP FW to HRSG HP Desuperheater	Flow, lb/h	1,193	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	1,376	2,116	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	17.9	19.9	19.0	18.6	18.6	20.5	20.1	19.6	18.9	18.1	17.9	19.9	19.1	18.7	18.7
LP Approach	Temperature, F	15.5	16.7	15.2	14.2	14.3	6.1	4.9	5.9	2.4	2.2	2.5	5.5	2.2	1.5	1.6
Condensate Recirculated	Flow, lb/h	94,305	187,247	114,722	94,033	94,077	168,584	147,125	147,182	92,845	76,819	76,652	147,565	93,018	77,180	77,192
	Temperature, F	303.9	301.8	308.4	308.8	308.6	322.5	323.3	320.9	323.9	322.7	321.9	322.0	324.6	324.6	324.4
% of Total LP Economizer Flow		12%	21%	14%	12%	12%	21%	15%	20%	14%	12%	12%	19%	13%	12%	12%
Condensate from LP Economizer	Flow, lb/h	780,842	911,884	828,152	800,149	799,533	787,756	780,936	761,249	667,630	656,618	650,963	758,119	692,572	669,716	669,136
	Temperature, F	303.4	301.2	305.8	306.3	306.1	322.6	322.8	320.5	323.5	322.3	321.5	321.5	324.2	324.2	324.0
	Enthalpy, Btu/lb	273.9	271.5	276.3	276.8	276.7	293.0	293.9	291.5	294.6	293.4	292.8	292.5	295.4	295.4	295.2
Condensate to LP Economizer	Flow, lb/h	780,842	911,884	828,152	800,149	799,533	787,756	780,936	761,249	667,630	656,618	650,963	758,119	692,572	669,716	669,136
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3
Condensate from Recirculation	Flow, lb/h	94,305	187,247	114,722	94,033	94,077	168,584	147,125	147,182	92,845	76,819	76,652	147,565	93,018	77,180	77,192
	Temperature, F	303.9	301.8	308.4	308.8	308.6	322.5	323.3	320.9	323.9	322.7	321.9	322.0	324.6	324.6	324.4
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	111.5	91.3	107.1	111.8	111.8	89.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
Condensate to HRSG	Flow, lb/h	686,537	724,437	713,430	706,116	705,456	619,171	613,810	604,067	594,795	579,799	574,311	610,554	599,554	592,536	591,944
	Pressure, psia	553.7	532.8	532.2	532.3	532.3	540.5	540.5	541.1	540.4	540.9	541.3	540.7	540.0	540.1	540.1
	Temperature, F	111.5	91.3	107.1	111.8	111.8	89.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
Stack Exit	Flow, lb/h	3,838,756	4,067,965	3,883,441	3,783,432	3,770,702	4,201,486	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,875,066	3,775,057	3,766,327
	Temperature, F	194.6	193.5	196.5	197.2	197.0	208.6	209.5	207.8	211.2	210.4	209.8	208.6	211.8	212.2	212.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	5,032	5,067	5,079	5,082	5,083	3,954	3,951	3,949	3,957	3,921	3,900	3,966	3,970	3,969	3,970
HP Turbine Remainder Shaft Power	kW	43,948	43,814	44,104	44,235	44,258	33,136	33,184	33,296	33,488	33,276	33,098	33,369	33,565	33,645	33,661
IP Turbine Shaft Power	kW	71,741	73,453	72,990	72,748	72,760	58,577	58,451	58,229	57,902	57,225	56,919	56,566	58,166	57,933	57,933
LP Turbine Shaft Power	kW	117,263	126,190	123,348	120,961	120,031	103,669	108,461	107,292	101,663	97,169	95,330	108,235	102,386	99,126	99,060
Total Shaft Power	kW	232,961	246,487	240,443	237,075	237,039	209,683	209,996	106,759	196,950	187,669	189,248	200,172	194,106	190,668	190,654
HTG Throttle Steam	Flow, lb/h	1,221,148	1,269,076	1,254,894	1,246,395	1,245,849	969,710	984,003	975,484	956,078	946,431	938,139	963,157	971,826	964,900	964,483
	Pressure, psia (MAX 2270 psia)	1,288.1	1,319.0	1,312.5	1,308.2	1,308.1	1,032.5	1,028.9	1,023.8	1,019.4	1,004.2	997.1	1,030.2	1,024.2	1,020.1	1,020.0
	Temperature, F	1,050.0	1,015.1	1,030.1	1,036.5	1,039.4	1,003.9	1,009.7	1,019.0	1,032.6	1,046.3	1,060.1	1,015.2	1,029.7	1,037.8	1,038.6
	Enthalpy, Btu/lb	1,526.7	1,506.4	1,514.4	1,519.5	1,520.0	1,507.4	1,510.9	1,516.3	1,524.2	1,532.4	1,534.6	1,513.9	1,522.4	1,527.2	1,527.6
THV Pressure Loss	psi	25.4	26.0	25.9	25.6	25.6	20.3	20.2	20.1	20.1	19.8	19.6	20.3	20.2	20.1	20.1
		1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%
Leak 1 Leakage Flow to HRH	Flow, lb/h	16,471	16,586	15,904	15,795	15,787	12,571	12,497	12,366	12,264	12,012	11,907	12,484	12,337	12,247	12,242
HP Turbine Exit	Flow, lb/h	1,205,678	1,252,686	1,238,992	1,230,661	1,230,063	977,139	971,507	963,078	953,815	934,417	926,231	970,671	959,490	952,653	952,242
	Pressure, psia	405.6	420.5	416.2	413.6	413.4	342.4	340.4	337.4	334.1	328.2	325.8	340.0	336.1	333.7	333.5
	Temperature, F (MAX 840 F)	747.4	719.7	731.5	738.2	738.8	722.3	726.8	734.0	744.7	756.1	759.5	731.0	742.4	748.7	749.4
	Enthalpy, Btu/lb	1,368.3	1,372.5	1,379.2	1,382.9	1,383.3	1,378.1	1,380.6	1,384.6	1,390.5	1,396.8	1,398.7	1,382.9	1,389.1	1,392.6	1,393.0
Efficiency (THV Inlet to HPT exit)		86.70%	85.69%	85.69%	86.70%	85.70%	85.63%	85.63%	85.64%	85.64%	85.85%	85.85%	85.63%	85.64%	85.85%	85.85%
Efficiency (THV exit to HPT exit)		87.01%	87.01%	87.01%	87.02%	87.02%	87.01%	87.01%	87.01%	87.01%	87.01%	87.01%	87.01%	87.01%	87.01%	87.01%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,218	1,261	1,260	1,248	1,247	1,037	1,029	1,016	1,001	978	969	1,026	1,008	998	997
CRH Steam to Steam Seals	Flow, lb/h	1,364	1,234	1,271	1,296	1,297	1,637	1,654	1,681	1,711	1,757	1,774	1,662	1,697	1,717	1,719
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	1,203,105	1,250,472	1,236,460	1,228,058	1,227,519	974,465	968,824	960,581	951,103	931,662	923,468	967,963	956,785	949,938	949,526
	Pressure, psia	405.6	420.5	416.2	413.6	413.4	342.4	340.4	337.4	334.1	328.2	325.8	340.0	336.1	333.7	333.5
	Temperature, F	747.4	719.7	731.5	738.2	738.8	722.3	726.8	734.0	744.7	756.1	759.5	731.0	742.4	748.7	749.4
	Enthalpy, Btu/lb	1,368.3	1,372.5	1,379.2	1,382.9	1,383.3	1,378.1	1,380.6	1,384.6	1,390.5	1,396.8	1,398.7	1,382.9	1,389.1	1,392.6	1,393.0
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	2,752	4,233	0	0	0	0
	Temperature, F	322.0	323.9	324.0	323.6	323.5	331.2	330.9	329.5	329.1	327.8	327.2	330.2	329.5	328.9	328.9
Final Cold Reheat Steam after Conditioning	Flow, lb/h	1,203,105	1,250,472	1,236,460	1,228,058	1,227,519	974,465	968,824	960,581	951,103	934,494	927,721	967,963	956,785	949,938	949,526
	Pressure, psia	405.6	420.5	416.2	413.6	413.4	342.4	340.4	337.4	334.1	328.2	325.8	340.0	336.1	333.7	333.5
	Temperature, F (MAX 750 F)	747.4	719.7	731.5	738.2	738.8	722.3	726.8	734.0	744.7	760.0	750.0	731.0	742.4	748.7	749.4
	Enthalpy, Btu/lb	1,368.3	1,372.5	1,379.2	1,382.9	1,383.3	1,378.1	1,380.6	1,384.6	1,390.5	1,393.6	1,393.7	1,382.9	1,389.1	1,392.6	1,393.0
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	78,841	98,131	89,925	85,460	85,070	135,734	132,105	126,685	119,146	114,529	113,944	129,393	121,015	116,804	116,212
Reheat System dP	psi	22.1	24.6	24.0	23.6	23.5	16.0	14.7	14.3	13.6	12.6	12.1	14.7	14.2	13.8	13.8
Reheat System dP		22.72%	22.51%	22.60%	22.64%	22.65%	21.92%	21.95%	22.01%	22.09%	22.13%	22.13%	21.98%	22.07%	22.11%	22.12%
Hot Reheat Flow	Flow, lb/h	1,281,946	1,348,603	1,325,285	1,313,518	1,312,589	1,110,199	1,100,929	1,087,066	1,070,249	1,048,211	1,037,432	1,097,356	1,077,801	1,066,542	1,065,738
	Pressure, psia (MAX 584 psia)	313.4	325.8	322.1	319.9	319.8	267.3	265.6	263.1	260.3	255.6	253.7	265.3	261.9	259.9	259.8
	Temperature, F	1,041.1	1,008.5	1,022.6	1,030.6	1,031.4	995.3	1,000.9	1,009.7	1,022.9	1,035.1	1,038.2	1,008.2	1,020.2	1,028.0	1,028.8
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-8.9	-8.8	-7.4	-7.9	-7.9	-8.6	-8.9	-9.3	-9.8	-11.2	-11.9	-8.8	-9.5	-9.8	-9.8
	Enthalpy, Btu/lb	1,548.2	1,530.5	1,538.2	1,542.4	1,542.9	1,525.1	1,528.1	1,532.8	1,539.9	1,546.6	1,548.2	1,530.9	1,538.5	1,542.6	1,543.1
INTV Pressure Loss	psi	6.3	6.5	6.5	6.4	6.4	5.3	5.3	5.3	5.2	5.1	5.1	5.3	5.2	5.2	5.2
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	1,297,417	1,364,691	1,342,189	1,329,313	1,328,376	1,122,770	1,113,426	1,099,452	1,082,513	1,058,223	1,049,339	1,109,771	1,090,138	1,078,789	1,077,980
	Pressure, psia	70.7	73.8	73.0	72.5	72.4	62.9	62.5	61.7	61.0	59.7	59.2	62.3	61.4	60.9	60.8
	Temperature, F	655.9	630.4	642.2	648.4	648.9	629.3	633.7	640.0	650.6	659.8	662.1	637.5	648.7	654.7	655.2
	Enthalpy, Btu/lb	1,359.1	1,340.3	1,352.2	1,358.3	1,358.8	1,346.4	1,348.6	1,351.8	1,357.1	1,361.7	1,362.8	1,350.5	1,356.1	1,359.1	1,359.4
Efficiency (INTV inlet to IPT exit)		90.85%	90.85%	90.85%	90.85%	90.85%	90.82%	90.82%	90.82%	90.82%	91.01%	91.01%	90.83%	90.82%	90.82%	90.82%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,027	1,066	1,066	1,057	1,056	925	917	902	889	865	857	912	895	886	884
LP Steam Admitted to STG (total)	Flow, lb/h	73,012	81,574	82,100	80,283	79,696	112,825	111,435	105,910	104,269	98,554	96,452	108,590	106,187	103,489	103,111
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	78.3	78.2	78.3	78.3	78.3	78.2	78.2	78.2	78.2	78.2	78.2	78.2	78.2	78.2	78.2
	Temperature, F	609.8	613.9	612.4	611.8	611.8	576.9	578.2	578.1	577.0	575.2	574.4	578.7	577.5	577.0	577.0
	Enthalpy, Btu/lb	1,335.8	1,337.6	1,337.1	1,336.8	1,336.8	1,320.5	1,320.2	1,320.1	1,319.6	1,318.7	1,318.3	1,320.4	1,319.8	1,319.6	1,319.6
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 100 F)	-46.1	-16.6	-29.8	-36.6	-37.1	-50.5	-55.5	-61.8	-73.6	-84.6	-87.7	-58.8	-71.2	-77.7	-78.2
LP Admission CV Pressure Loss	% loss	9.7%	5.7%	6.7%	7.4%	7.4%	19.5%	20.1%	21.1%	22.0%	23.7%	24.3%	20.4%	21.4%	22.2%	22.2%
LP Turbine Inlet Steam	Flow, lb/h	1,369,402	1,445,179	1,423,221	1,408,638	1,407,216	1,234,699	1,223,944	1,204,459	1,185,593	1,155,912	1,144,634	1,217,449	1,195,430	1,181,394	1,180,207
	Pressure, psia	69.6	72.7	71.9	71.4	71.3	62.0	61.6	60.7	60.1	58.8	58.3	61.3	60.5	60.0	59.9
	Temperature, F	663.3	629.3	640.3	646.1	646.7	624.4	628.3	634.2	643.8	652.3	654.4	632.0	642.1	647.5	648.1
	Enthalpy, Btu/lb	1,357.9	1,346.8	1,351.3	1,354.2	1,354.5	1,344.1	1,346.0	1,349.0	1,353.8	1,358.0	1,359.1	1,347.9	1,352.9	1,355.9	1,355.9
LP Turbine Exit	Flow, lb/h	1,369,400	1,445,178	1,423,219	1,408,634	1,407,212	1,234,666	1,223,941	1,204,456	1,185,590	1,155,909	1,144,632	1,217,448	1,195,427	1,181,392	1,180,205
	Pressure, psia	1.199	0.954	1.056	1.212	1.211	0.491	0.505	0.591	0.956	1.107	1.103	0.594	0.971	1.117	1.117
	Pressure, in. HgA	2.435	1.931	2.150	2.467	2.466	1.000	1.212	1.202	1.970	2.255	2.246	1.209	1.977	2.275	2.274
	Temperature, F	107.8	87.9	103.6	108.2	108.2	79.0	84.9	84.7	100.6	105.1	105.9	84.8	100.7	105.4	105.4
ELEP Enthalpy, Btu/lb		1,059.3	1,022.4	1,048.2	1,056.8	1,057.0	1,016.4	1,026.4	1,028.1	1,054.6	1,064.5	1,065.2	1,037.4	1,053.6	1,062.7	1,062.8
UEEP Enthalpy, Btu/lb		1,066.7	1,043.2	1,056.6	1,063.3	1,063.5	1,043.2	1,043.7	1,045.1	1,061.3	1,071.2	1,072.0	1,044.5	1,060.6	1,069.3	1,069.5
Exhaust Loss Btu/lb		6.4	20.8	7.4	6.5	6.5	26.6	17.2	16.9	8.7	9.7	6.8	17.1	6.7	6.7	6.7
Moisture @ UEEP (MIN 1.7%)		4.10%	5.40%	4.59%	4.36%	4.34%	5.00%	5.22%	5.06%	4.22%	3.46%	3.37%	5.14%	4.28%	3.65%	3.63%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4
LPT Efficiency to ELEP		90.94%	90.20%	90.67%	90.85%	90.86%	90.14%	90.31%	90.38%	90.84%	91.06%	91.08%	90.35%	90.82%	90.99%	91.00%
LPT Efficiency to UEEP		88.98%	84.40%	88.48%	88.67%	88.68%	82.78%	85.44%	85.62%	88.81%	89.97%	88.99%	85.52%	88.78%	88.93%	88.93%
Annulus Velocity ft/s		505.1	1,096.6	700.5	613.1	612.8	1,225.7	1,020.9	1,013.8	638.8	552.7	549.9	1,018.7	641.4	559.2	558.9
Volumetric Flow 1000 ft3/min per end		3,063	5,671	3,573	3,124	3,123	6,377	5,299	5,222	3,256	2,817	2,803	5,248	3,270	2,850	2,849
Gross Generator Output	kW	233,530	248,012	241,016	237,675	237,640	200,401	199,815	198,514	192,817	187,432	186,096	199,905	193,881	190,490	190,447
Generator MVA		430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5
Closed Cycle Cooling Water	Temperature, F	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.13%	98.19%	98.16%	98.15%	98.15%	97.93%	97.93%	97.92%	97.87%	97.83%	97.82%	97.93%	97.88%	97.85%	97.85%

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,358.1	1,429.3	1,403.0	1,392.8	1,391.8	1,232.6	1,215.2	1,197.8	1,179.7	1,160.2	1,148.3	1,209.8	1,188.3	1,179.1	1,178.1
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	10.3	12.0	10.8	10.5	10.5	12.2	10.2	10.1	9.1	8.7	8.7	10.2	9.1	8.9	8.9
LP Turbine Exit Steam to Condenser	Flow, lb/h	1,389,409	1,445,179	1,423,219	1,408,534	1,407,212	1,234,858	1,223,941	1,204,459	1,185,890	1,165,909	1,154,932	1,217,446	1,195,427	1,181,392	1,180,205
	Pressure, psia	1.196	0.864	1.056	1.212	1.211	0.491	0.595	0.591	0.968	1.107	1.103	0.594	0.971	1.117	1.117
	Pressure, in. HgA	2.435	1.331	2.150	2.467	2.466	1.000	1.212	1.202	1.970	2.255	2.246	1.209	1.977	2.275	2.274
	Temperature, F	107.8	87.9	103.5	108.2	108.2	79.0	84.9	84.7	100.6	105.1	105.0	84.8	100.7	105.4	105.4
	Enthalpy, Btu/lb	1,065.7	1,043.2	1,055.6	1,063.3	1,063.5	1,043.2	1,043.7	1,045.1	1,061.3	1,071.2	1,072.0	1,044.5	1,060.6	1,069.3	1,069.5
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,380.0	1,364.6	1,371.1	1,374.8	1,375.1	1,370.0	1,372.5	1,376.4	1,382.2	1,388.3	1,390.2	1,374.7	1,380.9	1,384.4	1,384.7
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	62	56	36	79	80	63	66	64	66	73	73	51	66	67	68
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,549.2	1,531.5	1,539.2	1,543.4	1,543.9	1,526.1	1,529.1	1,533.8	1,540.9	1,547.5	1,549.2	1,531.9	1,539.6	1,543.6	1,544.1
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,338.8	1,338.8	1,338.1	1,337.8	1,337.8	1,321.5	1,321.2	1,321.1	1,320.8	1,319.7	1,319.3	1,321.4	1,320.8	1,320.6	1,320.6
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	80.9	60.8	76.5	81.2	81.2	52.7	58.7	58.5	74.5	79.2	79.1	58.5	74.5	79.4	79.3
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	80.9	60.8	76.5	81.2	81.2	52.7	58.7	58.5	74.5	79.2	79.1	58.5	74.5	79.4	79.3
Condenser Exit	Flow, lb/h	1,373,082	1,448,661	1,426,655	1,412,213	1,410,892	1,238,329	1,227,607	1,208,120	1,189,556	1,169,582	1,148,605	1,221,097	1,199,094	1,185,058	1,183,873
	Pressure, psia	1.196	0.864	1.056	1.212	1.211	0.491	0.595	0.591	0.968	1.107	1.103	0.594	0.971	1.117	1.117
	Pressure, in HgA (MIN 1.0 in. HgA)	2.435	1.331	2.150	2.467	2.466	1.000	1.212	1.202	1.970	2.255	2.246	1.209	1.977	2.275	2.274
	Temperature, F	107.8	87.9	103.5	108.2	108.2	79.0	84.9	84.7	100.6	105.1	105.0	84.8	100.7	105.4	105.4
	Enthalpy, Btu/lb	75.8	55.9	71.6	76.2	76.2	47.1	53.0	52.7	68.6	73.2	73.0	52.9	68.7	73.5	73.4
Condensate Pump Discharge	Flow, lb/h	1,373,082	1,448,661	1,426,655	1,412,213	1,410,892	1,238,329	1,227,607	1,208,120	1,189,556	1,169,582	1,148,605	1,221,097	1,199,094	1,185,058	1,183,873
	Pressure, psia	533.7	532.8	532.2	532.3	532.3	540.5	540.5	541.1	540.4	540.9	541.3	540.7	540.0	540.1	540.1
	Temperature, F	109.9	89.9	105.5	110.3	110.3	81.5	87.4	87.2	103.2	107.9	107.8	87.4	103.9	108.1	108.1
	Enthalpy, Btu/lb	79.3	59.3	75.0	79.7	79.7	51.0	56.9	56.8	72.7	77.3	77.2	56.9	72.8	77.5	77.5
Condensate after GSC	Flow, lb/h	1,373,082	1,448,661	1,426,655	1,412,213	1,410,892	1,238,329	1,227,607	1,208,120	1,189,556	1,169,582	1,148,605	1,221,097	1,199,094	1,185,058	1,183,873
	Temperature, F	111.6	91.3	107.1	111.8	111.8	83.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,373,075	1,448,675	1,426,650	1,412,233	1,410,911	1,238,343	1,227,621	1,208,134	1,189,571	1,169,596	1,148,621	1,221,108	1,199,108	1,185,072	1,183,887
	Temperature, F	111.6	91.3	107.1	111.8	111.8	83.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
Total Circulating Water	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,097,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Flow, gpm	369,682	369,785	369,696	369,682	369,682	369,853	369,785	369,785	369,696	369,682	369,682	369,785	369,696	369,682	369,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	88.0	85.0	90.0	90.0	80.0	88.0	88.0	85.0	90.0	90.0	88.0	85.0	90.0	90.0
Circulating Water to Condenser	Flow, lb/h	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Flow, gpm	374,593	374,741	374,619	374,593	374,593	374,819	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	88.1	85.1	90.1	90.1	80.1	88.1	88.1	85.1	90.1	90.1	88.1	85.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Temperature, F	97.5	76.9	92.7	97.7	97.7	86.8	74.7	74.6	91.5	96.4	96.3	74.7	91.6	96.5	96.5
Total Circulating Water Discharge	Flow, lb/h	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Temperature, F	97.7	76.0	92.9	97.9	97.9	87.0	74.8	74.8	91.7	96.6	96.6	74.9	91.8	96.7	96.7
Circulating Water Temperature Rise	dT, F	7.68	8.03	7.91	7.86	7.86	7.01	6.92	6.83	6.75	6.63	6.58	6.89	6.79	6.75	6.74
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Flow, gpm	15,062	15,013	15,049	15,062	15,062	15,009	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062
	Temperature, F	90.1	88.1	85.1	90.1	90.1	80.1	88.1	88.1	85.1	90.1	90.1	88.1	85.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427
	Temperature, F	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 66 2x100% Fired Gas Fuel 95 F	Case 67 2x100% Fired Gas Fuel 59 F/EC On	Case 68 2x100% Fired Gas Fuel 74 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 70 2x100% Fired Gas Fuel 95 F/EC On	Case 71 2x100% Unfired Gas Fuel 35 F	Case 72 2x100% Unfired Gas Fuel 45 F	Case 73 2x100% Unfired Gas Fuel 59 F	Case 74 2x100% Unfired Gas Fuel 74 F	Case 75 2x100% Unfired Gas Fuel 90 F	Case 76 2x100% Unfired Gas Fuel 95 F	Case 77 2x100% Unfired Gas Fuel 59 F/EC On	Case 78 2x100% Unfired Gas Fuel 74 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 80 2x100% Unfired Gas Fuel 95 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	62	66	65	73	80	63	66	64	66	73	73	51	66	67	68
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	649,969	663,808	672,365	665,924	665,457	562,718	558,047	551,070	542,907	530,482	520,044	556,231	546,414	540,747	540,342
	Pressure, psia	91.3	93.7	93.9	93.3	93.2	103.4	102.9	101.9	100.4	98.5	97.5	101.9	101.1	100.2	100.0
	Temperature, F	319.5	321.4	321.5	321.1	321.0	328.6	328.2	327.5	326.4	325.0	324.5	327.5	326.9	326.3	326.2
	Enthalpy, Btu/lb	299.9	291.9	292.0	291.5	291.5	299.4	299.0	297.8	297.2	295.7	295.1	298.3	297.6	297.0	296.9
IP Bleed (before CV)	Flow, lb/h	39,416	40,089	44,009	42,726	42,539	67,803	66,048	63,338	59,666	57,266	56,974	64,662	60,501	58,297	58,101
	Pressure, psia	1,012.4	991.9	999.4	1,003.3	1,003.5	1,063.6	1,065.5	1,067.8	1,071.2	1,075.4	1,078.5	1,065.9	1,069.8	1,071.8	1,071.9
	Temperature, F	322.8	323.9	324.0	323.6	323.5	331.2	330.9	329.5	329.1	327.8	327.2	330.2	329.6	328.9	328.9
	Enthalpy, Btu/lb	294.1	295.0	295.2	295.7	295.8	303.8	303.4	302.0	301.6	300.2	299.6	302.7	302.0	301.4	301.3
IP FW Control Valve Exit Pressure	Pressure, psia	395.8	409.9	401.1	396.3	396.0	370.2	365.4	358.3	349.4	338.9	335.3	362.7	352.6	347.1	345.7
	CV dP, psi	626.8	581.9	598.3	607.0	607.6	693.4	700.2	709.5	721.7	736.5	741.5	703.2	717.2	724.7	725.3
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,368.0	3,341.5	3,355.6	3,364.4	3,365.0	3,516.7	3,521.2	3,528.7	3,536.1	3,549.2	3,554.8	3,523.1	3,532.0	3,537.5	3,537.9
	CV dP, psi	1,772.3	1,679.3	1,704.2	1,719.8	1,720.7	2,238.0	2,247.6	2,262.6	2,276.9	2,310.8	2,325.5	2,248.3	2,266.3	2,277.7	2,278.4
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	610,573	634,639	627,440	623,197	622,924	494,655	492,001	487,732	483,039	473,215	469,070	491,579	485,913	482,450	482,241
	Pressure, psia	1,615.7	1,662.2	1,651.5	1,644.6	1,644.3	1,278.7	1,273.6	1,266.1	1,256.2	1,238.4	1,228.8	1,274.7	1,265.7	1,259.7	1,259.5
	Temperature, F	331.3	333.0	333.2	332.8	332.7	342.0	341.7	340.4	340.1	338.8	338.4	341.0	340.5	339.9	339.8
	Enthalpy, Btu/lb	304.7	306.6	306.8	306.3	306.2	315.2	314.9	313.6	313.2	311.9	311.4	314.2	313.5	313.0	312.9
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	610,574	634,638	627,447	623,197	622,925	494,655	492,001	487,732	483,039	473,215	469,070	491,579	485,913	482,450	482,241
	Pressure, psia	1,365.6	1,398.3	1,391.5	1,386.9	1,386.8	1,094.6	1,090.9	1,085.5	1,080.8	1,064.0	1,057.2	1,092.2	1,085.9	1,081.6	1,081.5
	Temperature, F	1,055.4	1,020.8	1,035.7	1,044.0	1,044.8	1,008.9	1,014.7	1,023.8	1,037.4	1,050.9	1,054.7	1,020.1	1,034.5	1,042.6	1,043.4
	Enthalpy, Btu/lb	1,527.7	1,508.4	1,515.4	1,520.5	1,521.0	1,508.4	1,511.9	1,517.3	1,526.2	1,533.4	1,535.8	1,514.9	1,523.4	1,528.2	1,528.6
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1,365.6	1,398.3	1,391.5	1,386.9	1,386.8	1,094.6	1,090.9	1,085.5	1,080.8	1,064.0	1,057.2	1,092.2	1,085.9	1,081.6	1,081.5
	Temperature, F	1,055.4	1,020.8	1,035.7	1,044.0	1,044.8	1,008.9	1,014.7	1,023.8	1,037.4	1,050.9	1,054.7	1,020.1	1,034.5	1,042.6	1,043.4
	Enthalpy, Btu/lb	1,527.7	1,508.4	1,515.4	1,520.5	1,521.0	1,508.4	1,511.9	1,517.3	1,526.2	1,533.4	1,535.8	1,514.9	1,523.4	1,528.2	1,528.6
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	331.3	333.0	333.2	332.8	332.7	342.0	341.7	340.4	340.1	338.8	338.4	341.0	340.5	339.9	339.8
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	1,004.7	964.6	981.6	991.0	992.0	988.5	974.9	986.1	1,000.9	1,015.3	1,019.8	980.7	998.6	1,005.5	1,006.4
	Enthalpy, Btu/lb	1,527.7	1,508.4	1,515.4	1,520.5	1,521.0	1,508.4	1,511.9	1,517.3	1,526.2	1,533.4	1,535.8	1,514.9	1,523.4	1,528.2	1,528.6
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	648,973	674,301	663,143	656,759	656,294	565,099	560,464	549,539	535,124	523,106	518,716	548,643	536,906	533,271	532,959
	Pressure, psia	332.8	346.0	342.0	339.7	339.6	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.6	276.9
	Temperature, F	1,044.0	1,011.5	1,025.7	1,033.5	1,034.3	998.1	1,003.8	1,012.4	1,025.6	1,037.7	1,040.9	1,009.0	1,023.0	1,030.7	1,031.5
	Enthalpy, Btu/lb	1,649.2	1,631.5	1,639.2	1,643.4	1,643.9	1,626.1	1,629.1	1,633.8	1,640.9	1,647.5	1,649.2	1,631.9	1,639.5	1,643.6	1,644.1
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	332.8	346.0	342.0	339.7	339.6	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.6	276.9
	Temperature, F	1,044.0	1,011.5	1,025.7	1,033.5	1,034.3	998.1	1,003.8	1,012.4	1,025.6	1,037.7	1,040.9	1,009.0	1,023.0	1,030.7	1,031.5
	Enthalpy, Btu/lb	1,649.2	1,631.5	1,639.2	1,643.4	1,643.9	1,626.1	1,629.1	1,633.8	1,640.9	1,647.5	1,649.2	1,631.9	1,639.5	1,643.6	1,644.1
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	111.5	91.3	107.1	111.8	111.8	83.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,037.4	1,003.7	1,018.3	1,026.4	1,027.2	993.6	999.2	1,008.2	1,021.6	1,034.1	1,037.4	1,004.6	1,018.9	1,026.8	1,027.6
	Enthalpy, Btu/lb	1,649.2	1,631.5	1,639.2	1,643.4	1,643.9	1,626.1	1,629.1	1,633.8	1,640.9	1,647.5	1,649.2	1,631.9	1,639.5	1,643.6	1,644.1
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	36,506	40,787	41,050	40,141	39,946	56,412	56,717	52,955	52,134	49,277	48,226	54,296	53,094	51,745	51,556
	Pressure, psia	84.4	85.8	85.9	85.6	85.5	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4
	Temperature, F	612.7	616.9	616.4	614.8	614.8	562.8	562.2	561.8	560.7	578.8	577.9	562.6	561.3	560.7	560.7
	Enthalpy, Btu/lb	1,336.8	1,336.8	1,336.1	1,337.8	1,337.8	1,321.5	1,321.2	1,321.1	1,320.6	1,319.7	1,319.3	1,321.4	1,320.8	1,320.6	1,320.6
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	84.4	85.8	85.9	85.6	85.5	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4
	Temperature, F	612.7	616.9	616.4	614.8	614.8	562.8	562.2	561.8	560.7	578.8	577.9	562.6	561.3	560.7	560.7
	Enthalpy, Btu/lb	1,336.8	1,336.8	1,336.1	1,337.8	1,337.8	1,321.5	1,321.2	1,321.1	1,320.6	1,319.7	1,319.3	1,321.4	1,320.8	1,320.6	1,320.6
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	111.5	91.3	107.1	111.8	111.8	83.2	89.2	89.0	105.1	109.8	109.7	89.1	105.1	109.9	109.9
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	84.4	85.8	85.9	85.6	85.5	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4
	Temperature, F	612.7	616.9	616.4	614.8	614.8	562.8	562.2	561.8	560.7	578.8	577.9	562.6	561.3	560.7	560.7
	Enthalpy, Btu/lb	1,336.8	1,336.8	1,336.1	1,337.8	1,337.8	1,321.5	1,321.2	1,321.1	1,320.6	1,319.7	1,319.3	1,321.4	1,320.8	1,320.6	1,320.6
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 35 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 35 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
GateCycle Model ID		8BART2	8BART2	8BART2	8BARTO	8BART2	8BARTO	8BARTO	8BART2	8BART2	8BART2	8BART2	8BARTO	8BART2	8BARTO	8BART2
GateCycle Case ID		B8-81	B8-82	B8-83	B8-84	B8-85	B8-86	B8-91	B8-92	B8-93	B8-94	B8-95	B8-96	B8-97	B8-98	B8-99
Ambient Temperature		35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/75%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/70%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/70%RH	90 F/55%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		2@50%	2@50%	2@50%	2@50%	2@50%	2@50%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Fired/1119 F	Fired/1128 F	Fired/1136 F	Fired/1133 F	Fired/1086 F	Fired/1080 F	Fired/1132 F	Fired/1132 F	Fired/1091 F
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		148.0 MW	146.7 MW	145.1 MW	138.0 MW	133.3 MW	132.5 MW	115.2 MW	114.0 MW	113.1 MW	106.1 MW	98.7 MW	97.7 MW	113.9 MW	105.8 MW	100.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		777p/1,041F	772p/1,042F	764p/1,043F	764p/1,045F	743p/1,047F	739p/1,048F	711p/1,012F	711p/1,019F	711p/1,029F	711p/1,041F	711p/1,01DF	711p/1,005F	711p/1,025F	711p/1,038F	711p/1,016F
STG Cold Reheat Conditions, psia/F		253p/763F	252p/754F	249p/756F	248p/757F	242p/759F	241p/759F	285p/789F	283p/795F	280p/804F	275p/818F	267p/795F	265p/791F	282p/800F	277p/815F	272p/799F
Cold Reheat Conditions after Conditioning, psia/F		253p/750F	252p/750F	249p/750F	248p/750F	242p/750F	241p/750F	285p/750F	283p/750F	280p/750F	275p/750F	267p/750F	265p/750F	282p/750F	277p/750F	272p/750F
STG Hot Reheat Conditions, psia/F		197p/1,026F	196p/1,026F	193p/1,027F	191p/1,028F	188p/1,030F	187p/1,031F	166p/1,000F	166p/1,006F	163p/1,014F	162p/1,006F	161p/950F	160p/956F	164p/1,011F	163p/1,006F	163p/995F
Condenser Pressure		1.00 In HgA	1.04 In HgA	1.04 In HgA	1.74 In HgA	2.01 In HgA	2.01 In HgA	1.00 In HgA	1.09 In HgA	1.09 In HgA	1.83 In HgA	2.12 In HgA	2.11 In HgA	1.09 In HgA	1.83 In HgA	2.13 In HgA
Stack Temperature		197 F	197 F	197 F	203 F	204 F	204 F	191 F	191 F	190 F	193 F	191 F	190 F	190 F	193 F	193 F
Run Date		8-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06	8-Sep-06	7-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	7-Sep-06	9-Sep-06	7-Sep-06	9-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		2	2	2	2	2	2	1	1	1	1	1	1	1	1	1
Gross CTG Output (each)	kW	102,942	100,174	95,579	89,853	83,606	81,723	207,123	201,614	192,471	181,068	168,833	164,861	197,137	184,229	177,293
Gross CTG Output (total)	kW	205,884	200,348	191,158	179,706	167,212	163,446	207,123	201,614	192,471	181,068	168,833	164,861	197,137	184,229	177,293
Gross CTG Heat Rate (LHV)	Btu/kWh	11,390	11,474	11,649	11,921	12,283	12,371	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,466
Gross CTG Heat Rate (HHV)	Btu/kWh	12,475	12,567	12,759	13,057	13,451	13,550	10,000	9,999	10,117	10,311	10,529	10,592	10,186	10,394	10,521
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	2,345.02	2,298.79	2,226.80	2,142.28	2,056.52	2,021.99	1,878.81	1,839.53	1,777.65	1,704.57	1,621.07	1,594.56	1,810.51	1,726.59	1,681.80
CTG Heat Input (HHV) (total)	MMBtu/h	2,568.44	2,517.81	2,438.96	2,346.38	2,245.68	2,214.63	2,083.71	2,014.79	1,947.24	1,866.96	1,775.82	1,748.40	2,007.96	1,914.89	1,865.22
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	166.36	164.29	164.29	164.29	164.29	164.29	166.36	166.36	166.36
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	166.36	164.29	164.29	164.29	164.29	164.29	166.36	166.36	166.36
Gross STG Output	kW	148,010	146,730	145,080	137,950	133,270	132,530	115,180	113,960	113,110	105,140	98,740	97,740	113,890	105,840	100,750
STG Output, percent of CTG Output		71.9%	73.2%	75.9%	76.8%	79.7%	81.1%	55.6%	56.5%	58.8%	58.1%	58.5%	59.3%	57.8%	57.5%	56.8%
Gross Plant Output	kW	353,894	347,078	336,238	317,656	300,482	295,976	322,303	315,554	305,581	286,208	267,573	262,621	311,027	290,069	278,043
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,626	6,623	6,623	6,744	6,824	6,832	6,295	6,305	6,369	6,480	6,624	6,643	6,303	6,469	6,588
Gross Cycle Heat Rate (HHV)	Btu/kWh	7,258	7,254	7,254	7,387	7,474	7,482	6,981	6,965	6,910	7,097	7,265	7,276	6,991	7,175	7,307
Plant Heat Input (LHV)	MMBtu/h	2,345.02	2,298.79	2,226.80	2,142.28	2,056.52	2,021.99	2,028.81	1,989.53	1,927.65	1,854.57	1,771.07	1,744.56	1,960.51	1,876.59	1,831.80
Plant Heat Input (HHV)	MMBtu/h	2,568.44	2,517.81	2,438.96	2,346.38	2,245.68	2,214.63	2,250.07	2,179.08	2,111.53	2,031.27	1,939.61	1,910.78	2,174.32	2,081.25	2,031.58
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	19,800	19,760	19,700	19,580	19,480	19,450	15,490	15,390	15,320	15,140	15,000	14,970	16,360	15,180	15,080
Total Auxiliary Power/Losses, percent of gross		5.59%	5.69%	5.86%	6.16%	6.48%	6.57%	4.79%	4.88%	5.01%	5.29%	5.61%	5.70%	4.94%	5.23%	5.42%
Net Plant Output w/ Step-Up Xfmr Losses	kW	334,094	327,318	316,538	298,076	281,002	276,526	306,813	300,174	290,261	271,068	252,573	247,651	295,667	274,889	262,963
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,019	7,023	7,035	7,187	7,317	7,312	6,612	6,626	6,642	6,842	7,016	7,044	6,631	6,827	6,966
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,688	7,692	7,705	7,872	7,992	8,008	7,333	7,259	7,276	7,494	7,686	7,718	7,354	7,571	7,726

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%
	WBT, F	30.9	39.3	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6
Compressor Inlet Conditions	Temperature, F	35.0	45.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5
	Relative Humidity	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	5,631	3,605	9,622
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,172.5	1,149.4	1,113.4	1,071.1	1,025.3	1,011.0	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8
	Flow, lb/h	56,412	54,319	52,618	50,621	48,463	47,779	88,908	86,934	84,020	80,566	76,619	75,357	85,540	82,624	80,481
Fuel LHV	Btu/lb	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	21,160	20,897	20,897
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

DEF-19FL-FUEL-002479

Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 35 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 35 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	230.5	228.9	226.4	223.5	220.0	218.9	243.3	241.9	239.7	236.7	231.9	230.4	241.4	238.0	235.5
	Temperature, F	745.9	746.0	746.5	746.9	746.0	746.0	744.2	744.2	744.3	744.5	744.7	744.8	744.3	744.4	744.7
	Enthalpy, Btu/lb	1,396.2	1,396.3	1,396.4	1,396.5	1,396.5	1,396.5	1,394.7	1,394.8	1,394.9	1,395.1	1,395.5	1,395.6	1,394.8	1,395.1	1,395.3
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	320.6	320.6	320.3	320.8	320.7	320.6	318.1	317.8	317.1	317.4	317.0	316.7	317.4	317.7	317.6
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	230.5	228.9	226.4	223.5	220.0	218.9	243.3	241.9	239.7	236.7	231.9	230.4	241.4	238.0	235.5
	Temperature, F	745.9	746.0	746.5	746.9	746.0	746.0	744.2	744.2	744.3	744.5	744.7	744.8	744.3	744.4	744.7
	Enthalpy, Btu/lb	1,396.2	1,396.3	1,396.4	1,396.5	1,396.5	1,396.5	1,394.7	1,394.8	1,394.9	1,395.1	1,395.5	1,395.6	1,394.8	1,395.1	1,395.3
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	2,944,151	2,916,983	2,872,774	2,811,624	2,756,485	2,742,044	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,875,066	3,775,057
	Pressure, in. H2O	9.48	9.31	9.04	8.69	8.36	8.27	19.73	19.17	18.29	17.09	15.90	15.56	18.59	17.39	16.69
	Temperature, F	1,095.8	1,096.7	1,098.1	1,099.5	1,101.1	1,101.7	1,072.9	1,072.8	1,069.9	1,108.0	1,123.4	1,127.2	1,067.0	1,105.0	1,115.0
CTG Load	% of Base Load	50%	50%	50%	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	102,942	100,174	95,579	89,883	83,666	81,723	207,123	201,614	192,471	181,068	168,633	164,881	197,137	184,229	177,293
Gross Heat Rate	Btu/kWh (LHV)	11,390	11,474	11,649	11,921	12,283	12,371	9,971	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,466

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

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Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	365,388	362,742	358,577	353,870	348,245	346,374	629,473	624,341	616,380	591,910	565,139	560,268	621,797	597,469	575,698
(at HRSG terminal point)	Pressure, psia	824.5	818.9	810.2	800.2	788.2	784.2	791.6	790.8	789.5	784.5	777.0	775.7	790.5	786.6	779.5
	Temperature, F	1,044.8	1,045.0	1,047.5	1,049.0	1,051.0	1,051.6	1,018.1	1,024.5	1,034.6	1,048.2	1,015.2	1,010.2	1,030.5	1,043.5	1,020.3
	Enthalpy, Btu/lb	1,536.5	1,537.3	1,538.4	1,539.5	1,540.9	1,541.5	1,522.5	1,526.1	1,531.7	1,538.3	1,521.3	1,518.6	1,529.4	1,536.8	1,524.1
dP from HP drum to HRSG terminal point	psi	61.5	61.0	60.1	79.1	78.0	77.6	226.3	224.0	220.4	207.3	178.5	173.5	223.0	210.2	187.8
HP SH #1 Steam Outlet Temperature	Temperature, F	1,045.6	1,046.6	1,048.2	1,049.7	1,051.7	1,052.5	1,020.3	1,026.7	1,036.7	1,048.1	1,017.1	1,012.1	1,032.6	1,045.5	1,022.2
HP SH #2 Steam Outlet Temperature	Temperature, F	1,019.2	1,020.3	1,021.8	1,023.3	1,025.2	1,026.0	1,008.0	1,011.9	1,021.2	1,029.1	977.3	968.4	1,017.3	1,028.9	988.5
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	33,495	39,597	0	0	23,478
(from HP Feedwater)	Temperature, F	334.1	334.1	334.0	334.7	334.7	334.7	328.1	327.8	327.1	327.7	327.5	327.3	327.4	327.9	328.0
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%	7.6%	0.0%	0.0%	4.3%
	Final Superheat, F	335.4	337.0	339.5	342.1	345.4	346.6	390.4	395.7	403.9	407.3	271.9	248.4	399.6	405.1	307.2
HP SH #3/4 Steam Outlet Temperature	Temperature, F	865.4	866.3	867.6	868.6	870.2	870.8	930.6	935.6	943.3	944.9	924.1	922.3	939.4	943.0	924.2
HP Evaporator #1 Exit	Flow, lb/h	46,146	47,028	47,557	47,042	46,582	46,446	81,977	82,182	82,416	79,653	70,180	68,827	82,355	79,983	72,251
	Pressure, psia	900.0	899.9	900.3	879.3	868.2	861.8	1,017.9	1,014.7	1,009.9	991.7	955.5	949.2	1,013.5	996.6	957.4
	Temperature, F	532.8	532.0	530.7	529.3	527.5	526.9	546.8	546.4	545.8	543.6	539.2	538.4	546.3	544.1	540.6
	Enthalpy, Btu/lb	1,196.0	1,196.2	1,196.5	1,196.8	1,197.3	1,197.4	1,191.9	1,192.0	1,192.2	1,192.9	1,194.2	1,194.4	1,192.1	1,192.7	1,193.8
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	419.9	421.0	422.7	424.6	427.0	427.7	526.9	533.2	543.3	542.2	502.4	497.9	538.9	540.6	506.5
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.0	0.1	0.2	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	317,240	314,816	311,011	306,829	301,665	299,930	547,496	542,159	533,965	512,258	491,923	491,837	539,442	517,515	479,871
	Pressure, psia	900.0	899.9	900.3	879.3	868.2	861.8	1,017.9	1,014.7	1,009.9	991.7	955.5	949.2	1,013.5	996.6	957.4
	Temperature, F	532.8	532.0	530.7	529.3	527.5	526.9	546.8	546.4	545.8	543.6	539.2	538.4	546.3	544.1	540.6
	Enthalpy, Btu/lb	1,196.0	1,196.2	1,196.5	1,196.8	1,197.3	1,197.4	1,191.9	1,192.0	1,192.2	1,192.9	1,194.2	1,194.4	1,192.1	1,192.7	1,193.8
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	16.2	16.1	16.0	15.9	15.7	15.5	24.3	24.0	23.6	22.9	21.3	20.8	23.9	23.2	22.2
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.0	0.1	0.2	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	365,388	362,743	358,576	353,871	348,248	346,376	629,473	624,341	616,381	591,909	565,703	560,864	621,797	597,468	552,122
	Temperature, F	532.8	532.0	530.7	529.3	527.5	526.9	546.8	546.4	545.4	543.0	539.2	538.4	546.2	543.9	540.6
HP Economizer #4/5 Outlet Temperature	Temperature, F	493.0	492.2	491.0	489.3	487.5	487.0	488.1	484.4	482.3	480.8	485.4	485.6	483.3	481.4	485.8
HP Economizer #6/7 Outlet Temperature	Temperature, F	411.4	410.7	409.7	408.5	407.0	406.5	408.9	407.6	405.6	404.8	407.0	406.8	406.8	405.4	407.9
HP Economizer #8 Outlet Temperature	Temperature, F	373.9	373.6	372.9	372.6	371.8	371.6	363.9	363.1	361.6	361.7	364.1	364.1	362.3	362.0	364.5
Feedwater to HP Economizer #8	Flow, lb/h	365,388	362,743	358,576	353,871	348,248	346,376	629,473	624,341	616,381	591,909	565,703	560,864	621,797	597,468	552,122
	Pressure, psia	948.3	941.5	931.0	919.0	904.6	899.9	1,142.0	1,136.9	1,128.9	1,101.6	1,044.4	1,034.4	1,134.7	1,107.7	1,063.1
	Temperature, F	334.1	334.1	334.0	334.7	334.7	334.7	328.1	327.8	327.1	327.7	327.5	327.3	327.4	327.9	328.0
	Enthalpy, Btu/lb	306.5	306.5	306.4	307.1	307.1	307.0	300.7	300.3	299.6	300.1	299.9	299.8	299.9	300.3	300.4
HP FW Temperature Increase Across BFP	F	16.7	16.8	17.0	17.2	17.4	17.4	12.5	12.5	12.6	12.7	13.0	13.0	12.5	12.7	12.6
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	166.36	164.29	164.29	164.29	164.29	164.29	166.36	166.36	166.36
Inlet Temperature	Temperature, F	992.4	993.0	993.8	994.7	995.8	995.9	996.5	1,001.3	1,009.0	1,001.2	946.8	939.3	1,006.2	1,001.5	956.5
Exit Temperature	Temperature, F	992.4	993.0	993.8	994.7	995.8	995.9	1,118.8	1,125.5	1,136.4	1,133.5	1,085.9	1,080.4	1,131.8	1,132.2	1,091.3
HRSG Hot Reheat Steam	Flow, lb/h	404,068	401,159	396,566	391,219	384,961	382,903	665,223	660,097	672,419	676,692	675,921	673,025	677,907	673,651	683,264
(at HRSG terminal point)	Pressure, psia	209.2	207.8	205.5	202.8	199.7	198.7	181.7	180.7	179.2	178.1	176.6	176.5	180.4	179.0	178.8
	Temperature, F	1,027.4	1,028.3	1,029.6	1,030.8	1,032.6	1,033.2	1,002.9	1,008.2	1,016.6	1,007.8	982.8	957.8	1,013.3	1,007.8	987.8
	Enthalpy, Btu/lb	1,549.7	1,544.2	1,545.0	1,545.7	1,546.7	1,547.1	1,531.6	1,534.4	1,536.6	1,534.2	1,510.7	1,508.2	1,537.0	1,534.2	1,513.3
HRSG RH dP -- terminal pt. to terminal pt.	psi	21.3	21.1	20.8	20.6	20.3	20.2	61.6	61.2	60.5	58.6	55.5	54.9	61.0	59.0	56.6
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,027.7	1,028.6	1,029.9	1,031.2	1,032.8	1,033.5	1,003.8	1,009.1	1,017.4	1,008.6	983.7	958.7	1,014.1	1,008.5	988.7
RHTR #3 Steam Outlet Temperature	Temperature, F	955.0	955.7	956.7	957.6	958.9	959.4	951.5	955.6	962.0	953.5	847.3	836.5	959.3	936.0	881.4
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	21,166	57,635	61,569	0	18,823	52,891
(from IP Feedwater)	Temperature, F	320.6	320.6	320.3	320.8	320.7	320.6	318.1	317.8	317.1	317.4	317.0	316.7	317.4	317.7	317.8
	% of Inlet steam	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	9.4%	10.1%	0.0%	2.9%	8.4%
	Final Superheat, F	418.3	419.0	419.9	421.1	422.4	422.8	460.6	463.0	466.6	395.4	258.3	243.6	464.9	402.6	278.2
RHTR #4 Steam Outlet Temperature	Temperature, F	810.2	810.2	810.2	810.4	810.3	810.2	863.8	865.8	868.6	857.4	839.2	836.8	857.6	857.2	842.0
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	1,021.1	1,022.5	1,024.6	1,026.7	1,029.4	1,030.4	994.8	1,001.5	1,012.2	1,024.5	992.6	987.5	1,007.9	1,021.7	997.8
	Enthalpy, Btu/lb	1,536.5	1,537.3	1,538.4	1,539.5	1,540.9	1,541.5	1,522.5	1,526.1	1,531.7	1,538.3	1,521.3	1,518.6	1,529.4	1,536.8	1,524.1
Cold Reheat Steam from STG to HRSG	Flow, lb/h	350,816	357,352	353,471	349,026	343,741	341,998	626,752	626,219	626,760	596,816	566,595	560,595	625,221	604,717	576,200
(at HRSG terminal point)	Pressure, psia	230.5	229.9	228.4	226.5	224.0	218.9	243.3	241.9	239.7	238.7	237.9	236.4	241.4	238.0	235.5
	Temperature, F	746.9	748.0	749.0	748.0	746.0	746.0	744.2	744.2	744.3	744.5	744.7	744.8	744.3	744.4	744.7
	Enthalpy, Btu/lb	1,396.2	1,396.3	1,396.4	1,396.6	1,396.8	1,396.8	1,394.7	1,394.8	1,394.9	1,395.1	1,395.5	1,395.6	1,394.8	1,395.1	1,395.3
Cold Reheat Steam, % of HP Steam		96.48%	98.61%	98.66%	98.63%	98.71%	98.74%	100.04%	100.30%	100.71%	101.34%	100.24%	100.05%	100.55%	101.21%	100.45%
HP Steam - Cold Reheat Steam	Flow, lb/h	5,572	5,389	5,105	4,844	4,505	4,379	-279	-1,878	-4,380	-7,905	-1,385	-266	-3,424	-7,246	-2,902

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 36 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 35 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	44,281	43,809	43,097	42,166	41,222	40,908	55,472	53,881	51,659	49,707	51,163	50,924	52,590	50,310	52,196
	Pressure, psia	230.5	228.9	226.4	223.5	220.1	218.9	243.3	241.9	239.7	238.7	231.9	230.4	241.4	238.0	235.5
	Temperature, F	540.0	539.2	538.0	536.7	535.0	534.4	568.9	568.6	568.2	568.9	549.4	548.2	558.7	556.5	554.4
	Enthalpy, Btu/lb	1,287.9	1,287.6	1,287.2	1,286.7	1,286.1	1,285.9	1,297.0	1,297.0	1,297.0	1,297.0	1,295.9	1,292.8	1,292.4	1,297.1	1,296.2	1,293.6
IP Evaporator Drum Exit	Flow, lb/h	44,281	43,809	43,097	42,166	41,222	40,908	55,472	53,881	51,659	49,707	51,163	50,924	52,590	50,310	52,196
	Pressure, psia	242.8	241.0	238.3	235.0	231.2	230.0	261.4	259.0	256.7	251.7	248.1	246.4	257.9	253.3	252.0
	Temperature, F	398.4	397.8	396.8	395.6	394.2	393.7	404.9	404.1	403.0	401.6	400.3	399.7	403.7	402.1	401.7
	Enthalpy, Btu/lb	1,201.3	1,201.2	1,201.0	1,200.9	1,200.7	1,200.6	1,202.1	1,202.0	1,201.8	1,201.7	1,201.5	1,201.4	1,201.9	1,201.7	1,201.7
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	21.7	21.9	21.4	21.2	21.9	29.8	22.6	22.1	21.6	21.2	22.1	22.1	21.9	21.4	22.3
IP Approach	Temperature, F	2.7	2.6	2.4	2.0	1.7	1.7	10.2	10.4	10.7	10.1	8.2	7.9	10.6	10.1	8.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	44,281	43,809	43,097	42,166	41,222	40,908	55,472	53,881	51,659	49,707	51,163	50,924	52,590	50,310	52,196
	Pressure, psia	242.8	241.0	238.3	235.0	231.2	230.0	261.4	259.0	256.7	251.7	248.1	246.4	257.9	253.3	252.0
	Temperature, F	395.7	395.2	394.4	393.6	392.4	392.0	394.7	393.6	392.3	391.5	392.1	391.6	393.1	392.0	393.2
	Enthalpy, Btu/lb	370.5	369.9	369.0	368.2	366.9	366.5	369.4	368.4	366.8	366.9	366.6	366.2	367.7	366.5	367.7
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	44,281	43,809	43,097	42,166	41,222	40,908	55,472	53,881	51,659	49,707	51,163	50,924	52,590	50,310	52,196
	Pressure, psia	258.4	256.9	253.1	249.2	244.8	243.3	285.7	282.0	276.9	271.9	268.8	267.0	279.9	273.4	273.6
	Temperature, F	322.9	322.0	321.8	322.3	322.2	322.1	319.3	319.0	316.3	318.7	318.3	317.9	316.6	318.9	318.8
	Enthalpy, Btu/lb	292.8	292.8	292.5	293.1	293.0	292.9	290.1	289.7	289.0	289.4	289.9	289.6	289.3	289.6	289.6
IP FW Temperature Increase Across BFP	F	4.6	4.7	4.7	4.8	4.8	4.8	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
LP Steam (at HRSG terminal point)	Flow, lb/h	32,433	32,144	31,597	32,728	32,349	32,034	30,682	29,900	27,388	28,802	27,378	26,507	28,559	29,060	29,513
	Pressure, psia	82.7	82.7	82.5	82.8	82.7	82.5	80.9	80.6	80.3	80.5	80.3	80.0	80.5	80.6	80.5
	Temperature, F	547.2	546.3	545.0	543.1	541.1	540.4	570.1	569.5	568.7	565.6	559.7	558.6	562.4	560.5	561.9
	Enthalpy, Btu/lb	1,304.5	1,304.0	1,303.4	1,302.4	1,301.4	1,301.1	1,316.0	1,315.7	1,315.3	1,313.8	1,310.9	1,310.3	1,315.8	1,314.1	1,314.9
LP Evaporator Steam Exit	Flow, lb/h	32,433	32,144	31,597	32,728	32,349	32,034	30,682	29,900	27,388	28,802	27,378	26,507	28,559	29,060	29,513
	Pressure, psia	86.4	86.3	86.0	86.5	86.4	86.2	84.3	83.9	83.6	83.5	83.9	82.6	83.4	83.7	83.7
	Temperature, F	317.4	317.3	317.0	317.5	317.4	317.2	315.7	315.3	314.6	315.0	314.6	314.2	314.9	315.2	315.1
	Enthalpy, Btu/lb	1,184.8	1,184.6	1,184.7	1,184.8	1,184.8	1,184.7	1,184.3	1,184.2	1,184.0	1,184.1	1,184.0	1,183.9	1,184.1	1,184.2	1,184.2
LP Evaporator Water Exit to BFPs	Flow, lb/h	410,204	407,243	402,003	397,189	390,875	388,794	696,420	691,232	683,462	681,419	685,925	683,374	689,011	684,846	693,818
	Pressure, psia	86.4	86.3	86.0	86.5	86.4	86.2	84.3	83.9	83.6	83.5	83.9	82.6	83.4	83.7	83.7
	Temperature, F	317.4	317.3	317.0	317.5	317.4	317.2	315.7	315.3	314.6	315.0	314.6	314.2	314.9	315.2	315.1
	Enthalpy, Btu/lb	287.7	287.7	287.4	287.9	287.7	287.6	285.9	285.6	284.8	285.2	284.8	284.5	285.2	285.5	285.4
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	44,281	43,809	43,097	42,166	41,222	40,908	55,472	53,881	51,659	49,707	51,163	50,924	52,590	50,310	52,196
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	21,156	57,836	61,659	0	18,823	52,691
HP FW to HRSG HP Economizer #6	Flow, lb/h	365,388	362,743	358,578	353,871	348,248	346,376	629,473	624,341	616,381	591,969	531,703	520,664	621,797	597,469	552,122
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	33,435	39,597	0	0	23,476
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	535	693	927	1,131	1,464	1,511	11,476	13,015	15,421	18,639	11,794	10,620	14,530	16,050	13,136
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	14.1	13.9	13.7	13.5	13.2	13.1	17.2	16.9	16.4	16.0	16.0	15.9	16.7	16.1	16.4
LP Approach	Temperature, F	8.1	7.9	7.9	8.2	8.1	8.1	21.7	21.3	22.5	18.2	19.3	19.9	22.1	17.8	18.1
Condensate Recirculated	Flow, lb/h	124,615	120,314	119,264	75,679	62,682	62,423	216,478	202,258	201,974	124,029	104,514	104,768	202,731	124,184	104,531
	Temperature, F	308.9	309.1	308.7	313.8	314.9	314.7	294.0	294.0	292.1	296.7	295.1	294.2	292.9	297.3	296.9
% of Total LP Economizer Flow		22%	21%	22%	15%	13%	13%	23%	22%	22%	15%	13%	13%	22%	15%	13%
Condensate from LP Economizer	Flow, lb/h	567,254	559,722	553,292	505,619	485,935	483,281	943,579	923,392	912,822	834,261	817,823	814,652	920,304	838,497	827,865
	Temperature, F	308.6	308.9	308.4	313.6	314.6	314.4	293.4	293.5	291.5	296.2	294.7	293.8	292.3	296.9	296.6
	Enthalpy, Btu/lb	279.4	279.6	279.2	284.5	285.6	285.4	263.5	263.0	261.6	266.6	264.9	264.0	262.4	267.2	266.8
Condensate to LP Economizer	Flow, lb/h	567,254	559,722	553,292	505,619	485,935	483,281	943,579	923,392	912,822	834,261	817,823	814,652	920,304	838,497	827,865
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4
Condensate from Recirculation	Flow, lb/h	124,615	120,314	119,264	75,679	62,682	62,423	216,478	202,258	201,974	124,029	104,514	104,768	202,731	124,184	104,531
	Temperature, F	308.9	309.1	308.7	313.8	314.9	314.7	294.0	294.0	292.1	296.7	295.1	294.2	292.9	297.3	296.9
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	85.4	85.7	85.6	103.1	108.0	108.0	87.1	86.9	86.9	106.4	111.3	111.2	86.9	106.4	111.3
Condensate to HRSG	Flow, lb/h	442,639	439,409	434,028	429,540	423,253	426,858	727,101	721,134	710,849	710,232	713,309	709,884	717,573	714,313	723,334
	Pressure, psia	551.2	551.3	551.6	550.6	550.5	550.7	556.6	555.5	556.6	554.5	554.0	554.1	555.5	554.4	553.7
	Temperature, F	85.4	85.7	85.6	103.1	108.0	108.0	87.1	86.9	86.9	106.4	111.3	111.2	86.9	106.4	111.3
Stack Exit	Flow, lb/h	2,944,151	2,916,983	2,872,774	2,811,624	2,756,485	2,742,644	4,308,966	4,134,479	4,016,100	3,946,023	3,881,991	3,837,577	4,055,758	3,882,244	3,782,235
	Temperature, F	196.8	197.0	196.6	202.7	204.2	203.9	191.4	191.3	189.7	192.8	190.7	189.8	190.5	193.4	192.6

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-061108-8 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 35 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 35 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	3,045	3,026	2,995	2,961	2,920	2,906	2,483	2,475	2,462	2,376	2,265	2,176	2,478	2,396	2,256
HP Turbine Remainder Shaft Power	kW	25,690	25,733	25,464	25,200	24,855	24,742	16,718	16,668	16,586	16,790	14,207	13,684	16,677	15,906	14,592
IP Turbine Shaft Power	kW	44,370	44,081	43,647	42,998	42,358	42,183	37,744	37,627	37,497	37,112	36,203	35,657	37,584	37,264	36,667
LP Turbine Shaft Power	kW	78,883	77,841	76,992	70,708	67,026	66,603	62,065	60,994	60,379	53,689	46,691	40,388	66,672	54,083	50,972
Total Shaft Power	kW	148,923	147,654	146,024	138,904	134,241	133,508	118,618	115,289	114,462	109,662	103,301	99,326	118,233	107,253	102,262
STG Throttle Steam	Flow, lb/h	730,776	725,484	717,153	707,740	696,492	692,748	629,473	624,341	616,360	591,910	565,139	550,258	621,797	597,469	575,508
	Pressure, psia (MAX 2270 psia)	777.9	772.1	763.8	754.4	743.1	739.3	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2
	Temperature, F	1,040.7	1,041.6	1,043.5	1,045.0	1,047.0	1,047.8	1,012.2	1,013.6	1,020.9	1,040.6	1,010.0	1,005.1	1,024.7	1,038.0	1,015.0
	Enthalpy, Btu/lb	1,535.5	1,536.3	1,537.4	1,538.5	1,539.9	1,540.5	1,521.5	1,525.1	1,530.7	1,537.3	1,520.3	1,517.6	1,528.4	1,535.8	1,523.1
THV Pressure Loss	psi	15.3	15.2	15.0	14.9	14.8	14.8	50.9	54.7	60.5	82.8	116.4	122.5	55.8	77.4	104.5
		1.97%	1.97%	1.97%	1.97%	1.97%	1.97%	7.16%	7.99%	8.51%	11.91%	16.37%	17.23%	7.85%	10.86%	14.80%
Leak 1 Leakage Flow to HRH	Flow, lb/h	9,274	9,206	9,101	8,961	8,838	8,790	8,139	8,079	7,970	7,665	7,343	7,282	8,040	7,739	7,476
HP Turbine Exit	Flow, lb/h	721,602	716,273	706,049	696,755	687,551	683,954	621,333	616,268	608,409	584,244	557,796	542,986	613,757	589,731	568,123
	Pressure, psia	263.3	261.6	258.8	255.6	241.9	240.7	284.5	282.9	280.4	275.4	267.5	265.5	282.4	277.1	271.9
	Temperature, F (MAX 640 F)	753.2	754.1	755.6	756.9	758.7	759.4	789.1	794.6	803.8	817.9	795.1	791.0	800.3	815.1	799.2
	Enthalpy, Btu/lb	1,398.9	1,399.4	1,400.3	1,401.2	1,402.3	1,402.7	1,418.2	1,419.3	1,421.1	1,421.6	1,420.1	1,418.0	1,422.1	1,420.1	1,422.0
Efficiency (THV inlet to HPT exit)		85.85%	85.85%	85.85%	85.85%	85.85%	85.85%	80.55%	80.10%	79.41%	76.85%	72.44%	71.72%	79.96%	77.28%	73.84%
Efficiency (THV exit to HPT exit)		87.01%	87.01%	87.01%	87.01%	87.01%	87.01%	86.95%	86.95%	86.95%	86.94%	86.93%	86.93%	86.95%	86.94%	86.93%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	753	746	739	728	717	713	634	627	615	597	761	777	623	603	793
CRH Steam to Steam Seals	Flow, lb/h	2,187	2,198	2,214	2,231	2,253	2,260	2,223	2,235	2,253	2,273	2,286	2,293	2,241	2,264	2,287
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	718,562	713,328	705,096	695,796	684,681	680,681	618,276	613,206	605,340	581,174	554,729	549,916	610,692	586,664	565,063
	Pressure, psia	263.3	261.6	258.8	255.6	241.9	240.7	284.5	282.9	280.4	275.4	267.5	265.5	282.4	277.1	271.9
	Temperature, F	753.2	754.1	755.6	756.9	758.7	759.4	789.1	794.6	803.8	817.9	795.1	791.0	800.3	815.1	799.2
	Enthalpy, Btu/lb	1,398.9	1,399.4	1,400.3	1,401.2	1,402.3	1,402.7	1,418.2	1,419.3	1,421.1	1,421.6	1,420.1	1,418.0	1,422.1	1,420.1	1,422.0
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	1,070	1,387	1,854	2,262	2,809	3,023	11,476	13,015	15,421	16,539	11,794	10,820	14,539	16,050	13,136
	Temperature, F	320.6	320.6	320.3	320.8	320.7	320.6	318.1	317.8	317.1	317.4	317.0	316.7	317.4	317.7	317.6
Final Cold Reheat Steam after Conditioning	Flow, lb/h	719,632	714,715	706,950	698,059	687,490	684,004	629,752	626,221	620,761	599,814	566,523	560,736	625,233	604,714	578,201
	Pressure, psia	263.3	261.6	258.8	255.6	241.9	240.7	284.5	282.9	280.4	275.4	267.5	265.5	282.4	277.1	271.9
	Temperature, F (MAX 760 F)	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0
	Enthalpy, Btu/lb	1,397.2	1,397.3	1,397.4	1,397.6	1,397.8	1,397.8	1,395.7	1,396.0	1,396.9	1,396.1	1,396.5	1,396.6	1,396.8	1,396.1	1,396.3
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	89,634	88,989	88,036	86,625	85,241	84,625	80,947	86,690	87,079	80,516	120,792	123,110	87,216	87,186	118,221
Reheat System dP	psi	56.4	56.0	55.4	54.7	53.9	53.6	118.9	118.2	117.1	113.1	106.7	105.5	117.9	114.0	108.9
Reheat System dP		22.26%	22.27%	22.27%	22.28%	22.29%	22.29%	41.79%	41.78%	41.76%	41.05%	39.86%	39.76%	41.76%	41.14%	40.06%
Hot Reheat Flow	Flow, lb/h	808,196	802,318	793,132	782,421	769,922	765,607	685,223	680,097	672,419	670,692	675,221	673,025	677,907	673,851	683,284
	Pressure, psia (MAX 564 psia)	196.9	195.5	193.4	190.9	188.0	187.0	165.6	164.7	163.3	162.3	160.8	159.9	164.5	163.1	163.0
	Temperature, F	1,024.9	1,025.8	1,027.1	1,028.4	1,030.1	1,030.8	1,000.2	1,005.5	1,013.8	1,035.0	960.0	955.0	1,010.5	1,035.0	965.0
Differential to HP Temperature	dT, F (MAX +/- 60 F)	-16.9	-16.1	-16.3	-16.6	-17.0	-17.1	-12.0	-13.2	-16.0	-36.8	-50.0	-50.1	-14.2	-33.0	-50.0
	Enthalpy, Btu/lb	1,542.7	1,543.2	1,544.0	1,544.7	1,545.7	1,546.1	1,530.6	1,533.4	1,537.8	1,533.2	1,509.7	1,507.2	1,536.0	1,533.2	1,512.3
INTV Pressure Loss	psi	3.9	3.9	3.9	3.8	3.8	3.7	3.3	3.3	3.3	3.3	3.2	3.2	3.3	3.3	3.3
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.01%	2.00%	2.01%	2.00%	2.00%	2.00%
IP Turbine Exit	Flow, lb/h	817,470	811,624	802,233	791,402	778,760	774,597	693,352	688,170	680,389	678,360	682,864	680,308	685,947	681,589	690,760
	Pressure, psia	45.3	45.0	44.5	44.1	43.4	43.2	36.9	36.6	36.2	36.1	35.8	35.4	36.5	36.3	36.2
	Temperature, F	649.1	649.8	650.7	652.7	654.2	654.7	622.1	626.2	632.2	625.8	592.6	585.4	629.8	626.0	594.2
	Enthalpy, Btu/lb	1,357.3	1,357.8	1,358.1	1,359.1	1,359.9	1,360.1	1,344.6	1,346.8	1,349.5	1,346.4	1,328.8	1,326.8	1,346.4	1,346.5	1,331.0
Efficiency (INTV inlet to IPT exit)		90.84%	90.83%	90.84%	90.83%	90.83%	90.83%	90.87%	90.87%	90.86%	90.87%	90.87%	90.87%	90.87%	90.87%	90.87%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	660	655	647	641	630	627	543	538	531	530	533	530	536	533	540
LP Steam Admitted to STG (total)	Flow, lb/h	84,866	84,287	82,793	86,457	84,899	84,066	30,582	29,990	27,386	26,802	27,378	26,507	28,559	29,660	26,513
(upstream of LP admission CV)	Pressure, psia (MIN 78.3 psia)	78.2	78.2	78.2	78.2	78.2	78.2	78.4	78.2	78.3	78.2	78.3	78.2	78.3	78.2	78.2
	Temperature, F	544.4	543.5	542.3	540.3	538.3	537.8	597.7	597.1	596.3	583.3	557.4	556.2	567.0	564.0	559.5
	Enthalpy, Btu/lb	1,303.5	1,303.0	1,302.4	1,301.4	1,300.4	1,300.1	1,315.0	1,314.7	1,314.3	1,312.8	1,309.9	1,309.3	1,314.6	1,313.1	1,310.9
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 100 F)	-104.7	-105.3	-106.5	-112.4	-115.9	-117.0	-54.4	-59.1	-65.9	-62.6	-32.2	-29.2	-62.6	-62.1	-34.6
LP Admission CV Pressure Loss	% loss	42.9%	42.4%	43.1%	43.6%	44.5%	44.8%	53.0%	53.2%	53.8%	53.9%	54.5%	54.7%	53.4%	53.6%	53.7%
LP Turbine Inlet Steam	Flow, lb/h	861,676	875,156	864,379	858,218	842,828	838,038	723,501	717,531	707,246	706,632	709,709	708,285	713,971	710,716	719,732
	Pressure, psia	44.7	44.3	43.8	43.4	42.8	42.5	36.3	36.1	35.7	35.5	35.1	34.8	35.9	35.7	35.6
	Temperature, F	641.0	641.6	642.4	643.7	644.6	645.2	619.5	623.4	629.3	623.0	590.0	584.0	627.8	623.1	592.4
	Enthalpy, Btu/lb	1,353.3	1,353.6	1,354.1	1,354.7	1,355.3	1,355.5	1,343.3	1,345.2	1,348.2	1,345.1	1,328.1	1,326.1	1,347.0	1,345.1	1,330.2
LP Turbine Exit	Flow, lb/h	861,676	875,154	864,378	858,218	842,825	838,036	723,501	717,531	707,247	706,631	709,710	708,285	713,971	710,716	719,732
	Pressure, psia	0.492	0.512	0.510	0.654	0.687	0.685	0.493	0.538	0.535	0.598	1.041	1.038	0.537	0.900	1.046
	Pressure, in. HgA	1.001	1.043	1.038	1.739	2.009	2.006	1.003	1.095	1.089	1.829	2.119	2.114	1.093	1.833	2.130
	Temperature, F	79.0	80.3	80.1	96.6	101.3	101.2	79.1	81.8	81.6	96.1	103.0	103.0	81.7	96.2	103.2
ELEP Enthalpy, Btu/lb		1,037.0	1,039.4	1,040.0	1,065.8	1,074.2	1,074.5	1,042.8	1,048.2	1,049.9	1,074.2	1,073.6	1,072.9	1,049.1	1,074.0	1,074.1
UEEP Enthalpy, Btu/lb		1,048.9	1,050.1	1,050.5	1,072.9	1,084.0	1,084.3	1,050.7	1,055.2	1,056.9	1,085.6	1,088.2	1,087.5	1,056.1	1,085.6	1,088.5
Exhaust Loss Btu/lb		11.8	10.7	10.5	7.1	9.8	9.9	7.9	7.0	6.9	11.5	14.6	14.7	7.0	11.5	14.4
Moisture @ UEEP (MIN 1.7%)		4.46%	4.40%	4.35%	2.92%	2.06%	2.01%	4.35%	3.96%	3.81%	1.74%	1.72%	1.78%	3.82%	1.77%	1.70%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.67%	90.71%	90.73%	91.10%	91.24%	91.26%	90.67%	90.76%	90.85%	91.16%	90.94%	90.90%	90.82%	91.15%	90.97%
LPT Efficiency to UEEP		87.27%	87.52%	87.56%	88.89%	89.07%	89.06%	88.30%	88.54%	88.73%	87.25%	86.72%	86.63%	88.59%	87.26%	86.96%
Annulus Velocity ft/s		892.7	894.3	896.1	925.6	954.4	952.7	735.4	674.2	669.2	418.9	363.5	362.2	672.6	418.4	368.9
Volumetric Flow 1000 ft3/min per end		4,573	4,372	4,339	2,960	2,323	2,314	3,752	3,437	3,412	2,135	1,857	1,861	3,429	2,143	1,884
Gross Generator Output	kW	148,012	146,730	145,076	137,953	133,269	132,526	115,180	113,947	113,111	105,144	98,741	97,743	113,823	105,840	100,747
Generator MVA		447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		97.40%	97.38%	97.35%	97.24%	97.16%	97.15%	96.79%	96.76%	96.74%	96.52%	96.33%	96.29%	96.76%	96.54%	96.39%

Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 35 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 35 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	885.9	879.4	869.0	856.0	857.8	853.3	728.7	724.0	715.0	723.2	724.5	720.6	721.2	727.1	734.6
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	14.1	7.4	7.3	6.7	6.5	6.4	12.4	7.1	7.0	6.5	6.4	6.3	7.1	6.5	6.4
LP Turbine Exit Steam to Condenser	Flow, lb/h	881,676	875,154	864,376	850,216	842,826	838,036	723,501	717,531	707,247	706,631	709,718	705,265	713,971	710,716	719,732
	Pressure, psia	0.492	0.512	0.510	0.854	0.987	0.985	0.493	0.538	0.535	0.868	1.041	1.036	0.537	0.900	1.046
	Pressure, in. HgA	1.001	1.043	1.038	1.739	2.009	2.006	1.003	1.095	1.089	1.829	2.119	2.114	1.093	1.833	2.130
	Temperature, F	79.0	80.3	80.1	98.5	101.3	101.2	79.1	81.5	81.5	98.1	103.0	103.0	81.7	98.2	103.2
	Enthalpy, Btu/lb	1,048.9	1,050.1	1,050.5	1,072.9	1,084.0	1,084.3	1,050.7	1,056.2	1,056.9	1,085.6	1,088.2	1,087.5	1,068.1	1,085.6	1,088.5
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,391.2	1,391.6	1,392.6	1,393.7	1,394.9	1,395.3	1,406.4	1,408.4	1,413.1	1,419.1	1,406.6	1,404.6	1,411.2	1,417.7	1,408.4
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	1	53	67	51	66	66	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,543.7	1,544.2	1,545.0	1,545.7	1,546.7	1,547.1	1,531.0	1,534.4	1,538.8	1,534.2	1,510.7	1,508.2	1,537.1	1,534.2	1,513.3
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,304.5	1,304.0	1,303.4	1,302.4	1,301.4	1,301.1	1,316.9	1,315.7	1,315.3	1,313.6	1,310.9	1,310.3	1,315.5	1,314.1	1,311.9
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	54.9	56.2	56.2	72.6	77.5	77.4	56.7	59.4	59.4	75.9	80.7	80.7	59.4	75.9	80.6
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	54.9	56.2	56.2	72.6	77.5	77.4	56.7	59.4	59.4	75.9	80.7	80.7	59.4	75.9	80.6
Condenser Exit	Flow, lb/h	883,277	878,906	868,043	859,867	848,492	841,701	727,101	721,131	710,847	710,231	713,310	709,885	717,571	714,316	723,332
	Pressure, psia	0.492	0.512	0.510	0.854	0.987	0.985	0.493	0.538	0.535	0.868	1.041	1.036	0.537	0.900	1.046
	Pressure, in HgA (MIN 1.0 in. HgA)	1.001	1.043	1.038	1.739	2.010	2.006	1.003	1.095	1.089	1.829	2.119	2.114	1.093	1.833	2.130
	Temperature, F	79.0	80.3	80.1	98.5	101.3	101.2	79.1	81.5	81.5	98.1	103.0	103.0	81.7	98.2	103.2
	Enthalpy, Btu/lb	47.1	48.3	48.2	64.5	69.3	69.2	47.2	49.8	49.7	66.2	71.1	71.0	49.8	66.2	71.2
Condensate Pump Discharge	Flow, lb/h	883,277	878,906	868,043	859,867	848,492	841,701	727,101	721,131	710,847	710,231	713,310	709,885	717,571	714,316	723,332
	Pressure, psia	561.2	561.3	561.6	556.6	550.5	550.7	555.9	555.5	555.8	554.5	554.0	554.1	555.6	554.4	553.7
	Temperature, F	82.9	84.2	84.1	100.5	105.4	105.4	84.1	86.8	86.7	103.3	108.2	108.1	86.8	103.3	108.3
	Enthalpy, Btu/lb	52.5	53.7	53.7	70.0	74.9	74.8	53.8	56.4	56.3	72.8	77.6	77.6	56.3	72.8	77.7
Condensate after GSC	Flow, lb/h	883,277	878,906	868,043	859,867	848,492	841,701	727,101	721,131	710,847	710,231	713,310	709,885	717,571	714,316	723,332
	Temperature, F	85.4	86.7	86.6	103.1	108.0	108.0	87.1	89.9	89.9	106.4	111.3	111.2	89.9	106.4	111.3
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	883,276	878,817	868,058	859,880	848,506	841,715	727,101	721,134	710,849	710,232	713,309	709,884	717,573	714,313	723,334
	Temperature, F	85.4	86.7	86.6	103.1	108.0	108.0	87.1	89.9	89.9	106.4	111.3	111.2	89.9	106.4	111.3
Total Circulating Water	Flow, lb/h	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	122,892,528	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832
	Flow, gpm	389,853	389,785	389,785	389,096	389,682	389,682	239,913	239,676	239,676	239,837	239,834	239,834	239,676	239,837	239,834
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	60.0	68.0	68.0	85.0	90.0	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0
Circulating Water to Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,650	191,115,650	115,208,112	115,089,984	115,089,984	114,776,440	114,659,400	114,659,400	115,089,984	114,776,440	114,659,400
	Flow, gpm	374,619	374,741	374,741	374,619	374,693	374,693	224,892	224,844	224,844	224,771	224,756	224,756	224,844	224,771	224,756
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	60.1	68.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1
Circulating Water from Condenser	Flow, lb/h	192,013,504	191,816,624	191,816,624	191,294,048	191,115,650	191,115,650	115,208,112	115,089,984	115,089,984	114,776,440	114,659,400	114,659,400	115,089,984	114,776,440	114,659,400
	Temperature, F	84.9	72.9	72.8	89.8	94.8	94.8	86.7	74.7	74.6	91.7	96.7	96.6	74.6	91.7	96.8
Total Circulating Water Discharge	Flow, lb/h	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	122,892,528	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832
	Temperature, F	85.2	73.2	73.1	90.1	95.1	95.0	87.0	75.0	74.9	92.0	97.0	97.0	75.0	92.0	97.1
Circulating Water Temperature Rise	dT, F	5.20	5.17	5.11	5.11	5.07	5.04	7.05	7.01	6.93	7.01	7.03	7.00	6.99	7.06	7.12
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427
	Flow, gpm	15,000	15,013	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062
	Temperature, F	60.1	68.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427
	Temperature, F	72.3	80.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 81 2x50% Unfired Gas Fuel 36 F	Case 82 2x50% Unfired Gas Fuel 45 F	Case 83 2x50% Unfired Gas Fuel 59 F	Case 84 2x50% Unfired Gas Fuel 74 F	Case 85 2x50% Unfired Gas Fuel 90 F	Case 86 2x50% Unfired Gas Fuel 95 F	Case 91 1x100% Fired Gas Fuel 36 F	Case 92 1x100% Fired Gas Fuel 45 F	Case 93 1x100% Fired Gas Fuel 59 F	Case 94 1x100% Fired Gas Fuel 74 F	Case 95 1x100% Fired Gas Fuel 90 F	Case 96 1x100% Fired Gas Fuel 95 F	Case 97 1x100% Fired Gas Fuel 59 F/EC On	Case 98 1x100% Fired Gas Fuel 74 F/EC On	Case 99 1x100% Fired Gas Fuel 90 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	1	53	57	51	55	56	0	0	0	0	0	0	0	0	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	410,294	407,243	402,603	397,189	390,675	388,794	696,420	691,232	683,462	681,419	685,925	683,374	689,011	684,846	683,613
	Pressure, psia	68.7	68.6	68.3	68.8	68.7	68.5	66.6	66.2	65.3	65.8	65.3	64.9	65.7	66.0	66.0
	Temperature, F	317.4	317.3	317.0	317.5	317.4	317.2	315.7	315.3	314.6	315.0	314.6	314.2	314.9	315.2	315.1
	Enthalpy, Btu/lb	287.7	287.7	287.4	287.9	287.7	287.6	285.9	285.6	284.8	285.2	284.8	284.5	285.2	285.5	285.4
IP Bleed (before CV)	Flow, lb/h	44,515	44,500	44,025	43,317	42,627	42,416	66,946	66,891	67,081	69,510	120,788	123,113	67,215	67,178	116,216
	Pressure, psia	1,110.8	1,111.5	1,112.5	1,114.1	1,116.8	1,118.0	980.7	984.1	989.1	990.8	987.4	989.0	985.5	986.5	982.3
	Temperature, F	320.6	320.5	320.3	320.8	320.7	320.5	318.1	317.8	317.1	317.4	317.0	316.7	317.4	317.7	317.6
	Enthalpy, Btu/lb	292.6	292.8	292.5	293.1	293.0	292.9	290.1	289.7	289.0	289.4	288.9	288.6	289.3	289.6	289.5
IP FW Control Valve Exit Pressure	Pressure, psia	258.4	256.3	253.1	249.2	244.8	243.3	285.7	282.0	276.9	274.3	268.8	267.0	279.9	273.4	273.6
	CV dP, psi	852.4	855.2	859.5	865.0	870.8	872.7	694.9	702.1	712.2	716.3	718.6	722.0	705.5	716.1	708.7
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,659.0	3,661.1	3,664.8	3,667.7	3,672.0	3,673.5	3,345.1	3,354.0	3,367.6	3,390.3	3,410.3	3,418.4	3,358.4	3,382.9	3,395.5
	CV dP, psi	2,710.8	2,719.8	2,733.8	2,748.7	2,767.4	2,773.8	2,203.1	2,217.1	2,238.8	2,268.8	2,295.9	2,302.0	2,223.7	2,275.2	2,332.4
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	365,968	362,743	358,578	353,671	348,248	346,378	629,473	624,341	616,381	591,909	585,139	580,261	621,797	597,469	575,598
	Pressure, psia	948.3	941.6	931.0	919.0	904.6	899.9	1,142.0	1,136.9	1,128.9	1,101.6	1,044.4	1,034.4	1,134.7	1,107.7	1,063.1
	Temperature, F	334.1	334.1	334.0	334.7	334.7	334.7	328.1	327.8	327.1	327.7	327.6	327.3	327.4	327.9	328.0
	Enthalpy, Btu/lb	306.5	306.5	306.4	307.1	307.1	307.0	300.7	300.3	299.6	300.1	299.9	299.6	299.9	300.3	300.4
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	356,388	352,742	348,577	343,670	338,248	336,374	629,473	624,341	616,380	591,910	585,139	580,258	621,797	597,469	575,598
	Pressure, psia	824.5	818.9	810.2	800.2	788.2	784.2	791.6	790.8	789.5	784.5	777.0	775.7	790.5	785.6	779.5
	Temperature, F	1,044.8	1,045.9	1,047.5	1,049.0	1,051.0	1,051.6	1,016.1	1,024.5	1,034.6	1,046.2	1,015.2	1,010.2	1,030.5	1,043.5	1,020.3
	Enthalpy, Btu/lb	1,536.5	1,537.3	1,538.4	1,539.5	1,540.9	1,541.5	1,522.5	1,526.1	1,531.7	1,538.3	1,521.3	1,518.6	1,529.4	1,536.8	1,524.1
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	824.5	818.9	810.2	800.2	788.2	784.2	791.6	790.8	789.5	784.5	777.0	775.7	790.5	785.6	779.5
	Temperature, F	1,044.8	1,045.9	1,047.5	1,049.0	1,051.0	1,051.6	1,016.1	1,024.5	1,034.6	1,046.2	1,015.2	1,010.2	1,030.5	1,043.5	1,020.3
	Enthalpy, Btu/lb	1,536.5	1,537.3	1,538.4	1,539.5	1,540.9	1,541.5	1,522.5	1,526.1	1,531.7	1,538.3	1,521.3	1,518.6	1,529.4	1,536.8	1,524.1
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	334.1	334.1	334.0	334.7	334.7	334.7	328.1	327.8	327.1	327.7	327.5	327.3	327.4	327.9	328.0
HP Steam Bypassed to Cold Reheat – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	1,021.1	1,022.5	1,024.6	1,026.7	1,029.4	1,030.4	994.8	1,001.5	1,012.2	1,024.5	992.6	987.5	1,007.9	1,021.7	997.8
	Enthalpy, Btu/lb	1,536.5	1,537.3	1,538.4	1,539.5	1,540.9	1,541.5	1,522.5	1,526.1	1,531.7	1,538.3	1,521.3	1,518.6	1,529.4	1,536.8	1,524.1
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	404,095	401,159	396,556	391,210	384,981	382,903	685,223	680,097	672,419	670,692	675,521	673,025	677,907	673,851	663,284
	Pressure, psia	209.2	207.8	205.5	202.8	199.7	198.7	181.7	180.7	179.2	178.1	176.5	175.5	180.4	179.0	178.8
	Temperature, F	1,027.4	1,028.3	1,029.8	1,030.9	1,032.6	1,033.2	1,002.9	1,008.2	1,016.8	1,007.8	982.8	987.5	1,013.3	1,007.8	987.8
	Enthalpy, Btu/lb	1,543.7	1,544.2	1,545.0	1,545.7	1,546.7	1,547.1	1,531.8	1,534.4	1,538.8	1,534.2	1,510.7	1,508.2	1,537.0	1,534.2	1,513.3
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	209.2	207.8	205.5	202.8	199.7	198.7	181.7	180.7	179.2	178.1	176.5	175.5	180.4	179.0	178.8
	Temperature, F	1,027.4	1,028.3	1,029.8	1,030.9	1,032.6	1,033.2	1,002.9	1,008.2	1,016.8	1,007.8	982.8	987.5	1,013.3	1,007.8	987.8
	Enthalpy, Btu/lb	1,543.7	1,544.2	1,545.0	1,545.7	1,546.7	1,547.1	1,531.8	1,534.4	1,538.8	1,534.2	1,510.7	1,508.2	1,537.0	1,534.2	1,513.3
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	85.4	85.7	86.8	103.1	108.0	108.0	87.1	92.9	89.9	106.4	111.3	111.2	89.9	106.4	111.3
HRH Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	200.0	200.0	200.0	200.0	199.7	198.7	181.7	180.7	179.2	178.1	176.5	175.5	180.4	179.0	178.8
	Temperature, F	1,026.9	1,027.9	1,029.4	1,030.6	1,032.6	1,033.2	1,002.9	1,008.2	1,016.8	1,007.8	982.8	987.5	1,013.3	1,007.8	987.5
	Enthalpy, Btu/lb	1,543.7	1,544.2	1,545.0	1,545.7	1,546.7	1,547.1	1,531.8	1,534.4	1,538.8	1,534.2	1,510.7	1,508.2	1,537.0	1,534.2	1,513.3
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	32,433	32,144	31,367	32,728	32,349	32,034	30,682	29,900	27,388	28,882	27,378	29,507	28,559	29,660	29,513
	Pressure, psia	82.7	82.7	82.5	82.8	82.7	82.6	80.9	80.8	80.3	80.5	80.3	80.0	80.5	80.6	80.5
	Temperature, F	547.2	546.3	545.0	543.1	541.1	540.4	570.1	569.5	568.7	565.6	559.7	558.6	569.4	566.3	561.9
	Enthalpy, Btu/lb	1,304.5	1,304.0	1,303.4	1,302.4	1,301.4	1,301.1	1,316.0	1,315.7	1,315.3	1,313.8	1,310.9	1,310.3	1,315.6	1,314.1	1,311.9
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	82.7	82.7	82.5	82.8	82.7	82.6	80.9	80.8	80.3	80.5	80.3	80.0	80.5	80.6	80.5
	Temperature, F	547.2	546.3	545.0	543.1	541.1	540.4	570.1	569.5	568.7	565.6	559.7	558.6	569.4	566.3	561.9
	Enthalpy, Btu/lb	1,304.5	1,304.0	1,303.4	1,302.4	1,301.4	1,301.1	1,316.0	1,315.7	1,315.3	1,313.8	1,310.9	1,310.3	1,315.6	1,314.1	1,311.9
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	85.4	85.7	86.8	103.1	108.0	108.0	87.1	92.9	89.9	106.4	111.3	111.2	89.9	106.4	111.3
LP Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	82.7	82.7	82.5	82.8	82.7	82.6	80.9	80.8	80.3	80.5	80.3	80.0	80.5	80.6	80.5
	Temperature, F	547.2	546.3	545.0	543.1	541.1	540.4	570.1	569.5	568.7	565.6	559.7	558.6	569.4	566.3	561.9
	Enthalpy, Btu/lb	1,304.5	1,304.0	1,303.4	1,302.4	1,301.4	1,301.1	1,316.0	1,315.7	1,315.3	1,313.8	1,310.9	1,310.3	1,315.6	1,314.1	1,311.9
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
GateCycle Model ID		8BART2	8BARTO	8BART2	8BART2	8BARTO	8BART2	8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BARTO
GateCycle Case ID		B8-100	B8-101	B8-102	B8-103	B8-104	B8-105	B8-106	B8-107	B8-108	B8-109	B8-110	B8-111	B8-112	B8-113	B8-114
Ambient Temperature		95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/56%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@70%	1@70%	1@70%	1@70%
CTG Inlet Air Cooler		Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/HB Exit Temperature		Fired/1091 F	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		100.7 MW	94.9 MW	94.0 MW	93.1 MW	83.6 MW	77.5 MW	76.8 MW	93.9 MW	84.3 MW	79.5 MW	79.5 MW	72.5 MW	72.3 MW	71.6 MW	61.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		711p/1,016F	711p/1,006F	711p/1,012F	711p/1,022F	711p/1,010F	711p/960F	711p/990F	711p/1,018F	711p/1,010F	711p/985F	711p/985F	711p/1,018F	711p/1,024F	711p/1,034F	711p/945F
STG Cold Reheat Conditions, psia/F		272p/799F	238p/787F	237p/794F	236p/803F	228p/803F	221p/784F	220p/786F	237p/799F	229p/802F	224p/786F	224p/786F	210p/816F	209p/822F	208p/832F	198p/771F
Cold Reheat Conditions after Conditioning, psia/F		272p/750F	238p/750F	237p/750F	236p/750F	228p/750F	221p/750F	220p/750F	237p/750F	229p/750F	224p/750F	224p/750F	210p/750F	209p/750F	208p/750F	198p/750F
STG Hot Reheat Conditions, psia/F		163p/965F	142p/994F	142p/999F	142p/1,008F	142p/960F	142p/910F	142p/910F	142p/1,004F	142p/960F	142p/915F	142p/915F	142p/1,001F	142p/1,006F	142p/1,015F	142p/895F
Condenser Pressure		2.13 in HgA	1.00 in HgA	1.03 in HgA	1.03 in HgA	1.74 in HgA	2.02 in HgA	2.02 in HgA	1.03 in HgA	1.75 in HgA	2.03 in HgA	2.03 in HgA	1.02 in HgA	0.99 in HgA	0.99 in HgA	1.66 in HgA
Stack Temperature		192 F	204 F	204 F	202 F	204 F	202 F	201 F	203 F	205 F	204 F	204 F	200 F	198 F	197 F	197 F
Run Date		9-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	10-Sep-06	9-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	7-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gross CTG Output (each)	kW	176,696	207,123	201,614	192,471	181,068	168,833	164,681	197,137	184,229	177,293	176,696	144,685	140,615	134,395	120,388
Gross CTG Output (total)	kW	176,696	207,123	201,614	192,471	181,068	168,833	164,681	197,137	184,229	177,293	176,696	144,685	140,615	134,395	120,388
Gross CTG Heat Rate (LHV)	Btu/kWh	9,404	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,824	9,892	10,026	10,234
Gross CTG Heat Rate (HHV)	Btu/kWh	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	10,790	10,834	10,981	11,209
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	1,677.55	1,878.81	1,839.53	1,777.85	1,704.57	1,621.07	1,594.56	1,810.51	1,726.59	1,681.80	1,677.55	1,421.39	1,392.94	1,347.44	1,293.45
CTG Heat Input (HHV) (total)	MMBtu/h	1,860.50	2,083.71	2,014.79	1,947.24	1,866.98	1,775.52	1,746.49	2,007.98	1,914.89	1,865.22	1,860.50	1,556.61	1,525.65	1,475.82	1,416.69
Duct Burner Heat Input (LHV) (each)	MMBtu/h	150.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	166.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	150.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	166.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	100,690	94,850	93,966	93,100	83,580	77,530	76,770	93,910	84,250	79,510	79,450	72,460	72,390	71,670	61,030
STG Output, percent of CTG Output		57.0%	45.8%	46.6%	48.4%	46.2%	46.0%	46.6%	47.6%	45.7%	44.8%	45.0%	50.1%	51.3%	53.3%	48.3%
Gross Plant Output	kW	277,386	301,973	295,574	285,571	264,648	246,163	241,451	291,047	268,479	256,803	256,146	217,145	213,115	205,965	167,418
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,588	6,222	6,224	6,226	6,441	6,585	6,599	6,221	6,431	6,549	6,549	6,546	6,536	6,542	6,901
Gross Cycle Heat Rate (HHV)	Btu/kWh	7,307	6,900	6,817	6,819	7,055	7,213	7,227	6,899	7,132	7,263	7,263	7,169	7,159	7,165	7,559
Plant Heat Input (LHV)	MMBtu/h	1,827.55	1,878.81	1,839.53	1,777.85	1,704.57	1,621.07	1,594.56	1,810.51	1,726.59	1,681.80	1,677.55	1,421.39	1,392.94	1,347.44	1,293.45
Plant Heat Input (HHV)	MMBtu/h	2,026.86	2,083.71	2,014.79	1,947.24	1,866.98	1,775.52	1,746.49	2,007.98	1,914.89	1,865.22	1,860.50	1,556.61	1,525.65	1,475.82	1,416.69
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power Losses	kW	15,090	14,920	14,880	14,820	14,840	14,530	14,500	14,660	14,670	14,600	14,590	14,270	14,240	14,200	14,050
Total Auxiliary Power Losses, percent of gross		5.44%	4.94%	5.03%	5.19%	5.59%	5.90%	6.00%	5.11%	5.46%	5.69%	5.70%	6.57%	6.68%	6.89%	7.50%
Net Plant Output w/ Step-Up Xfmr Losses	kW	262,296	287,053	280,694	270,751	250,008	231,633	227,151	276,387	253,809	242,203	241,556	202,875	198,875	191,765	153,368
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,967	6,545	6,553	6,566	6,818	6,998	7,020	6,550	6,803	6,944	6,945	7,008	7,004	7,027	7,461
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,727	7,259	7,178	7,192	7,466	7,665	7,689	7,270	7,545	7,701	7,702	7,674	7,671	7,693	8,172

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0
	Relative Humidity	43.6%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.6%	43.8%	60.1%	59.9%	59.7%	78.5%
	WBT, F	76.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1
Compressor Inlet Conditions	Temperature, F	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	76.6	79.3	35.0	45.0	59.0	74.0
	Relative Humidity	86.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.6%	99.5%	91.4%	86.4%	60.1%	59.9%	59.7%	78.5%
Inlet Air Cooler Status		Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	13,119	0	0	0	0	0	0	5,691	3,905	9,622	13,119	0	0	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,677.6	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	1,421.4	1,392.9	1,347.4	1,293.5
	Flow, lb/h	80,277	89,908	88,034	84,029	80,566	76,610	75,357	86,640	82,624	80,461	80,277	67,173	65,829	63,679	61,127
Fuel LHV	Btu/lb	20,897	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	21,160	21,160	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	235.4	206.0	205.3	204.2	200.4	196.6	195.6	205.1	201.1	196.6	196.5	186.4	185.9	185.2	180.3
	Temperature, F	744.7	745.1	745.1	745.1	745.5	745.8	745.8	745.1	745.5	745.7	745.7	745.9	745.9	745.9	746.4
	Enthalpy, Btu/lb	1,395.3	1,397.0	1,397.0	1,397.1	1,397.5	1,397.8	1,397.8	1,397.0	1,397.4	1,397.6	1,397.6	1,398.3	1,398.3	1,398.4	1,398.9
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	317.6	322.9	322.4	321.5	322.3	322.2	321.9	321.9	322.4	322.9	322.6	319.2	318.8	318.3	319.5
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	235.4	206.0	205.3	204.2	200.4	196.6	195.6	205.1	201.1	196.6	196.5	186.4	185.9	185.2	180.3
	Temperature, F	744.7	745.1	745.1	745.1	745.5	745.8	745.8	745.1	745.5	745.7	745.7	745.9	745.9	745.9	746.4
	Enthalpy, Btu/lb	1,395.3	1,397.0	1,397.0	1,397.1	1,397.5	1,397.8	1,397.8	1,397.0	1,397.4	1,397.6	1,397.6	1,398.3	1,398.3	1,398.4	1,398.9
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,768,327	4,201,468	4,127,390	4,009,011	3,838,934	3,674,902	3,636,468	4,059,590	3,875,066	3,775,067	3,768,327	3,333,034	3,277,792	3,185,950	3,052,963
	Pressure, in. H2O	16.69	19.73	19.17	18.29	17.09	15.90	15.56	16.89	17.39	15.80	16.59	12.67	12.32	11.76	10.99
	Temperature, F	1,118.0	1,072.9	1,079.6	1,090.9	1,108.0	1,123.4	1,127.2	1,087.0	1,105.0	1,118.0	1,118.0	1,072.9	1,079.6	1,090.9	1,107.9
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	70%	70%	70%
Generator Gross Output	kW	176,696	207,123	201,614	192,471	181,098	168,633	164,881	197,137	184,229	177,293	176,696	144,665	140,816	134,395	126,388
Gross Heat Rate	Btu/kWh (LHV)	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,824	9,892	10,028	10,234

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	576,186	597,994	593,549	496,606	456,752	432,818	428,363	501,668	459,393	443,703	443,293	403,971	400,913	395,534	344,878
(at HRSG terminal point)	Pressure, psia	779.4	765.0	764.4	763.4	765.2	749.5	748.6	764.2	755.8	751.8	751.5	746.4	746.0	745.4	735.8
	Temperature, F	1,020.3	1,010.8	1,018.9	1,028.7	1,014.1	994.0	994.0	1,022.8	1,014.1	999.1	999.1	1,021.7	1,027.8	1,037.6	948.3
	Enthalpy, Btu/lb	1,524.1	1,519.2	1,522.6	1,528.1	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,496.4	1,496.4	1,525.5	1,529.2	1,534.6	1,485.3
dP from HP drum to HRSG terminal point	psi	187.4	168.0	164.1	161.2	122.4	96.2	94.0	153.4	124.9	103.3	103.0	106.3	106.2	103.1	61.4
HP SH #1 Steam Outlet Temperature	Temperature, F	1,022.2	1,012.4	1,018.5	1,028.1	1,015.4	995.2	995.2	1,024.3	1,015.4	970.4	970.4	1,022.7	1,028.8	1,038.5	949.1
HP SH #2 Steam Outlet Temperature	Temperature, F	968.1	967.2	992.7	1,001.5	969.6	882.1	879.5	998.0	971.5	865.8	865.9	998.2	1,003.7	1,012.5	852.3
HP Steam Desuperheating Flow	Flow, lb/h	24,158	0	0	0	22,650	55,890	57,321	0	20,109	59,475	59,936	0	0	0	61,724
(from HP Feedwater)	Temperature, F	328.0	334.0	333.5	332.6	334.1	334.4	334.2	333.1	334.2	334.9	334.8	332.0	331.7	331.3	339.8
	% of inlet steam	4.4%	0.0%	0.0%	0.0%	5.2%	13.0%	13.8%	0.0%	4.6%	15.5%	15.8%	0.0%	0.0%	0.0%	21.8%
	Final Superheat, F	305.0	310.8	314.3	319.8	206.4	28.5	22.7	317.2	216.9	53.3	51.8	331.9	334.4	339.7	0.0
HP SH #3/4 Steam Outlet Temperature	Temperature, F	924.4	840.4	843.6	848.7	822.9	791.8	791.5	846.4	823.3	795.4	795.3	852.9	856.1	861.2	775.6
HP Evaporator #1 Exit	Flow, lb/h	72,180	58,269	58,290	58,296	49,693	39,975	39,494	58,404	49,941	41,726	41,650	50,084	50,127	50,134	31,767
	Pressure, psia	966.8	921.0	918.4	914.6	877.6	846.8	842.8	917.7	880.8	854.9	854.5	852.7	851.2	848.5	797.2
	Temperature, F	540.6	534.8	534.4	533.9	529.0	524.7	524.3	534.3	529.5	526.0	525.9	525.7	525.5	525.1	517.9
	Enthalpy, Btu/lb	1,193.8	1,195.4	1,195.5	1,195.7	1,196.9	1,197.9	1,198.0	1,195.6	1,196.8	1,197.6	1,197.6	1,197.7	1,197.7	1,197.8	1,199.4
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	506.5	411.2	415.4	422.1	376.6	326.7	324.8	419.6	376.0	332.4	332.3	414.6	418.6	426.1	297.9
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	478,849	449,728	445,261	438,507	384,008	326,750	321,636	443,265	389,581	342,499	341,793	353,887	350,785	345,401	251,351
	Pressure, psia	966.8	921.0	918.4	914.6	877.6	846.8	842.8	917.7	880.8	854.9	854.5	852.7	851.2	848.5	797.2
	Temperature, F	540.6	534.8	534.4	533.9	529.0	524.7	524.3	534.3	529.5	526.0	525.9	525.7	525.5	525.1	517.9
	Enthalpy, Btu/lb	1,193.8	1,195.4	1,195.5	1,195.7	1,196.9	1,197.9	1,198.0	1,195.6	1,196.8	1,197.6	1,197.6	1,197.7	1,197.7	1,197.8	1,199.4
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	22.2	24.2	23.9	23.5	21.7	19.4	19.1	23.9	22.0	20.3	20.2	19.0	18.8	18.5	15.1
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	561,009	527,996	523,560	466,603	433,100	386,726	381,031	501,669	439,222	384,226	383,354	403,970	400,914	395,535	283,149
	Temperature, F	540.6	534.8	534.4	533.9	529.0	524.7	524.3	534.3	529.5	526.0	525.9	525.7	525.5	525.1	517.9
HP Economizer #4/5 Outlet Temperature	Temperature, F	495.7	496.5	496.2	496.3	500.5	504.7	504.3	497.9	500.6	505.2	505.1	488.6	487.9	486.3	500.0
HP Economizer #5/7 Outlet Temperature	Temperature, F	407.8	416.3	414.1	412.3	415.2	417.8	417.3	413.2	415.6	416.8	416.7	403.3	402.4	400.9	409.5
HP Economizer #8 Outlet Temperature	Temperature, F	364.5	374.9	373.9	372.4	377.3	382.9	382.6	373.1	377.4	382.9	382.9	366.6	367.8	366.6	380.7
Feedwater to HP Economizer #8	Flow, lb/h	551,009	527,996	523,560	466,603	433,100	386,726	381,031	501,669	439,222	384,226	383,354	403,970	400,914	395,535	283,149
	Pressure, psia	1,062.2	1,062.2	996.2	992.3	936.8	888.4	884.1	995.8	941.6	901.8	901.0	904.3	902.0	898.0	822.7
	Temperature, F	328.0	334.0	333.5	332.8	334.1	334.4	334.2	333.1	334.2	334.9	334.8	332.0	331.7	331.3	339.8
	Enthalpy, Btu/lb	300.4	306.5	306.0	305.2	306.5	306.7	306.5	305.5	306.6	307.2	307.2	304.3	303.9	303.5	306.0
HP FW Temperature Increase Across BFP	F	12.9	13.6	13.7	13.8	14.4	14.8	14.8	13.7	14.3	14.6	14.6	15.5	15.7	15.9	17.0
Duct Burner	HC, MMBtu/h (LHV)	160.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	168.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	956.2	979.1	983.6	990.8	936.4	877.0	875.5	988.4	936.3	885.2	885.0	977.2	981.6	988.7	841.6
Exit Temperature	Temperature, F	1,091.2	979.1	983.6	990.8	936.4	877.0	875.5	988.4	936.3	885.2	885.0	977.2	981.6	988.7	841.6
HRSG Hot Reheat Steam	Flow, lb/h	583,053	575,274	571,601	564,668	573,091	575,921	571,916	569,735	578,419	583,887	583,669	462,467	459,316	453,767	475,593
(at HRSG terminal point)	Pressure, psia	178.8	155.3	155.2	154.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7	150.5	150.6
	Temperature, F	967.8	960.0	1,001.8	1,010.2	962.7	912.8	912.8	1,007.0	962.7	917.8	917.8	1,003.4	1,008.7	1,017.3	897.6
	Enthalpy, Btu/lb	1,513.3	1,529.0	1,531.7	1,539.1	1,511.3	1,485.4	1,485.4	1,534.4	1,511.3	1,488.0	1,488.0	1,532.7	1,535.5	1,540.6	1,477.7
HRSG RH dP -- terminal pt. to terminal pt.	psi	56.8	50.7	50.2	49.3	45.6	42.1	41.4	50.0	46.0	43.7	43.6	36.5	36.2	34.8	29.7
RHTR #1/2 Steam Outlet Temperature	Temperature, F	968.7	997.3	1,002.5	1,010.9	963.4	913.6	913.6	1,007.7	963.4	918.6	918.6	1,003.9	1,009.2	1,017.7	898.2
RHTR #3 Steam Outlet Temperature	Temperature, F	960.7	990.6	994.4	940.5	937.6	738.6	736.4	938.2	940.2	764.4	759.7	935.9	939.8	948.0	707.0
Reheat Steam Desuperheating Flow	Flow, lb/h	53,185	0	0	0	48,918	51,841	52,582	0	48,125	76,832	77,121	0	0	0	75,900
(from IP Feedwater)	Temperature, F	317.5	322.9	322.4	321.5	322.3	322.2	321.9	321.9	322.4	322.9	322.8	319.2	318.8	318.3	319.5
	% of inlet steam	8.4%	0.0%	0.0%	0.0%	9.3%	10.0%	10.9%	0.0%	9.1%	15.2%	15.2%	0.0%	0.0%	0.0%	19.3%
	Final Superheat, F	277.1	428.2	428.0	430.8	222.0	81.4	76.0	429.8	226.8	105.4	104.2	439.2	441.9	434.6	33.3
RHTR #4 Steam Outlet Temperature	Temperature, F	841.9	805.4	807.0	809.4	786.1	758.8	758.6	808.7	787.1	763.0	762.9	802.2	803.8	806.2	746.6
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	997.8	988.7	995.1	1,005.3	992.6	940.5	940.5	1,001.2	992.8	945.8	945.8	1,001.0	1,007.4	1,017.6	924.9
	Enthalpy, Btu/lb	1,524.1	1,519.2	1,522.6	1,528.1	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,496.4	1,496.4	1,525.5	1,529.2	1,534.6	1,485.3
Cold Reheat Steam from STG to HRSG	Flow, lb/h	577,774	567,051	563,977	499,351	457,703	426,550	422,485	503,330	461,256	438,051	437,662	407,629	405,634	401,949	340,312
(at HRSG terminal point)	Pressure, psia	235.4	206.0	205.9	204.2	200.4	196.6	196.6	205.1	201.1	198.6	198.5	186.4	185.9	185.2	180.3
	Temperature, F	744.7	745.1	745.1	745.1	745.5	745.6	745.6	745.1	745.6	745.7	745.7	745.9	745.9	745.9	748.4
	Enthalpy, Btu/lb	1,395.3	1,397.0	1,397.0	1,397.1	1,397.5	1,397.8	1,397.8	1,397.0	1,397.4	1,397.6	1,397.6	1,398.3	1,398.3	1,398.4	1,398.9
Cold Reheat Steam, % of HP Steam		100.45%	98.81%	100.08%	100.51%	100.43%	99.50%	98.63%	100.33%	100.41%	98.73%	98.73%	100.91%	101.18%	102.62%	98.68%
HP Steam - Cold Reheat Steam	Flow, lb/h	-2,606	943	-428	-2,558	-1,951	6,056	6,868	-1,865	-1,862	5,652	5,630	-3,659	-5,721	-8,415	4,565

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
IP Steam (at HRSG terminal point)	Flow, lb/h	52,096	69,228	67,629	65,226	66,440	67,618	66,747	66,412	67,039	69,004	68,884	54,831	53,684	51,819	58,477
	Pressure, psia	235.4	206.0	205.3	204.2	206.4	196.6	196.9	205.1	201.1	198.5	198.5	185.4	185.9	185.2	180.3
	Temperature, F	551.3	542.4	542.2	541.9	535.0	528.2	527.6	542.5	535.5	529.5	529.5	532.1	531.9	531.7	510.3
	Enthalpy, Btu/lb	1,293.6	1,291.4	1,291.4	1,291.3	1,288.0	1,284.7	1,284.5	1,291.4	1,288.2	1,285.4	1,285.3	1,287.7	1,287.7	1,287.6	1,281.5
IP Evaporator Drum Exit	Flow, lb/h	52,096	69,228	67,629	65,226	66,440	67,618	66,747	66,412	67,039	69,004	68,884	54,831	53,684	51,819	58,477
	Pressure, psia	251.8	237.4	235.4	232.5	230.1	227.6	226.3	234.3	231.2	230.5	230.4	208.6	207.3	205.3	205.9
	Temperature, F	401.6	396.4	395.7	394.7	393.7	392.8	392.3	395.3	394.1	393.9	393.9	386.3	384.8	384.0	384.2
	Enthalpy, Btu/lb	1,201.7	1,201.0	1,200.9	1,200.7	1,200.6	1,200.5	1,200.4	1,200.8	1,200.7	1,200.6	1,200.6	1,199.4	1,199.3	1,199.1	1,199.2
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	22.3	29.8	29.4	28.8	29.7	30.6	30.4	29.1	29.9	31.0	30.9	28.2	28.9	25.3	28.5
IP Approach	Temperature, F	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IP PW to IP Evaporator (after IPCV)	Flow, lb/h	52,096	69,228	67,629	65,226	66,440	67,618	66,747	66,412	67,039	69,004	68,884	54,831	53,684	51,819	58,477
	Pressure, psia	251.8	237.4	235.4	232.5	230.1	227.6	226.3	234.3	231.2	230.5	230.4	208.6	207.3	205.3	205.9
	Temperature, F	393.1	388.4	387.7	384.6	383.7	382.8	382.3	385.3	384.1	383.9	383.9	386.3	384.8	384.0	384.2
	Enthalpy, Btu/lb	367.7	371.6	370.7	369.3	370.5	371.7	371.2	370.0	370.9	372.6	372.5	361.0	360.3	360.2	364.4
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.3%	0.5%	0.5%	0.0%	0.3%	0.5%	0.5%	0.2%	0.2%	0.2%	0.7%
Feedwater to IP Economizer	Flow, lb/h	52,096	69,228	67,629	65,226	66,440	67,618	66,747	66,412	67,039	69,004	68,884	54,831	53,684	51,819	58,477
(pressure is preliminary)	Pressure, psia	273.4	275.2	271.5	266.1	264.9	263.6	261.4	269.1	266.6	265.1	267.8	232.4	230.2	226.6	232.9
	Temperature, F	318.6	324.2	323.7	322.8	323.6	323.5	323.3	323.2	323.8	324.2	324.1	320.7	320.3	319.8	321.1
	Enthalpy, Btu/lb	289.5	295.1	294.6	293.7	294.5	294.4	294.1	294.1	294.6	295.1	295.0	291.4	291.0	290.5	291.6
IP PW Temperature Increase Across BFP	F	3.7	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8	4.3	4.4	4.4	4.3
LP Steam (at HRSG terminal point)	Flow, lb/h	29,339	44,671	43,397	41,926	43,009	43,126	42,240	42,118	43,704	44,917	44,783	33,590	32,404	30,704	35,066
	Pressure, psia	80.5	83.4	83.0	82.6	83.1	82.9	82.8	83.1	83.3	83.3	81.2	80.9	80.7	80.7	81.4
	Temperature, F	561.8	556.3	555.8	555.2	548.2	541.6	541.0	555.8	548.8	543.5	543.4	543.2	542.9	542.3	531.4
	Enthalpy, Btu/lb	1,311.9	1,308.9	1,308.7	1,308.5	1,304.9	1,301.7	1,301.4	1,308.7	1,305.2	1,302.6	1,302.5	1,302.6	1,302.5	1,302.2	1,296.7
LP Evaporator Steam Exit	Flow, lb/h	29,339	44,671	43,397	41,926	43,009	43,126	42,240	42,118	43,704	44,917	44,783	33,590	32,404	30,704	35,066
	Pressure, psia	83.6	90.1	89.4	88.3	89.3	89.2	88.9	89.8	89.5	90.0	90.0	85.1	84.6	84.0	85.7
	Temperature, F	315.1	320.4	319.8	318.9	319.7	319.6	319.4	319.3	319.9	320.3	320.3	318.4	315.9	315.4	316.8
	Enthalpy, Btu/lb	1,184.2	1,185.8	1,185.4	1,185.2	1,185.4	1,185.4	1,185.3	1,185.3	1,185.4	1,185.6	1,185.5	1,184.5	1,184.4	1,184.3	1,184.6
LP Evaporator Water Exit to BFPs	Flow, lb/h	693,575	586,007	581,283	574,185	582,143	584,721	580,661	579,410	585,832	592,815	592,685	470,985	467,617	462,205	483,503
	Pressure, psia	83.6	90.1	89.4	88.3	89.3	89.2	88.9	89.8	89.5	90.0	90.0	85.1	84.6	84.0	85.7
	Temperature, F	315.1	320.4	319.8	318.9	319.7	319.6	319.4	319.3	319.9	320.3	320.3	318.4	315.9	315.4	316.8
	Enthalpy, Btu/lb	286.4	290.8	290.2	289.4	290.1	290.1	289.8	289.8	290.3	290.8	290.7	288.7	288.2	287.7	287.1
Boiler Feed Pumps Flow Detail:																
IP PW to HRSG IP Economizer	Flow, lb/h	52,096	69,228	67,629	65,226	66,440	67,618	66,747	66,412	67,039	69,004	68,884	54,831	53,684	51,819	58,477
IP PW to HRSG RH Desuperheater	Flow, lb/h	53,185	0	0	0	48,919	81,841	82,682	0	46,125	76,832	77,121	0	0	0	76,900
HP PW to HRSG HP Economizer #8	Flow, lb/h	561,008	507,998	503,560	496,803	433,100	368,726	361,031	501,869	439,222	384,226	383,584	403,970	400,914	395,635	283,149
HP PW to HRSG HP Desuperheater	Flow, lb/h	24,158	0	0	0	22,660	56,890	57,321	0	20,169	59,475	59,936	0	0	0	61,724
IP PW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP PW to Cold Reheat Steam Desuperheater	Flow, lb/h	13,136	8,799	10,196	12,165	11,036	2,767	2,894	11,326	10,989	3,266	3,296	12,186	13,214	14,849	3,263
HP PW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	16.4	17.8	17.4	17.0	17.3	17.7	17.8	17.2	17.4	18.0	18.0	14.3	14.1	13.8	15.4
LP Approach	Temperature, F	18.2	8.5	8.7	9.8	7.0	7.8	8.2	9.3	8.8	8.9	7.0	7.8	8.5	9.4	8.5
Condensate Recirculated	Flow, lb/h	104,571	164,299	159,127	158,334	100,294	84,377	84,012	159,296	100,888	84,864	84,887	124,557	128,159	124,542	84,066
	Temperature, F	296.8	311.9	311.0	309.2	312.5	311.6	311.0	309.9	312.9	313.2	313.0	309.2	307.0	305.7	307.9
% of Total LP Economizer Flow		13%	21%	20%	20%	14%	12%	12%	20%	14%	12%	12%	20%	20%	20%	14%
Condensate from LP Economizer	Flow, lb/h	827,493	794,997	783,792	773,521	726,455	712,240	706,934	780,797	729,944	722,809	722,258	629,133	626,372	617,442	602,673
	Temperature, F	296.3	311.3	310.6	308.7	312.1	311.2	310.6	309.5	312.5	312.8	312.6	307.9	306.7	305.4	307.6
	Enthalpy, Btu/lb	268.6	282.1	281.3	279.4	282.9	282.0	281.3	280.1	283.3	283.6	283.4	278.6	277.4	276.0	278.3
Condensate to LP Economizer	Flow, lb/h	827,493	794,997	783,792	773,521	726,455	712,240	706,934	780,797	729,944	722,809	722,258	629,133	626,372	617,442	602,673
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4
Condensate from Recirculation	Flow, lb/h	104,571	164,299	159,127	158,334	100,294	84,377	84,012	159,296	100,888	84,864	84,887	124,557	128,159	124,542	84,066
	Temperature, F	296.8	311.8	311.0	309.2	312.5	311.6	311.0	309.9	312.9	313.2	313.0	309.2	307.0	305.7	307.9
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	111.3	88.3	89.6	89.6	106.1	111.0	111.0	89.6	106.1	111.0	111.0	91.7	91.1	91.3	106.6
Condensate to HRSG	Flow, lb/h	722,922	630,698	624,666	615,187	625,161	627,863	622,923	621,501	629,256	637,745	637,371	504,576	500,213	492,901	518,607
	Pressure, psia	653.7	566.1	558.2	558.4	556.8	556.3	556.5	558.2	556.7	556.1	556.1	561.2	561.3	561.5	556.6
	Temperature, F	111.3	88.3	89.6	89.6	106.1	111.0	111.0	89.6	106.1	111.0	111.0	91.7	91.1	91.3	106.6
Stack Exit	Flow, lb/h	3,775,505	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,690	3,875,066	3,776,057	3,766,327	3,333,034	3,277,792	3,186,950	3,052,663
	Temperature, F	192.4	204.5	203.8	202.0	204.1	202.0	201.2	202.8	204.7	203.9	203.7	199.7	198.5	197.0	196.7

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	2,255	1,981	1,972	1,959	1,769	1,590	1,573	1,973	1,774	1,643	1,541	1,557	1,551	1,540	1,210
HP Turbine Remainder Shaft Power	kW	14,577	12,856	12,771	12,644	10,730	9,270	9,120	12,777	10,866	9,723	9,706	9,135	9,080	8,970	6,154
IP Turbine Shaft Power	kW	36,689	31,048	30,942	30,607	30,133	29,138	28,952	30,901	30,297	29,622	29,516	25,125	25,061	24,974	23,808
LP Turbine Shaft Power	kW	50,936	52,717	52,029	51,436	44,676	41,232	40,824	51,916	45,039	42,237	42,194	40,336	40,276	39,777	33,536
Total Shaft Power	kW	102,202	98,621	97,743	94,689	88,540	79,641	78,897	95,584	88,202	81,572	81,519	74,598	74,438	73,721	63,490
STG Throttle Steam	Flow, lb/h	575,158	507,994	503,549	496,800	465,762	432,616	428,353	501,666	459,393	443,703	443,293	403,971	400,913	395,634	344,676
	Pressure, psia (MAX 2270 psia)	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2
	Temperature, F	1,016.0	1,006.2	1,012.4	1,022.2	1,010.0	960.0	960.0	1,018.3	1,010.6	965.0	965.0	1,018.1	1,024.2	1,034.1	945.0
	Enthalpy, Btu/lb	1,523.1	1,516.2	1,521.6	1,527.1	1,520.3	1,492.6	1,492.6	1,524.9	1,520.3	1,495.4	1,495.4	1,524.6	1,528.2	1,533.6	1,484.3
THV Pressure Loss	psi	104.9	177.7	181.0	186.0	229.0	260.5	264.7	181.8	225.4	248.7	249.1	281.0	283.1	287.1	348.6
		14.76%	24.99%	25.45%	26.15%	32.20%	36.63%	37.22%	25.56%	31.69%	34.97%	35.03%	39.51%	39.81%	40.37%	49.01%
Leak 1 Leakage Flow to HRH	Flow, lb/h	7,470	6,594	6,538	6,452	5,957	5,663	5,631	6,513	6,002	5,819	5,814	5,302	5,264	5,196	4,614
HP Turbine Exit	Flow, lb/h	567,688	501,399	497,010	490,345	449,797	426,933	422,724	495,149	463,393	437,887	437,482	398,669	395,648	390,336	340,266
	Pressure, psia	271.7	238.2	237.2	235.7	227.8	221.2	220.0	236.9	228.8	224.1	224.0	210.0	209.4	208.4	197.8
	Temperature, F (MAX 640 F)	799.3	787.5	793.5	803.1	802.7	763.9	764.7	799.0	802.0	768.1	768.2	816.1	822.3	832.4	770.8
	Enthalpy, Btu/lb	1,422.1	1,417.4	1,420.6	1,425.6	1,425.7	1,408.0	1,406.4	1,423.4	1,425.3	1,407.0	1,407.0	1,433.4	1,436.7	1,441.9	1,410.6
Efficiency (THV inlet to HPT exit)		73.78%	66.13%	65.76%	65.19%	59.73%	56.69%	56.17%	65.87%	60.17%	57.19%	57.12%	53.97%	53.70%	53.21%	44.36%
Efficiency (THV exit to HPT exit)		86.93%	86.93%	86.93%	86.93%	86.91%	86.90%	86.90%	86.93%	86.91%	86.90%	86.90%	86.90%	86.90%	86.89%	86.84%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	702	667	662	665	662	653	650	666	665	662	661	607	603	598	582
CRH Steam to Steam Seals	Flow, lb/h	2,268	2,433	2,442	2,457	2,472	2,478	2,485	2,447	2,466	2,462	2,463	2,818	2,825	2,836	2,631
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	564,638	496,266	493,675	487,203	446,893	423,802	419,568	492,012	460,262	434,783	434,357	395,444	392,420	387,103	337,953
	Pressure, psia	271.7	238.2	237.2	235.7	227.8	221.2	220.0	236.9	228.8	224.1	224.0	210.0	209.4	208.4	197.8
	Temperature, F	799.3	787.5	793.5	803.1	802.7	763.9	764.7	799.0	802.0	768.1	768.2	816.1	822.3	832.4	770.8
	Enthalpy, Btu/lb	1,422.1	1,417.4	1,420.6	1,425.6	1,425.7	1,408.0	1,406.4	1,423.4	1,425.3	1,407.0	1,407.0	1,433.4	1,436.7	1,441.9	1,410.6
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	13,138	8,789	10,166	12,155	11,036	2,757	2,694	11,326	10,869	3,268	3,296	12,186	13,214	14,849	3,253
	Temperature, F	317.6	322.9	322.4	321.5	322.3	322.2	321.9	321.9	322.4	322.9	322.8	319.2	318.8	318.3	319.5
Final Cold Reheat Steam after Conditioning	Flow, lb/h	577,774	507,057	503,982	499,359	457,899	426,559	422,463	503,338	481,251	438,048	437,855	407,630	405,634	401,951	340,305
	Pressure, psia	271.7	238.2	237.2	235.7	227.8	221.2	220.0	236.9	228.8	224.1	224.0	210.0	209.4	208.4	197.8
	Temperature, F (MAX 750 F)	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0
	Enthalpy, Btu/lb	1,398.3	1,398.0	1,398.0	1,398.1	1,398.5	1,398.8	1,398.8	1,398.0	1,398.4	1,398.6	1,398.6	1,398.3	1,398.3	1,398.4	1,398.9
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	118,416	78,906	77,726	77,365	126,398	162,120	162,327	77,724	126,157	149,125	149,311	67,014	66,995	66,964	136,540
Reheat System dP	psi	108.9	96.2	95.2	93.7	86.8	79.2	78.0	94.9	86.8	82.1	82.0	68.0	67.4	66.4	55.8
Reheat System dP		40.06%	40.36%	40.14%	39.76%	37.67%	35.79%	35.47%	40.07%	37.83%	36.65%	36.61%	32.38%	32.21%	31.85%	28.23%
Hot Reheat Flow	Flow, lb/h	683,063	576,274	571,601	564,568	573,061	575,921	571,916	569,735	576,419	583,867	583,669	462,457	459,316	453,767	475,693
	Pressure, psia (MAX 564 psia)	162.9	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
	Temperature, F	965.0	993.9	999.2	1,007.6	960.0	910.0	910.0	1,004.4	960.0	915.0	915.0	1,001.0	1,006.9	1,014.9	895.0
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-50.0	-12.3	-13.2	-14.6	-50.0	-50.0	-50.0	-13.9	-50.0	-50.0	-50.0	-17.1	-17.9	-19.2	-50.0
	Enthalpy, Btu/lb	1,512.3	1,529.0	1,530.7	1,535.1	1,510.3	1,484.4	1,484.4	1,533.4	1,510.3	1,487.0	1,487.0	1,531.7	1,534.5	1,539.0	1,476.7
INTV Pressure Loss	psi	3.3	5.7	5.8	7.9	8.2	10.1	11.0	6.8	7.5	8.0	8.1	32.4	32.9	33.9	33.7
		2.01%	4.04%	4.04%	5.54%	5.81%	7.12%	7.77%	4.78%	5.26%	5.64%	5.68%	22.80%	23.18%	23.88%	23.72%
IP Turbine Exit	Flow, lb/h	690,523	582,868	576,139	571,020	579,019	581,004	577,547	576,249	582,422	589,766	589,463	467,780	464,590	458,963	480,907
	Pressure, psia	36.2	31.9	31.7	31.3	31.3	30.8	30.6	31.6	31.5	31.4	31.4	25.6	25.4	25.1	25.3
	Temperature, F	594.1	624.4	628.2	634.2	597.0	557.2	556.9	592.0	597.2	561.7	561.8	626.0	631.9	638.1	544.1
	Enthalpy, Btu/lb	1,331.0	1,346.0	1,347.9	1,350.8	1,332.7	1,313.4	1,313.3	1,349.7	1,332.8	1,315.6	1,315.6	1,348.2	1,350.0	1,353.1	1,307.6
Efficiency (INTV inlet to IPT exit)		90.57%	89.76%	89.46%	88.98%	88.84%	88.17%	87.83%	89.37%	89.13%	88.93%	88.91%	80.22%	80.04%	79.72%	79.78%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	540	470	465	456	466	469	465	463	469	476	476	376	372	366	387
LP Steam Admitted to STG (total)	Flow, lb/h	29,939	44,671	43,397	41,026	43,009	43,126	42,240	42,116	43,704	44,917	44,763	33,590	32,464	30,704	35,086
(upstream of LP admission CV)	Pressure, psia (MIN 76.2 psia)	76.2	76.3	76.2	76.2	76.3	76.2	76.3	76.2	76.2	76.2	76.2	76.2	76.2	76.2	76.2
	Temperature, F	559.4	553.4	553.0	552.5	545.4	538.6	538.2	553.1	546.0	540.6	540.5	540.8	540.4	539.9	526.8
	Enthalpy, Btu/lb	1,310.9	1,307.9	1,307.7	1,307.5	1,303.9	1,300.7	1,300.4	1,307.7	1,304.2	1,301.6	1,301.5	1,301.6	1,301.5	1,301.2	1,295.7
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)	-94.7	-70.9	-75.2	-81.7	-51.6	-18.4	-18.7	-78.9	-51.2	-21.1	-21.1	-87.4	-91.5	-98.2	-15.2
LP Admission CV Pressure Loss	% loss	63.8%	52.2%	52.5%	52.9%	52.1%	53.6%	53.9%	52.7%	52.9%	52.9%	52.9%	67.5%	67.5%	67.9%	67.7%
LP Turbine Inlet Steam	Flow, lb/h	719,322	627,989	621,071	611,568	621,561	624,262	619,322	617,693	625,657	634,147	633,770	500,975	496,512	488,301	515,006
	Pressure, psia	36.6	31.5	31.2	30.8	30.8	30.4	30.1	31.1	31.0	30.9	30.9	25.2	25.0	24.7	24.9
	Temperature, F	592.4	618.7	622.4	628.2	592.9	555.3	555.0	626.0	593.0	559.5	559.5	621.8	625.3	631.4	542.3
	Enthalpy, Btu/lb	1,330.1	1,343.3	1,345.1	1,347.9	1,330.7	1,312.5	1,312.5	1,346.8	1,330.8	1,314.6	1,314.6	1,345.9	1,346.9	1,349.8	1,305.7
LP Turbine Exit	Flow, lb/h	719,323	627,989	621,071	611,569	621,561	624,262	619,322	617,694	625,657	634,147	633,770	500,975	496,512	489,301	515,006
	Pressure, psia	1.046	0.489	0.508	0.505	0.857	0.994	0.991	0.507	0.859	0.999	0.999	0.509	0.488	0.486	0.814
	Pressure, in. HgA	2.130	0.996	1.034	1.028	1.746	2.023	2.018	1.032	1.748	2.034	2.034	1.018	0.993	0.995	1.657
	Temperature, F	103.2	78.9	80.0	79.9	96.8	101.6	101.4	80.0	96.7	101.7	101.7	79.5	78.8	78.8	94.9
ELEP Enthalpy, Btu/lb		1,074.2	1,049.7	1,052.7	1,054.4	1,072.1	1,070.8	1,071.0	1,053.6	1,071.9	1,071.2	1,071.2	1,052.9	1,052.9	1,055.0	1,068.1
UEEP Enthalpy, Btu/lb		1,088.6	1,056.4	1,059.2	1,060.9	1,085.6	1,087.2	1,087.6	1,060.2	1,085.2	1,087.4	1,087.4	1,059.3	1,059.1	1,062.6	1,084.6
Exhaust Loss Btu/lb		14.4	6.8	6.5	6.5	13.4	16.4	16.5	6.6	13.3	16.2	16.2	7.4	7.2	7.4	16.5
Moisture @ UEEP (MIN 1.7%)		1.69%	3.74%	3.62%	3.35%	1.71%	1.75%	1.71%	3.43%	1.74%	1.74%	1.74%	2.44%	2.43%	2.21%	1.72%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.97%	90.81%	90.88%	90.96%	90.97%	90.71%	90.71%	90.92%	90.99%	90.74%	90.74%	91.07%	91.09%	91.16%	90.62%
LPT Efficiency to UEEP		85.85%	88.72%	88.65%	88.93%	86.24%	84.56%	84.50%	88.69%	86.28%	84.76%	84.76%	86.67%	86.77%	86.78%	84.55%
Annulus Velocity ft/s		366.6	545.9	619.4	614.0	392.8	333.2	331.5	617.7	364.5	335.9	336.6	512.2	520.1	512.6	331.9
Volumetric Flow 1000 ft3/min per end		1,884	3,292	3,156	3,129	1,964	1,715	1,705	3,148	1,972	1,733	1,732	2,612	2,652	2,614	1,708
Gross Generator Output	kW	100,985	94,849	93,965	93,100	83,679	77,527	76,786	93,906	84,255	79,506	79,451	72,453	72,298	71,571	61,034
Generator MVA		430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.39%	98.19%	98.15%	98.13%	95.74%	95.44%	95.40%	98.16%	95.77%	95.54%	95.54%	95.15%	95.14%	95.10%	94.33%

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC501-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 35 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	734.4	635.7	630.7	622.2	637.2	637.9	633.1	626.1	641.1	647.9	647.6	515.1	510.9	504.5	528.8
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	6.4	13.0	6.2	6.1	5.7	5.6	5.6	6.2	5.7	5.7	5.7	14.8	6.1	6.2	5.0
LP Turbine Exit Steam to Condenser	Flow, lb/h	719,323	627,069	621,071	611,589	621,661	624,282	619,322	617,904	625,657	634,147	633,770	506,975	496,612	490,301	516,006
	Pressure, psia	1.046	0.489	0.508	0.505	0.857	0.994	0.991	0.507	0.859	0.999	0.999	0.500	0.488	0.488	0.814
	Pressure, in. HgA	2.130	0.996	1.034	1.028	1.745	2.023	2.018	1.032	1.748	2.034	2.034	1.018	0.993	0.995	1.657
	Temperature, F	103.2	78.9	80.0	79.9	96.6	101.5	101.4	80.0	96.7	101.7	101.7	79.5	78.8	78.8	94.9
	Enthalpy, Btu/lb	1,088.5	1,056.4	1,059.2	1,060.9	1,065.5	1,067.2	1,067.6	1,060.2	1,065.2	1,067.4	1,067.4	1,070.3	1,070.1	1,072.5	1,064.6
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,408.4	1,408.1	1,411.2	1,416.1	1,413.7	1,393.9	1,394.4	1,413.6	1,413.3	1,394.9	1,394.9	1,424.6	1,427.7	1,432.9	1,399.5
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,613.3	1,629.0	1,631.7	1,636.1	1,611.3	1,485.4	1,485.4	1,634.4	1,611.3	1,488.0	1,488.0	1,632.7	1,635.5	1,640.0	1,477.7
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,311.0	1,308.9	1,308.7	1,308.5	1,304.9	1,301.7	1,301.4	1,308.7	1,305.2	1,302.6	1,302.5	1,302.6	1,302.5	1,302.2	1,296.7
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	80.8	57.9	59.1	59.1	75.6	80.4	80.4	59.1	75.6	80.4	80.4	61.2	60.8	60.9	76.1
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	80.8	57.9	59.1	59.1	75.6	80.4	80.4	59.1	75.6	80.4	80.4	61.2	60.8	60.9	76.1
Condenser Exit	Flow, lb/h	722,922	630,669	624,671	615,189	625,161	627,862	622,922	621,504	629,257	637,747	637,370	504,575	500,212	492,901	518,806
	Pressure, psia	1.046	0.489	0.508	0.505	0.857	0.994	0.991	0.507	0.859	0.999	0.999	0.500	0.488	0.488	0.814
	Pressure, in HgA (MIN 1.0 in. HgA)	2.130	0.996	1.034	1.028	1.745	2.023	2.018	1.032	1.748	2.034	2.034	1.018	0.993	0.995	1.657
	Temperature, F	103.2	78.9	80.0	79.9	96.6	101.5	101.4	80.0	96.7	101.7	101.7	79.5	78.8	78.8	94.9
	Enthalpy, Btu/lb	71.2	47.0	48.1	47.9	64.6	69.5	69.4	48.0	64.7	69.7	69.7	47.6	46.9	46.9	62.9
Condensate Pump Discharge	Flow, lb/h	722,922	630,669	624,671	615,189	625,161	627,862	622,922	621,504	629,257	637,747	637,370	504,575	500,212	492,901	518,806
	Pressure, psia	553.7	553.1	553.2	553.4	553.6	553.3	553.5	553.2	553.7	553.1	553.1	551.2	551.3	551.5	553.6
	Temperature, F	108.2	84.8	86.0	85.9	102.6	107.5	107.4	86.0	102.6	107.5	107.5	87.2	86.5	86.7	102.4
	Enthalpy, Btu/lb	77.7	54.4	55.6	55.5	72.1	76.9	76.9	55.8	72.1	77.0	77.0	56.8	56.1	56.3	71.9
Condensate after GSC	Flow, lb/h	722,922	630,669	624,671	615,189	625,161	627,862	622,922	621,504	629,257	637,747	637,370	504,575	500,212	492,901	518,806
	Temperature, F	111.3	88.3	89.5	89.6	105.1	111.0	111.0	89.6	105.1	111.0	111.0	91.7	91.1	91.3	105.6
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	722,922	630,669	624,666	615,187	625,161	627,863	622,923	621,501	629,256	637,745	637,371	504,578	500,213	492,901	518,807
	Temperature, F	111.3	88.3	89.6	89.6	105.1	111.0	111.0	89.6	105.1	111.0	111.0	91.7	91.1	91.3	105.6
Total Circulating Water	Flow, lb/h	122,353,832	122,892,528	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832	122,353,832	122,892,528	122,774,400	122,774,400	122,460,856
	Flow, gpm	239,834	239,913	239,676	239,676	239,837	239,834	239,834	239,676	239,837	239,834	239,834	239,913	239,676	239,676	239,837
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0	68.0	68.0	85.0
Circulating Water to Condenser	Flow, lb/h	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440	114,669,400	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440
	Flow, gpm	224,756	224,862	224,644	224,644	224,771	224,756	224,756	224,644	224,771	224,756	224,756	224,862	224,644	224,644	224,771
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1
Circulating Water from Condenser	Flow, lb/h	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440	114,669,400	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440
	Temperature, F	96.8	66.9	73.8	73.7	90.9	95.9	96.9	73.8	90.9	96.0	96.0	64.8	72.7	72.7	89.9
Total Circulating Water Discharge	Flow, lb/h	122,353,832	122,892,528	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832	122,353,832	122,892,528	122,774,400	122,774,400	122,460,856
	Temperature, F	97.1	66.9	74.2	74.1	91.3	96.3	96.3	74.2	91.3	96.4	96.4	65.2	73.2	73.2	90.4
Circulating Water Temperature Rise	dT, F	7.11	6.25	6.22	6.15	6.28	6.30	6.25	6.20	6.32	6.38	6.38	5.24	6.20	6.15	5.36
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426
	Flow, gpm	15,052	15,000	15,013	15,013	15,049	15,052	15,052	15,013	15,049	15,052	15,052	15,000	15,013	15,013	15,049
	Temperature, F	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426
	Temperature, F	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

DECLASSIFIED

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 100 1x100% Fired Gas Fuel 95 F/EC On	Case 101 1x100% Unfired Gas Fuel 95 F	Case 102 1x100% Unfired Gas Fuel 45 F	Case 103 1x100% Unfired Gas Fuel 59 F	Case 104 1x100% Unfired Gas Fuel 74 F	Case 105 1x100% Unfired Gas Fuel 90 F	Case 106 1x100% Unfired Gas Fuel 95 F	Case 107 1x100% Unfired Gas Fuel 59 F/EC On	Case 108 1x100% Unfired Gas Fuel 74 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 110 1x100% Unfired Gas Fuel 95 F/EC On	Case 111 1x70% Unfired Gas Fuel 35 F	Case 112 1x70% Unfired Gas Fuel 45 F	Case 113 1x70% Unfired Gas Fuel 59 F	Case 114 1x70% Unfired Gas Fuel 74 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	693,575	568,907	561,283	574,185	582,143	584,721	580,661	579,410	585,532	592,815	592,585	470,985	467,817	462,205	463,503
	Pressure, psia	85.9	92.4	91.7	90.8	91.8	91.6	91.2	91.1	91.8	92.3	92.3	87.4	86.9	86.3	86.0
	Temperature, F	315.1	320.4	319.8	318.9	319.7	319.6	319.4	319.3	319.9	320.3	320.2	316.3	315.9	315.4	316.9
	Enthalpy, Btu/lb	285.4	290.8	290.2	289.4	290.1	290.1	289.8	289.8	290.3	290.8	290.7	286.7	286.2	285.7	287.1
IP Bleed (before CV)	Flow, lb/h	118,407	78,011	77,733	77,382	126,392	152,106	152,309	77,741	126,141	149,114	149,295	67,015	66,903	66,571	136,631
	Pressure, psia	982.4	1,047.8	1,049.8	1,052.7	1,049.3	1,048.0	1,049.6	1,050.6	1,047.7	1,044.4	1,044.4	1,092.3	1,093.1	1,094.7	1,088.3
	Temperature, F	317.5	322.9	322.4	321.5	322.3	322.2	321.9	321.9	322.4	322.9	322.8	319.2	318.8	318.3	319.6
	Enthalpy, Btu/lb	286.5	296.1	294.6	293.7	294.5	294.4	294.1	294.1	294.6	295.1	295.0	291.4	291.0	290.5	291.8
IP FW Control Valve Exit Pressure	Pressure, psia	273.4	275.2	271.5	266.1	264.9	263.5	261.4	259.1	266.6	268.1	267.8	232.4	230.2	228.6	232.9
	CV dP, psi	709.1	772.6	778.3	788.8	784.4	784.5	788.4	781.4	781.1	776.2	776.9	859.9	862.9	866.1	855.4
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,306.0	3,305.4	3,311.5	3,620.7	3,543.3	3,556.3	3,681.1	3,614.3	3,639.1	3,544.8	3,545.3	3,622.4	3,625.5	3,630.8	3,647.7
	CV dP, psi	2,333.9	2,503.2	2,513.3	2,528.4	2,506.5	2,667.9	2,677.0	2,617.5	2,597.5	2,643.2	2,644.3	2,718.1	2,723.5	2,732.8	2,825.0
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	575,168	507,996	503,550	496,803	456,751	432,615	428,362	501,669	459,391	443,700	443,290	403,970	400,914	395,636	344,872
	Pressure, psia	1,062.2	1,062.2	998.2	992.3	936.8	888.4	884.1	996.8	941.6	901.6	901.0	994.3	992.0	988.0	822.7
	Temperature, F	328.0	334.0	333.5	332.8	334.1	334.4	334.2	333.1	334.2	334.9	334.8	332.0	331.7	331.3	333.6
	Enthalpy, Btu/lb	300.4	305.5	305.0	305.2	305.6	305.7	305.6	305.6	305.8	307.2	307.2	304.3	303.9	303.5	305.0
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	575,168	507,994	503,549	496,800	456,762	432,616	428,353	501,668	459,393	443,703	443,293	403,971	400,913	396,534	344,875
	Pressure, psia	779.4	765.0	764.4	763.4	758.2	749.6	748.8	764.2	756.8	751.6	751.5	746.4	746.0	745.4	735.8
	Temperature, F	1,020.3	1,010.8	1,010.9	1,026.7	1,014.1	984.0	984.0	1,022.8	1,014.1	989.1	989.1	1,021.7	1,027.8	1,037.6	948.3
	Enthalpy, Btu/lb	1,524.1	1,519.2	1,522.6	1,528.1	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,498.4	1,498.4	1,526.8	1,529.2	1,534.6	1,485.3
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	328.0	334.0	333.5	332.8	334.1	334.4	334.2	333.1	334.2	334.9	334.8	332.0	331.7	331.3	333.6
HP Steam Bypassed to Cold Reheat -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0	950.0
	Temperature, F	997.8	988.7	995.1	1,005.3	992.6	940.5	940.5	1,001.2	992.6	945.8	945.8	1,001.0	1,007.4	1,017.6	924.9
	Enthalpy, Btu/lb	1,524.1	1,519.2	1,522.6	1,528.1	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,499.4	1,498.4	1,526.8	1,529.2	1,534.6	1,485.3
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	583,053	576,274	571,001	564,568	573,061	575,921	571,916	569,735	576,419	583,667	583,669	462,457	459,316	453,767	475,593
	Pressure, psia	178.8	165.3	165.2	164.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7	150.6	150.6
	Temperature, F	997.8	998.6	1,001.8	1,010.2	992.7	912.8	912.8	1,007.0	992.7	917.8	917.8	1,003.4	1,008.7	1,017.3	897.6
	Enthalpy, Btu/lb	1,513.3	1,529.0	1,531.7	1,536.1	1,511.3	1,485.4	1,485.4	1,534.4	1,511.3	1,488.0	1,488.0	1,532.7	1,535.5	1,540.0	1,477.7
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	178.8	165.3	165.2	164.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7	150.6	150.6
	Temperature, F	997.8	998.6	1,001.8	1,010.2	992.7	912.8	912.8	1,007.0	992.7	917.8	917.8	1,003.4	1,008.7	1,017.3	897.6
	Enthalpy, Btu/lb	1,513.3	1,529.0	1,531.7	1,536.1	1,511.3	1,485.4	1,485.4	1,534.4	1,511.3	1,488.0	1,488.0	1,532.7	1,535.5	1,540.0	1,477.7
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	111.3	88.3	89.6	89.6	106.1	111.0	111.0	89.6	106.1	111.0	111.0	91.7	91.1	91.3	106.6
HRH Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	178.8	165.3	165.2	164.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7	150.6	150.6
	Temperature, F	997.8	998.6	1,001.8	1,010.2	992.7	912.8	912.8	1,007.0	992.7	917.8	917.8	1,003.4	1,008.7	1,017.3	897.6
	Enthalpy, Btu/lb	1,513.3	1,529.0	1,531.7	1,536.1	1,511.3	1,485.4	1,485.4	1,534.4	1,511.3	1,488.0	1,488.0	1,532.7	1,535.5	1,540.0	1,477.7
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	29,339	44,671	43,997	41,026	43,009	43,126	42,240	42,116	43,704	44,917	44,783	33,590	32,464	30,704	35,086
	Pressure, psia	80.5	83.4	83.0	82.8	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9	80.7	81.4
	Temperature, F	561.8	556.3	555.8	555.2	548.2	541.6	541.0	555.8	548.8	543.5	543.4	543.2	542.9	542.3	531.4
	Enthalpy, Btu/lb	1,311.9	1,308.9	1,308.7	1,308.5	1,304.9	1,301.7	1,301.4	1,308.7	1,305.2	1,302.6	1,302.5	1,302.6	1,302.5	1,302.2	1,296.7
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	80.5	83.4	83.0	82.8	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9	80.7	81.4
	Temperature, F	561.8	556.3	555.8	555.2	548.2	541.6	541.0	555.8	548.8	543.5	543.4	543.2	542.9	542.3	531.4
	Enthalpy, Btu/lb	1,311.9	1,308.9	1,308.7	1,308.5	1,304.9	1,301.7	1,301.4	1,308.7	1,305.2	1,302.6	1,302.5	1,302.6	1,302.5	1,302.2	1,296.7
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	111.3	88.3	89.6	89.6	106.1	111.0	111.0	89.6	106.1	111.0	111.0	91.7	91.1	91.3	106.6
LP Steam Bypassed to Condenser -- CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	80.5	83.4	83.0	82.8	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9	80.7	81.4
	Temperature, F	561.8	556.3	555.8	555.2	548.2	541.6	541.0	555.8	548.8	543.5	543.4	543.2	542.9	542.3	531.4
	Enthalpy, Btu/lb	1,311.9	1,308.9	1,308.7	1,308.5	1,304.9	1,301.7	1,301.4	1,308.7	1,305.2	1,302.6	1,302.5	1,302.6	1,302.5	1,302.2	1,296.7
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
GateCycle Model ID		8BART2	8BART0	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART0	8BART2	8BART2	8BART2	8BART2	8BART2
GateCycle Case ID		B8-115	B8-116	B8-221	B8-222	B8-223	B8-224	B8-225	B8-226	B8-227	B8-228	B8-229	B8-230	B8-251	B8-252	B8-253
Ambient Temperature		90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		1@70%	1@70%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	3@100%	3@100%	3@100%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		67.0 MW	68.4 MW	353.1 MW	354.6 MW	352.5 MW	350.8 MW	344.7 MW	342.9 MW	355.0 MW	352.3 MW	348.3 MW	346.4 MW	270.5 MW	270.6 MW	269.6 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		711p/900F	711p/895F	1,784p/997F	1,782p/1,003F	1,779p/1,012F	1,776p/1,025F	1,764p/1,039F	1,758p/1,043F	1,788p/1,008F	1,786p/1,023F	1,781p/1,030F	1,781p/1,031F	1,385p/1,003F	1,382p/1,006F	1,378p/1,010F
STG Cold Reheat Conditions, psia/F		196p/733F	194p/729F	542p/868F	539p/862F	535p/856F	531p/706F	522p/718F	519p/721F	538p/695F	534p/706F	530p/712F	530p/712F	432p/704F	430p/706F	428p/715F
Cold Reheat Conditions after Conditioning, psia/F		196p/733F	194p/729F	542p/868F	539p/862F	535p/856F	531p/706F	522p/718F	519p/721F	538p/695F	534p/706F	530p/712F	530p/712F	432p/704F	430p/706F	428p/715F
STG Hot Reheat Conditions, psia/F		142p/860F	142p/845F	491p/996F	488p/1,002F	484p/1,011F	480p/1,024F	472p/1,037F	469p/1,040F	487p/1,007F	483p/1,022F	479p/1,029F	479p/1,030F	374p/1,000F	372p/1,005F	369p/1,014F
Condenser Pressure		1.93 in HgA	1.93 in HgA	1.42 in HgA	1.71 in HgA	1.69 in HgA	2.65 in HgA	2.99 in HgA	2.97 in HgA	1.70 in HgA	2.66 in HgA	3.02 in HgA	3.02 in HgA	1.13 in HgA	1.39 in HgA	1.39 in HgA
Stack Temperature		195 F	194 F	317 F	316 F	314 F	316 F	314 F	312 F	316 F	316 F	317 F	317 F	301 F	302 F	299 F
Run Date		6-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	7-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		1	1	4	4	4	4	4	4	4	4	4	4	3	3	3
Gross CTG Output (each)	kW	117,666	115,025	198,774	193,463	184,606	173,548	161,444	157,783	189,138	176,617	169,872	169,266	193,774	193,463	184,606
Gross CTG Output (total)	kW	117,666	115,025	795,096	773,852	738,424	694,184	645,776	631,132	756,552	706,468	679,488	677,144	581,322	580,389	553,818
Gross CTG Heat Rate (LHV)	Btu/kWh	10,467	10,565	9,353	9,406	9,523	9,708	9,920	9,982	9,467	9,693	9,784	9,793	9,353	9,406	9,523
Gross CTG Heat Rate (HHV)	Btu/kWh	11,486	11,572	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	9,979	10,035	10,160
Fuel Gas Temperature to CTG, F		90	95	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	1,233.68	1,215.24	7,436.53	7,278.85	7,032.01	6,739.14	6,406.10	6,299.96	7,162.28	6,826.60	6,648.11	6,631.27	5,577.40	5,459.14	5,274.01
CTG Heat Input (HHV) (total)	MMBtu/h	1,351.44	1,331.02	7,934.20	7,765.97	7,502.61	7,190.14	6,834.81	6,721.57	7,641.59	7,283.45	7,093.02	7,075.05	5,950.65	5,824.48	5,626.96
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	56,990	56,390	353,130	354,570	353,490	350,780	344,670	342,690	355,000	352,250	348,310	348,380	270,490	270,500	269,670
STG Output, percent of CTG Output		48.4%	49.0%	44.4%	45.8%	47.9%	50.5%	53.4%	54.3%	46.9%	49.9%	51.3%	51.4%	46.5%	46.6%	48.7%
Gross Plant Output	kW	174,648	171,405	1,148,226	1,128,422	1,091,914	1,044,944	990,446	974,022	1,111,552	1,058,718	1,027,798	1,025,504	856,812	850,980	823,388
Gross Cycle Heat Rate (LHV)	Btu/kWh	7,065	7,090	6,477	6,450	6,440	6,449	6,468	6,468	6,443	6,448	6,468	6,466	6,434	6,415	6,405
Gross Cycle Heat Rate (HHV)	Btu/kWh	7,738	7,765	5,910	5,882	5,871	6,881	6,901	6,901	6,875	6,889	6,901	6,899	6,855	6,844	6,834
Plant Heat Input (LHV)	MMBtu/h	1,233.68	1,215.24	7,436.53	7,278.85	7,032.01	6,739.14	6,406.10	6,299.96	7,162.28	6,826.60	6,648.11	6,631.27	5,577.40	5,459.14	5,274.01
Plant Heat Input (HHV)	MMBtu/h	1,351.44	1,331.02	7,934.20	7,765.97	7,502.61	7,190.14	6,834.81	6,721.57	7,641.59	7,283.45	7,093.02	7,075.05	5,950.65	5,824.48	5,626.96
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	13,990	13,970	32,250	32,140	31,970	31,720	31,430	31,330	32,070	31,800	31,640	31,630	27,620	27,530	27,390
Total Auxiliary Power/Losses, percent of gross		8.01%	8.15%	2.81%	2.85%	2.93%	3.04%	3.17%	3.22%	2.89%	3.00%	3.08%	3.08%	3.19%	3.24%	3.33%
Net Plant Output w/ Step-Up Xfmr Losses	kW	160,658	157,435	1,115,976	1,096,282	1,059,944	1,013,224	959,016	942,692	1,079,482	1,026,918	996,158	993,874	829,192	823,450	795,998
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,680	7,719	6,664	6,640	6,634	6,651	6,680	6,683	6,635	6,648	6,674	6,672	6,648	6,630	6,626
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	8,412	8,454	7,110	7,084	7,078	7,096	7,127	7,133	7,079	7,093	7,120	7,119	7,991	7,073	7,068

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0
	Relative Humidity	54.8%	43.9%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%
	WBT, F	78.5	78.5	30.9	39.3	51.4	69.1	78.6	78.6	51.4	69.1	78.6	78.6	30.9	39.3	51.4
Compressor Inlet Conditions	Temperature, F	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0
	Relative Humidity	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	22.8%	26.5%	91.4%	88.4%	60.1%	59.9%	59.7%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	0	0	5,831	3,896	9,623	13,120	0	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,233.9	1,215.2	1,859.1	1,819.7	1,758.0	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8	1,859.1	1,819.7	1,758.0
	Flow, lb/h	58,312	57,431	100,418	98,288	94,955	91,001	86,503	85,070	96,714	92,182	89,771	89,544	100,418	98,288	94,955
Fuel LHV	Btu/lb	21,160	21,160	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	176.6	176.2	516.2	515.6	511.2	506.6	496.3	494.8	514.6	509.7	505.8	505.7	407.7	405.6	401.9
	Temperature, F	729.3	725.3	683.3	687.4	694.0	703.9	713.9	716.7	691.1	701.9	707.5	708.1	699.4	703.8	710.8
	Enthalpy, Btu/lb	1,390.2	1,388.2	1,346.4	1,348.9	1,352.9	1,358.8	1,364.9	1,366.7	1,351.1	1,357.5	1,360.9	1,361.3	1,362.1	1,364.6	1,368.6
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	319.0	318.8	287.5	288.8	295.7	289.7	288.2	287.1	287.1	290.8	290.8	290.8	272.1	273.9	271.0
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	176.6	176.2	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	729.3	725.3	684.3	689.0	676.3	687.2	698.5	701.8	672.9	684.7	691.1	691.7	693.2	697.9	705.4
	Enthalpy, Btu/lb	1,390.2	1,388.2	1,346.4	1,348.9	1,352.9	1,358.8	1,364.9	1,366.7	1,351.1	1,357.5	1,360.9	1,361.3	1,362.1	1,364.6	1,368.6
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	40,160	39,310	37,978	36,396	34,598	34,026	38,684	36,871	35,906	35,816	40,160	39,310	37,978
CTG Exhaust Flow	Flow, lb/h	2,932,432	2,901,331	4,252,224	4,177,052	4,056,998	3,884,953	3,718,719	13,673,602	4,108,466	3,921,585	3,820,486	3,813,647	4,252,224	4,177,052	4,056,998
	Pressure, in. H2O	10.27	10.07	19.58	19.02	18.14	16.95	15.77	15.49	18.59	17.19	16.49	16.49	19.58	19.02	18.14
	Temperature, F	1,123.4	1,127.2	1,039.9	1,046.5	1,057.1	1,073.6	1,088.0	1,092.3	1,053.0	1,071.0	1,080.0	1,081.0	1,039.9	1,046.5	1,057.1
CTG Load	% of Base Load	70%	70%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	117,656	115,025	199,774	193,463	184,606	173,546	161,444	157,783	169,139	176,617	169,672	169,286	199,774	193,463	184,606
Gross Heat Rate	Btu/kWh (LHV)	10,467	10,[illegible]	9,363	9,406	9,523	9,708	9,920	9,982	9,467	9,663	9,784	9,793	9,363	9,406	9,523

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC501-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	335,446	333,324	436,508	436,899	434,142	431,600	425,376	422,573	436,693	433,896	431,235	431,177	447,481	445,549	442,268
(at HRSG terminal point)	Pressure, psia	733.6	733.3	1,819.5	1,817.6	1,813.7	1,814.0	1,798.9	1,790.2	1,820.6	1,821.1	1,816.3	1,816.7	1,427.3	1,424.7	1,419.9
	Temperature, F	903.2	898.2	1,000.4	1,006.1	1,015.2	1,028.7	1,042.1	1,045.8	1,011.2	1,026.0	1,033.7	1,034.5	1,007.3	1,013.1	1,022.5
	Enthalpy, Btu/lb	1,460.2	1,457.4	1,481.0	1,484.6	1,490.4	1,498.8	1,507.5	1,510.0	1,487.7	1,496.9	1,501.8	1,502.3	1,487.5	1,491.0	1,496.7
dP from HP drum to HRSG terminal point	psi	56.1	54.0	51.9	51.7	51.6	51.2	50.8	50.4	51.7	51.4	51.2	51.2	71.7	71.4	71.0
HP SH #1 Steam Outlet Temperature	Temperature, F	904.1	899.1	1,001.0	1,006.8	1,015.7	1,029.2	1,042.6	1,046.2	1,011.7	1,026.5	1,034.2	1,035.0	1,008.0	1,013.8	1,023.2
HP SH #2 Steam Outlet Temperature	Temperature, F	772.4	762.5	933.8	937.9	944.5	953.8	964.2	967.4	941.2	951.4	957.0	957.6	949.9	954.3	961.5
HP Steam Desuperheating Flow	Flow, lb/h	70,717	71,360	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	333.5	333.3	298.0	299.4	298.3	300.4	299.0	297.9	297.6	301.2	301.5	301.2	283.3	285.1	282.2
	% of Inlet steam	26.7%	27.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	0.0	0.0	199.5	201.9	205.6	209.8	216.9	219.7	202.9	207.6	210.8	211.0	252.9	256.8	260.4
HP SH #3/4 Steam Outlet Temperature	Temperature, F	771.5	772.4	825.1	827.2	830.6	834.6	840.9	842.9	828.5	833.2	836.0	836.3	847.5	850.1	854.3
HP Evaporator #1 Exit	Flow, lb/h	30,060	29,942	56,063	56,214	56,380	56,573	56,641	56,545	56,398	56,767	56,782	56,825	55,132	55,239	55,364
	Pressure, psia	788.7	787.3	1,871.4	1,869.3	1,865.2	1,865.2	1,849.5	1,840.6	1,872.5	1,872.6	1,867.4	1,867.8	1,499.0	1,496.2	1,490.9
	Temperature, F	516.6	516.4	626.5	626.3	626.0	626.0	624.8	624.2	626.6	626.6	626.2	626.2	596.2	595.9	595.5
	Enthalpy, Btu/lb	1,199.6	1,199.7	1,146.8	1,146.9	1,146.9	1,146.9	1,147.0	1,147.0	1,145.7	1,145.7	1,146.1	1,146.1	1,159.1	1,159.2	1,159.5
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	290.7	291.4	294.6	298.4	304.5	313.4	322.7	325.3	301.7	311.4	316.7	317.2	328.2	332.2	338.7
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	234,689	231,821	382,424	380,685	377,762	374,926	368,733	366,028	380,295	377,140	374,452	374,351	392,348	390,309	386,916
	Pressure, psia	788.7	787.3	1,871.4	1,869.3	1,865.2	1,865.2	1,849.5	1,840.6	1,872.5	1,872.6	1,867.4	1,867.8	1,499.0	1,496.2	1,490.9
	Temperature, F	516.6	516.4	626.5	626.3	626.0	626.0	624.8	624.2	626.6	626.6	626.2	626.2	596.2	595.9	595.5
	Enthalpy, Btu/lb	1,199.6	1,199.7	1,146.8	1,146.9	1,146.9	1,146.9	1,147.0	1,147.0	1,145.7	1,145.7	1,146.1	1,146.1	1,159.1	1,159.2	1,159.5
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	14.3	14.1	18.1	18.0	17.9	17.9	17.6	17.5	18.1	18.0	17.9	17.9	21.1	20.9	20.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	264,729	261,763	438,507	436,899	434,142	431,599	425,374	422,573	436,693	433,897	431,234	431,176	447,480	445,548	442,280
	Temperature, F	516.6	516.4	626.5	626.3	626.0	626.0	624.8	624.2	626.6	626.6	626.2	626.2	596.2	595.9	595.5
HP Economizer #4/5 Outlet Temperature	Temperature, F	499.9	499.5	589.4	588.0	585.5	582.2	578.2	576.9	586.8	583.2	581.1	580.9	586.8	584.3	581.8
HP Economizer #6/7 Outlet Temperature	Temperature, F	498.7	498.2	489.6	488.2	485.6	482.6	478.7	477.4	486.9	483.6	481.6	481.4	486.9	486.5	482.8
HP Economizer #8 Outlet Temperature	Temperature, F	381.0	380.7	404.6	403.7	399.6	398.3	394.3	392.9	401.5	399.4	397.6	397.9	383.9	383.3	379.6
Feedwater to HP Economizer #6	Flow, lb/h	264,729	261,763	438,507	436,899	434,142	431,599	425,374	422,573	436,693	433,897	431,234	431,176	447,480	445,548	442,280
	Pressure, psia	811.0	809.1	1,932.2	1,929.7	1,924.8	1,924.1	1,906.8	1,897.2	1,932.9	1,932.1	1,926.3	1,926.7	1,562.3	1,558.9	1,552.8
	Temperature, F	333.5	333.3	298.0	299.4	298.3	300.4	299.0	297.9	297.6	301.2	301.5	301.2	283.3	285.1	282.2
	Enthalpy, Btu/lb	305.7	305.5	271.2	272.6	269.5	273.6	272.2	271.1	270.6	274.5	274.7	274.5	256.5	257.9	254.4
HP FW Temperature Increase Across BFP	F	17.3	17.4	13.1	13.1	13.2	13.3	13.5	13.6	13.1	13.2	13.3	13.3	13.6	13.7	13.8
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	833.1	833.8	944.6	948.7	955.3	965.2	974.6	977.0	952.6	963.5	969.0	969.6	960.5	964.8	971.7
Exit Temperature	Temperature, F	833.1	833.8	944.6	948.7	955.3	965.2	974.6	977.0	952.6	963.5	969.0	969.6	960.5	964.8	971.7
HRSG Hot Reheat Steam	Flow, lb/h	479,367	477,864	513,060	509,453	503,317	495,492	485,791	481,721	507,409	499,818	494,612	494,297	518,089	515,267	508,810
(at HRSG terminal point)	Pressure, psia	150.5	150.4	502.2	499.8	495.5	491.3	483.1	479.6	498.8	494.1	490.3	490.2	386.5	384.5	381.0
	Temperature, F	852.6	847.6	998.7	1,004.2	1,013.1	1,026.5	1,039.3	1,042.7	1,009.4	1,024.1	1,031.5	1,032.4	1,002.2	1,007.9	1,016.9
	Enthalpy, Btu/lb	1,454.6	1,452.0	1,520.2	1,523.2	1,528.2	1,535.5	1,542.7	1,544.6	1,526.1	1,534.1	1,538.3	1,538.7	1,526.4	1,528.6	1,533.4
HRSG RH dP – terminal pt. to terminal pt.	psi	28.2	27.6	16.9	16.8	16.7	16.5	16.3	16.2	16.8	16.6	16.5	16.5	21.2	21.1	20.9
RHTR #1/2 Steam Outlet Temperature	Temperature, F	853.2	848.2	998.9	1,004.4	1,013.3	1,026.7	1,039.5	1,042.9	1,009.6	1,024.3	1,031.7	1,032.5	1,002.6	1,008.1	1,017.2
RHTR #3 Steam Outlet Temperature	Temperature, F	818.2	808.7	923.6	927.8	934.1	943.5	953.0	955.6	931.2	941.6	947.0	947.5	929.9	934.1	940.9
Reheat Steam Desuperheating Flow	Flow, lb/h	94,666	96,742	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	319.0	318.8	287.5	288.8	285.7	288.7	288.2	287.1	287.1	290.6	290.8	290.6	272.1	273.9	271.0
	% of Inlet steam	24.6%	25.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	0.0	0.0	318.9	321.9	326.6	333.5	340.9	343.1	324.4	331.9	335.9	336.3	346.3	349.4	354.3
RHTR #4 Steam Outlet Temperature	Temperature, F	792.3	791.7	788.9	791.3	795.3	801.2	806.8	808.3	793.6	800.1	803.4	803.6	791.6	794.1	798.1
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	877.6	872.6	916.8	923.6	934.5	950.3	966.7	971.4	929.4	946.8	956.0	956.9	947.9	954.6	965.3
	Enthalpy, Btu/lb	1,460.2	1,457.4	1,481.0	1,484.6	1,490.4	1,498.8	1,507.5	1,510.0	1,487.7	1,496.9	1,501.8	1,502.3	1,497.5	1,501.0	1,506.7
Cold Reheat Steam from STG to HRSG	Flow, lb/h	327,716	326,620	432,452	430,862	428,135	425,624	419,470	416,702	430,656	427,892	425,261	425,204	441,008	439,103	436,867
(at HRSG terminal point)	Pressure, psia	178.6	178.2	518.2	515.6	511.2	506.8	498.3	494.6	514.6	509.7	505.8	505.7	407.7	405.6	401.9
	Temperature, F	729.3	725.3	883.3	887.4	894.0	703.9	713.9	716.7	691.1	701.9	707.5	708.1	699.4	703.8	710.8
	Enthalpy, Btu/lb	1,360.2	1,358.2	1,348.4	1,348.9	1,362.9	1,358.8	1,364.9	1,366.7	1,351.1	1,357.5	1,360.9	1,361.3	1,362.1	1,364.6	1,368.6
Cold Reheat Steam, % of HP Steam		97.70%	97.62%	98.62%	98.62%	98.62%	98.62%	98.61%	98.61%	98.62%	98.62%	98.61%	98.61%	98.56%	98.56%	98.59%
HP Steam - Cold Reheat Steam	Flow, lb/h	7,731	7,704	6,056	6,038	6,007	5,979	5,905	5,871	6,037	6,005	5,974	5,973	6,472	6,449	6,415

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
IP Steam (at HRSG terminal point)	Flow, lb/h	57,050	56,445	80,609	78,592	76,183	70,869	66,323	65,020	76,754	71,927	69,352	69,094	78,082	76,169	72,944
	Pressure, psia	176.5	178.2	518.2	515.8	511.2	506.8	498.3	494.8	514.8	509.7	505.8	505.7	497.7	495.6	491.9
	Temperature, F	517.5	517.9	516.7	516.1	515.9	516.1	516.4	516.2	515.9	516.2	516.7	516.8	593.2	593.4	593.7
	Enthalpy, Btu/lb	1,260.7	1,260.6	1,306.7	1,307.1	1,307.9	1,309.0	1,309.9	1,310.0	1,307.7	1,308.9	1,309.5	1,309.5	1,302.3	1,302.6	1,303.1
IP Evaporator Drum Exit	Flow, lb/h	57,050	56,445	80,609	78,592	76,183	70,869	66,323	65,020	76,754	71,927	69,352	69,094	78,082	76,169	72,944
	Pressure, psia	203.2	202.4	536.7	533.4	527.6	521.6	511.5	507.6	531.6	524.8	520.0	519.6	429.5	426.5	421.3
	Temperature, F	363.2	362.6	474.4	473.8	472.6	471.4	469.4	468.6	473.4	472.1	471.1	471.1	451.7	451.0	449.7
	Enthalpy, Btu/lb	1,199.0	1,199.0	1,204.7	1,204.7	1,204.6	1,204.6	1,204.9	1,205.0	1,204.8	1,204.8	1,204.9	1,204.9	1,205.2	1,205.2	1,205.1
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	28.3	28.1	31.0	30.6	29.7	26.5	27.5	27.1	30.1	28.9	26.3	28.2	31.0	31.1	30.3
IP Approach	Temperature, F	0.0	0.0	30.3	30.1	31.1	30.5	31.0	31.2	30.6	30.4	30.5	30.6	27.4	27.1	28.0
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	57,050	56,445	80,609	78,592	76,183	70,869	66,323	65,020	76,754	71,927	69,352	69,094	78,082	76,169	72,944
	Pressure, psia	203.2	202.4	536.7	533.4	527.6	521.6	511.5	507.6	531.6	524.8	520.0	519.6	429.5	426.5	421.3
	Temperature, F	383.2	382.6	444.1	443.6	441.6	440.9	438.4	437.4	442.6	441.7	440.6	440.5	424.2	423.9	421.8
	Enthalpy, Btu/lb	363.7	363.3	423.6	423.1	420.8	420.1	417.4	416.3	422.0	420.9	419.6	419.6	401.6	401.2	398.9
	% Steam In Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	57,050	56,445	80,609	78,592	76,183	70,869	66,323	65,020	76,754	71,927	69,352	69,094	78,082	76,169	72,944
(pressure is preliminary)	Pressure, psia	229.0	227.5	589.3	583.4	573.4	562.3	547.3	542.0	579.3	566.8	559.1	558.5	478.9	473.5	464.4
	Temperature, F	320.5	320.2	288.4	289.7	286.0	290.7	289.2	288.1	288.0	291.6	291.8	291.5	273.3	275.1	272.2
	Enthalpy, Btu/lb	291.2	290.9	258.6	260.2	257.0	261.1	259.6	258.4	258.4	262.0	262.2	262.0	243.2	245.0	242.0
IP FW Temperature Increase Across BFP	F	4.9	4.8	3.5	3.5	3.5	3.6	3.7	3.7	3.5	3.6	3.6	3.6	3.6	3.6	3.7
LP Steam (at HRSG terminal point)	Flow, lb/h	33,274	32,507	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	61.0	60.9	53.2	54.3	51.7	55.0	53.7	52.7	52.8	56.8	59.0	55.7	41.6	42.8	40.8
	Temperature, F	529.6	529.2	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	288.2	287.9	269.7	271.4	268.5
	Enthalpy, Btu/lb	1,295.6	1,295.7	1,176.4	1,176.8	1,174.9	1,176.1	1,175.6	1,175.3	1,175.3	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
LP Evaporator Steam Exit	Flow, lb/h	33,274	32,507	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	84.9	84.7	53.2	54.3	51.7	55.0	53.7	52.7	52.8	56.8	59.0	55.7	41.6	42.8	40.8
	Temperature, F	316.2	316.0	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	288.2	287.9	269.7	271.4	268.5
	Enthalpy, Btu/lb	1,184.5	1,184.4	1,176.4	1,176.8	1,174.9	1,176.1	1,175.6	1,175.3	1,175.3	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
LP Evaporator Water Exit to BFPs	Flow, lb/h	467,097	465,621	519,111	515,485	509,319	502,468	491,597	487,593	513,443	505,819	500,586	500,271	526,538	521,717	515,220
	Pressure, psia	84.9	84.7	53.2	54.3	51.7	55.0	53.7	52.7	52.8	56.8	59.0	55.7	41.6	42.9	40.8
	Temperature, F	316.2	316.0	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	288.2	287.9	269.7	271.4	268.5
	Enthalpy, Btu/lb	286.5	286.3	254.2	255.6	252.4	256.5	254.9	253.7	253.8	257.4	257.6	257.3	238.6	240.4	237.4
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	57,050	56,445	80,609	78,592	76,183	70,869	66,323	65,020	76,754	71,927	69,352	69,094	78,082	76,169	72,944
IP FW to HRSG RH Desuperheater	Flow, lb/h	94,806	95,742	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	284,729	281,763	438,507	436,899	434,142	431,599	426,374	422,573	438,663	433,997	431,234	431,176	447,480	445,546	442,280
HP FW to HRSG HP Desuperheater	Flow, lb/h	70,717	71,580	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	15.2	16.0	32.3	31.5	31.0	29.3	28.2	27.9	31.4	29.6	28.9	29.6	31.8	31.0	30.5
LP Approach	Temperature, F	9.6	10.1	191.7	187.0	184.1	173.0	167.1	166.1	185.3	173.8	169.4	169.2	182.5	177.6	174.9
Condensate Recirculated	Flow, lb/h	70,566	70,333	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	306.2	305.4	92.1	98.1	97.9	113.0	117.4	117.2	98.1	113.1	117.7	117.7	88.0	92.6	92.4
% of Total LP Economizer Flow		12%	12%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	590,928	588,347	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	306.9	305.2	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
	Enthalpy, Btu/lb	276.6	275.8	61.3	67.4	67.2	82.2	86.5	86.4	67.3	82.3	86.9	86.9	55.4	61.9	61.8
Condensate to LP Economizer	Flow, lb/h	590,928	588,347	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	136.0	135.0	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
	Enthalpy, Btu/lb	104.4	104.4	61.3	67.4	67.2	82.2	86.5	86.4	67.3	82.3	86.9	86.9	55.4	61.9	61.8
Condensate from Recirculation	Flow, lb/h	70,566	70,333	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	306.2	305.4	92.1	98.1	97.9	113.0	117.4	117.2	98.1	113.1	117.7	117.7	88.0	92.6	92.4
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	519,118	515,491	509,324	502,470	491,597	487,596	513,446	505,823	500,585	500,277	526,578	521,725	515,250
	% of Total Condensate Flow	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Temperature, F	111.5	111.6	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
Condensate to HRSG	Flow, lb/h	520,362	518,014	519,118	515,491	509,324	502,470	491,597	487,596	513,446	505,823	500,585	500,277	526,578	521,725	515,250
	Pressure, psia	569.2	569.2	507.8	507.9	509.0	508.6	510.2	511.0	508.3	508.2	508.7	508.7	528.6	528.5	529.2
	Temperature, F	111.5	111.6	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
Stack Exit	Flow, lb/h	2,932,422	2,901,331	4,252,224	4,177,052	4,056,998	3,864,963	3,718,719	3,673,602	4,108,466	3,921,586	3,820,488	3,813,647	4,252,224	4,177,052	4,056,998
	Temperature, F	194.9	193.6	317.2	317.7	314.1	316.4	313.7	312.3	315.8	317.6	317.0	316.8	301.5	302.4	299.8

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	1,121	1,107	6,781	6,774	6,794	6,843	6,836	6,816	6,805	6,860	6,869	6,873	5,301	5,307	5,314
HP Turbine Remainder Shaft Power	kW	5,487	5,385	60,599	60,680	61,343	62,182	62,459	62,383	61,326	62,235	62,538	62,601	46,586	46,764	47,010
IP Turbine Shaft Power	kW	23,188	23,037	113,816	113,507	112,922	112,541	111,208	110,565	113,598	113,077	112,539	112,537	87,071	86,802	86,309
LP Turbine Shaft Power	kW	30,849	30,568	177,452	178,918	177,931	174,684	169,580	168,518	178,861	176,569	171,810	171,800	138,269	136,468	135,663
Total Shaft Power	kW	59,625	59,030	351,667	353,315	352,196	349,388	343,247	341,466	360,714	358,861	348,656	348,938	269,918	270,024	268,982
STG Throttle Steam	Flow, lb/h	336,446	333,324	1,764,031	1,747,897	1,736,567	1,726,401	1,701,499	1,690,294	1,745,773	1,735,591	1,724,938	1,724,707	1,342,442	1,336,646	1,326,840
	Pressure, psia (MAX 2270 psia)	711.2	711.2	1,784.3	1,782.4	1,778.6	1,778.6	1,784.0	1,784.5	1,785.6	1,785.9	1,781.1	1,781.5	1,385.0	1,382.5	1,377.6
	Temperature, F	900.0	895.0	997.0	1,002.7	1,011.8	1,025.4	1,038.6	1,042.5	1,007.9	1,022.7	1,030.4	1,031.2	1,003.5	1,009.3	1,018.7
	Enthalpy, Btu/lb	1,462.2	1,458.4	1,480.0	1,483.6	1,489.4	1,497.8	1,508.5	1,509.0	1,486.7	1,495.9	1,500.8	1,501.3	1,496.5	1,500.0	1,505.7
THV Pressure Loss	psi	363.4 51.10%	366.0 51.47%	35.3 1.96%	35.3 1.96%	35.2 1.96%	35.2 1.96%	35.0 1.96%	34.8 1.96%	35.3 1.96%	35.4 1.96%	35.3 1.96%	35.3 1.96%	27.4 1.96%	27.3 1.96%	27.2 1.96%
Leak 1 Leakage Flow to HRH	Flow, lb/h	4,514	4,496	22,186	22,104	21,959	21,823	21,502	21,359	22,099	21,941	21,802	21,799	17,001	16,926	16,797
HP Turbine Exit	Flow, lb/h	330,931	328,834	1,731,845	1,725,498	1,714,609	1,704,583	1,680,000	1,668,935	1,724,684	1,713,651	1,703,138	1,702,910	1,325,441	1,319,722	1,310,043
	Pressure, psia	194.9	194.3	541.9	539.5	535.1	530.9	522.4	518.8	538.5	533.9	530.0	529.9	432.0	429.9	426.2
	Temperature, F (MAX 840 F)	732.8	728.9	687.7	691.8	698.3	708.2	718.1	720.9	695.4	706.1	711.8	712.4	703.7	708.1	715.1
	Enthalpy, Btu/lb	1,391.2	1,389.2	1,347.4	1,349.9	1,353.9	1,359.8	1,366.9	1,367.7	1,352.1	1,358.5	1,361.9	1,362.3	1,363.1	1,365.6	1,369.8
Efficiency (THV Inlet to HPT exit)		42.07%	41.69%	85.76%	85.77%	85.77%	85.78%	85.79%	85.79%	85.78%	85.79%	85.79%	85.79%	85.72%	85.72%	85.73%
Efficiency (THV exit to HPT exit)		86.83%	86.93%	87.03%	87.03%	87.03%	87.03%	87.03%	87.03%	87.03%	87.03%	87.03%	87.03%	87.02%	87.02%	87.02%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	583	582	1,602	1,596	1,590	1,638	1,602	1,589	1,674	1,649	1,632	1,631	1,328	1,318	1,302
CRH Steam to Steam Seals	Flow, lb/h	2,628	2,631	351	374	412	456	523	549	356	434	467	469	1,091	1,109	1,140
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	327,719	325,620	1,729,802	1,723,442	1,712,637	1,702,489	1,677,875	1,666,801	1,722,623	1,711,568	1,701,039	1,700,810	1,323,023	1,317,295	1,307,601
	Pressure, psia	194.9	194.3	541.9	539.5	535.1	530.9	522.4	518.8	538.5	533.9	530.0	529.9	432.0	429.9	426.2
	Temperature, F	732.8	728.9	687.7	691.8	698.3	708.2	718.1	720.9	695.4	706.1	711.8	712.4	703.7	708.1	715.1
	Enthalpy, Btu/lb	1,391.2	1,389.2	1,347.4	1,349.9	1,353.9	1,359.8	1,366.9	1,367.7	1,352.1	1,358.5	1,361.9	1,362.3	1,363.1	1,365.6	1,369.8
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	319.0	318.8	287.5	288.8	285.7	289.7	288.2	287.1	287.1	290.6	290.8	290.8	272.1	273.9	271.0
Final Cold Reheat Steam after Conditioning	Flow, lb/h	327,719	325,620	1,729,802	1,723,442	1,712,637	1,702,489	1,677,875	1,666,801	1,722,623	1,711,568	1,701,039	1,700,810	1,323,023	1,317,295	1,307,601
	Pressure, psia	194.9	194.3	541.9	539.5	535.1	530.9	522.4	518.8	538.5	533.9	530.0	529.9	432.0	429.9	426.2
	Temperature, F (MAX 750 F)	732.8	728.9	687.7	691.8	698.3	708.2	718.1	720.9	695.4	706.1	711.8	712.4	703.7	708.1	715.1
	Enthalpy, Btu/lb	1,391.2	1,389.2	1,347.4	1,349.9	1,353.9	1,359.8	1,366.9	1,367.7	1,352.1	1,358.5	1,361.9	1,362.3	1,363.1	1,365.6	1,369.8
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	151,848	152,184	322,437	314,370	300,731	283,480	266,291	260,085	307,014	287,705	277,407	276,377	234,185	228,508	218,829
Reheat System dP	psi	52.9	52.3	51.2	51.1	50.9	50.9	50.4	50.1	51.2	51.1	50.9	50.9	58.1	57.9	57.6
Reheat System dP		27.14%	26.93%	9.44%	9.47%	9.52%	9.58%	9.65%	9.67%	9.50%	9.57%	9.60%	9.61%	13.44%	13.48%	13.52%
Hot Reheat Flow	Flow, lb/h	479,567	477,804	2,052,239	2,037,812	2,013,368	1,986,970	1,943,166	1,926,886	2,029,637	1,999,272	1,978,446	1,977,187	1,557,208	1,546,802	1,526,431
	Pressure, psia (MAX 564 psia)	142.0	142.0	490.8	488.3	484.1	480.0	472.0	468.6	487.4	482.8	479.1	479.0	373.9	371.9	368.6
	Temperature, F	880.8	846.0	996.3	1,001.8	1,010.7	1,024.1	1,036.9	1,040.3	1,007.0	1,021.7	1,029.1	1,029.9	999.7	1,005.3	1,014.4
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-50.0	-50.0	-0.8	-0.9	-1.1	-1.3	-1.9	-2.2	-0.9	-1.0	-1.3	-1.3	-3.8	-4.0	-4.3
	Enthalpy, Btu/lb	1,453.8	1,451.0	1,519.2	1,522.2	1,527.2	1,534.5	1,541.7	1,543.6	1,525.1	1,533.1	1,537.3	1,537.7	1,524.4	1,527.5	1,532.4
INTV Pressure Loss	psi	34.8 24.49%	35.3 24.89%	9.9 2.01%	9.8 2.01%	9.7 2.01%	9.6 2.01%	9.5 2.01%	9.4 2.01%	9.6 2.01%	9.7 2.01%	9.6 2.01%	9.6 2.01%	7.6 2.01%	7.6 2.01%	7.4 2.01%
IP Turbine Exit	Flow, lb/h	483,661	482,294	2,074,427	2,059,915	2,035,227	2,007,793	1,964,957	1,948,244	2,051,727	2,021,213	2,000,248	1,998,985	1,574,210	1,562,727	1,542,228
	Pressure, psia	24.9	24.8	104.3	103.8	102.9	102.1	100.4	99.7	103.6	102.8	101.9	101.9	79.5	79.1	78.4
	Temperature, F	507.5	503.2	604.5	608.9	616.1	626.9	637.3	640.0	613.1	624.9	630.9	631.8	608.8	613.3	620.8
	Enthalpy, Btu/lb	1,290.8	1,288.6	1,331.4	1,333.7	1,337.3	1,342.7	1,348.0	1,349.4	1,335.7	1,341.7	1,344.8	1,345.1	1,335.2	1,337.5	1,341.2
Efficiency (INTV inlet to IPT exit)		79.46%	79.26%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	388	387	1,657	1,646	1,626	1,607	1,475	1,462	1,640	1,617	1,601	1,600	1,181	1,173	1,158
LP Steam Admitted to STG (total)	Flow, lb/h	33,274	22,907	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	78.2	78.2	53.2	54.3	51.7	55.0	53.7	52.7	52.8	55.8	56.0	56.7	41.6	42.8	40.8
	Temperature, F	527.0	526.7	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	288.2	287.9	269.7	271.4	268.5
	Enthalpy, Btu/lb	1,294.8	1,294.7	1,174.4	1,174.8	1,173.9	1,175.1	1,174.6	1,174.3	1,174.3	1,175.4	1,175.4	1,175.4	1,169.6	1,170.2	1,169.2
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 108 F)	19.6	23.6													
LP Admission CV Pressure Loss	% loss	98.1%	98.3%	-98.1%	-91.2%	-99.1%	-85.6%	-88.9%	-89.0%	-98.1%	-93.9%	-92.1%	-92.7%	-90.8%	-94.5%	-91.8%
LP Turbine Inlet Steam	Flow, lb/h	516,767	514,415	2,072,670	2,058,369	2,033,699	2,006,286	1,963,193	1,946,782	2,050,187	2,019,896	1,998,747	1,997,485	1,573,028	1,561,555	1,542,070
	Pressure, psia	24.6	24.4	102.7	102.2	101.4	100.5	98.9	98.2	102.0	101.1	100.4	100.3	78.3	77.9	77.2
	Temperature, F	508.0	504.9	604.3	608.7	615.9	626.7	637.1	639.8	612.9	624.7	630.7	631.4	608.6	613.2	620.5
	Enthalpy, Btu/lb	1,290.3	1,288.4	1,331.4	1,333.7	1,337.3	1,342.7	1,348.0	1,349.4	1,335.7	1,341.7	1,344.8	1,345.1	1,335.2	1,337.5	1,341.2
LP Turbine Exit	Flow, lb/h	516,767	514,415	2,072,670	2,058,369	2,033,699	2,006,286	1,963,193	1,946,782	2,050,187	2,019,896	1,998,747	1,997,485	1,573,028	1,561,555	1,542,070
	Pressure, psia	0.947	0.948	0.865	0.838	0.831	1.299	1.469	1.461	0.838	1.305	1.465	1.484	0.559	0.985	0.980
	Pressure, in. HgA	1.928	1.930	1.415	1.705	1.692	2.645	2.990	2.975	1.702	2.657	3.023	3.022	1.133	1.395	1.385
	Temperature, F	99.9	99.9	89.8	95.9	95.6	110.6	114.9	114.7	95.8	110.8	115.3	115.3	82.8	89.4	89.1
ELEP Enthalpy, Btu/lb		1,067.4	1,066.8	1,002.7	1,010.6	1,012.5	1,036.5	1,045.9	1,046.7	1,011.7	1,035.9	1,044.0	1,044.2	1,008.9	1,017.0	1,018.9
UEEP Enthalpy, Btu/lb		1,066.6	1,066.0	1,039.3	1,037.1	1,038.8	1,045.7	1,053.3	1,054.1	1,038.0	1,045.1	1,051.5	1,051.6	1,039.7	1,039.3	1,041.9
Exhaust Loss Btu/lb		19.2	19.3	36.8	28.4	28.3	9.2	7.4	7.4	29.4	9.2	7.4	7.4	33.4	22.3	22.1
Moisture @ UEEP (MIN 1.7%)		1.74%	1.80%	5.66%	6.34%	6.16%	6.17%	5.82%	5.63%	6.24%	6.23%	5.81%	5.80%	5.51%	5.83%	5.66%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.37%	90.33%	89.61%	89.77%	89.85%	90.32%	90.58%	90.59%	89.81%	90.29%	90.46%	90.49%	89.79%	89.98%	90.07%
LPT Efficiency to UEEP		82.60%	82.47%	79.63%	82.42%	82.57%	87.01%	89.34%	89.36%	82.50%	87.67%	88.24%	88.26%	80.68%	83.73%	83.90%
Annulus Velocity ft/s		287.8	286.2	1,398.0	1,216.0	1,213.6	799.9	703.0	701.2	1,215.3	801.4	706.8	706.7	1,370.4	1,126.9	1,122.5
Volumetric Flow 1000 ft3/min per end		1,485	1,477	7,642	6,328	6,314	4,089	3,596	3,577	6,324	4,096	3,606	3,605	7,180	5,836	5,814
Gross Generator Output	kW	56,968	56,380	353,126	354,575	353,487	350,756	344,671	342,869	355,000	352,251	348,306	348,362	270,466	270,598	269,571
Generator MVA		430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.97%	98.91%	98.47%	98.47%	98.47%	98.46%	98.46%	98.45%	98.47%	98.47%	98.46%	98.46%	98.28%	98.28%	98.28%

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	529.0	526.3	2,036.9	2,005.6	1,956.7	1,942.8	1,967.5	1,983.5	1,999.8	1,954.1	1,937.6	1,936.7	1,557.9	1,535.8	1,519.6
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	5.0	5.0	18.7	18.9	16.7	14.9	14.4	14.3	18.8	15.0	14.8	14.8	14.3	12.9	12.8
LP Turbine Exit Steam to Condenser	Flow, lb/h	516,767	514,416	2,072,876	2,056,369	2,033,699	2,006,288	1,993,193	1,986,782	2,050,187	2,019,696	1,998,747	1,997,485	1,573,028	1,551,555	1,542,070
	Pressure, psia	0.947	0.948	0.995	0.838	0.831	1.299	1.469	1.461	0.836	1.305	1.485	1.484	0.856	0.865	0.860
	Pressure, in. HgA	1.928	1.930	1.415	1.706	1.692	2.645	2.990	2.975	1.702	2.657	3.023	3.022	1.133	1.395	1.385
	Temperature, F	99.9	99.9	89.5	95.6	95.6	110.6	114.9	114.7	95.8	110.8	115.3	115.3	82.8	89.4	89.1
	Enthalpy, Btu/lb	1,066.6	1,066.0	1,039.3	1,037.1	1,038.8	1,045.7	1,053.3	1,054.1	1,038.9	1,045.1	1,051.6	1,051.6	1,039.7	1,039.3	1,041.0
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,360.3	1,378.3	1,340.5	1,342.9	1,340.9	1,352.7	1,358.6	1,360.3	1,345.1	1,351.4	1,354.6	1,356.1	1,353.9	1,356.5	1,360.5
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	0	0	4	0	0	1	0	8	0	0	0	29	93	22	71
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,454.6	1,452.0	1,626.2	1,623.2	1,626.2	1,635.5	1,642.7	1,644.6	1,626.1	1,634.1	1,638.3	1,638.7	1,625.4	1,626.5	1,633.4
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,295.6	1,295.7	1,176.4	1,176.8	1,174.9	1,176.1	1,175.9	1,175.9	1,176.3	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	81.0	81.0	81.3	87.4	87.2	82.2	86.5	86.4	87.3	82.3	86.9	86.9	85.4	81.9	81.8
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	81.0	81.0	81.3	87.4	87.2	82.2	86.5	86.4	87.3	82.3	86.9	86.9	85.4	81.9	81.8
Condenser Exit	Flow, lb/h	520,367	518,016	2,076,474	2,061,969	2,037,299	2,009,887	1,996,793	1,990,390	2,053,787	2,023,296	2,002,347	2,001,114	1,576,721	1,555,177	1,545,740
	Pressure, psia	0.947	0.948	0.995	0.838	0.831	1.299	1.469	1.461	0.836	1.305	1.485	1.484	0.856	0.865	0.860
	Pressure, in HgA (MIN 1.0 in. HgA)	1.929	1.930	1.415	1.706	1.692	2.645	2.990	2.975	1.702	2.657	3.023	3.022	1.133	1.396	1.385
	Temperature, F	99.9	99.9	89.8	95.9	95.6	110.6	114.9	114.7	95.8	110.8	115.3	115.3	82.8	89.4	89.1
	Enthalpy, Btu/lb	67.9	67.9	57.9	63.9	63.6	78.6	82.9	82.7	63.8	78.8	83.3	83.3	50.9	57.4	57.2
Condensate Pump Discharge	Flow, lb/h	520,367	518,016	2,076,474	2,061,969	2,037,299	2,009,887	1,996,793	1,990,390	2,053,787	2,023,296	2,002,347	2,001,114	1,576,721	1,555,177	1,545,740
	Pressure, psia	569.2	569.2	607.8	607.9	609.0	608.8	610.2	611.0	608.3	608.2	608.7	608.7	628.6	628.5	629.2
	Temperature, F	107.3	107.4	90.9	97.0	96.7	111.8	116.2	116.0	96.9	112.0	116.5	116.5	84.8	91.1	90.9
	Enthalpy, Btu/lb	76.8	76.9	60.3	66.4	66.1	81.1	85.5	85.3	66.3	81.3	85.8	85.8	54.0	60.6	60.4
Condensate after GSC	Flow, lb/h	520,367	518,016	2,076,474	2,061,969	2,037,299	2,009,887	1,996,793	1,990,390	2,053,787	2,023,296	2,002,347	2,001,114	1,576,721	1,555,177	1,545,740
	Temperature, F	111.5	111.6	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	86.9	92.5	92.3
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	520,362	518,014	2,076,471	2,061,964	2,037,295	2,009,882	1,996,787	1,990,385	2,053,783	2,023,291	2,002,341	2,001,108	1,576,732	1,555,175	1,545,749
	Temperature, F	111.5	111.5	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	86.9	92.5	92.3
Total Circulating Water	Flow, lb/h	122,353,832	122,353,832	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,697,952	199,501,072	199,501,072
	Flow, gpm	239,834	239,834	389,653	389,785	389,785	389,696	389,662	389,662	389,785	389,699	389,662	389,662	389,853	389,785	389,785
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	90.0	69.0	69.0	69.0	85.0	90.0	90.0	68.9	85.0	90.0	90.0	60.9	68.0	68.0
Circulating Water to Condenser	Flow, lb/h	114,969,400	114,969,400	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624
	Flow, gpm	224,756	224,756	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	90.1	69.1	69.1	69.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1
Circulating Water from Condenser	Flow, lb/h	114,969,400	114,969,400	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624
	Temperature, F	94.9	94.9	71.2	79.0	78.9	95.7	100.5	100.4	79.0	95.7	100.6	100.6	68.6	76.4	76.4
Total Circulating Water Discharge	Flow, lb/h	122,353,832	122,353,832	199,697,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,697,952	199,501,072	199,501,072
	Temperature, F	95.4	95.3	71.2	79.0	78.9	95.7	100.6	100.5	79.0	95.8	100.7	100.7	68.7	76.6	76.5
Circulating Water Temperature Rise	dT, F	5.37	5.35	11.29	11.04	10.94	10.73	10.55	10.48	11.01	10.79	10.71	10.71	8.70	8.59	8.51
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,884,427	7,884,427	7,884,427	7,884,426	7,884,426	7,884,426	7,884,427	7,884,427	7,884,426	7,884,426	7,884,427	7,884,427	7,884,427	7,884,426	7,884,426
	Flow, gpm	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013	15,013
	Temperature, F	90.1	90.1	69.1	69.1	69.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,884,427	7,884,427	7,884,427	7,884,426	7,884,426	7,884,426	7,884,427	7,884,427	7,884,426	7,884,426	7,884,427	7,884,427	7,884,427	7,884,426	7,884,426
	Temperature, F	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 115 1x70% Unfired Gas Fuel 90 F	Case 116 1x70% Unfired Gas Fuel 95 F	Case 221 4x100% Unfired Oil Fuel 35 F	Case 222 4x100% Unfired Oil Fuel 45 F	Case 223 4x100% Unfired Oil Fuel 59 F	Case 224 4x100% Unfired Oil Fuel 74 F	Case 225 4x100% Unfired Oil Fuel 90 F	Case 226 4x100% Unfired Oil Fuel 95 F	Case 227 4x100% Unfired Oil Fuel 59 F/EC On	Case 228 4x100% Unfired Oil Fuel 74 F/EC On	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 230 4x100% Unfired Oil Fuel 95 F/EC On	Case 251 3x100% Unfired Oil Fuel 35 F	Case 252 3x100% Unfired Oil Fuel 45 F	Case 253 3x100% Unfired Oil Fuel 59 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	0	0	4	0	0	1	0	6	0	0	9	29	93	22	71
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	487,097	486,561	519,111	515,485	509,318	502,468	491,697	487,563	513,443	505,819	500,956	500,271	525,538	521,717	515,220
	Pressure, psia	87.2	86.9	56.6	56.6	54.0	57.3	56.0	56.0	56.1	58.1	58.3	58.0	43.9	45.1	43.1
	Temperature, F	316.2	316.0	284.9	280.2	283.1	287.1	285.5	284.4	284.5	288.0	286.2	287.9	289.7	271.4	288.5
	Enthalpy, Btu/lb	288.6	288.3	264.2	265.8	262.4	264.5	264.9	263.7	263.8	267.4	267.6	267.3	238.6	240.4	237.4
IP Bleed (before CV)	Flow, lb/h	151,550	152,178	80,604	78,566	75,178	70,869	66,323	65,020	76,750	71,022	69,352	69,094	76,056	76,169	72,040
	Pressure, psia	1,068.6	1,067.2	1,064.3	1,065.9	1,067.6	1,070.9	1,074.3	1,075.5	1,068.3	1,069.9	1,071.6	1,071.8	1,060.0	1,061.6	1,063.8
	Temperature, F	319.0	318.8	287.5	288.8	285.7	289.7	288.2	287.1	287.1	290.6	290.8	290.6	272.1	273.9	271.0	
	Enthalpy, Btu/lb	291.2	290.9	268.6	269.2	267.0	269.1	268.6	268.4	268.4	272.0	272.2	272.0	243.2	245.0	242.0
IP FW Control Valve Exit Pressure	Pressure, psia	229.9	227.9	562.9	563.4	573.4	582.3	547.3	542.0	579.3	566.8	559.1	558.5	476.9	473.5	484.4
	CV dP, psi	857.8	858.8	476.9	482.5	494.2	508.5	527.0	533.5	487.1	503.0	512.7	513.3	561.1	558.0	559.3
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,661.5	3,653.2	3,623.8	3,624.4	3,632.4	3,631.1	3,640.5	3,645.0	3,627.6	3,627.4	3,630.6	3,631.1	3,639.6	3,639.6	3,645.2
	CV dP, psi	2,840.4	2,844.1	1,691.6	1,694.7	1,707.6	1,707.0	1,733.7	1,747.8	1,694.7	1,695.3	1,704.9	1,704.4	2,074.3	2,077.9	2,082.4
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	335,447	333,323	438,607	436,899	434,142	431,599	426,974	422,673	436,693	433,897	431,234	431,176	447,480	446,548	442,280
	Pressure, psia	811.0	809.1	1,932.2	1,929.7	1,924.8	1,924.1	1,906.8	1,897.2	1,932.9	1,932.1	1,926.3	1,926.7	1,562.9	1,562.9	1,562.8
	Temperature, F	333.5	333.3	298.0	299.4	296.3	300.4	299.0	297.9	297.8	301.2	301.5	301.2	283.3	285.1	282.2
	Enthalpy, Btu/lb	306.7	305.5	271.2	272.8	269.5	273.6	272.2	271.1	270.8	274.5	274.7	274.5	255.6	257.3	254.4
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	335,446	333,324	438,608	436,899	434,142	431,600	426,975	422,673	436,693	433,898	431,235	431,177	447,481	446,549	442,280
	Pressure, psia	733.6	732.3	1,819.5	1,817.6	1,813.7	1,814.0	1,796.9	1,790.2	1,820.8	1,821.1	1,816.3	1,816.7	1,427.3	1,424.7	1,419.9
	Temperature, F	903.2	899.2	1,006.4	1,006.1	1,015.2	1,028.7	1,042.1	1,045.8	1,011.2	1,026.0	1,033.7	1,034.5	1,007.3	1,013.1	1,022.5
	Enthalpy, Btu/lb	1,460.2	1,457.4	1,481.0	1,484.6	1,490.4	1,498.8	1,507.5	1,510.0	1,487.7	1,496.9	1,501.8	1,502.3	1,497.5	1,501.0	1,506.7
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	733.6	732.3	1,819.5	1,817.6	1,813.7	1,814.0	1,796.9	1,790.2	1,820.8	1,821.1	1,816.3	1,816.7	1,427.3	1,424.7	1,419.9
	Temperature, F	903.2	899.2	1,006.4	1,006.1	1,015.2	1,028.7	1,042.1	1,045.8	1,011.2	1,026.0	1,033.7	1,034.5	1,007.3	1,013.1	1,022.5
	Enthalpy, Btu/lb	1,460.2	1,457.4	1,481.0	1,484.6	1,490.4	1,498.8	1,507.5	1,510.0	1,487.7	1,496.9	1,501.8	1,502.3	1,497.5	1,501.0	1,506.7
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	333.5	333.3	298.0	299.4	296.3	300.4	299.0	297.9	297.8	301.2	301.5	301.2	283.3	285.1	282.2
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	877.5	872.3	918.8	923.8	934.5	950.3	966.7	971.4	929.4	946.8	956.0	956.9	947.9	954.8	965.3
	Enthalpy, Btu/lb	1,460.2	1,457.4	1,481.0	1,484.6	1,490.4	1,498.8	1,507.5	1,510.0	1,487.7	1,496.9	1,501.8	1,502.3	1,497.5	1,501.0	1,506.7
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	479,367	477,804	513,080	509,468	503,317	495,492	485,791	481,721	507,409	499,818	494,812	494,297	510,959	510,267	508,810
	Pressure, psia	150.5	150.4	502.2	499.8	495.6	491.3	483.1	479.6	498.8	494.1	490.3	490.2	368.5	364.5	361.0
	Temperature, F	852.8	847.9	998.7	1,004.2	1,013.1	1,028.5	1,039.3	1,042.7	1,009.4	1,024.1	1,031.5	1,032.4	1,002.2	1,007.9	1,016.9
	Enthalpy, Btu/lb	1,464.6	1,462.0	1,520.2	1,523.2	1,528.2	1,535.5	1,542.7	1,544.8	1,526.1	1,534.1	1,538.3	1,538.7	1,525.4	1,528.5	1,533.4
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	150.5	150.4	502.2	499.8	495.6	491.3	483.1	479.6	498.8	494.1	490.3	490.2	368.5	364.5	361.0
	Temperature, F	852.8	847.9	998.7	1,004.2	1,013.1	1,028.5	1,039.3	1,042.7	1,009.4	1,024.1	1,031.5	1,032.4	1,002.2	1,007.9	1,016.9
	Enthalpy, Btu/lb	1,464.6	1,462.0	1,520.2	1,523.2	1,528.2	1,535.5	1,542.7	1,544.8	1,526.1	1,534.1	1,538.3	1,538.7	1,525.4	1,528.5	1,533.4
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	111.5	111.5	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	150.5	150.4	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	852.8	847.9	982.2	988.0	997.4	1,011.4	1,025.0	1,028.7	993.4	1,008.8	1,016.7	1,017.5	992.1	998.0	1,007.4
	Enthalpy, Btu/lb	1,454.6	1,452.0	1,520.2	1,523.2	1,528.2	1,535.5	1,542.7	1,544.8	1,526.1	1,534.1	1,538.3	1,538.7	1,525.4	1,528.5	1,533.4
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	33,274	32,507	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	61.0	60.9	53.2	54.3	51.7	55.0	53.7	52.7	52.8	55.8	56.0	55.7	41.6	42.8	40.8
	Temperature, F	529.5	529.2	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	286.2	287.9	289.7	271.4	288.5
	Enthalpy, Btu/lb	1,295.8	1,295.7	1,175.4	1,175.8	1,174.9	1,176.1	1,175.6	1,175.3	1,175.0	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	61.0	60.9	53.2	54.3	51.7	55.0	53.7	52.7	52.8	55.8	56.0	55.7	41.6	42.8	40.8
	Temperature, F	529.5	529.2	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	286.2	287.9	289.7	271.4	288.5
	Enthalpy, Btu/lb	1,295.8	1,295.7	1,175.4	1,175.8	1,174.9	1,176.1	1,175.6	1,175.3	1,175.0	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	111.5	111.5	91.9	98.0	97.8	112.9	117.2	117.1	97.9	113.0	117.6	117.6	85.9	92.5	92.3
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	61.0	60.9	53.2	54.3	51.7	55.0	53.7	52.7	52.8	55.8	56.0	55.7	41.6	42.8	40.8
	Temperature, F	529.5	529.2	284.9	286.2	283.1	287.1	285.5	284.4	284.5	288.0	286.2	287.9	289.7	271.4	288.5
	Enthalpy, Btu/lb	1,295.8	1,295.7	1,175.4	1,175.8	1,174.9	1,176.1	1,175.6	1,175.3	1,175.0	1,176.4	1,176.4	1,176.4	1,170.6	1,171.2	1,170.2
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

DEF-18FL-FUEL-002499

DECLASSIFIED

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 35 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
GateCycle Model ID		8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3
GateCycle Case ID		B8-254	B8-255	B8-256	B8-257	B8-258	B8-259	B8-260	B8-271	B8-272	B8-273	B8-274	B8-275	B8-276	B8-277	B8-278
Ambient Temperature		74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/80%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/80%RH	45 F/60%RH	59 F/80%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/80%RH	74 F/79%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On
Fuel Type		Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		265.4 MW	260.0 MW	258.5 MW	270.8 MW	266.6 MW	262.9 MW	263.0 MW	182.4 MW	180.7 MW	179.8 MW	172.5 MW	167.5 MW	166.5 MW	180.8 MW	173.4 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,376p/1,033F	1,362p/1,046F	1,355p/1,050F	1,384p/1,016F	1,381p/1,030F	1,376p/1,038F	1,377p/1,039F	980p/981F	977p/987F	972p/986F	969p/1,009F	958p/1,022F	952p/1,026F	977p/992F	973p/1,006F
STG Cold Reheat Conditions, psia/F		423p/726F	416p/736F	413p/739F	429p/712F	425p/724F	422p/730F	422p/730F	328p/706F	326p/709F	323p/716F	320p/726F	315p/737F	312p/739F	325p/713F	322p/725F
Cold Reheat Conditions after Conditioning, psia/F		423p/726F	416p/736F	413p/739F	429p/712F	425p/724F	422p/730F	422p/730F	328p/706F	326p/709F	323p/716F	320p/726F	315p/737F	312p/739F	325p/713F	322p/725F
STG Hot Reheat Conditions, psia/F		366p/1,028F	359p/1,041F	356p/1,046F	371p/1,011F	367p/1,026F	364p/1,033F	364p/1,034F	259p/972F	256p/977F	252p/985F	250p/998F	245p/1,011F	243p/1,014F	254p/982F	251p/996F
Condenser Pressure		2.23 in HgA	2.54 in HgA	2.63 in HgA	1.39 in HgA	2.23 in HgA	2.66 in HgA	2.66 in HgA	1.08 in HgA	1.34 in HgA	1.33 in HgA	2.17 in HgA	2.49 in HgA	2.48 in HgA	1.34 in HgA	2.18 in HgA
Stack Temperature		302 F	300 F	298 F	301 F	303 F	303 F	302 F	282 F	283 F	280 F	283 F	282 F	280 F	281 F	284 F
Run Date		9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		3	3	3	3	3	3	3	2	2	2	2	2	2	2	2
Gross CTG Output (each)	kW	173,546	161,444	157,783	169,138	176,517	169,872	169,268	193,774	193,483	184,906	173,546	161,444	157,783	169,138	176,617
Gross CTG Output (total)	kW	520,636	484,332	473,349	507,414	529,551	509,616	507,804	387,548	386,026	369,212	347,092	322,888	315,566	338,276	353,234
Gross CTG Heat Rate (LHV)	Btu/kWh	9,709	9,920	9,982	9,467	9,653	9,784	9,793	9,353	9,406	9,523	9,706	9,920	9,982	9,467	9,663
Gross CTG Heat Rate (HHV)	Btu/kWh	10,368	10,584	10,650	10,101	10,310	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	5,054.35	4,804.57	4,724.97	5,371.71	5,119.95	4,985.08	4,973.45	3,718.27	3,639.43	3,516.01	3,369.57	3,203.05	3,149.98	3,581.14	3,413.38
CTG Heat Input (HHV) (total)	MMBtu/h	5,392.80	5,126.11	5,041.18	5,731.20	5,462.59	5,319.76	5,306.29	3,967.10	3,882.99	3,751.31	3,595.07	3,417.40	3,360.78	3,820.80	3,641.73
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	265,370	259,970	258,540	270,810	266,580	262,940	262,970	182,350	180,740	179,800	172,530	167,470	166,460	180,750	173,400
STG Output, percent of CTG Output		51.0%	53.7%	54.6%	47.7%	50.3%	51.6%	51.8%	45.6%	46.7%	48.7%	49.7%	51.9%	52.7%	47.8%	49.1%
Gross Plant Output	kW	786,008	744,302	731,889	838,224	796,131	772,556	770,826	579,898	567,866	549,012	519,622	490,358	482,026	559,026	526,634
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,430	6,455	6,456	6,408	6,429	6,454	6,452	6,412	6,411	6,404	6,465	6,532	6,535	6,406	6,481
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,861	6,887	6,888	6,837	6,859	6,886	6,884	6,841	6,840	6,833	6,919	6,969	6,972	6,835	6,915
Plant Heat Input (LHV)	MMBtu/h	5,054.35	4,804.57	4,724.97	5,371.71	5,119.95	4,985.08	4,973.45	3,718.27	3,639.43	3,516.01	3,369.57	3,203.05	3,149.98	3,581.14	3,413.38
Plant Heat Input (HHV)	MMBtu/h	5,392.80	5,126.11	5,041.18	5,731.20	5,462.59	5,319.76	5,306.29	3,967.10	3,882.99	3,751.31	3,595.07	3,417.40	3,360.78	3,820.80	3,641.73
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	27,190	26,980	26,890	27,480	27,250	27,130	27,120	20,460	20,360	20,290	20,140	19,970	19,920	20,350	20,180
Total Auxiliary Power/Losses, percent of gross		3.46%	3.62%	3.67%	3.28%	3.42%	3.51%	3.52%	3.53%	3.59%	3.70%	3.88%	4.07%	4.13%	3.64%	3.83%
Net Plant Output w/ Step-Up Xfmr Losses	kW	758,818	717,342	704,999	810,744	768,881	745,426	743,706	559,438	547,506	528,722	499,482	470,388	462,106	538,676	506,454
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,661	6,698	6,702	6,626	6,656	6,689	6,687	6,646	6,650	6,650	6,746	6,809	6,817	6,648	6,740
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,107	7,148	7,151	7,069	7,102	7,137	7,135	7,091	7,095	7,095	7,198	7,265	7,273	7,093	7,191

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0
	Relative Humidity	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	80.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%
	WBT, F	69.1	76.8	76.8	51.4	69.1	76.8	76.8	30.9	39.3	51.4	69.1	76.8	76.8	51.4	69.1
Compressor Inlet Conditions	Temperature, F	74.0	90.0	95.0	62.6	69.8	78.6	79.3	35.0	45.0	59.0	74.0	90.0	95.0	62.6	69.8
	Relative Humidity	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.4%	80.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On
Saturation Efficiency		0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	5,831	3,606	9,023	13,120	0	0	0	0	0	0	5,831	3,606
Fuel Flow	Fuel Type	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,664.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8	1,859.1	1,819.7	1,756.0	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7
	Flow, lb/h	91,001	86,593	85,070	96,714	92,182	89,771	89,544	100,418	98,288	94,955	91,001	86,593	85,070	96,714	92,182
Fuel LHV	Btu/lb	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 35 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	398.1	391.2	388.4	404.6	400.5	397.3	397.1	299.7	298.0	295.1	292.1	286.9	284.8	297.2	293.9
	Temperature, F	721.6	731.9	734.7	707.8	719.6	725.6	726.2	700.1	704.5	711.3	721.6	732.0	734.7	708.4	719.8
	Enthalpy, Btu/lb	1,374.7	1,380.7	1,382.3	1,366.9	1,373.5	1,376.9	1,377.3	1,368.6	1,371.0	1,374.8	1,380.5	1,386.1	1,387.7	1,373.1	1,379.4
Desuperheating Flow for PAC Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	278.7	274.5	273.5	272.3	276.5	277.0	276.8	249.7	252.0	249.4	256.1	254.5	253.6	250.5	255.9
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	360.0	350.0	360.0	360.0	350.0	350.0	350.0	299.7	298.0	295.1	292.1	286.9	284.8	297.2	293.9
	Temperature, F	718.7	727.9	731.0	702.2	714.5	720.9	721.6	700.1	704.5	711.3	721.8	732.0	734.7	708.4	719.8
	Enthalpy, Btu/lb	1,374.7	1,380.7	1,382.3	1,366.9	1,373.5	1,376.9	1,377.3	1,368.6	1,371.0	1,374.8	1,380.5	1,386.1	1,387.7	1,373.1	1,379.4
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	36,998	34,599	34,026	38,684	36,871	35,006	35,616	40,160	39,310	37,976	36,338	34,599	34,026	38,684	36,871
CTG Exhaust Flow	Flow, lb/h	3,884,963	3,716,719	3,673,602	4,108,466	3,921,665	3,820,488	3,813,947	4,262,224	4,177,052	4,056,998	3,864,963	3,716,719	3,673,602	4,108,466	3,921,665
	Pressure, In. H2O	16.95	15.77	15.43	18.59	17.19	16.49	16.49	19.58	19.02	18.14	16.95	15.77	15.43	18.59	17.19
	Temperature, F	1,073.6	1,088.6	1,092.3	1,053.0	1,071.0	1,080.0	1,081.0	1,039.9	1,046.5	1,057.1	1,073.6	1,088.6	1,092.3	1,053.0	1,071.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	173,546	161,444	157,783	189,138	176,617	169,672	169,266	198,774	193,463	184,605	173,546	161,444	157,783	189,138	176,617
Gross Heat Rate	Btu/kWh (LHV)	9,708	9,920	9,982	9,467	9,663	9,784	9,793	9,353	9,466	9,623	9,708	9,920	9,982	9,467	9,663

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-5 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 35 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	436,674	432,173	429,275	444,995	441,350	436,313	433,213	473,190	470,846	466,939	462,803	465,072	461,882	459,992	465,425
(at HRSG terminal point)	Pressure, psia	1,417.6	1,403.7	1,395.5	1,426.1	1,423.6	1,418.5	1,416.5	1,038.8	1,035.8	1,031.0	1,027.3	1,016.5	1,009.9	1,036.0	1,032.0
	Temperature, F	1,038.6	1,050.1	1,053.7	1,018.6	1,034.1	1,041.9	1,042.8	996.0	991.5	1,000.3	1,013.6	1,026.5	1,029.9	999.6	1,011.2
	Enthalpy, Btu/lb	1,516.2	1,523.6	1,525.9	1,504.3	1,513.5	1,516.3	1,516.5	1,496.9	1,500.2	1,505.4	1,513.1	1,520.8	1,522.9	1,503.1	1,511.5
dP from HP drum to HRSG terminal point	psi	70.5	69.7	69.3	71.4	70.9	70.5	70.5	102.7	102.2	101.5	100.8	99.4	98.8	102.1	101.3
HP SH #1 Steam Outlet Temperature	Temperature, F	1,037.3	1,050.7	1,054.3	1,019.3	1,034.7	1,042.6	1,043.4	997.0	992.5	1,001.3	1,014.6	1,027.4	1,030.8	997.6	1,012.1
HP SH #2 Steam Outlet Temperature	Temperature, F	972.0	982.7	985.7	958.3	969.6	975.6	976.5	953.1	948.1	976.0	987.9	999.5	1,002.7	972.6	986.6
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	287.0	286.0	285.0	283.4	287.8	288.3	288.0	261.3	263.0	261.0	266.9	266.4	265.6	262.1	267.5
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	266.4	274.2	277.0	257.7	264.3	268.3	268.8	266.8	269.7	274.5	280.9	288.0	291.6	271.8	278.8
HP SH #3/4 Steam Outlet Temperature	Temperature, F	850.0	866.5	869.6	852.1	856.5	862.0	862.3	824.7	827.3	831.6	837.4	843.9	845.9	829.6	836.0
HP Evaporator #1 Exit	Flow, lb/h	56,599	56,540	56,448	56,389	56,682	56,665	56,724	56,222	56,311	56,426	56,624	56,561	56,468	56,449	56,703
	Pressure, psia	1,468.2	1,473.3	1,465.8	1,497.5	1,494.5	1,488.9	1,489.1	1,141.2	1,138.0	1,132.5	1,128.1	1,114.9	1,108.6	1,138.1	1,133.3
	Temperature, F	595.2	593.9	593.2	596.0	595.8	595.3	595.3	560.9	560.6	560.0	559.5	558.0	557.3	560.8	560.1
	Enthalpy, Btu/lb	1,169.7	1,170.5	1,170.9	1,169.2	1,169.3	1,169.6	1,169.6	1,186.8	1,187.0	1,187.2	1,187.4	1,187.9	1,188.2	1,187.0	1,187.2
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	348.3	357.8	360.5	335.9	345.3	351.9	352.4	384.9	389.2	376.1	366.5	399.5	399.2	373.2	384.5
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	383,374	378,632	373,826	389,606	385,688	382,628	382,490	417,967	415,536	411,513	407,179	399,511	395,413	414,642	409,722
	Pressure, psia	1,468.2	1,473.3	1,465.8	1,497.5	1,494.5	1,488.9	1,489.1	1,141.2	1,138.0	1,132.5	1,128.1	1,114.9	1,108.6	1,138.1	1,133.3
	Temperature, F	595.2	593.9	593.2	596.0	595.8	595.3	595.3	560.9	560.6	560.0	559.5	558.0	557.3	560.8	560.1
	Enthalpy, Btu/lb	1,162.7	1,170.5	1,170.9	1,169.2	1,169.3	1,169.6	1,169.6	1,186.8	1,187.0	1,187.2	1,187.4	1,187.9	1,188.2	1,187.0	1,187.2
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	20.7	20.3	20.2	21.0	20.8	20.7	20.7	21.2	21.0	20.8	20.6	20.2	20.0	21.0	20.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	436,973	432,172	429,274	444,995	441,350	436,313	433,214	473,189	470,846	466,938	462,803	465,072	461,881	459,991	465,425
	Temperature, F	595.2	593.9	593.2	596.0	595.8	595.3	595.3	560.9	560.6	560.0	559.5	558.0	557.3	560.8	560.1
HP Economizer #4/5 Outlet Temperature	Temperature, F	558.6	554.6	553.3	563.1	559.6	557.5	557.3	533.0	531.5	528.9	525.6	521.5	520.2	530.3	526.6
HP Economizer #6/7 Outlet Temperature	Temperature, F	460.0	456.2	454.9	464.2	461.0	459.1	458.9	436.4	435.1	432.4	429.7	425.9	424.7	433.8	430.7
HP Economizer #8 Outlet Temperature	Temperature, F	378.7	375.1	373.7	381.2	378.8	378.2	377.9	355.8	355.6	352.9	351.9	348.8	347.6	353.5	352.9
Feedwater to HP Economizer #8	Flow, lb/h	436,973	432,172	429,274	444,995	441,350	436,313	433,214	473,189	470,846	466,938	462,803	465,072	461,881	459,991	465,425
	Pressure, psia	1,549.1	1,532.5	1,524.1	1,560.1	1,555.1	1,549.6	1,549.9	1,211.6	1,207.9	1,201.2	1,195.6	1,180.2	1,173.0	1,207.7	1,201.6
	Temperature, F	287.0	286.0	285.0	283.4	287.8	288.3	288.0	261.3	263.0	261.0	266.9	266.4	265.6	262.1	267.5
	Enthalpy, Btu/lb	259.2	258.2	257.1	255.7	260.0	260.6	260.3	232.5	234.8	232.2	238.1	237.6	236.7	233.3	238.8
HP FW Temperature Increase Across BFP	F	13.8	14.0	14.1	13.7	13.8	13.9	13.9	13.9	13.9	14.0	14.1	14.3	14.4	14.0	14.1
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	972.2	981.7	984.1	958.0	970.5	976.2	976.8	955.1	950.6	968.9	978.1	988.1	990.6	964.1	976.3
Exit Temperature	Temperature, F	972.2	981.7	984.1	958.0	970.5	976.2	976.8	955.1	950.6	968.9	978.1	988.1	990.6	964.1	976.3
HRSG Hot Reheat Steam	Flow, lb/h	501,551	496,491	488,353	513,016	504,938	499,511	499,177	536,928	532,899	526,006	518,313	508,660	502,330	530,470	521,862
(at HRSG terminal point)	Pressure, psia	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.0	270.4	267.9	265.2	260.4	258.5	269.7	266.8
	Temperature, F	1,030.7	1,043.6	1,047.0	1,013.2	1,028.3	1,035.9	1,036.7	974.3	979.6	988.2	1,001.0	1,013.2	1,016.4	984.6	998.7
	Enthalpy, Btu/lb	1,540.9	1,548.0	1,549.9	1,531.4	1,539.5	1,543.7	1,544.1	1,513.9	1,518.7	1,521.3	1,526.2	1,534.8	1,536.5	1,519.4	1,526.9
HRSG RH dP -- terminal pt. to terminal pt.	psi	20.8	20.3	20.1	21.0	20.8	20.6	20.6	27.7	27.6	27.3	27.0	26.6	26.3	27.6	27.1
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,030.9	1,043.9	1,047.2	1,013.5	1,028.5	1,036.1	1,037.0	974.7	980.0	988.5	1,001.3	1,013.5	1,016.8	985.0	999.0
RHTR #3 Steam Outlet Temperature	Temperature, F	950.9	960.6	963.2	938.0	949.0	954.6	955.2	912.4	916.5	923.2	933.2	942.7	945.3	920.4	931.4
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	275.7	274.5	273.5	272.3	276.5	277.0	276.8	249.7	252.0	249.4	255.1	254.6	253.6	250.5	255.9
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	361.4	368.8	370.9	352.1	359.9	364.0	364.4	376.4	378.6	383.9	391.5	399.2	401.3	381.5	388.8
RHTR #4 Steam Outlet Temperature	Temperature, F	804.3	810.9	811.4	796.5	803.3	806.7	807.1	790.5	793.2	797.6	804.3	810.3	811.8	795.9	803.2
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	981.2	999.9	1,001.2	960.6	978.0	987.0	988.0	946.8	953.0	962.8	977.3	991.7	995.7	968.5	974.4
	Enthalpy, Btu/lb	1,515.2	1,523.6	1,525.9	1,504.3	1,513.5	1,518.3	1,518.8	1,496.9	1,500.2	1,505.4	1,513.1	1,520.8	1,522.9	1,503.1	1,511.5
Cold Reheat Steam from STG to HRSG	Flow, lb/h	432,601	425,879	423,015	438,551	434,945	431,945	431,647	465,787	463,496	456,508	455,521	447,880	444,728	462,624	458,110
(at HRSG terminal point)	Pressure, psia	398.1	391.2	388.4	404.6	400.6	397.3	397.1	296.7	295.0	293.1	292.1	286.9	284.8	297.2	293.9
	Temperature, F	721.6	731.9	734.7	707.8	719.6	726.6	726.2	700.1	704.5	711.3	721.6	732.0	734.7	708.4	716.8
	Enthalpy, Btu/lb	1,374.7	1,380.7	1,382.3	1,366.9	1,373.5	1,376.9	1,377.3	1,368.6	1,371.0	1,374.8	1,380.5	1,386.1	1,387.7	1,373.1	1,379.4
Cold Reheat Steam, % of HP Steam		98.55%	98.54%	98.54%	98.56%	98.56%	98.55%	98.55%	98.44%	98.43%	98.43%	98.43%	98.42%	98.42%	98.43%	98.43%
HP Steam - Cold Reheat Steam	Flow, lb/h	6,373	6,294	6,290	6,444	6,403	6,368	6,367	7,402	7,380	7,331	7,282	7,192	7,154	7,368	7,316

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 35 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	66,952	64,614	63,340	74,465	66,987	67,567	67,332	71,142	69,436	66,399	62,793	58,783	57,602	67,847	63,774
	Pressure, psia	398.1	391.2	388.4	404.6	400.4	397.3	397.1	299.7	298.0	295.1	292.2	286.6	284.8	297.2	293.9
	Temperature, F	594.4	594.2	593.9	593.9	594.7	594.8	594.9	565.4	565.3	565.4	565.5	564.6	564.2	565.7	565.9
	Enthalpy, Btu/lb	1,303.9	1,304.3	1,304.3	1,303.0	1,303.9	1,304.2	1,304.2	1,295.7	1,295.8	1,296.1	1,296.4	1,296.4	1,296.3	1,296.1	1,296.5
IP Evaporator Drum Exit	Flow, lb/h	66,952	64,614	63,340	74,465	66,987	67,567	67,332	71,142	69,436	66,399	62,793	58,783	57,602	67,847	63,774
	Pressure, psia	415.7	407.0	403.7	424.7	418.5	414.2	414.0	323.7	321.1	316.5	311.5	304.3	301.6	319.3	313.8
	Temperature, F	446.4	446.3	446.5	450.5	449.1	448.1	448.0	424.4	423.6	422.3	420.9	418.7	417.9	423.1	421.5
	Enthalpy, Btu/lb	1,205.1	1,205.1	1,205.1	1,205.2	1,205.1	1,205.1	1,205.1	1,204.0	1,203.9	1,203.6	1,203.7	1,203.6	1,203.4	1,203.9	1,203.7
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	29.3	28.1	27.7	30.7	29.6	29.0	28.9	29.5	29.6	28.3	27.4	26.2	25.8	26.7	27.8
IP Approach	Temperature, F	27.2	27.6	27.8	27.7	27.1	27.2	27.2	25.6	25.2	25.0	25.0	25.3	25.5	25.6	24.9
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	66,952	64,614	63,340	74,465	66,987	67,567	67,332	71,142	69,436	66,399	62,793	58,783	57,602	67,847	63,774
	Pressure, psia	415.7	407.0	403.7	424.7	418.5	414.2	414.0	323.7	321.1	316.5	311.5	304.3	301.6	319.3	313.8
	Temperature, F	421.2	418.7	417.7	422.8	421.9	420.9	420.8	398.8	398.5	396.3	395.8	393.3	392.4	397.4	396.6
	Enthalpy, Btu/lb	396.3	395.6	394.5	400.1	399.1	398.0	397.8	373.9	373.5	371.2	370.7	368.0	366.9	372.3	371.5
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	66,952	64,614	63,340	74,465	66,987	67,567	67,332	71,142	69,436	66,399	62,793	58,783	57,602	67,847	63,774
(pressure is preliminary)	Pressure, psia	454.3	446.9	436.3	469.6	456.2	451.3	450.8	363.6	359.1	351.3	342.7	331.6	327.9	356.6	346.9
	Temperature, F	276.9	275.7	274.7	279.4	277.7	276.2	277.9	251.1	253.5	256.8	256.6	256.1	255.1	252.0	257.3
	Enthalpy, Btu/lb	246.6	245.6	244.5	248.3	247.7	248.1	247.9	220.5	222.8	226.1	226.0	225.4	224.4	221.3	226.7
IP FW Temperature Increase Across BFP	F	3.7	3.8	3.6	3.7	3.7	3.8	3.8	3.8	3.6	3.8	3.9	3.9	4.0	3.8	3.9
LP Steam (at HRSG terminal point)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,163.1	1,163.9	1,163.0	1,165.0	1,164.8	1,164.4	1,163.4	1,165.2
LP Evaporator Steam Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,163.1	1,163.9	1,163.0	1,165.0	1,164.8	1,164.4	1,163.4	1,165.2
LP Evaporator Water Exit to BFPs	Flow, lb/h	507,926	495,788	492,614	519,464	511,337	505,875	505,543	544,331	540,277	533,331	525,598	513,665	509,460	537,834	529,194
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.9	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	242.2	241.0	239.9	238.7	243.1	243.5	243.3	216.0	218.3	215.6	221.4	220.8	219.8	216.7	222.2
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	66,952	64,614	63,340	74,465	66,987	67,567	67,332	71,142	69,436	66,399	62,793	58,783	57,602	67,847	63,774
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #5	Flow, lb/h	438,973	432,172	429,274	444,995	441,350	438,313	438,214	473,189	470,846	466,936	462,803	456,072	451,861	469,991	465,426
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	29.7	27.6	27.3	30.8	29.0	28.2	28.2	34.3	33.3	32.8	30.7	29.5	29.2	33.2	31.0
LP Approach	Temperature, F	163.9	158.1	157.2	176.0	164.7	160.4	160.2	159.7	155.2	152.5	142.3	137.0	136.1	153.7	143.9
Condensate Recirculated	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.1	112.6	112.5	92.5	108.1	112.8	112.8	86.3	93.2	93.1	109.2	113.9	113.8	93.2	109.2
% of Total LP Economizer Flow		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
	Enthalpy, Btu/lb	77.4	81.9	81.8	61.9	77.4	82.1	82.1	55.8	62.6	62.5	78.5	83.2	83.1	62.6	78.6
Condensate to LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
	Enthalpy, Btu/lb	77.4	81.9	81.8	61.9	77.4	82.1	82.1	55.8	62.6	62.5	78.5	83.2	83.1	62.6	78.6
Condensate from Recirculation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.1	112.6	112.5	92.5	108.1	112.8	112.8	86.3	93.2	93.1	109.2	113.9	113.8	93.2	109.2
Condensate Bypassing LP Economizer	Flow, lb/h	507,933	495,793	492,622	519,467	511,339	505,878	505,556	544,349	540,277	533,337	525,601	513,663	509,466	537,838	529,195
	% of Total Condensate Flow	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
Condensate to HRSG	Flow, lb/h	507,933	495,793	492,622	519,467	511,339	505,878	505,556	544,349	540,277	533,337	525,601	513,663	509,466	537,838	529,195
	Pressure, psia	528.6	529.4	529.9	528.7	528.3	528.4	528.5	545.1	544.8	545.2	544.3	544.6	544.9	545.0	544.1
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
Stack Exit	Flow, lb/h	3,864,963	3,718,719	3,673,902	4,108,466	3,921,665	3,820,488	3,813,847	4,252,224	4,177,062	4,066,998	3,864,963	3,718,719	3,673,902	4,108,466	3,921,665
	Temperature, F	301.9	299.5	298.2	300.6	302.9	302.7	302.4	281.7	283.0	279.8	283.5	281.6	280.3	281.3	284.5

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC501-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 95 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	5,342	5,325	5,307	5,326	5,357	5,358	5,361	3,716	3,716	3,714	3,725	3,704	3,690	3,726	3,737
HP Turbine Remainder Shaft Power	kW	47,511	47,013	47,522	47,008	47,595	47,763	47,794	30,925	30,966	31,090	31,316	31,292	31,209	31,135	31,388
IP Turbine Shaft Power	kW	85,956	84,879	84,378	86,776	86,370	85,935	85,931	59,144	58,944	58,562	58,259	57,473	57,121	58,868	58,667
LP Turbine Shaft Power	kW	131,262	128,807	126,975	136,406	131,958	128,566	128,566	92,691	91,210	90,549	89,308	79,047	78,480	91,111	89,795
Total Shaft Power	kW	264,720	259,299	257,673	270,220	269,926	262,254	262,281	182,782	181,141	180,201	177,862	167,812	166,810	181,144	173,749
STG Throttle Steam	Flow, lb/h	1,316,921	1,296,518	1,287,824	1,334,965	1,324,049	1,314,940	1,314,640	946,079	941,892	933,878	925,806	910,144	903,783	930,983	930,850
	Pressure, psia (MAX 2270 psia)	1,375.6	1,362.9	1,355.6	1,383.9	1,381.4	1,376.4	1,376.6	979.8	976.9	972.3	968.9	957.7	952.4	977.1	973.3
	Temperature, F	1,032.9	1,046.4	1,050.0	1,014.6	1,030.3	1,038.2	1,039.1	981.0	966.6	966.6	1,008.9	1,021.8	1,025.9	991.7	1,006.4
	Enthalpy, Btu/lb	1,514.2	1,522.6	1,524.9	1,509.3	1,512.5	1,517.3	1,517.5	1,485.9	1,489.2	1,504.4	1,512.1	1,519.8	1,521.9	1,502.1	1,510.6
THV Pressure Loss	psi	27.2	26.9	26.8	27.3	27.3	27.2	27.2	19.2	19.2	19.1	19.1	18.8	18.7	19.2	19.1
		1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.98%	1.94%	1.94%	1.97%	1.97%	1.97%	1.97%	1.97%	1.97%
Leak 1 Leakage Flow to HRH	Flow, lb/h	16,667	16,404	16,293	16,902	16,758	16,640	16,636	12,027	11,966	11,664	11,755	11,556	11,474	11,942	11,822
HP Turbine Exit	Flow, lb/h	1,300,267	1,280,116	1,271,534	1,316,084	1,307,290	1,298,300	1,298,004	934,354	929,725	922,018	913,850	898,588	892,290	920,041	919,026
	Pressure, psia	422.6	415.6	412.7	429.0	426.0	421.8	421.7	327.6	325.9	323.0	320.1	314.6	312.4	325.2	322.0
	Temperature, F (MAX 640 F)	725.8	736.1	738.9	712.2	723.9	729.8	730.5	704.9	709.2	716.1	726.5	736.6	739.3	713.1	724.5
	Enthalpy, Btu/lb	1,375.7	1,381.7	1,383.3	1,367.9	1,374.5	1,377.9	1,378.3	1,369.6	1,372.0	1,375.8	1,381.5	1,387.1	1,388.7	1,374.1	1,380.4
Efficiency (THV inlet to HPT exit)		85.74%	85.75%	85.75%	85.73%	85.74%	85.74%	85.74%	85.62%	85.62%	85.63%	85.63%	85.64%	85.64%	85.62%	85.63%
Efficiency (THV exit to HPT exit)		87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.02%	87.01%	87.01%	87.00%	87.01%	87.01%	87.01%	87.00%	87.01%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	1,264	1,256	1,246	1,313	1,293	1,279	1,278	1,000	993	981	967	946	938	969	973
CRH Steam to Steam Seals	Flow, lb/h	1,174	1,227	1,248	1,119	1,158	1,184	1,186	1,785	1,798	1,821	1,846	1,885	1,900	1,866	1,834
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	1,297,799	1,277,632	1,269,041	1,315,652	1,304,840	1,295,837	1,295,541	931,569	928,934	919,214	911,037	896,757	890,452	925,246	916,220
	Pressure, psia	422.6	415.6	412.7	429.0	425.0	421.8	421.7	327.6	325.9	323.0	320.1	314.6	312.4	325.2	322.0
	Temperature, F	725.8	736.1	738.9	712.2	723.9	729.8	730.5	704.9	709.2	716.1	726.5	736.6	739.3	713.1	724.5
	Enthalpy, Btu/lb	1,375.7	1,381.7	1,383.3	1,367.9	1,374.5	1,377.9	1,378.3	1,369.6	1,372.0	1,375.8	1,381.5	1,387.1	1,388.7	1,374.1	1,380.4
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	275.7	274.5	273.5	272.3	276.5	277.0	278.6	249.7	252.0	249.4	255.1	254.5	253.8	250.5	255.9
Final Cold Reheat Steam after Conditioning	Flow, lb/h	1,297,799	1,277,632	1,269,041	1,315,652	1,304,840	1,295,837	1,295,541	931,569	928,934	919,214	911,037	896,757	890,452	925,246	916,220
	Pressure, psia	422.6	415.6	412.7	429.0	425.0	421.8	421.7	327.6	325.9	323.0	320.1	314.6	312.4	325.2	322.0
	Temperature, F (MAX 750 F)	725.8	736.1	738.9	712.2	723.9	729.8	730.5	704.9	709.2	716.1	726.5	736.6	739.3	713.1	724.5
	Enthalpy, Btu/lb	1,375.7	1,381.7	1,383.3	1,367.9	1,374.5	1,377.9	1,378.3	1,369.6	1,372.0	1,375.8	1,381.5	1,387.1	1,388.7	1,374.1	1,380.4
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	206,855	193,840	190,019	223,395	209,951	202,296	201,992	142,287	138,855	132,797	125,588	117,563	115,207	135,594	127,544
Reheat System dP	psi	57.4	55.8	56.4	57.9	57.7	57.4	57.4	71.6	71.3	70.9	70.5	69.8	69.1	71.3	70.9
Reheat System dP		13.50%	13.85%	13.88%	13.50%	13.58%	13.81%	13.92%	21.85%	21.89%	21.95%	22.02%	22.11%	22.13%	21.92%	22.01%
Hot Reheat Flow	Flow, lb/h	1,604,654	1,471,472	1,459,059	1,539,047	1,514,791	1,498,532	1,497,532	1,073,857	1,065,799	1,052,011	1,036,626	1,013,321	1,004,660	1,060,840	1,043,764
	Pressure, psia (MAX 584 psia)	365.2	358.8	356.3	371.1	367.3	364.4	364.2	256.0	254.6	252.1	249.6	245.1	243.3	253.9	251.1
	Temperature, F	1,028.2	1,041.1	1,044.5	1,010.7	1,025.6	1,033.4	1,034.2	971.5	976.8	985.4	998.3	1,010.5	1,013.7	981.6	995.9
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-4.7	-5.3	-5.5	-4.1	-4.5	-4.8	-4.8	-9.5	-9.7	-10.1	-10.8	-11.3	-11.6	-9.9	-10.4
	Enthalpy, Btu/lb	1,539.9	1,547.0	1,548.9	1,530.4	1,536.5	1,542.7	1,543.1	1,512.9	1,515.7	1,520.3	1,527.2	1,533.8	1,535.5	1,518.4	1,525.9
INTV Pressure Loss	psi	7.3	7.2	7.2	7.4	7.4	7.3	7.3	5.1	5.1	5.1	5.0	4.9	4.9	5.1	5.0
		2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%	2.01%
IP Turbine Exit	Flow, lb/h	1,521,321	1,487,877	1,476,362	1,556,950	1,531,549	1,515,172	1,514,168	1,085,683	1,077,784	1,063,876	1,048,361	1,024,876	1,016,134	1,072,883	1,055,588
	Pressure, psia	77.7	76.3	75.8	78.9	78.1	77.5	77.5	54.4	54.1	53.5	53.0	52.1	51.7	53.9	53.4
	Temperature, F	631.6	642.1	644.8	617.6	629.7	635.8	636.5	586.0	592.2	599.0	609.3	619.2	621.7	598.2	607.5
	Enthalpy, Btu/lb	1,346.7	1,351.9	1,353.3	1,339.6	1,345.7	1,348.7	1,349.1	1,326.7	1,328.8	1,332.2	1,337.3	1,342.1	1,343.4	1,330.6	1,336.3
Efficiency (INTV inlet to IPT exit)		90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%	90.90%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	1,142	1,117	1,107	1,188	1,169	1,137	1,136	815	809	799	787	769	763	805	792
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	44.1	43.2	42.6	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	249.2	253.5
	Enthalpy, Btu/lb	1,170.7	1,170.3	1,170.0	1,169.7	1,171.0	1,171.1	1,171.1	1,162.1	1,162.9	1,162.0	1,164.0	1,163.8	1,163.4	1,162.4	1,164.2
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)															
LP Admission CV Pressure Loss	% loss	-78.2%	-76.6%	-78.6%	-82.1%	-74.8%	-72.2%	-72.6%	-90.7%	-82.2%	-82.2%	-82.5%	-86.2%	-86.8%	-86.6%	-86.3%
LP Turbine Inlet Steam	Flow, lb/h	1,520,179	1,486,760	1,474,245	1,554,782	1,530,399	1,514,035	1,513,032	1,085,058	1,076,955	1,063,077	1,047,594	1,024,107	1,015,372	1,072,078	1,054,794
	Pressure, psia	78.5	75.2	74.7	77.7	78.9	78.3	78.3	53.6	53.3	52.7	52.2	51.3	50.9	53.1	52.6
	Temperature, F	631.5	642.0	644.7	617.5	629.5	636.7	636.4	587.9	592.1	599.0	609.2	619.0	621.6	598.1	607.4
	Enthalpy, Btu/lb	1,346.7	1,351.9	1,353.3	1,339.6	1,345.7	1,348.7	1,349.1	1,326.7	1,328.8	1,332.2	1,337.3	1,342.1	1,343.4	1,330.6	1,336.3
LP Turbine Exit	Flow, lb/h	1,520,179	1,486,760	1,474,245	1,554,782	1,530,399	1,514,035	1,513,032	1,085,058	1,076,955	1,063,077	1,047,594	1,024,107	1,015,372	1,072,078	1,054,794
	Pressure, psia	1.093	1.245	1.240	0.884	1.097	1.256	1.256	0.631	0.650	0.655	1.066	1.221	1.216	0.656	1.071
	Pressure, in. HgA	2.226	2.536	2.525	1.802	2.233	2.558	2.557	1.080	1.348	1.334	2.174	2.485	2.476	1.340	2.181
	Temperature, F	104.7	109.1	109.0	89.3	104.8	109.5	109.4	81.4	86.2	87.9	103.9	108.5	108.3	88.1	104.0
ELEP Enthalpy, Btu/lb		1,044.4	1,054.3	1,055.2	1,018.1	1,043.8	1,052.3	1,052.5	1,018.9	1,030.2	1,032.0	1,058.8	1,068.7	1,069.5	1,031.2	1,058.9
UEEP Enthalpy, Btu/lb		1,052.1	1,060.9	1,061.8	1,040.3	1,051.5	1,059.0	1,059.2	1,035.2	1,039.6	1,041.6	1,065.9	1,078.8	1,079.7	1,040.8	1,065.9
Exhaust Loss Btu/lb		7.7	8.8	8.8	22.2	7.7	8.7	8.7	16.4	9.8	9.5	7.3	10.1	10.2	9.6	7.3
Moisture @ UEEP (MIN 1.7%)		5.25%	4.62%	4.54%	5.74%	5.35%	4.82%	4.81%	5.87%	5.73%	5.55%	3.91%	2.86%	2.77%	5.64%	3.98%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.54%	90.77%	90.81%	90.03%	90.52%	90.70%	90.71%	89.95%	90.16%	90.24%	90.73%	90.99%	90.99%	90.20%	90.73%
LPT Efficiency to UEEP		88.25%	88.76%	88.80%	88.81%	88.21%	88.66%	88.67%	86.17%	87.25%	87.37%	88.33%	87.61%	87.61%	87.31%	88.32%
Annulus Velocity ft/s		721.2	628.8	626.5	1,125.6	723.2	633.7	633.5	1,002.4	515.9	513.3	515.8	448.0	446.3	515.8	517.2
Volumetric Flow 1000 ft3/min per end		3,660	3,205	3,193	5,830	3,690	3,230	3,229	5,161	4,177	4,158	2,630	2,291	2,282	4,171	2,688
Gross Generator Output	kW	255,370	269,974	268,542	270,611	266,562	262,940	262,909	182,348	180,736	179,709	172,530	167,465	166,455	180,749	173,395
Generator MVA		447.8	436.5	436.5	447.8	447.8	436.5	436.5	447.8	447.8	447.8	447.8	436.5	436.5	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.26%	98.24%	98.24%	98.26%	98.27%	98.25%	98.25%	97.79%	97.77%	97.76%	97.69%	97.64%	97.63%	97.77%	97.70%

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 35 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,491.3	1,466.1	1,454.2	1,530.8	1,500.2	1,468.6	1,457.9	1,072.9	1,061.9	1,050.3	1,043.8	1,029.0	1,021.3	1,068.2	1,060.2
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,977	137,977	137,975	137,976
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	11.5	11.1	11.0	12.9	11.5	11.2	11.2	11.6	10.5	10.3	9.3	9.0	9.0	10.4	9.4
LP Turbine Exit Steam to Condenser	Flow, lb/h	1,529,179	1,486,760	1,474,245	1,564,782	1,530,399	1,514,035	1,513,032	1,085,058	1,076,956	1,063,077	1,047,594	1,024,107	1,015,372	1,072,078	1,054,794
	Pressure, psia	1.093	1.245	1.240	0.884	1.097	1.256	1.256	0.531	0.660	0.655	1.068	1.221	1.216	0.658	1.071
	Pressure, in. HgA	2.225	2.536	2.525	1.802	2.233	2.558	2.557	1.080	1.343	1.334	2.174	2.485	2.476	1.340	2.181
	Temperature, F	104.7	109.1	109.0	89.3	104.8	109.5	109.4	81.4	88.2	87.9	103.9	108.5	108.3	88.1	104.0
	Enthalpy, Btu/lb	1,052.1	1,060.9	1,061.8	1,040.3	1,051.5	1,059.0	1,059.2	1,035.2	1,039.8	1,041.8	1,055.9	1,078.8	1,079.7	1,040.8	1,055.3
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,366.5	1,372.4	1,374.1	1,358.7	1,365.3	1,366.7	1,366.1	1,360.9	1,362.3	1,365.1	1,371.8	1,377.5	1,379.1	1,364.4	1,370.7
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	22	21	22	19	16	2	39	25	0	0	10	0	1	0	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,540.9	1,548.0	1,549.9	1,531.4	1,539.5	1,543.7	1,544.1	1,519.9	1,516.7	1,521.3	1,526.2	1,534.8	1,536.5	1,519.4	1,526.9
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,183.1	1,183.9	1,183.0	1,185.0	1,184.6	1,184.4	1,183.4	1,185.2
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	77.4	81.9	81.8	61.9	77.4	82.1	82.1	56.6	62.6	62.5	78.5	83.2	83.1	62.5	78.5
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	77.4	81.9	81.8	61.9	77.4	82.1	82.1	55.6	62.6	62.5	78.5	83.2	83.1	62.5	78.5
Condenser Exit	Flow, lb/h	1,523,801	1,490,380	1,477,867	1,558,400	1,534,017	1,517,636	1,516,670	1,088,093	1,080,555	1,066,677	1,051,204	1,027,708	1,018,972	1,075,678	1,058,394
	Pressure, psia	1.093	1.245	1.240	0.884	1.097	1.256	1.256	0.531	0.660	0.655	1.068	1.221	1.216	0.658	1.071
	Pressure, in HgA (MIN 1.0 in. HgA)	2.225	2.536	2.525	1.802	2.233	2.558	2.558	1.080	1.343	1.334	2.174	2.485	2.476	1.340	2.181
	Temperature, F	104.7	109.1	109.0	89.3	104.8	109.5	109.4	81.4	88.2	87.9	103.9	108.5	108.3	88.1	104.0
	Enthalpy, Btu/lb	72.7	77.2	77.0	57.3	72.8	77.5	77.5	49.4	55.2	55.0	71.0	76.5	76.3	56.1	72.0
Condensate Pump Discharge	Flow, lb/h	1,523,801	1,490,380	1,477,867	1,558,400	1,534,017	1,517,636	1,516,670	1,088,093	1,080,555	1,066,677	1,051,204	1,027,708	1,018,972	1,075,678	1,058,394
	Pressure, psia	528.6	529.4	529.9	528.7	528.3	528.4	528.5	546.1	544.8	545.2	544.3	544.6	544.9	545.0	544.1
	Temperature, F	106.5	111.1	111.0	91.1	106.6	111.3	111.3	84.3	91.2	91.0	107.0	111.7	111.6	91.1	107.1
	Enthalpy, Btu/lb	75.9	80.5	80.3	60.5	76.0	80.7	80.7	53.9	60.7	60.5	76.5	81.1	81.0	60.6	76.6
Condensate after GSC	Flow, lb/h	1,523,801	1,490,380	1,477,867	1,558,400	1,534,017	1,517,636	1,516,670	1,088,093	1,080,555	1,066,677	1,051,204	1,027,708	1,018,972	1,075,678	1,058,394
	Temperature, F	108.0	112.6	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,523,809	1,490,380	1,477,866	1,558,401	1,534,018	1,517,633	1,516,668	1,088,097	1,080,563	1,066,674	1,051,203	1,027,706	1,018,971	1,075,675	1,058,391
	Temperature, F	108.0	112.6	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
Total Circulating Water	Flow, lb/h	198,978,496	198,800,096	198,800,096	199,601,072	198,978,496	198,800,096	198,800,096	122,892,626	122,774,400	122,774,400	122,460,856	122,353,632	122,353,632	122,774,400	122,460,856
	Flow, gpm	389,996	389,662	389,662	389,785	389,996	389,662	389,662	239,913	239,678	239,678	239,037	239,834	239,834	239,678	239,037
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	85.0	90.0	90.0	66.0	85.0	90.0	90.0	66.0	66.0	66.0	85.0	90.0	90.0	68.0	85.0
Circulating Water to Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440
	Flow, gpm	374,619	374,503	374,503	374,741	374,619	374,503	374,503	224,802	224,844	224,844	224,771	224,758	224,758	224,844	224,771
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	85.1	90.1	90.1	68.1	85.1	90.1	90.1	68.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1
Circulating Water from Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440
	Temperature, F	93.2	98.1	98.0	76.4	93.3	98.2	98.2	66.8	77.7	77.6	94.6	99.4	99.4	77.7	94.6
Total Circulating Water Discharge	Flow, lb/h	198,978,496	198,800,096	198,800,096	199,601,072	198,978,496	198,800,096	198,800,096	122,892,626	122,774,400	122,774,400	122,460,856	122,353,632	122,353,632	122,774,400	122,460,856
	Temperature, F	93.4	98.2	98.2	76.6	93.4	98.4	98.4	76.0	77.9	77.8	94.7	99.5	99.5	77.8	94.8
Circulating Water Temperature Rise	dT, F	8.37	8.24	8.19	8.56	8.42	8.36	8.36	9.96	9.87	9.77	9.74	9.62	9.56	9.84	9.76
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426
	Flow, gpm	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049
	Temperature, F	85.1	90.1	90.1	68.1	85.1	90.1	90.1	68.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426
	Temperature, F	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 254 3x100% Unfired Oil Fuel 74 F	Case 255 3x100% Unfired Oil Fuel 90 F	Case 256 3x100% Unfired Oil Fuel 95 F	Case 257 3x100% Unfired Oil Fuel 59 F/EC On	Case 258 3x100% Unfired Oil Fuel 74 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 260 3x100% Unfired Oil Fuel 95 F/EC On	Case 271 2x100% Unfired Oil Fuel 36 F	Case 272 2x100% Unfired Oil Fuel 45 F	Case 273 2x100% Unfired Oil Fuel 59 F	Case 274 2x100% Unfired Oil Fuel 74 F	Case 275 2x100% Unfired Oil Fuel 90 F	Case 276 2x100% Unfired Oil Fuel 95 F	Case 277 2x100% Unfired Oil Fuel 59 F/EC On	Case 278 2x100% Unfired Oil Fuel 74 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	22	21	22	19	18	2	39	25	0	0	10	0	1	0	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	507,925	496,786	492,614	519,454	511,397	505,876	505,543	544,331	540,277	533,331	526,595	513,855	509,480	537,834	529,194
	Pressure, psia	46.4	45.5	44.8	44.0	47.0	47.3	47.1	30.8	32.0	30.6	33.5	33.3	32.8	31.2	34.0
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.6
	Enthalpy, Btu/lb	242.2	241.0	239.9	238.7	243.1	243.6	243.3	216.0	218.3	215.6	221.4	220.8	219.8	216.7	222.2
IP Bleed (before CV)	Flow, lb/h	68,902	64,614	63,340	74,459	69,987	67,662	67,329	71,142	69,436	68,392	62,793	59,783	57,599	67,843	63,769
	Pressure, psia	1,066.6	1,070.6	1,071.9	1,062.3	1,065.6	1,067.6	1,067.7	1,053.0	1,054.4	1,057.3	1,059.9	1,064.2	1,065.8	1,056.6	1,056.5
	Temperature, F	575.7	574.6	573.5	572.3	576.6	577.0	576.8	549.7	552.0	549.4	555.1	554.6	553.6	550.5	556.9
	Enthalpy, Btu/lb	246.6	245.6	244.5	243.3	247.7	248.1	247.9	220.5	222.8	220.1	226.0	225.4	224.4	221.3	226.7
IP FW Control Valve Exit Pressure	Pressure, psia	454.3	440.9	436.3	466.6	456.2	451.3	450.8	363.6	359.1	351.3	342.7	331.6	327.9	355.6	345.9
	CV dP, psi	612.5	629.7	635.6	592.6	607.4	616.3	616.9	669.4	695.5	708.1	717.2	732.6	737.9	699.8	712.6
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,643.4	3,652.9	3,657.5	3,640.3	3,639.6	3,642.8	3,643.9	3,045.1	3,044.9	3,053.9	3,051.1	3,061.0	3,065.9	3,048.6	3,047.1
	CV dP, psi	2,094.3	2,120.5	2,133.4	2,080.1	2,083.5	2,093.0	2,093.4	2,433.3	2,437.0	2,452.7	2,455.5	2,480.9	2,492.9	2,440.8	2,445.5
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	438,973	432,172	429,274	444,995	441,350	438,313	438,214	473,189	470,846	466,939	462,803	455,072	451,882	469,992	465,425
	Pressure, psia	1,549.1	1,532.5	1,524.1	1,558.1	1,556.1	1,549.8	1,549.9	1,211.8	1,207.9	1,201.2	1,195.8	1,189.2	1,179.0	1,207.7	1,201.6
	Temperature, F	287.0	286.0	285.0	283.4	287.8	288.3	288.0	261.3	263.6	261.0	266.9	266.4	265.6	262.1	267.5
	Enthalpy, Btu/lb	259.2	258.2	257.1	255.7	260.0	260.6	260.3	232.5	234.8	232.2	238.1	237.6	236.7	233.3	238.8
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	438,974	432,173	429,275	444,995	441,350	438,313	438,213	473,190	470,846	466,939	462,803	455,072	451,882	469,992	465,425
	Pressure, psia	1,417.6	1,403.7	1,396.5	1,426.1	1,423.6	1,418.5	1,418.6	1,038.6	1,035.8	1,031.0	1,027.3	1,015.6	1,009.9	1,038.0	1,032.0
	Temperature, F	1,036.6	1,050.1	1,053.7	1,018.8	1,034.1	1,041.9	1,042.8	986.0	991.5	1,000.3	1,013.6	1,026.6	1,029.9	998.8	1,011.2
	Enthalpy, Btu/lb	1,515.2	1,523.6	1,525.9	1,504.3	1,513.5	1,518.3	1,518.8	1,496.9	1,500.2	1,505.4	1,513.1	1,520.8	1,522.9	1,503.1	1,511.6
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1,417.6	1,403.7	1,396.5	1,426.1	1,423.6	1,418.5	1,418.6	1,038.6	1,035.8	1,031.0	1,027.3	1,015.6	1,009.9	1,038.0	1,032.0
	Temperature, F	1,036.6	1,050.1	1,053.7	1,018.8	1,034.1	1,041.9	1,042.8	986.0	991.5	1,000.3	1,013.6	1,026.6	1,029.9	998.8	1,011.2
	Enthalpy, Btu/lb	1,515.2	1,523.6	1,525.9	1,504.3	1,513.5	1,518.3	1,518.8	1,496.9	1,500.2	1,505.4	1,513.1	1,520.8	1,522.9	1,503.1	1,511.6
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	287.0	286.0	285.0	283.4	287.8	288.3	288.0	261.3	263.6	261.0	266.9	266.4	265.6	262.1	267.5
HP Steam Bypassed to Cold Reheat – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	981.2	995.9	1,001.2	966.6	978.0	987.0	988.0	946.8	953.0	962.6	977.3	991.7	995.7	968.5	974.4
	Enthalpy, Btu/lb	1,515.2	1,523.6	1,525.9	1,504.3	1,513.5	1,518.3	1,518.8	1,496.9	1,500.2	1,505.4	1,513.1	1,520.8	1,522.9	1,503.1	1,511.6
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	501,551	490,491	486,353	513,016	504,930	499,511	499,177	536,926	532,899	526,906	518,313	506,660	502,330	530,470	521,882
	Pressure, psia	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.5	269.7	266.8
	Temperature, F	1,030.7	1,043.6	1,047.0	1,013.2	1,028.3	1,035.9	1,036.7	974.3	979.6	988.2	1,001.8	1,013.2	1,016.4	984.6	998.7
	Enthalpy, Btu/lb	1,540.9	1,549.0	1,549.9	1,531.4	1,539.5	1,543.7	1,544.1	1,513.9	1,516.7	1,521.3	1,528.2	1,534.8	1,536.5	1,519.4	1,526.9
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.5	269.7	266.8
	Temperature, F	1,030.7	1,043.6	1,047.0	1,013.2	1,028.3	1,035.9	1,036.7	974.3	979.6	988.2	1,001.8	1,013.2	1,016.4	984.6	998.7
	Enthalpy, Btu/lb	1,540.9	1,549.0	1,549.9	1,531.4	1,539.5	1,543.7	1,544.1	1,513.9	1,516.7	1,521.3	1,528.2	1,534.8	1,536.5	1,519.4	1,526.9
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
HRH Steam Bypassed to Condenser – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
	Temperature, F	1,021.6	1,035.1	1,038.6	1,003.5	1,019.0	1,026.9	1,027.8	970.2	975.6	984.4	997.5	1,010.0	1,013.4	980.7	995.1
	Enthalpy, Btu/lb	1,540.9	1,549.0	1,549.9	1,531.4	1,539.5	1,543.7	1,544.1	1,513.9	1,516.7	1,521.3	1,528.2	1,534.8	1,536.5	1,519.4	1,526.9
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,163.1	1,163.9	1,163.0	1,165.0	1,164.8	1,164.4	1,163.4	1,165.2
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,163.1	1,163.9	1,163.0	1,165.0	1,164.8	1,164.4	1,163.4	1,165.2
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	108.0	112.5	112.4	92.4	108.0	112.7	112.7	86.3	93.1	93.0	109.1	113.8	113.7	93.1	109.2
LP Steam Bypassed to Condenser – CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	44.1	43.2	42.5	41.7	44.7	45.0	44.8	28.5	29.7	28.3	31.3	31.0	30.5	28.9	31.7
	Temperature, F	273.1	271.9	270.8	269.8	274.0	274.4	274.2	247.4	249.7	247.0	252.7	252.1	251.2	248.2	253.5
	Enthalpy, Btu/lb	1,171.7	1,171.4	1,171.0	1,170.7	1,172.0	1,172.1	1,172.1	1,163.1	1,163.9	1,163.0	1,165.0	1,164.8	1,164.4	1,163.4	1,165.2
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 35 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 59 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
GateCycle Model ID		8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BARTO	8BART3	8BARTO
GateCycle Case ID		B8-279	B8-280	B8-301	B8-302	B8-303	B8-304	B8-305	B8-306	B8-307	B8-308	B8-309	B8-310	B8-21S	B8-22S	B8-23S
Ambient Temperature		90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		2@100%	2@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	4@100%	4@100%	4@100%
CTG Inlet Air Cooler		Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Dist. Oil	Dist. Oil	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		169.6 MW	169.6 MW	85.7 MW	85.4 MW	84.6 MW	74.9 MW	69.0 MW	68.3 MW	86.1 MW	76.5 MW	70.7 MW	70.7 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		969p/1,014F	969p/1,015F	711p/980F	711p/987F	711p/999F	711p/985F	711p/940F	711p/940F	711p/992F	711p/985F	711p/945F	711p/945F	1,928p/1,020F	1,924p/1,027F	1,919p/1,037F
STG Cold Reheat Conditions, psia/F		319p/730F	319p/731F	232p/766F	231p/773F	230p/782F	221p/784F	214p/751F	213p/751F	231p/778F	222p/784F	217p/753F	217p/753F	566p/947F	565p/947F	565p/967F
Cold Reheat Conditions after Conditioning, psia/F		319p/730F	319p/731F	232p/766F	231p/750F	230p/750F	221p/750F	214p/750F	213p/750F	231p/750F	222p/750F	217p/750F	217p/750F	565p/947F	565p/947F	565p/967F
STG Hot Reheat Conditions, psia/F		249p/1,003F	249p/1,004F	142p/972F	142p/978F	142p/985F	142p/935F	142p/890F	142p/890F	142p/981F	142p/935F	142p/895F	142p/895F	523p/1,013F	520p/1,018F	516p/1,027F
Condenser Pressure		2.51 in HgA	2.51 in HgA	1.02 in HgA	0.99 in HgA	1.00 in HgA	1.68 in HgA	1.98 in HgA	1.95 in HgA	1.01 in HgA	1.68 in HgA	1.98 in HgA	1.98 in HgA	3.01 in HgA	3.44 in HgA	3.38 in HgA
Stack Temperature		284 F	284 F	266 F	264 F	261 F	271 F	276 F	275 F	263 F	272 F	277 F	277 F	230 F	230 F	228 F
Run Date		9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	7-Sep-06	10-Sep-06	7-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		2	2	1	1	1	1	1	1	1	1	1	1	4	4	4
Gross CTG Output (each)	kW	169,872	169,268	198,774	193,463	184,906	173,548	161,444	157,783	189,138	176,617	169,872	169,286	207,123	201,614	192,471
Gross CTG Output (total)	kW	339,744	338,572	198,774	193,463	184,906	173,548	161,444	157,783	189,138	176,617	169,872	169,286	828,492	806,456	769,884
Gross CTG Heat Rate (LHV)	Btu/kWh	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,982	9,467	9,663	9,784	9,793	9,071	9,124	9,237
Gross CTG Heat Rate (HHV)	Btu/kWh	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	10,060	9,993	10,117
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	3,324.06	3,315.64	1,859.13	1,819.71	1,758.90	1,684.78	1,601.52	1,574.99	1,790.57	1,706.85	1,662.03	1,657.82	7,515.25	7,358.11	7,111.42
CTG Heat Input (HHV) (total)	MMBtu/h	3,546.51	3,537.53	1,983.55	1,941.49	1,876.65	1,797.53	1,708.70	1,680.39	1,910.40	1,820.86	1,773.25	1,768.76	8,334.86	8,059.14	7,788.95
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	169,590	169,590	85,740	85,390	84,600	74,850	68,970	68,300	85,120	75,450	70,720	70,670	0	0	0
STG Output, percent of CTG Output		49.9%	50.1%	43.1%	44.1%	45.8%	43.1%	42.7%	43.3%	45.0%	42.7%	41.6%	41.7%	0.0%	0.0%	0.0%
Gross Plant Output	kW	509,334	508,162	284,514	278,853	269,206	248,398	230,414	226,083	274,258	252,067	240,592	239,956	828,492	806,456	769,884
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,525	6,525	6,534	6,526	6,530	6,783	6,951	6,966	6,529	6,771	6,909	6,909	9,071	9,124	9,237
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,963	6,961	6,972	6,962	6,907	7,237	7,416	7,433	6,966	7,224	7,370	7,371	10,060	9,993	10,117
Plant Heat Input (LHV)	MMBtu/h	3,324.06	3,315.64	1,859.13	1,819.71	1,758.90	1,684.78	1,601.52	1,574.99	1,790.57	1,706.85	1,662.03	1,657.82	7,515.25	7,358.11	7,111.42
Plant Heat Input (HHV)	MMBtu/h	3,546.51	3,537.53	1,983.55	1,941.49	1,876.65	1,797.53	1,708.70	1,680.39	1,910.40	1,820.86	1,773.25	1,768.76	8,334.86	8,059.14	7,788.95
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	20,080	20,080	16,630	15,590	15,630	15,360	15,240	15,220	15,670	15,390	15,310	15,300	26,530	26,380	26,180
Total Auxiliary Power/Losses, percent of gross		3.94%	3.95%	5.49%	5.59%	5.77%	6.18%	6.61%	6.73%	5.68%	6.11%	6.36%	6.38%	3.44%	3.62%	3.59%
Net Plant Output w/ Step-Up Xfmr Losses	kW	489,254	488,082	268,884	263,263	253,576	233,038	215,174	210,863	258,588	236,677	225,282	224,655	799,962	778,076	741,704
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,794	6,793	6,914	6,912	6,936	7,230	7,443	7,466	6,922	7,211	7,378	7,379	9,396	9,457	9,588
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,249	7,248	7,377	7,375	7,394	7,714	7,941	7,966	7,385	7,693	7,871	7,873	10,419	10,356	10,501

Revision History:
Rev. 8, 9/11/06 – GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0
	Relative Humidity	54.8%	43.8%	60.1%	59.5%	59.7%	78.6%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.5%	59.7%
	WBT, F	76.6	76.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4
Compressor Inlet Conditions	Temperature, F	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.5	78.5	79.3	35.0	45.0	59.0
	Relative Humidity	91.4%	86.4%	60.1%	59.5%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	86.4%	60.1%	59.5%	59.7%
Inlet Air Cooler Status		Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	9,623	13,120	0	0	0	0	0	0	5,831	3,606	9,623	13,120	0	0	0
Fuel Flow	Fuel Type	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,662.0	1,657.8	1,859.1	1,819.7	1,758.9	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8	1,878.8	1,839.5	1,777.9
	Flow, lb/h	89,771	89,544	100,418	98,286	94,956	91,001	86,503	85,070	96,714	92,162	89,771	89,544	89,908	88,034	84,020
Fuel LHV	Btu/lb	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	20,887	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 35 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 59 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	291.4	291.3	291.9	291.0	290.0	195.6	191.7	191.0	290.7	196.2	193.6	193.5	565.3	216.8	565.3
	Temperature, F	725.7	726.3	750.9	745.3	745.3	745.7	746.0	746.0	745.3	745.7	745.9	745.9	946.2	931.6	964.7
	Enthalpy, Btu/lb	1,382.6	1,382.9	1,405.3	1,397.3	1,397.4	1,397.8	1,398.1	1,398.2	1,397.3	1,397.7	1,398.0	1,398.0	1,480.1	1,493.3	1,499.8
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	256.7	256.5	235.2	233.7	231.7	242.7	247.3	248.8	232.6	243.0	248.1	248.0	385.1	384.4	382.6
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	291.4	291.3	291.9	291.0	290.0	195.6	191.7	191.0	290.7	196.2	193.6	193.5	350.0	216.8	350.0
	Temperature, F	725.7	726.3	750.9	745.3	745.3	745.7	746.0	746.0	745.3	745.7	745.9	745.9	932.2	931.6	952.2
	Enthalpy, Btu/lb	1,382.6	1,382.9	1,405.3	1,397.3	1,397.4	1,397.8	1,398.1	1,398.2	1,397.3	1,397.7	1,398.0	1,398.0	1,480.1	1,493.3	1,499.8
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	35,906	35,816	40,160	39,316	37,976	36,398	34,599	34,028	38,684	36,871	35,606	35,816	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,820,488	3,813,647	4,252,224	4,177,052	4,050,998	3,884,933	3,718,719	3,673,902	4,108,468	3,921,685	3,820,488	3,813,647	4,201,488	4,127,390	4,009,911
	Pressure, in. H2O	16.49	16.49	19.58	19.02	18.14	16.95	15.77	15.43	18.59	17.19	16.49	16.49	19.73	19.17	18.29
	Temperature, F	1,060.0	1,061.0	1,039.9	1,040.5	1,057.1	1,073.6	1,088.6	1,092.3	1,053.0	1,071.0	1,060.0	1,061.0	1,072.9	1,079.6	1,090.9
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	169,672	169,286	198,774	193,463	184,606	173,546	161,444	157,783	189,138	176,617	169,672	169,286	207,123	201,814	192,471
Gross Heat Rate	Btu/kWh (LHV)	9,784	9,793	9,363	9,406	9,523	9,708	9,920	9,982	9,457	9,663	9,754	9,793	9,071	9,124	9,237

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScriver
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 35 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 90 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	461,686	461,739	494,669	487,042	480,773	434,178	409,056	404,677	484,679	437,683	419,726	419,902	453,311	449,600	444,020
(at HRSG terminal point)	Pressure, psia	1,027.2	1,027.3	761.4	760.2	759.4	750.5	745.1	744.5	760.0	751.2	747.0	745.9	1,028.2	1,024.4	1,018.9
	Temperature, F	1,018.5	1,019.4	984.8	991.4	1,000.7	998.9	943.8	946.5	999.0	945.9	948.9	948.9	1,022.1	1,028.5	1,038.8
	Enthalpy, Btu/lb	1,516.0	1,516.4	1,504.8	1,508.5	1,513.7	1,507.4	1,482.5	1,482.5	1,511.5	1,507.4	1,485.2	1,485.2	1,491.1	1,495.3	1,501.8
dP from HP drum to HRSG terminal joint	psi	100.7	100.8	147.6	144.4	141.0	111.4	88.6	84.5	143.7	113.7	93.2	92.9	51.9	51.4	50.6
HP SH #1 Steam Outlet Temperature	Temperature, F	1,019.5	1,020.4	986.3	992.9	1,002.1	999.1	945.0	944.9	998.3	990.2	950.1	950.1	1,022.8	1,028.9	1,039.1
HP SH #2 Steam Outlet Temperature	Temperature, F	992.2	992.9	963.9	970.0	978.5	946.8	935.0	882.3	974.9	946.8	879.2	878.8	940.4	945.3	953.1
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	20,766	58,797	60,100	0	18,589	52,878	53,120	0	0	0
(from HP Feedwater)	Temperature, F	288.5	288.3	247.0	246.6	243.8	255.5	280.6	280.2	244.7	255.7	281.1	281.0	374.5	373.8	372.0
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	16.8%	17.4%	0.0%	4.5%	14.4%	14.5%	0.0%	0.0%	0.0%
	Final Superheat, F	282.9	283.3	300.1	304.8	310.1	192.5	20.3	14.5	307.8	202.4	48.0	44.3	187.1	190.3	195.0
HP SH #3/4 Steam Outlet Temperature	Temperature, F	839.5	839.8	828.3	832.5	837.4	809.0	770.1	778.7	835.2	809.4	783.0	782.9	820.6	823.4	827.7
HP Evaporator #1 Exit	Flow, lb/h	55,692	55,728	55,421	55,399	55,432	45,836	37,417	35,956	55,484	46,346	39,087	39,014	55,599	55,555	55,626
	Pressure, psia	1,127.9	1,127.9	909.2	904.6	901.2	862.0	831.8	829.0	903.7	864.9	840.2	839.8	1,980.1	1,975.6	1,969.5
	Temperature, F	569.5	569.5	533.2	532.6	532.2	526.9	522.8	522.4	532.5	527.3	524.0	523.9	634.4	634.1	633.7
	Enthalpy, Btu/lb	1,187.4	1,187.4	1,195.8	1,196.0	1,196.1	1,197.4	1,198.3	1,198.4	1,196.0	1,197.3	1,196.1	1,196.1	1,138.0	1,138.3	1,138.8
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	390.4	391.0	362.5	366.5	403.1	354.4	307.2	306.1	400.5	355.6	313.9	313.7	298.6	302.4	308.0
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.9
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	406,194	406,010	439,247	431,643	425,341	367,677	312,843	307,822	429,394	372,659	327,965	327,170	394,802	391,044	385,363
	Pressure, psia	1,127.9	1,127.9	909.2	904.6	901.2	862.0	831.8	829.0	903.7	864.9	840.2	839.8	1,980.1	1,975.6	1,969.5
	Temperature, F	569.5	569.5	533.2	532.6	532.2	526.9	522.8	522.4	532.5	527.3	524.0	523.9	634.4	634.1	633.7
	Enthalpy, Btu/lb	1,187.4	1,187.4	1,195.8	1,196.0	1,196.1	1,197.4	1,198.3	1,198.4	1,196.0	1,197.3	1,196.1	1,196.1	1,138.0	1,138.3	1,138.8
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	20.6	20.6	23.7	23.4	23.0	21.0	18.6	18.4	23.3	21.3	19.8	19.8	18.1	18.0	17.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.9
HP Economizer #1/2/3 Outlet	Flow, lb/h	461,686	461,738	494,668	487,042	480,773	419,412	350,260	344,778	484,678	419,005	367,052	366,184	453,310	449,599	444,019
	Temperature, F	559.5	559.5	533.2	532.6	532.2	526.9	522.8	522.4	532.5	527.3	524.0	523.9	634.2	633.6	632.8
HP Economizer #4/5 Outlet Temperature	Temperature, F	524.5	524.3	504.9	504.1	501.9	508.3	512.6	512.2	503.0	508.5	513.0	513.0	579.6	578.4	576.6
HP Economizer #6/7 Outlet Temperature	Temperature, F	428.8	428.6	407.3	405.4	404.1	411.5	416.6	416.1	405.2	411.8	417.3	417.2	494.6	493.4	491.5
HP Economizer #8 Outlet Temperature	Temperature, F	351.7	351.4	330.5	329.5	328.9	342.7	355.3	355.1	328.0	342.6	354.5	354.5	438.9	437.7	435.5
Feedwater to HP Economizer #8	Flow, lb/h	461,686	461,736	494,668	487,042	480,773	419,412	350,260	344,778	484,678	419,005	367,052	366,184	453,310	449,599	444,019
	Pressure, psia	1,195.1	1,195.1	986.2	979.3	974.0	915.0	870.7	866.7	977.7	920.3	882.9	882.3	2,045.1	2,039.7	2,031.9
	Temperature, F	268.5	268.3	247.0	246.6	243.8	255.5	280.6	280.2	244.7	255.7	281.1	281.0	374.5	373.8	372.0
	Enthalpy, Btu/lb	239.7	239.5	217.6	216.2	214.3	226.0	251.1	250.7	215.3	226.2	251.7	251.5	350.3	349.8	347.7
HP FW Temperature Increase Across BFP	F	14.1	14.1	14.0	14.2	14.3	15.0	15.6	15.7	14.2	15.0	15.3	15.3	12.1	12.1	12.2
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	982.4	983.1	957.2	961.1	968.2	910.1	854.9	853.5	966.5	911.9	863.0	862.9	956.9	960.9	967.1
Exit Temperature	Temperature, F	982.4	983.1	957.2	961.1	968.2	910.1	854.9	853.5	966.5	911.9	863.0	862.8	956.9	960.9	967.1
HRSG Hot Reheat Steam	Flow, lb/h	513,145	513,782	554,824	550,711	543,644	548,756	548,932	544,985	548,228	553,102	550,430	550,291	589,381	585,109	578,726
(at HRSG terminal point)	Pressure, psia	284.5	284.4	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6	523.3	520.3	515.9
	Temperature, F	1,005.8	1,006.6	974.4	978.9	987.1	937.6	892.7	892.7	983.7	937.8	897.7	897.7	1,014.4	1,020.0	1,028.8
	Enthalpy, Btu/lb	1,530.8	1,531.2	1,517.5	1,519.8	1,524.1	1,496.3	1,475.1	1,475.1	1,522.3	1,496.3	1,477.7	1,477.7	1,528.1	1,531.2	1,536.1
HRSG RH dP – terminal pt. to terminal pt.	psi	25.9	25.9	47.6	47.0	46.1	41.9	38.4	37.8	46.7	42.4	39.9	39.9	42.0	-303.6	49.4
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,006.2	1,007.0	976.1	979.6	987.8	938.4	893.5	893.4	984.4	938.4	898.5	898.5	1,014.7	1,020.2	1,029.0
RHTR #3 Steam Outlet Temperature	Temperature, F	936.9	937.5	916.6	917.9	924.0	814.0	720.4	717.1	921.5	816.4	737.0	736.3	926.9	929.5	935.2
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	46,931	77,283	78,102	0	48,306	72,466	72,699	0	0	0
(from IP Feedwater)	Temperature, F	258.7	258.5	235.2	233.7	231.7	242.7	247.3	246.8	232.6	243.0	248.1	248.0	365.1	364.4	362.5
	% of Inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	9.8%	16.4%	16.7%	0.0%	9.6%	15.0%	15.0%	0.0%	0.0%	0.0%
	Final Superheat, F	394.3	394.7	423.6	421.2	424.2	192.1	58.5	52.8	423.0	196.6	83.6	82.4	317.3	319.1	321.7
RHTR #4 Steam Outlet Temperature	Temperature, F	806.8	807.3	801.3	798.6	801.2	775.2	749.6	747.9	800.3	776.2	753.0	752.9	792.1	793.2	795.0
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	515,034	512,530	508,785
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	543.4	540.4	535.8
	Temperature, F	982.8	983.5	961.6	968.6	978.4	966.6	910.6	919.6	974.3	966.6	924.8	924.8	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,516.6	1,516.4	1,504.8	1,508.5	1,513.7	1,507.4	1,482.5	1,482.5	1,511.5	1,507.4	1,485.2	1,485.2	1,354.4	1,354.8	1,354.9
Cold Reheat Steam from STG to HRSG	Flow, lb/h	464,612	464,470	465,064	462,265	477,888	431,643	400,568	396,593	481,175	435,046	411,498	411,095	0	0	0
(at HRSG terminal point)	Pressure, psia	291.4	291.3	201.9	201.0	200.0	195.6	191.7	191.0	200.7	196.2	193.6	193.5	595.3	216.8	595.3
	Temperature, F	725.7	726.3	750.9	745.3	745.3	745.7	746.0	746.0	745.3	745.7	745.9	745.9	945.2	931.8	964.7
	Enthalpy, Btu/lb	1,382.6	1,382.9	1,405.3	1,397.3	1,397.4	1,397.8	1,398.1	1,398.2	1,397.3	1,397.7	1,398.0	1,398.0	1,480.1	1,493.3	1,499.8
Cold Reheat Steam, % of HP Steam		98.43%	98.43%	98.06%	99.02%	99.40%	99.42%	97.93%	97.95%	99.24%	99.40%	98.04%	99.04%	0.00%	0.00%	0.00%
HP Steam - Cold Reheat Steam	Flow, lb/h	7,274	7,269	9,606	4,757	2,885	2,834	8,487	8,284	3,704	2,647	8,230	8,208	453,311	449,600	444,020

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 35 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 59 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
IP Steam (at HRSG terminal point)	Flow, lb/h	61,534	61,313	69,761	68,426	65,758	69,185	71,082	70,271	67,034	69,751	72,534	72,409	74,347	72,578	69,940
	Pressure, psia	291.4	291.3	291.6	291.0	199.9	196.5	191.7	191.0	200.7	196.2	193.6	193.5	543.4	540.4	535.8
	Temperature, F	565.8	565.8	541.3	540.7	540.8	532.2	525.1	524.6	540.8	532.7	526.7	526.6	624.6	624.2	624.5
	Enthalpy, Btu/lb	1,296.6	1,296.6	1,291.2	1,291.0	1,291.0	1,286.9	1,283.5	1,283.3	1,291.1	1,287.1	1,284.2	1,284.1	1,309.7	1,310.1	1,310.6
IP Evaporator Drum Exit	Flow, lb/h	61,534	61,313	69,761	68,426	65,758	69,185	71,082	70,271	67,034	69,751	72,534	72,409	74,347	72,576	69,940
	Pressure, psia	310.1	309.9	234.2	232.4	229.2	226.2	226.3	225.0	231.0	229.2	229.2	229.1	558.6	554.9	549.4
	Temperature, F	420.4	420.4	396.3	394.6	393.4	393.0	392.3	391.8	394.1	393.4	393.4	393.4	478.6	477.9	478.0
	Enthalpy, Btu/lb	1,203.8	1,203.8	1,200.8	1,200.7	1,200.6	1,200.5	1,200.4	1,200.3	1,200.7	1,200.6	1,200.6	1,200.6	1,204.6	1,204.5	1,204.6
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	27.1	27.0	30.7	30.3	29.6	31.9	32.4	32.2	30.0	31.5	32.6	32.7	28.0	27.6	27.6
IP Approach	Temperature, F	24.9	25.0	22.4	22.6	23.1	10.3	11.3	11.2	22.9	10.5	12.0	12.0	11.8	12.0	12.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	61,534	61,313	69,761	68,426	65,758	69,185	71,082	70,271	67,034	69,751	72,534	72,409	74,347	72,578	69,940
	Pressure, psia	310.1	309.9	234.2	232.4	229.2	229.2	229.3	225.0	231.0	229.2	229.2	229.1	558.6	554.9	549.4
	Temperature, F	365.6	365.4	372.9	372.0	370.3	376.7	381.0	380.6	371.1	376.9	381.4	381.3	466.8	465.9	464.4
	Enthalpy, Btu/lb	370.4	370.2	348.1	345.2	343.3	350.1	354.7	354.3	344.2	350.4	355.1	356.1	448.3	448.3	446.6
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	61,534	61,313	69,761	68,426	65,758	69,185	71,082	70,271	67,034	69,751	72,534	72,409	74,347	72,578	69,940
	Pressure, psia	340.1	339.6	272.6	259.3	253.4	256.9	256.2	264.0	255.4	257.6	270.7	270.4	603.4	597.6	589.1
	Temperature, F	259.2	258.6	230.9	235.4	233.4	244.3	248.9	246.5	234.4	244.6	249.7	249.8	385.8	385.1	383.3
	Enthalpy, Btu/lb	227.6	227.4	205.8	204.3	202.3	213.4	218.0	217.6	203.4	213.6	218.6	218.7	339.1	338.3	336.5
IP FW Temperature Increase Across BFP	F	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.4	3.4	3.5
LP Steam (at HRSG terminal point)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	73,031	72,013	68,936
	Pressure, psia	32.2	32.0	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	147.3	146.8	143.2
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	246.0	244.6	230.5	240.7	245.6	245.7	634.2	633.6	634.2
	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.8	1,162.6	1,162.5	1,343.5	1,343.4	1,343.8
LP Evaporator Steam Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	73,031	72,013	68,936
	Pressure, psia	32.2	32.0	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	157.7	156.2	152.7
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	246.0	244.6	230.5	240.7	245.6	245.7	362.4	361.6	362.8
	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.8	1,162.6	1,162.5	1,195.3	1,195.1	1,194.8
LP Evaporator Water Exit to BFPs	Flow, lb/h	523,419	523,051	564,424	560,224	553,057	558,632	557,506	553,496	557,691	562,025	565,138	564,910	569,366	565,103	578,722
	Pressure, psia	32.2	32.1	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	157.7	156.2	152.7
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	246.0	244.6	230.5	240.7	245.6	245.7	362.4	361.6	362.8
	Enthalpy, Btu/lb	223.0	222.8	201.4	199.8	197.8	208.9	213.6	213.1	198.9	209.2	214.4	214.2	334.8	334.1	332.2
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	61,534	61,313	69,761	68,426	65,758	69,185	71,082	70,271	67,034	69,751	72,534	72,409	74,347	72,578	69,940
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	46,991	77,263	78,102	0	46,306	72,405	72,699	0	0	0
HP FW to HRSG HP Economizer #3	Flow, lb/h	461,885	461,736	494,668	487,042	480,773	419,412	350,200	344,778	484,878	419,065	367,052	366,164	463,310	449,699	444,019
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	20,766	58,797	60,109	0	18,659	52,678	53,120	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	4,760	6,557	6,346	95	249	6,785	6,273	479	494	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	61,723	82,930	84,765
LP Pinch	Temperature, F	30.1	30.1	32.4	32.3	31.8	31.6	31.0	30.7	32.1	31.2	31.4	31.4	28.5	29.2	29.8
LP Approach	Temperature, F	139.0	138.8	141.2	140.5	138.2	132.9	132.5	132.0	139.0	133.2	133.4	133.3	4.2	3.4	4.4
Condensate Recirculated	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	54,572	40,747	42,223
	Temperature, F	114.1	114.1	90.4	89.6	89.9	106.2	111.2	111.2	90.2	106.2	111.1	111.1	358.9	358.9	356.0
% of Total LP Economizer Flow		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	8%	6%	6%
Condensate from LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	717,110	697,898	689,939
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	358.0	358.0	355.2
	Enthalpy, Btu/lb	83.4	83.4	59.9	59.1	59.4	75.6	80.6	80.8	59.7	75.6	80.5	80.5	330.4	330.5	327.5
Condensate to LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	717,110	697,898	689,939
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	83.4	83.4	59.9	59.1	59.4	75.6	80.6	80.8	59.7	75.6	80.5	80.5	104.0	104.0	104.0
Condensate from Recirculation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	54,572	40,747	42,223
	Temperature, F	114.1	114.1	90.4	89.6	89.9	106.2	111.2	111.2	90.2	106.2	111.1	111.1	358.9	358.9	356.0
Condensate Bypassing LP Economizer	Flow, lb/h	523,421	523,057	564,432	560,226	553,385	558,634	557,512	553,496	557,699	562,017	565,137	564,899	0	0	0
	% of Total Condensate Flow	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
Condensate to HRSG	Flow, lb/h	523,421	523,057	564,432	560,226	553,385	558,634	557,512	553,496	557,699	562,017	565,137	564,899	562,438	557,150	547,716
	Pressure, psia	544.0	544.1	559.7	559.9	560.0	558.6	558.2	558.3	559.9	558.5	558.0	558.0	417.3	418.0	420.9
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
Stack Exit	Flow, lb/h	3,820,466	3,813,647	4,252,224	4,177,052	4,056,998	3,964,063	3,718,719	3,673,602	4,106,466	3,921,565	3,829,468	3,813,647	4,201,488	4,127,390	4,009,011
	Temperature, F	264.5	264.2	265.4	263.7	261.2	271.4	276.0	276.3	262.6	271.9	277.2	277.1	229.9	230.3	227.7

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Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	3,734	3,735	1,885	1,884	1,882	1,834	1,466	1,451	1,883	1,849	1,818	1,817	0	0	0
HP Turbine Remainder Shaft Power	kW	31,438	31,459	12,090	11,971	11,764	9,884	8,262	8,119	11,863	9,811	8,666	8,571	0	0	0
IP Turbine Shaft Power	kW	58,220	58,214	30,751	30,620	30,467	29,626	28,567	28,360	30,568	29,808	29,073	29,060	0	0	0
LP Turbine Shaft Power	kW	80,256	80,243	44,756	44,758	44,298	37,602	34,957	34,049	44,530	37,884	35,129	35,110	0	0	0
Total Shaft Power	kW	166,914	166,916	87,576	87,249	86,469	78,912	71,188	70,328	88,981	77,551	72,687	72,641	0	0	0
STG Throttle Steam	Flow, lb/h	923,771	923,478	494,650	487,042	480,773	434,176	409,056	404,877	484,870	437,693	419,728	419,302	0	0	0
	Pressure, psia (MAX 2270 psia)	968.8	968.8	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	711.2	1,926.2	1,924.4	1,918.9
	Temperature, F	1,013.8	1,014.7	960.2	966.9	966.3	965.0	940.0	940.0	962.4	965.0	945.0	945.0	1,020.6	1,020.9	1,017.0
	Enthalpy, Btu/lb	1,515.0	1,515.4	1,503.8	1,507.5	1,512.7	1,508.4	1,481.5	1,481.5	1,510.5	1,500.4	1,484.2	1,484.2	1,490.1	1,494.3	1,500.8
THV Pressure Loss	psi	19.1	19.1	198.9	202.6	207.1	255.1	287.1	291.2	203.7	251.6	275.9	276.3	0.0	0.0	0.0
		1.97%	1.97%	27.80%	29.49%	29.13%	35.87%	40.36%	40.94%	28.65%	35.38%	38.79%	38.85%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	11,731	11,727	6,430	6,335	6,256	5,992	5,396	5,344	6,308	5,736	5,525	5,520	0	0	0
HP Turbine Exit	Flow, lb/h	912,040	911,753	488,240	480,797	474,618	428,482	403,659	399,532	478,572	431,956	414,201	413,781	0	0	0
	Pressure, psia	319.4	319.3	232.5	231.1	229.8	229.8	214.1	213.0	230.6	221.7	216.9	216.8	565.3	216.8	565.3
	Temperature, F (MAX 640 F)	730.3	731.0	765.6	773.0	782.1	784.2	750.5	751.4	778.1	783.5	752.7	752.8	947.0	933.7	966.6
	Enthalpy, Btu/lb	1,383.6	1,383.9	1,406.3	1,410.2	1,415.0	1,416.5	1,399.4	1,399.9	1,412.9	1,416.1	1,400.4	1,400.4	1,490.1	1,494.3	1,500.8
Efficiency (THV inlet to HPT exit)		85.64%	85.64%	84.06%	83.29%	82.78%	86.59%	92.34%	91.67%	83.17%	87.02%	83.83%	83.77%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		87.01%	87.01%	86.93%	86.93%	86.93%	86.90%	86.89%	86.88%	86.93%	86.90%	86.89%	86.89%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	903	902	587	580	573	547	536	533	576	549	544	543	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	1,853	1,856	2,492	2,502	2,514	2,537	2,548	2,554	2,505	2,531	2,534	2,535	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	909,224	908,936	485,061	477,525	471,331	425,299	400,476	396,345	476,388	428,775	411,022	410,603	0	0	0
	Pressure, psia	319.4	319.3	232.5	231.1	229.8	229.8	214.1	213.0	230.6	221.7	216.9	216.8	565.3	216.8	565.3
	Temperature, F	730.3	731.0	765.6	773.0	782.1	784.2	750.5	751.4	778.1	783.5	752.7	752.8	947.0	933.7	966.6
	Enthalpy, Btu/lb	1,383.6	1,383.9	1,406.3	1,410.2	1,415.0	1,416.5	1,399.4	1,399.9	1,412.9	1,416.1	1,400.4	1,400.4	1,490.1	1,494.3	1,500.8
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	4,780	6,557	6,346	96	249	5,785	6,273	476	494	0	0	0
	Temperature, F	258.7	256.5	235.2	233.7	231.7	242.7	247.3	246.8	232.8	243.0	246.1	246.0	365.1	364.4	362.6
Final Cold Reheat Steam after Conditioning	Flow, lb/h	909,224	908,936	485,061	482,285	477,887	431,645	400,570	396,594	481,173	435,048	411,501	411,097	0	0	0
	Pressure, psia	319.4	319.3	232.5	231.1	229.8	229.8	214.1	213.0	230.6	221.7	216.9	216.8	565.3	216.8	565.3
	Temperature, F (MAX 750 F)	730.3	731.0	765.6	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	750.0	947.0	933.7	966.6
	Enthalpy, Btu/lb	1,383.6	1,383.9	1,406.3	1,398.3	1,398.4	1,398.8	1,399.1	1,399.2	1,398.3	1,398.7	1,399.0	1,399.0	1,490.1	1,494.3	1,500.8
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	123,065	122,629	69,763	73,188	72,313	124,459	148,457	148,620	72,829	124,327	146,414	146,599	0	0	0
Reheat System dP	psi	70.6	70.4	90.4	89.1	87.8	78.8	72.1	71.0	88.6	79.7	74.9	74.8	42.0	-303.6	46.4
Reheat System dP		22.06%	22.06%	38.91%	38.54%	38.17%	35.58%	33.67%	33.34%	38.43%	35.95%	34.52%	34.49%	7.43%	-140.05%	8.73%
Hot Reheat Flow	Flow, lb/h	1,032,289	1,031,564	554,824	556,711	543,644	549,758	548,932	544,966	548,208	553,102	556,436	556,201	0	0	0
	Pressure, psia (MAX 504 psia)	248.0	248.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	523.3	520.3	515.9
	Temperature, F	1,003.1	1,003.9	971.8	976.3	984.5	935.0	890.0	890.0	981.1	935.0	895.0	895.0	1,012.6	1,018.1	1,026.9
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-10.8	-10.8	-6.4	-10.6	-11.8	-60.0	-60.0	-60.0	-11.3	-50.0	-50.0	-50.0	-7.9	-8.7	-10.1
	Enthalpy, Btu/lb	1,529.8	1,530.2	1,518.5	1,518.8	1,523.1	1,497.3	1,474.1	1,474.1	1,521.3	1,497.3	1,478.7	1,478.7	1,527.1	1,530.2	1,535.1
INTV Pressure Loss	psi	5.0	5.0	12.9	12.7	14.0	15.0	17.4	18.3	13.1	14.2	15.4	15.5	0.0	0.0	0.0
		2.01%	2.01%	8.43%	8.27%	9.87%	10.57%	12.24%	12.88%	9.22%	10.02%	10.87%	10.90%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	1,044,020	1,043,291	561,254	567,047	549,900	555,451	554,928	550,910	554,516	558,837	561,961	561,721	0	0	0
	Pressure, psia	52.9	52.9	28.2	28.0	27.7	27.5	26.9	26.8	27.9	27.7	27.4	27.4	124.9	27.4	124.9
	Temperature, F	613.2	613.6	589.4	592.9	599.5	560.5	524.9	524.9	596.8	560.5	529.0	529.0	893.5	877.8	893.5
	Enthalpy, Btu/lb	1,339.2	1,339.5	1,329.2	1,331.0	1,334.1	1,315.3	1,298.2	1,298.2	1,332.8	1,315.3	1,300.1	1,300.1	1,476.5	1,471.9	1,476.5
Efficiency (INTV inlet to IPT exit)		90.90%	90.90%	87.73%	87.46%	87.02%	86.66%	85.89%	85.58%	87.33%	86.98%	86.58%	86.64%	90.79%	86.54%	90.79%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	784	783	421	418	413	417	416	413	416	419	422	422	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	32.2	32.0	22.0	21.4	20.6	26.2	27.3	27.1	21.0	26.3	27.7	27.7	147.3	146.0	143.2
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	245.0	244.6	230.5	240.7	245.8	245.7	632.3	631.9	632.3
	Enthalpy, Btu/lb	1,164.5	1,164.4	1,157.0	1,156.5	1,155.8	1,159.7	1,161.3	1,161.1	1,156.1	1,159.8	1,161.6	1,161.5	1,342.5	1,342.4	1,342.8
dT, F (MAX 106 F)																
LP Admission CV Pressure Loss	% loss	-94.5%	-95.1%	-26.2%	-31.1%	-34.7%	-9.2%	1.4%	1.3%	-33.0%	-9.3%	1.3%	1.1%	15.2%	81.3%	12.8%
LP Turbine Inlet Steam	Flow, lb/h	1,043,236	1,042,508	560,833	566,626	549,487	555,034	553,912	549,897	554,100	558,418	561,539	561,300	0	0	0
	Pressure, psia	52.1	52.1	27.8	27.6	27.3	27.1	26.5	26.4	27.5	27.2	27.0	27.0	123.0	27.0	123.0
	Temperature, F	613.1	613.7	589.3	592.9	599.4	560.5	524.9	524.8	596.7	560.5	528.9	528.9	893.4	877.8	893.4
	Enthalpy, Btu/lb	1,339.2	1,339.5	1,329.2	1,331.0	1,334.1	1,315.3	1,298.2	1,298.2	1,332.8	1,315.3	1,300.1	1,300.1	1,476.5	1,471.9	1,476.5
LP Turbine Exit	Flow, lb/h	1,043,236	1,042,508	560,833	566,626	549,487	555,034	553,912	549,897	554,100	558,418	561,539	561,300	0	0	0
	Pressure, psia	1.231	1.231	0.503	0.487	0.491	0.825	0.961	0.959	0.496	0.827	0.963	0.963	0.806	0.963	0.806
	Pressure, in. HgA	2.507	2.506	1.023	0.992	0.999	1.680	1.956	1.952	1.010	1.683	1.960	1.960	1.642	1.960	1.642
	Temperature, F	108.8	108.7	79.7	78.8	79.0	95.4	100.4	100.3	79.3	95.4	100.4	100.4	885.1	875.9	885.1
ELEP Enthalpy, Btu/lb		1,066.8	1,066.9	1,050.5	1,050.1	1,052.5	1,066.9	1,068.4	1,068.7	1,052.0	1,068.7	1,068.7	1,068.6	1,012.3	1,068.8	1,012.3
UEEP Enthalpy, Btu/lb		1,078.7	1,078.8	1,057.1	1,056.6	1,059.1	1,084.2	1,088.6	1,087.0	1,058.8	1,083.8	1,086.7	1,086.7	1,476.5	1,471.9	1,476.5
Exhaust Loss Btu/lb		9.9	9.9	6.6	6.5	6.6	15.2	18.2	18.2	6.6	15.1	17.9	17.9	38.0	17.9	38.0
Moisture @ UEEP (MIN 1.7%)		3.68%	3.68%	3.71%	3.72%	3.49%	1.76%	1.76%	1.73%	3.56%	1.82%	1.76%	1.76%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.86%	90.90%	90.86%	90.68%	90.78%	90.74%	90.49%	90.50%	90.73%	90.73%	90.62%	90.62%	90.04%	90.52%	90.04%
LPT Efficiency to UEEP		87.59%	87.59%	86.51%	86.50%	86.64%	85.13%	83.34%	83.30%	86.50%	85.17%	83.51%	83.50%	80.02%	83.50%	80.02%
Annulus Velocity ft/s		451.7	451.6	563.6	575.6	566.2	353.2	304.7	303.2	564.6	354.7	308.4	308.3	1,398.0	308.3	1,398.0
Volumetric Flow 1000 ft3/min per end		2,310	2,309	2,872	2,934	2,865	1,816	1,571	1,563	2,877	1,823	1,589	1,589	7,853	1,589	7,853
Gross Generator Output	kW	169,588	169,590	85,736	85,387	84,598	74,849	68,972	68,296	85,120	75,451	70,719	70,671	0	0	0
Generator MVA		430.6	430.6	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		97.86%	97.86%	95.84%	95.82%	95.78%	95.29%	94.93%	94.89%	95.81%	95.33%	95.04%	95.04%	#DIV/0!	#DIV/0!	#DIV/0!

Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-061106-8 BJScrivner
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 35 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 59 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,046.6	1,045.1	566.7	564.7	558.8	559.2	566.8	562.7	563.0	572.4	574.3	574.1	3,774.6	3,739.7	3,700.5
Condenser Surface Area	ft2	137,975	137,975	137,977	137,975	137,975	137,975	137,978	137,978	137,975	137,978	137,977	137,977	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	9.2	9.2	14.5	5.6	5.6	5.1	5.1	5.1	5.1	5.1	5.1	5.1	34.6	31.5	31.1
LP Turbine Exit Steam to Condenser	Flow, lb/h	1,043,238	1,042,508	560,833	558,928	549,487	555,034	553,912	549,597	554,100	558,418	561,539	561,300	0	0	0
	Pressure, psia	1.231	1.231	0.503	0.487	0.491	0.825	0.961	0.959	0.496	0.827	0.963	0.963	0.806	0.963	0.806
	Pressure, in. HgA	2.507	2.506	1.023	0.992	0.999	1.680	1.956	1.952	1.010	1.683	1.960	1.960	1.642	1.960	1.642
	Temperature, F	106.8	106.7	79.7	78.8	79.0	95.4	100.4	100.3	79.3	95.4	100.4	100.4	885.1	875.9	885.1
	Enthalpy, Btu/lb	1,076.7	1,076.8	1,057.1	1,056.6	1,050.1	1,064.2	1,066.0	1,067.0	1,056.6	1,063.8	1,066.7	1,066.7	1,476.5	1,471.9	1,476.5
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	0	0	0
	Enthalpy, Btu/lb	1,373.9	1,374.2	1,397.3	1,401.0	1,405.7	1,404.8	1,387.7	1,388.2	1,405.6	1,404.9	1,388.6	1,388.7	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	6	7	0	0	0	0	0	0	0	0	0	0	91	98	78
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	3,022,401	3,009,721	2,966,660
(total, both units)	Enthalpy, Btu/lb	1,530.7	1,531.2	1,517.5	1,519.6	1,524.1	1,498.3	1,475.1	1,475.1	1,522.3	1,498.3	1,477.7	1,477.7	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	322,500	318,997	304,732
(total, both units)	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.8	1,162.6	1,162.5	1,225.0	1,225.0	1,225.0
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	23,000	23,000	23,000
	Enthalpy, Btu/lb	63.4	63.4	59.9	59.1	59.4	75.6	80.5	80.6	59.7	75.6	80.5	80.5	85.2	89.9	89.4
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	192,000	192,000	192,000
	Enthalpy, Btu/lb	63.4	63.4	59.9	59.1	59.4	75.6	80.5	80.6	59.7	75.6	80.5	80.5	85.2	89.9	89.4
Condenser Exit	Flow, lb/h	1,046,842	1,046,115	564,433	560,228	553,087	558,834	557,512	553,497	557,700	562,018	565,139	564,900	3,581,792	3,544,716	3,508,300
	Pressure, psia	1.231	1.231	0.503	0.487	0.491	0.825	0.961	0.959	0.496	0.827	0.963	0.963	1.480	1.667	1.662
	Pressure, in HgA (MIN 1.0 in. HgA)	2.507	2.506	1.023	0.992	0.999	1.680	1.956	1.952	1.010	1.683	1.960	1.960	3.013	3.436	3.384
	Temperature, F	106.8	106.7	79.7	78.8	79.0	95.4	100.4	100.3	79.3	95.4	100.4	100.4	116.2	119.8	119.3
	Enthalpy, Btu/lb	76.8	76.8	47.8	46.8	47.0	63.4	68.4	68.3	47.4	63.5	68.5	68.5	83.2	87.8	87.3
Condensate Pump Discharge	Flow, lb/h	1,046,842	1,046,115	564,433	560,228	553,087	558,834	557,512	553,497	557,700	562,018	565,139	564,900	3,581,792	3,544,716	3,508,300
	Pressure, psia	544.0	544.1	569.7	569.9	569.0	568.6	568.2	568.3	569.0	568.5	568.0	568.0	417.3	418.0	420.9
	Temperature, F	111.9	111.9	86.4	85.6	85.9	102.2	107.2	107.2	86.1	102.2	107.2	107.2	116.6	120.3	119.8
	Enthalpy, Btu/lb	81.3	81.3	56.0	55.1	55.4	71.7	76.7	76.7	55.7	71.7	76.7	76.7	84.7	89.4	88.8
Condensate after GSC	Flow, lb/h	1,046,842	1,046,115	564,433	560,228	553,087	558,834	557,512	553,497	557,700	562,018	565,139	564,900	3,581,792	3,544,716	3,508,300
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,046,842	1,046,114	564,432	560,228	553,085	558,834	557,512	553,496	557,699	562,017	565,137	564,899	3,346,805	3,329,730	3,293,311
	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
Total Circulating Water	Flow, lb/h	122,353,832	122,353,832	122,892,928	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832	122,353,832	199,897,952	199,501,072	199,501,072
	Flow, gpm	239,834	239,834	239,913	239,676	239,676	239,837	239,834	239,834	239,676	239,837	239,834	239,834	389,653	389,795	389,795
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	90.0	86.0	86.0	86.0	86.0	90.0	90.0	86.0	86.0	90.0	90.0	86.0	86.0	86.0
Circulating Water to Condenser	Flow, lb/h	114,669,400	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440	114,669,400	114,669,400	192,013,504	191,616,624	191,616,624
	Flow, gpm	224,756	224,756	224,892	224,644	224,644	224,771	224,756	224,756	224,644	224,771	224,756	224,756	374,619	374,741	374,741
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	90.1	86.1	86.1	86.1	86.1	90.1	90.1	86.1	86.1	90.1	90.1	86.1	86.1	86.1
Circulating Water from Condenser	Flow, lb/h	114,669,400	114,669,400	115,208,112	115,089,984	115,089,984	114,776,440	114,669,400	114,669,400	115,089,984	114,776,440	114,669,400	114,669,400	192,013,504	191,616,624	191,616,624
	Temperature, F	99.6	99.6	85.3	73.2	73.2	90.3	95.2	95.2	73.2	90.3	95.3	95.3	89.6	86.4	86.2
Total Circulating Water Discharge	Flow, lb/h	122,353,832	122,353,832	122,892,928	122,774,400	122,774,400	122,460,856	122,353,832	122,353,832	122,774,400	122,460,856	122,353,832	122,353,832	199,897,952	199,501,072	199,501,072
	Temperature, F	99.8	99.8	85.7	73.7	73.6	90.7	95.7	95.7	73.6	90.7	95.8	95.8	89.2	86.1	87.9
Circulating Water Temperature Rise	dT, F	9.76	9.75	5.69	5.66	5.61	5.71	5.69	5.69	5.65	5.74	5.76	5.75	20.25	20.86	19.67
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,664,427	7,664,427	7,664,427	7,664,427	7,664,427	7,664,426	7,664,427	7,664,427	7,664,427	7,664,426	7,664,427	7,664,427	7,664,427	7,664,426	7,664,426
	Flow, gpm	15,002	15,002	15,000	15,013	15,013	15,049	15,002	15,002	15,013	15,049	15,002	15,002	15,000	15,013	15,013
	Temperature, F	90.1	90.1	86.1	86.1	86.1	86.1	90.1	90.1	86.1	86.1	90.1	90.1	86.1	86.1	86.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,664,427	7,664,427	7,664,427	7,664,427	7,664,427	7,664,426	7,664,427	7,664,427	7,664,427	7,664,426	7,664,427	7,664,427	7,664,427	7,664,426	7,664,426
	Temperature, F	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 280 2x100% Unfired Oil Fuel 95 F/EC On	Case 301 1x100% Unfired Oil Fuel 33 F	Case 302 1x100% Unfired Oil Fuel 45 F	Case 303 1x100% Unfired Oil Fuel 59 F	Case 304 1x100% Unfired Oil Fuel 74 F	Case 305 1x100% Unfired Oil Fuel 90 F	Case 306 1x100% Unfired Oil Fuel 95 F	Case 307 1x100% Unfired Oil Fuel 59 F/EC On	Case 308 1x100% Unfired Oil Fuel 74 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On	Case 310 1x100% Unfired Oil Fuel 95 F/EC On	Case 21-BYP 4x100% STG Bypass Gas Fuel 35 F	Case 22-BYP 4x100% STG Bypass Gas Fuel 45 F	Case 23-BYP 4x100% STG Bypass Gas Fuel 59 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	6	7	0	0	0	0	0	0	0	0	0	0	91	98	76
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	523,419	523,051	564,424	560,224	553,087	558,632	557,556	553,495	557,691	562,025	555,138	564,910	589,386	585,103	576,722
	Pressure, psia	34.5	34.3	24.3	23.7	22.9	27.5	29.6	29.4	23.3	27.6	30.0	30.0	160.0	158.5	155.9
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	245.0	244.5	230.5	240.7	245.8	245.7	362.4	361.6	359.9
	Enthalpy, Btu/lb	223.0	222.8	201.4	199.8	197.8	208.9	213.6	213.1	198.9	209.2	214.4	214.2	334.8	334.1	332.2
IP Bleed (before CV)	Flow, lb/h	51,534	51,313	69,758	73,182	72,314	124,464	148,450	148,617	72,513	124,330	145,408	146,606	74,383	72,574	69,937
	Pressure, psia	1,060.6	1,060.6	1,048.6	1,048.6	1,051.8	1,047.9	1,047.9	1,049.6	1,049.8	1,048.5	1,044.6	1,044.7	1,080.4	1,081.7	1,083.0
	Temperature, F	250.7	250.5	235.2	233.7	231.7	242.7	247.3	246.8	232.8	243.0	248.1	248.0	365.1	364.4	362.6
	Enthalpy, Btu/lb	227.6	227.4	205.8	204.3	202.3	213.4	218.0	217.6	203.4	213.6	218.8	218.7	339.1	338.3	336.5
IP FW Control Valve Exit Pressure	Pressure, psia	340.1	339.6	272.6	269.3	263.4	265.9	266.2	264.0	266.4	267.6	270.7	270.4	603.4	597.6	589.1
	CV dP, psi	720.5	721.1	774.0	779.2	788.4	782.0	781.7	786.6	783.3	778.9	773.9	774.3	477.0	484.1	493.9
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,650.3	3,650.5	3,644.1	3,653.1	3,662.9	3,672.9	3,680.5	3,685.1	3,656.9	3,668.0	3,670.4	3,670.9	3,456.2	3,462.9	3,470.3
	CV dP, psi	2,455.1	2,455.7	2,657.8	2,673.6	2,688.9	2,756.9	2,809.9	2,818.5	2,679.2	2,748.7	2,767.5	2,788.6	1,413.1	1,423.2	1,436.4
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	461,888	461,738	494,668	487,042	480,773	434,178	409,057	404,678	484,678	437,694	419,730	419,304	515,033	512,629	506,785
	Pressure, psia	1,195.1	1,195.1	985.2	970.3	974.0	916.0	870.7	866.7	977.7	920.3	882.9	882.3	2,045.1	2,039.7	2,031.9
	Temperature, F	268.5	268.3	247.0	245.6	243.8	255.5	260.6	260.2	244.7	255.7	261.1	261.0	374.5	373.8	372.0
	Enthalpy, Btu/lb	239.7	239.5	217.8	216.2	214.3	226.0	231.1	230.7	215.3	226.2	231.7	231.5	350.3	349.6	347.7
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	461,888	461,739	494,669	487,042	480,773	434,178	409,056	404,677	484,679	437,693	419,728	419,302	463,311	449,609	444,020
	Pressure, psia	1,027.2	1,027.3	781.4	780.2	759.4	750.6	745.1	744.5	760.0	751.2	747.0	746.9	1,926.2	1,924.4	1,918.9
	Temperature, F	1,018.6	1,019.4	964.6	961.4	1,000.7	988.9	943.8	943.8	995.8	989.0	948.9	948.9	1,022.1	1,028.6	1,038.6
	Enthalpy, Btu/lb	1,516.0	1,516.4	1,504.8	1,508.5	1,513.7	1,507.4	1,482.5	1,482.5	1,511.5	1,507.4	1,485.2	1,485.2	1,491.1	1,495.3	1,501.6
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	463,311	449,609	444,020
	Pressure, psia	1,027.2	1,027.3	781.4	780.2	759.4	750.6	745.1	744.5	760.0	751.2	747.0	746.9	1,926.2	1,924.4	1,918.9
	Temperature, F	1,018.6	1,019.4	964.6	961.4	1,000.7	988.9	943.8	943.8	995.8	989.0	948.9	948.9	1,022.1	1,028.6	1,038.6
	Enthalpy, Btu/lb	1,516.0	1,516.4	1,504.8	1,508.5	1,513.7	1,507.4	1,482.5	1,482.5	1,511.5	1,507.4	1,485.2	1,485.2	1,491.1	1,495.3	1,501.6
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	51,723	62,930	64,765
(from HP BFP)	Temperature, F	268.5	268.3	247.0	245.6	243.8	255.5	260.6	260.2	244.7	255.7	261.1	261.0	374.5	373.8	372.0
HP Steam Bypassed to Cold Reheat – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	515,034	512,539	508,785
(per HRSG unit)	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	543.4	540.4	535.6
	Temperature, F	982.6	983.5	961.6	958.6	978.4	966.6	919.6	919.6	974.3	966.6	924.8	924.8	709.0	709.0	709.0
	Enthalpy, Btu/lb	1,516.0	1,516.4	1,504.8	1,508.5	1,513.7	1,507.4	1,482.5	1,482.5	1,511.5	1,507.4	1,485.2	1,485.2	1,364.4	1,364.6	1,364.9
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1,364.8	1,364.0	1,363.1
Total HRH Steam per HRSG Unit	Flow, lb/h	516,145	515,792	554,824	550,711	543,644	549,758	548,932	544,965	548,206	553,102	556,436	556,201	589,381	585,109	578,726
	Pressure, psia	264.5	264.4	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6	523.3	520.3	515.9
	Temperature, F	1,005.8	1,006.5	974.4	978.9	987.1	937.6	892.7	892.7	983.7	937.6	897.7	897.7	1,014.4	1,020.0	1,028.8
	Enthalpy, Btu/lb	1,530.8	1,531.2	1,517.5	1,519.8	1,524.1	1,498.3	1,475.1	1,475.1	1,522.3	1,498.3	1,477.7	1,477.7	1,528.1	1,531.2	1,536.1
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	589,381	585,109	578,726
	Pressure, psia	264.5	264.4	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6	523.3	520.3	515.9
	Temperature, F	1,005.8	1,006.5	974.4	978.9	987.1	937.6	892.7	892.7	983.7	937.6	897.7	897.7	1,014.4	1,020.0	1,028.8
	Enthalpy, Btu/lb	1,530.8	1,531.2	1,517.5	1,519.8	1,524.1	1,498.3	1,475.1	1,475.1	1,522.3	1,498.3	1,477.7	1,477.7	1,528.1	1,531.2	1,536.1
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	186,669	187,770	188,396
(from Condensate)	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
HRH Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	756,050	752,879	747,122
(per HRSG unit)	Pressure, psia	200.0	200.0	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6	114.8	114.5	113.8
	Temperature, F	1,002.4	1,003.2	974.4	978.9	987.1	937.6	892.7	892.7	983.7	937.6	897.7	897.7	372.1	372.0	371.7
	Enthalpy, Btu/lb	1,530.8	1,531.2	1,517.5	1,519.8	1,524.1	1,498.3	1,475.1	1,475.1	1,522.3	1,498.3	1,477.7	1,477.7	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	408.6	405.8	402.3
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	113.3	112.5	112.0
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	73,031	72,013	68,968
	Pressure, psia	32.2	32.0	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	147.3	146.0	143.2
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	245.0	244.6	230.5	240.7	245.8	245.7	634.2	633.6	634.2
	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.6	1,162.6	1,162.5	1,343.5	1,343.4	1,343.6
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	73,031	72,013	68,968
	Pressure, psia	32.2	32.0	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	147.3	146.0	143.2
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	245.0	244.6	230.5	240.7	245.8	245.7	634.2	633.6	634.2
	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.6	1,162.6	1,162.5	1,343.5	1,343.4	1,343.6
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	7,594	7,612	7,215
(from Condensate)	Temperature, F	114.0	114.0	90.3	89.5	89.9	106.2	111.1	111.2	90.1	106.2	111.0	111.0	116.1	120.8	120.3
LP Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	80,625	79,624	76,183
(per HRSG unit)	Pressure, psia	32.2	32.0	22.0	21.4	20.6	25.2	27.3	27.1	21.0	25.3	27.7	27.7	51.5	51.0	49.9
	Temperature, F	254.3	254.1	233.0	231.5	229.5	240.4	245.0	244.6	230.5	240.7	245.8	245.7	380.0	379.9	379.2
	Enthalpy, Btu/lb	1,165.5	1,165.4	1,158.0	1,157.5	1,156.8	1,160.7	1,162.3	1,162.1	1,157.1	1,160.6	1,162.6	1,162.5	1,225.0	1,225.0	1,225.0
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	95.8	95.0	94.2
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	50.0	49.3	47.2

DECLASSIFIED

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 35 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
GateCycle Model ID		8BARTO	8BART3	8BARTO	8BART3	8BARTO	8BART3	8BARTO	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BARTO
GateCycle Case ID		B8-24S	B8-25S	B8-26S	B8-27S	B8-28S	B8-29S	B8-30S	B8-51S	B8-52S	B8-53S	B8-54S	B8-55S	B8-56S	B8-57S	B8-58S
Ambient Temperature		74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/80%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/80%RH	45 F/80%RH	59 F/80%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/80%RH	74 F/79%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,917p/1,052F	1,848p/1,052F	1,824p/1,052F	1,929p/1,031F	1,925p/1,049F	1,895p/1,052F	1,882p/1,052F	1,600p/1,031F	1,505p/1,037F	1,499p/1,046F	1,489p/1,052F	1,443p/1,052F	1,427p/1,052F	1,508p/1,042F	1,498p/1,052F
STG Cold Reheat Conditions, psia/F		565p/984F	217p/988F	565p/988F	217p/939F	565p/979F	217p/965F	565p/965F	217p/962F	217p/969F	217p/980F	217p/987F	217p/990F	217p/990F	217p/975F	565p/1,006F
Cold Reheat Conditions after Conditioning, psia/F		565p/984F	217p/988F	565p/988F	217p/939F	565p/979F	217p/965F	565p/965F	217p/962F	217p/969F	217p/980F	217p/987F	217p/990F	217p/990F	217p/975F	565p/1,006F
STG Hot Reheat Conditions, psia/F		511p/1,040F	503p/1,044F	500p/1,045F	520p/1,023F	514p/1,037F	511p/1,042F	511p/1,042F	403p/1,017F	400p/1,022F	397p/1,031F	393p/1,038F	386p/1,042F	384p/1,042F	400p/1,028F	395p/1,038F
Condenser Pressure		4.88 in HgA	5.36 in HgA	5.30 in HgA	3.42 in HgA	4.92 in HgA	5.46 in HgA	6.46 in HgA	2.05 in HgA	2.41 in HgA	2.38 in HgA	3.58 in HgA	3.98 in HgA	3.95 in HgA	2.41 in HgA	3.80 in HgA
Stack Temperature		230 F	229 F	228 F	229 F	231 F	232 F	231 F	218 F	219 F	218 F	219 F	218 F	217 F	217 F	220 F
Run Date		7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	7-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Gross CTG Output (each)	kW	181,068	168,833	164,881	197,137	184,229	177,293	176,696	207,123	201,614	192,471	181,058	168,633	164,681	197,137	184,229
Gross CTG Output (total)	kW	724,272	674,532	659,524	788,548	736,916	709,172	706,784	621,369	604,842	577,413	543,204	505,899	494,643	591,411	552,687
Gross CTG Heat Rate (LHV)	Btu/kWh	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372
Gross CTG Heat Rate (HHV)	Btu/kWh	10,311	10,529	10,592	10,186	10,394	10,521	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	6,818.30	6,484.26	6,378.26	7,242.02	6,906.36	6,727.21	6,710.21	5,636.44	5,518.68	5,333.55	5,113.72	4,863.21	4,783.69	5,431.52	5,179.78
CTG Heat Input (HHV) (total)	MMBtu/h	7,467.90	7,102.06	6,985.94	8,031.83	7,559.58	7,460.87	7,442.01	6,251.14	6,044.36	5,841.71	5,609.93	5,326.55	5,239.46	6,023.87	5,744.68
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	724,272	674,532	659,524	788,548	736,916	709,172	706,784	621,369	604,842	577,413	543,204	505,899	494,643	591,411	552,687
Gross Cycle Heat Rate (LHV)	Btu/kWh	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372
Gross Cycle Heat Rate (HHV)	Btu/kWh	10,311	10,529	10,592	10,186	10,394	10,521	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394
Plant Heat Input (LHV)	MMBtu/h	6,818.30	6,484.26	6,378.26	7,242.02	6,906.36	6,727.21	6,710.21	5,636.44	5,518.68	5,333.55	5,113.72	4,863.21	4,783.69	5,431.52	5,179.78
Plant Heat Input (HHV)	MMBtu/h	7,467.90	7,102.06	6,985.94	8,031.83	7,559.58	7,460.87	7,442.01	6,251.14	6,044.36	5,841.71	5,609.93	5,326.55	5,239.46	6,023.87	5,744.68
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	27,870	27,580	27,460	28,390	27,950	27,800	27,790	24,670	24,750	24,600	24,350	24,110	24,030	24,590	24,420
Total Auxiliary Power/Losses, percent of gross		3.85%	4.09%	4.16%	3.59%	3.79%	3.92%	3.93%	4.00%	4.09%	4.26%	4.48%	4.77%	4.86%	4.17%	4.42%
Net Plant Output w/ Step-Up Xfmr Losses	kW	696,402	646,972	632,064	760,248	708,966	681,372	678,994	596,499	580,092	552,813	518,854	481,789	470,613	566,721	528,267
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	9,791	10,022	10,091	9,525	9,741	9,873	9,883	9,449	9,513	9,646	9,856	10,094	10,166	9,584	9,805
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	10,724	10,977	11,053	10,565	10,804	10,950	10,960	10,480	10,420	10,567	10,796	11,056	11,133	10,629	10,875

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0
	Relative Humidity	78.5%	54.6%	43.6%	59.7%	78.5%	54.6%	43.6%	60.1%	59.9%	59.7%	78.5%	54.6%	43.6%	59.7%	78.5%
	WBT, F	69.1	76.6	78.6	51.4	69.1	76.6	78.6	30.9	39.3	51.4	69.1	76.6	78.6	51.4	69.1
Compressor Inlet Conditions	Temperature, F	74.0	90.0	95.0	62.6	69.6	76.5	79.2	35.0	45.0	59.0	74.0	90.0	95.0	62.6	69.6
	Relative Humidity	78.5%	54.6%	43.6%	92.6%	90.5%	91.4%	88.4%	60.1%	59.9%	59.7%	78.5%	54.6%	43.6%	92.6%	90.5%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On
Saturation Efficiency		0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	5,831	3,805	9,822	13,119	0	0	0	0	0	0	5,831	3,805
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	1,978.6	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6
	Flow, lb/h	80,556	76,610	75,357	86,640	82,624	80,481	80,277	89,908	86,934	84,020	80,556	76,610	75,357	86,640	82,624
Fuel LHV	Btu/lb	21,160	21,160	21,160	20,897	20,897	20,897	20,897	22,010	21,160	21,160	21,160	21,160	21,160	20,897	20,897
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 35 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3
	Temperature, F	981.9	965.9	966.5	936.9	977.6	963.2	963.0	959.8	967.0	978.3	965.3	967.8	968.6	973.5	1,003.9
	Enthalpy, Btu/lb	1,509.2	1,511.1	1,511.6	1,495.9	1,508.8	1,509.7	1,509.7	1,508.0	1,511.7	1,517.6	1,521.3	1,522.6	1,523.0	1,515.1	1,521.1
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	361.4	359.8	359.1	363.7	362.2	361.3	361.3	347.2	346.6	344.7	344.1	342.3	341.6	345.8	345.2
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	216.8	350.0	216.8	350.0	216.8	350.0	216.8	216.8	216.8	216.8	216.8	216.8	216.8	350.0
	Temperature, F	969.8	965.9	974.5	936.9	965.4	963.2	963.0	959.8	967.0	978.3	965.3	967.8	968.6	973.5	992.3
	Enthalpy, Btu/lb	1,509.2	1,511.1	1,511.6	1,495.9	1,508.8	1,509.7	1,509.7	1,508.0	1,511.7	1,517.6	1,521.3	1,522.6	1,523.0	1,515.1	1,521.1
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,638,934	3,674,902	3,630,488	4,059,690	3,875,066	3,776,057	3,766,327	4,291,488	4,127,300	4,009,011	3,838,934	3,674,902	3,630,488	4,059,690	3,875,066
	Pressure, in. H2O	17.09	15.90	15.56	18.69	17.39	16.69	16.59	19.73	19.17	18.29	17.09	15.90	15.56	18.69	17.39
	Temperature, F	1,108.0	1,123.4	1,127.2	1,087.0	1,105.0	1,115.0	1,115.0	1,072.9	1,079.8	1,099.9	1,108.0	1,123.4	1,127.2	1,087.0	1,105.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	181,068	168,633	164,881	197,137	184,229	177,293	176,606	207,123	201,614	192,471	181,068	168,633	164,881	197,137	184,229
Gross Heat Rate	Btu/kWh (LHV)	9,414	9,613	9,671	9,184	9,372	9,466	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC501-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 36 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	437,390	429,865	428,789	448,578	440,865	437,136	436,940	455,797	452,075	446,425	441,050	433,720	430,752	450,651	443,733
(at HRSG terminal point)	Pressure, psia	1,918.7	1,846.5	1,824.4	1,929.4	1,924.7	1,855.5	1,832.1	1,509.6	1,505.1	1,469.5	1,469.0	1,443.0	1,427.3	1,508.1	1,497.6
	Temperature, F	1,053.5	1,053.4	1,053.3	1,032.9	1,050.1	1,053.4	1,053.3	1,032.2	1,038.3	1,048.0	1,053.7	1,053.7	1,053.6	1,044.1	1,053.6
	Enthalpy, Btu/lb	1,511.2	1,513.1	1,513.6	1,487.9	1,508.8	1,511.7	1,511.7	1,510.0	1,513.7	1,519.8	1,523.3	1,524.6	1,525.0	1,517.1	1,523.1
dP from HP drum to HRSG terminal point	psi	49.6	47.6	47.0	50.9	49.9	49.3	49.1	70.3	69.5	68.9	68.1	62.4	61.3	68.9	68.2
HP SH #1 Steam Outlet Temperature	Temperature, F	1,054.0	1,053.9	1,053.7	1,033.4	1,050.6	1,053.9	1,053.8	1,032.9	1,038.9	1,048.6	1,054.3	1,054.3	1,054.3	1,044.8	1,054.4
HP SH #2 Steam Outlet Temperature	Temperature, F	963.8	938.7	931.9	945.9	960.7	963.0	961.9	951.3	955.5	972.1	968.2	931.5	924.5	969.0	964.0
HP Steam Desuperheating Flow	Flow, lb/h	0	18,509	23,979	1,565	0	7,667	8,839	1,700	2,661	2,953	14,626	30,849	34,746	2,462	10,740
(from HP Feedwater)	Temperature, F	370.9	369.4	368.8	373.0	371.6	370.8	370.6	357.1	356.5	354.7	364.1	362.6	361.9	365.7	365.2
	% of inlet steam	0.0%	4.5%	5.7%	0.3%	0.0%	1.8%	2.1%	0.4%	0.6%	0.8%	3.4%	7.7%	8.8%	0.6%	2.5%
	Final Superheat, F	200.7	154.9	143.7	188.4	197.8	180.8	177.3	243.4	245.2	247.9	297.7	154.8	142.4	245.6	226.7
HP SH #3/4 Steam Outlet Temperature	Temperature, F	833.3	840.0	841.9	824.5	831.0	834.0	835.2	850.9	853.8	858.3	860.0	860.7	861.1	855.6	859.7
HP Evaporator #1 Exit	Flow, lb/h	56,743	55,628	54,763	58,516	56,834	57,659	57,480	57,018	56,998	69,932	55,160	52,401	51,836	57,081	55,669
	Pressure, psia	1,956.3	1,893.1	1,871.4	1,980.2	1,974.6	1,944.8	1,941.2	1,579.3	1,574.6	1,567.7	1,554.1	1,505.4	1,488.6	1,577.0	1,564.0
	Temperature, F	633.4	628.1	626.5	634.4	634.0	631.9	631.8	603.2	602.8	602.2	601.0	598.7	598.3	603.0	601.9
	Enthalpy, Btu/lb	1,139.0	1,144.3	1,145.8	1,136.0	1,138.4	1,140.6	1,140.8	1,164.5	1,164.8	1,165.2	1,165.9	1,166.7	1,166.8	1,164.6	1,165.4
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	317.6	316.4	316.2	304.5	314.9	316.7	316.5	333.1	336.7	342.4	342.3	336.6	339.1	340.0	343.4
HP Evaporator #1 Approach	Temperature, F	1.6	0.4	0.1	0.7	1.5	1.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	378,647	365,720	348,935	388,508	381,830	371,900	370,621	397,085	393,004	386,808	371,258	350,470	344,370	391,095	377,122
	Pressure, psia	1,956.3	1,893.1	1,871.4	1,980.2	1,974.6	1,944.8	1,941.2	1,579.3	1,574.6	1,567.7	1,554.1	1,505.4	1,488.6	1,577.0	1,564.0
	Temperature, F	633.4	628.1	626.5	634.4	634.0	631.9	631.8	603.2	602.8	602.2	601.0	598.7	598.3	603.0	601.9
	Enthalpy, Btu/lb	1,139.0	1,144.3	1,145.8	1,136.0	1,138.4	1,140.6	1,140.8	1,164.5	1,164.8	1,165.2	1,165.9	1,166.7	1,166.8	1,164.6	1,165.4
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	17.6	17.1	16.9	17.9	17.6	17.6	17.5	20.9	20.7	20.5	19.9	19.2	19.0	20.7	20.2
HP Evaporator #2/3/4/5 Approach	Temperature, F	1.6	0.4	0.1	0.7	1.5	1.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	437,390	411,348	403,668	447,024	440,664	429,559	428,101	454,103	450,000	443,739	426,427	402,871	396,006	448,176	432,991
	Temperature, F	631.9	627.7	626.4	633.7	632.5	630.7	630.5	603.2	602.8	602.2	601.0	598.7	598.3	603.0	601.9
HP Economizer #4/5 Outlet Temperature	Temperature, F	574.1	572.5	571.8	577.8	574.8	573.8	573.8	558.9	557.6	555.8	554.7	552.8	552.1	557.0	555.1
HP Economizer #6/7 Outlet Temperature	Temperature, F	489.1	487.9	487.3	492.8	490.0	489.2	489.2	473.4	472.2	470.3	469.0	467.5	466.8	471.4	469.6
HP Economizer #8 Outlet Temperature	Temperature, F	433.0	432.8	432.6	436.8	433.8	433.3	433.4	419.4	418.2	416.0	415.4	414.8	414.4	417.2	415.9
Feedwater to HP Economizer #8	Flow, lb/h	437,390	411,348	403,668	447,024	440,664	429,559	428,101	454,103	450,000	443,739	426,427	402,871	396,006	448,176	432,991
	Pressure, psia	2,026.9	1,946.8	1,923.1	2,043.5	2,036.1	2,003.1	1,999.3	1,644.5	1,638.6	1,630.0	1,611.7	1,566.0	1,638.4	1,640.9	1,623.3
	Temperature, F	370.9	369.4	368.8	373.0	371.6	370.8	370.6	357.1	356.5	354.7	364.1	362.5	361.9	365.7	365.2
	Enthalpy, Btu/lb	346.5	344.9	344.2	348.8	347.3	346.4	346.3	331.5	330.9	329.0	328.4	326.7	326.9	330.0	329.5
HP FW Temperature increase Across BFP	F	12.2	12.4	12.5	12.1	12.2	12.3	12.3	12.5	12.6	12.6	12.7	12.9	13.0	12.6	12.7
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	976.6	971.0	969.3	983.6	974.8	974.8	974.4	962.9	966.6	972.5	971.5	964.7	962.8	970.4	973.3
Exit Temperature	Temperature, F	976.6	971.0	969.3	983.6	974.8	974.8	974.4	962.9	966.6	972.5	971.5	964.7	962.8	970.4	973.3
HRSG Hot Reheat Steam	Flow, lb/h	571,271	560,536	556,303	583,668	575,062	570,342	570,031	595,505	591,039	584,316	577,055	566,135	561,995	589,619	580,818
(at HRSG terminal point)	Pressure, psia	511.1	503.4	500.9	519.9	514.1	511.2	511.0	402.7	400.3	396.7	392.6	386.2	383.5	399.8	395.0
	Temperature, F	1,041.9	1,045.8	1,046.7	1,024.5	1,039.2	1,043.6	1,043.8	1,018.7	1,024.1	1,032.7	1,040.0	1,043.6	1,044.3	1,029.4	1,039.4
	Enthalpy, Btu/lb	1,543.3	1,545.5	1,546.2	1,533.7	1,541.8	1,544.3	1,544.4	1,533.6	1,535.7	1,541.5	1,545.5	1,547.5	1,548.1	1,539.6	1,545.1
HRSG RH dP -- terminal pt. to terminal pt.	psi	54.2	-286.6	65.3	-303.2	51.2	-294.4	54.3	-186.9	-183.5	-179.9	-175.8	-160.4	-166.8	-183.1	170.3
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,042.1	1,048.0	1,048.9	1,024.6	1,039.4	1,043.6	1,044.0	1,019.6	1,024.5	1,033.1	1,040.4	1,043.6	1,044.7	1,029.7	1,039.7
RHTR #3 Steam Outlet Temperature	Temperature, F	943.3	937.6	936.2	931.5	941.4	940.9	940.5	931.6	935.0	940.3	938.5	931.9	930.3	938.1	940.1
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	361.4	359.8	359.1	363.7	362.2	361.3	361.3	347.2	348.6	344.7	344.1	342.3	341.6	345.8	345.2
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	325.4	322.7	322.2	319.8	324.3	323.6	323.6	340.3	341.9	344.5	343.6	341.2	340.8	343.1	344.2
RHTR #4 Steam Outlet Temperature	Temperature, F	797.7	793.3	792.2	793.9	797.2	796.0	795.8	790.3	791.4	793.0	791.3	787.1	786.0	792.5	792.3
Cold Reheat Steam from HP Bypass	Flow, lb/h	505,022	496,822	493,312	512,462	507,928	504,962	504,737	521,664	518,935	514,790	509,990	501,743	496,356	518,708	513,183
	Pressure, psia	530.6	522.6	519.0	540.0	533.9	530.7	530.6	429.3	426.7	422.8	418.4	411.4	408.5	426.2	421.0
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	706.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,355.2	1,355.7	1,355.9	1,354.9	1,355.6	1,355.2	1,355.2	1,361.2	1,361.3	1,361.5	1,361.6	1,362.2	1,362.4	1,361.4	1,361.6
Cold Reheat Steam from STG to HRSG	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(at HRSG terminal point)	Pressure, psia	565.3	215.8	565.3	216.6	565.3	215.8	565.3	216.8	216.8	216.8	216.8	216.8	215.8	216.8	565.3
	Temperature, F	961.9	965.9	966.5	936.9	977.6	963.2	963.0	959.8	967.0	978.3	983.3	987.8	988.6	973.5	1,003.9
	Enthalpy, Btu/lb	1,509.2	1,511.1	1,511.6	1,495.9	1,508.8	1,509.7	1,509.7	1,508.0	1,511.7	1,517.6	1,521.3	1,522.6	1,523.0	1,515.1	1,521.1
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam - Cold Reheat Steam	Flow, lb/h	437,390	429,865	428,789	448,578	440,865	437,136	436,940	455,797	452,075	446,425	441,050	433,720	430,752	450,651	443,733

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 35 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	66,248	63,709	62,989	71,384	67,132	65,372	65,295	73,840	72,103	69,538	67,068	64,391	63,540	70,813	67,652
	Pressure, psia	530.8	522.6	519.0	539.9	533.9	530.7	530.6	429.3	428.7	422.6	416.4	411.4	408.5	426.2	421.0
	Temperature, F	625.3	621.0	619.6	624.7	625.6	624.1	623.9	599.8	599.8	599.7	598.7	595.0	593.6	600.2	599.5
	Enthalpy, Btu/lb	1,311.5	1,309.5	1,309.0	1,310.4	1,311.4	1,310.8	1,310.6	1,304.4	1,304.6	1,304.9	1,304.7	1,303.1	1,302.6	1,304.9	1,304.9
IP Evaporator Drum Exit	Flow, lb/h	66,248	63,709	62,989	71,384	67,132	65,372	65,295	73,840	72,103	69,538	67,068	64,391	63,540	70,813	67,652
	Pressure, psia	543.1	534.2	530.5	554.0	546.5	542.8	542.6	447.9	444.6	439.7	434.3	429.3	423.1	443.5	437.0
	Temperature, F	475.7	473.9	473.2	477.8	476.3	475.9	475.8	455.9	455.1	454.0	452.7	450.9	450.2	454.9	453.4
	Enthalpy, Btu/lb	1,204.6	1,204.7	1,204.8	1,204.5	1,204.6	1,204.6	1,204.6	1,205.2	1,205.2	1,205.2	1,205.2	1,205.2	1,205.2	1,205.2	1,205.2
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	26.2	25.7	25.5	27.4	26.4	26.1	26.1	29.2	28.8	28.2	27.8	27.3	27.1	28.0	28.0
IP Approach	Temperature, F	12.9	12.2	11.9	12.3	12.8	12.7	12.7	9.2	9.4	9.8	9.5	8.9	8.8	9.7	9.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	66,248	63,709	62,989	71,384	67,132	65,372	65,295	73,840	72,103	69,538	67,068	64,391	63,540	70,813	67,652
	Pressure, psia	543.1	534.2	530.5	554.0	546.5	542.8	542.6	447.9	444.6	439.7	434.3	429.3	423.1	443.5	437.0
	Temperature, F	462.7	461.8	461.2	465.5	463.5	462.9	462.9	442.6	442.6	441.8	440.2	438.2	437.6	442.2	440.8
	Enthalpy, Btu/lb	444.8	443.5	442.9	447.7	445.5	444.8	444.8	426.4	425.5	423.7	422.6	421.2	420.6	424.8	423.3
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	66,248	63,709	62,989	71,384	67,132	65,372	65,295	73,840	72,103	69,538	67,068	64,391	63,540	70,813	67,652
(pressure is preliminary)	Pressure, psia	578.8	567.2	562.7	596.4	583.1	577.5	577.3	492.1	488.8	478.9	470.8	460.0	456.0	484.2	474.2
	Temperature, F	362.1	360.5	359.8	364.3	362.9	362.0	362.0	348.1	347.5	346.8	346.0	343.9	342.8	346.6	346.1
	Enthalpy, Btu/lb	335.2	333.6	332.8	337.6	336.0	335.1	335.0	320.4	319.7	317.7	317.1	315.3	314.5	318.8	318.3
IP FW Temperature Increase Across BFP	F	3.5	3.5	3.5	3.4	3.5	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.7	3.5	3.6
LP Steam (at HRSG terminal point)	Flow, lb/h	57,582	54,933	54,057	70,547	68,731	66,938	66,823	67,265	66,576	63,762	63,578	61,376	60,436	65,114	64,046
	Pressure, psia	141.1	138.5	137.3	144.9	142.3	141.1	141.0	114.3	113.4	111.0	109.9	107.7	106.8	112.4	111.8
	Temperature, F	633.4	628.6	627.2	634.6	633.6	631.9	631.8	610.7	610.0	610.0	607.6	603.2	601.8	610.6	608.5
	Enthalpy, Btu/lb	1,343.5	1,341.2	1,340.6	1,343.8	1,343.5	1,342.7	1,342.6	1,333.6	1,333.5	1,333.7	1,332.5	1,330.5	1,329.9	1,333.9	1,332.9
LP Evaporator Steam Exit	Flow, lb/h	57,582	54,933	54,057	70,547	68,731	66,938	66,823	67,265	66,576	63,762	63,578	61,376	60,436	65,114	64,046
	Pressure, psia	150.4	147.2	145.9	154.7	151.9	150.2	150.1	125.4	124.3	121.3	120.2	117.5	116.3	123.0	122.1
	Temperature, F	358.6	357.0	356.3	360.9	359.4	358.6	358.5	344.6	343.9	342.0	341.4	339.7	338.9	343.1	342.5
	Enthalpy, Btu/lb	1,194.5	1,194.2	1,194.0	1,195.0	1,194.7	1,194.5	1,194.5	1,191.6	1,191.3	1,190.9	1,190.5	1,190.4	1,190.2	1,191.2	1,191.0
LP Evaporator Water Exit to BFPs	Flow, lb/h	571,272	566,516	566,299	583,872	575,056	570,319	570,033	595,515	591,049	584,332	577,062	566,133	561,894	569,934	560,809
	Pressure, psia	150.4	147.2	145.9	154.7	151.9	150.2	150.1	125.4	124.3	121.3	120.2	117.5	116.3	123.0	122.1
	Temperature, F	358.6	357.0	356.3	360.9	359.4	358.6	358.5	344.6	343.9	342.0	341.4	339.7	338.9	343.1	342.5
	Enthalpy, Btu/lb	330.9	329.1	328.4	333.3	331.7	330.8	330.7	316.1	315.4	313.4	312.7	310.9	310.2	314.5	314.0
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	66,248	63,709	62,989	71,384	67,132	65,372	65,295	73,840	72,103	69,538	67,068	64,391	63,540	70,813	67,652
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	437,390	411,348	403,668	447,024	440,664	429,669	428,101	454,103	450,900	443,739	428,427	402,871	396,005	448,178	432,991
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	16,509	23,079	1,565	0	7,567	8,839	1,700	2,081	2,663	14,626	30,649	34,745	2,482	19,749
IP FW to PAC Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	67,832	66,256	65,543	63,904	67,263	67,826	67,797	65,887	65,860	65,854	68,940	68,023	67,605	68,057	69,430
LP Pinch	Temperature, F	19.3	18.9	18.8	20.1	19.4	19.3	19.2	20.5	20.2	19.6	19.4	19.1	18.9	20.1	19.5
LP Approach	Temperature, F	1.8	2.4	2.6	4.0	1.4	1.8	1.9	7.7	6.6	7.6	4.4	4.3	4.6	7.2	4.2
Condensate Recirculated	Flow, lb/h	3,323	0	0	41,163	0	0	0	101,959	83,475	84,797	38,111	25,691	26,402	84,011	37,441
	Temperature, F	357.3	356.1	354.1	357.5	356.8	357.2	357.1	337.3	337.7	334.8	337.2	335.6	334.5	336.2	336.6
% of Total LP Economizer Flow		1%	0%	0%	6%	0%	0%	0%	13%	11%	12%	6%	4%	4%	11%	6%
Condensate from LP Economizer	Flow, lb/h	642,173	625,492	620,387	695,605	643,825	637,307	636,875	784,744	741,105	732,891	676,799	653,212	648,742	738,665	682,316
	Temperature, F	356.6	354.3	353.4	356.7	357.8	356.5	356.3	336.5	337.9	334.1	336.6	335.0	333.9	335.6	337.9
	Enthalpy, Btu/lb	329.0	326.6	326.6	329.0	330.2	328.9	328.7	308.0	308.6	305.6	308.2	306.6	305.4	307.0	309.5
Condensate to LP Economizer	Flow, lb/h	642,173	625,492	620,387	695,605	643,825	637,307	636,875	784,744	741,105	732,891	676,799	653,212	648,742	738,665	682,316
	Temperature, F	135.0	137.3	137.0	135.0	134.1	136.1	136.1	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.9
	Enthalpy, Btu/lb	104.0	106.4	106.0	104.0	103.1	107.1	107.1	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2
Condensate from Recirculation	Flow, lb/h	3,323	0	0	41,163	0	0	0	101,959	83,475	84,797	38,111	25,691	26,402	84,011	37,441
	Temperature, F	357.3	356.1	354.1	357.5	356.8	357.2	357.1	337.3	337.7	334.8	337.2	335.6	334.5	336.2	336.6
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	133.6	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.6	108.4	122.6	126.7	126.4	108.7	123.0
Condensate to HRSG	Flow, lb/h	638,850	625,492	620,387	654,442	643,825	637,307	636,875	682,785	657,630	648,094	640,688	627,520	622,340	654,653	644,877
	Pressure, psia	420.8	424.9	426.8	418.6	419.1	420.5	420.6	479.9	474.0	475.6	475.0	477.1	478.1	474.4	474.1
	Temperature, F	133.6	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.6	108.4	122.6	126.7	126.4	108.7	123.0
Stack Exit	Flow, lb/h	3,838,934	3,674,902	3,630,488	4,059,590	3,875,066	3,775,067	3,768,327	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,875,066
	Temperature, F	230.2	229.0	227.8	229.0	231.0	231.5	231.4	217.9	218.6	216.2	219.0	217.8	216.6	217.4	220.1

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4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
.1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,855.5	1,892.1	1,600.0	1,505.1	1,469.5	1,469.0	1,443.0	1,427.3	1,508.1	1,497.8
	Temperature, F	1,051.9	1,051.8	1,051.6	1,031.3	1,048.5	1,051.8	1,051.7	1,030.6	1,030.7	1,046.3	1,052.0	1,052.0	1,052.0	1,042.5	1,052.1
	Enthalpy, Btu/lb	1,510.2	1,512.1	1,512.6	1,498.9	1,507.8	1,510.7	1,510.7	1,509.0	1,512.7	1,518.6	1,522.9	1,523.6	1,524.0	1,516.1	1,522.1
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	216.8	565.3	216.8	565.3	215.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3
	Temperature, F (MAX 840 F)	983.7	967.8	988.3	938.8	979.4	965.1	984.8	961.8	968.9	980.2	987.3	989.7	990.5	975.4	1,005.7
	Enthalpy, Btu/lb	1,510.2	1,512.1	1,512.6	1,498.9	1,507.8	1,510.7	1,510.7	1,509.0	1,512.7	1,518.6	1,522.9	1,523.6	1,524.0	1,516.1	1,522.1
Efficiency (THV inlet to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3
	Temperature, F	983.7	967.8	988.3	938.8	979.4	965.1	984.8	961.8	968.9	980.2	987.3	989.7	990.5	975.4	1,005.7
	Enthalpy, Btu/lb	1,510.2	1,512.1	1,512.6	1,498.9	1,507.8	1,510.7	1,510.7	1,509.0	1,512.7	1,518.6	1,522.9	1,523.6	1,524.0	1,516.1	1,522.1
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	361.4	359.6	359.1	363.7	362.2	361.3	361.3	347.2	346.6	344.7	344.1	342.9	341.6	345.8	345.2
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3
	Temperature, F (MAX 760 F)	983.7	967.8	988.3	938.8	979.4	965.1	984.8	961.8	968.9	980.2	987.3	989.7	990.5	975.4	1,005.7
	Enthalpy, Btu/lb	1,510.2	1,512.1	1,512.6	1,498.9	1,507.8	1,510.7	1,510.7	1,509.0	1,512.7	1,518.6	1,522.9	1,523.6	1,524.0	1,516.1	1,522.1
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	54.2	-286.6	66.3	-303.2	51.2	-264.4	54.3	-185.9	-183.5	-179.9	-175.8	-169.4	-166.8	-183.1	170.3
Reheat System dP		9.58%	-132.22%	11.56%	-139.86%	9.05%	-135.82%	9.60%	-85.77%	-84.65%	-83.00%	-81.12%	-78.15%	-76.93%	-84.45%	30.13%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 584 psia)	511.1	503.4	500.0	519.9	514.1	511.2	511.0	402.7	400.3	396.7	392.6	386.2	383.6	396.8	395.0
	Temperature, F	1,040.1	1,043.9	1,044.8	1,022.7	1,037.3	1,041.8	1,042.0	1,016.8	1,022.3	1,030.9	1,038.2	1,041.6	1,042.5	1,027.5	1,037.6
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-11.8	-7.9	-6.8	-6.6	-11.2	-10.6	-9.7	-13.8	-14.4	-15.4	-13.8	-10.4	-9.5	-14.0	-14.6
	Enthalpy, Btu/lb	1,542.3	1,544.6	1,545.2	1,532.7	1,540.8	1,543.3	1,543.4	1,532.8	1,535.7	1,540.5	1,544.5	1,545.5	1,547.1	1,538.6	1,544.1
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	124.9	27.4	124.9	27.4	124.9	27.4	124.9	27.4	27.4	27.4	27.4	27.4	27.4	27.4	124.9
	Temperature, F	1,020.5	877.8	1,026.9	877.8	893.5	877.8	1,022.6	877.8	877.8	877.8	877.8	877.8	877.8	877.8	1,023.9
	Enthalpy, Btu/lb	1,542.3	1,471.9	1,545.2	1,471.9	1,476.5	1,471.9	1,543.4	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,544.1
Efficiency (INTV inlet to IPT exit)		90.79%	86.54%	90.79%	86.54%	90.79%	86.54%	90.79%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	90.79%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	141.1	138.5	137.3	144.9	142.3	141.1	141.0	114.3	113.4	111.0	109.9	107.7	106.8	112.4	111.8
	Temperature, F	631.4	626.6	626.2	632.5	631.6	629.9	629.7	608.7	608.0	608.0	608.5	601.2	599.8	608.9	606.5
	Enthalpy, Btu/lb	1,342.5	1,340.2	1,339.6	1,342.8	1,342.5	1,341.7	1,341.6	1,332.8	1,332.5	1,332.7	1,331.5	1,329.5	1,328.9	1,332.9	1,331.9
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)															
LP Admission CV Pressure Loss	% loss	11.5%	80.2%	9.1%	81.1%	12.3%	80.5%	11.4%	78.1%	76.9%	75.4%	75.1%	74.6%	74.4%	75.7%	-11.7%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	123.0	27.0	123.0	27.0	123.0	27.0	123.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	107.1
	Temperature, F	1,020.4	877.8	1,025.9	877.8	893.4	877.8	1,022.4	877.8	877.8	877.8	877.8	877.8	877.8	877.8	605.8
	Enthalpy, Btu/lb	1,542.3	1,471.9	1,545.2	1,471.9	1,476.5	1,471.9	1,543.4	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,331.9
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.806	0.963	0.806	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.806
	Pressure, in. HgA	1.642	1.960	1.642	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642
	Temperature, F	1,014.0	875.9	1,019.6	875.9	885.1	875.9	1,016.0	875.9	875.9	875.9	875.9	875.9	875.9	875.9	591.0
ELEP Enthalpy, Btu/lb		1,012.3	1,058.8	1,012.3	1,058.8	1,012.3	1,058.8	1,012.3	1,058.8	1,058.8	1,058.8	1,058.8	1,058.8	1,058.8	1,058.8	1,012.3
UEEP Enthalpy, Btu/lb		1,542.3	1,471.9	1,545.2	1,471.9	1,476.5	1,471.9	1,543.4	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,331.9
Exhaust Loss Btu/lb		38.0	17.9	38.0	17.9	38.0	17.9	38.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	38.0
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.04%	90.52%	90.04%	90.52%	90.04%	90.52%	90.04%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.04%
LPT Efficiency to UEEP		89.02%	89.50%	89.02%	89.50%	89.02%	89.50%	89.02%	89.50%	89.50%	89.50%	89.50%	89.50%	89.50%	89.50%	89.02%
Annulus Velocity ft/s		1,398.0	308.3	1,398.0	308.3	1,398.0	308.3	1,398.0	308.3	308.3	308.3	308.3	308.3	308.3	308.3	1,398.0
Volumetric Flow 1000 ft3/min per end		7,853	1,589	7,853	1,589	7,853	1,589	7,853	1,589	1,589	1,589	1,589	1,589	1,589	1,589	7,853
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 35 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	3,632.4	3,553.2	3,526.5	3,731.4	3,655.9	3,614.8	3,612.6	2,870.1	2,842.4	2,811.5	2,758.2	2,698.1	2,677.4	2,835.5	2,775.3
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	27.9	26.8	26.6	31.4	28.1	27.3	27.3	26.3	23.9	23.6	21.2	20.4	20.2	23.8	21.4
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.866	0.963	0.866	0.963	0.866	0.963	0.866	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.866
	Pressure, in. HgA	1.642	1.960	1.642	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642
	Temperature, F	1,014.0	876.9	1,019.6	875.9	866.1	876.9	1,018.0	875.9	875.9	875.9	875.9	875.9	876.9	876.9	591.0
	Enthalpy, Btu/lb	1,542.3	1,471.9	1,545.2	1,471.9	1,476.5	1,471.9	1,543.4	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,331.9
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	56	70	67	92	93	88	77	32	33	36	43	23	25	41	26
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	2,971,259	2,922,243	2,901,148	3,008,452	2,967,936	2,971,062	2,969,609	2,293,252	2,283,151	2,264,299	2,246,879	2,211,192	2,195,236	2,281,676	2,253,025
(total, both units)	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser	Flow, lb/h	268,781	266,714	262,695	311,724	303,966	295,948	295,417	229,648	218,625	209,404	208,631	201,329	198,144	213,679	210,434
(total, both units)	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	102.9	106.4	106.0	89.8	103.1	107.1	107.1	72.6	76.1	77.7	92.0	95.8	95.6	78.9	92.2
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	102.9	106.4	106.0	89.8	103.1	107.1	107.1	72.6	76.1	77.7	92.0	95.8	95.6	78.9	92.2
Condenser Exit	Flow, lb/h	3,488,926	3,425,821	3,400,728	3,837,049	3,508,793	3,483,908	3,481,901	2,730,935	2,718,611	2,690,541	2,674,557	2,629,287	2,610,209	2,712,400	2,690,285
	Pressure, psia	2.397	2.626	2.603	1.682	2.416	2.682	2.680	1.906	1.185	1.176	1.758	1.954	1.939	1.161	1.780
	Pressure, in HgA (MIN 1.0 in. HgA)	4.880	5.347	5.299	3.425	4.920	5.460	5.456	2.053	2.412	2.382	3.579	3.977	3.948	2.406	3.691
	Temperature, F	132.8	138.3	135.9	119.7	133.1	137.1	137.0	102.0	107.4	107.0	121.3	125.2	124.9	107.3	121.5
	Enthalpy, Btu/lb	100.8	104.2	103.9	87.7	101.1	105.0	105.0	70.0	75.6	76.0	89.3	93.2	92.9	76.4	89.5
Condensate Pump Discharge	Flow, lb/h	3,488,926	3,425,821	3,400,728	3,837,049	3,508,793	3,483,908	3,481,901	2,730,935	2,718,611	2,690,541	2,674,557	2,629,287	2,610,209	2,712,400	2,690,285
	Pressure, psia	420.8	424.9	426.8	418.6	419.1	420.5	420.6	473.9	474.0	475.0	475.0	477.1	478.1	474.4	474.1
	Temperature, F	133.3	138.8	136.4	120.2	133.6	137.6	137.5	102.7	108.1	107.7	122.1	125.9	125.7	108.0	122.3
	Enthalpy, Btu/lb	102.3	105.8	105.5	89.3	102.6	106.6	105.6	71.9	77.4	77.0	91.3	95.1	94.9	77.3	91.5
Condensate after GSC	Flow, lb/h	3,488,926	3,425,821	3,400,728	3,837,049	3,508,793	3,483,908	3,481,901	2,730,935	2,718,611	2,690,541	2,674,557	2,629,287	2,610,209	2,712,400	2,690,285
	Temperature, F	133.8	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.8	108.4	122.8	126.7	126.4	108.7	123.0
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	3,271,034	3,210,854	3,185,751	3,322,085	3,293,624	3,268,688	3,266,919	2,515,933	2,503,611	2,475,541	2,459,575	2,414,292	2,395,213	2,497,406	2,475,291
	Temperature, F	133.8	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.8	108.4	122.8	126.7	126.4	108.7	123.0
Total Circulating Water	Flow, lb/h	196,978,496	196,800,096	196,800,096	199,501,072	196,978,496	196,800,096	196,800,096	199,697,952	199,501,072	199,501,072	196,978,496	196,800,096	196,800,096	199,501,072	196,978,496
	Flow, gpm	389,696	389,682	389,682	389,785	389,696	389,682	389,682	389,853	389,785	389,785	389,696	389,682	389,682	389,785	389,696
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0
Circulating Water to Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048
	Flow, gpm	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,819	374,741	374,741	374,619	374,593	374,593	374,741	374,619
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1
Circulating Water from Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048
	Temperature, F	104.6	109.4	109.3	88.3	105.0	109.6	109.6	75.7	83.5	83.4	100.1	104.8	104.7	83.5	100.2
Total Circulating Water Discharge	Flow, lb/h	196,978,496	196,800,096	196,800,096	199,501,072	196,978,496	196,800,096	196,800,096	199,697,952	199,501,072	199,501,072	196,978,496	196,800,096	196,800,096	199,501,072	196,978,496
	Temperature, F	104.6	109.2	109.0	88.0	104.7	109.5	109.5	75.5	83.4	83.2	100.0	104.7	104.6	83.4	100.1
Circulating Water Temperature Rise	dT, F	19.55	19.15	19.01	20.03	19.67	19.48	19.46	15.54	15.40	15.24	14.99	14.62	14.58	15.36	15.08
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426
	Flow, gpm	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049
	Temperature, F	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426
	Temperature, F	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 24-BYP 4x100% STG Bypass Gas Fuel 74 F	Case 25-BYP 4x100% STG Bypass Gas Fuel 90 F	Case 26-BYP 4x100% STG Bypass Gas Fuel 95 F	Case 27-BYP 4x100% STG Bypass Gas Fuel 59 F/EC On	Case 28-BYP 4x100% STG Bypass Gas Fuel 74 F/EC On	Case 29-BYP 4x100% STG Bypass Gas Fuel 90 F/EC On	Case 30-BYP 4x100% STG Bypass Gas Fuel 95 F/EC On	Case 51-BYP 3x100% STG Bypass Gas Fuel 35 F	Case 52-BYP 3x100% STG Bypass Gas Fuel 45 F	Case 53-BYP 3x100% STG Bypass Gas Fuel 59 F	Case 54-BYP 3x100% STG Bypass Gas Fuel 74 F	Case 55-BYP 3x100% STG Bypass Gas Fuel 90 F	Case 56-BYP 3x100% STG Bypass Gas Fuel 95 F	Case 57-BYP 3x100% STG Bypass Gas Fuel 59 F/EC On	Case 58-BYP 3x100% STG Bypass Gas Fuel 74 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	66	70	87	92	93	66	77	32	33	35	43	23	25	41	29
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	571,272	560,316	556,299	563,872	575,056	570,319	570,033	595,516	591,049	584,332	577,662	566,133	561,894	569,534	580,809
	Pressure, psia	152.7	149.5	148.2	157.0	154.2	152.5	152.4	127.7	126.6	125.6	122.5	119.6	118.6	126.3	124.4
	Temperature, F	358.6	357.0	356.3	356.9	359.4	358.5	358.5	344.8	343.9	342.0	341.4	339.7	338.9	343.1	342.5
	Enthalpy, Btu/lb	330.9	329.1	328.4	333.3	331.7	330.8	330.7	316.1	315.4	313.4	312.7	310.9	310.2	314.5	314.0
IP Bleed (before CV)	Flow, lb/h	66,251	63,703	62,658	71,389	67,129	65,366	65,267	73,845	72,109	69,546	67,068	64,391	63,538	70,819	67,648
	Pressure, psia	1,065.4	1,065.7	1,060.0	1,061.8	1,064.4	1,065.7	1,065.8	1,059.5	1,061.3	1,063.1	1,065.2	1,070.0	1,071.4	1,061.3	1,065.3
	Temperature, F	361.4	360.8	359.1	363.7	362.2	361.3	361.3	347.2	346.5	344.7	344.1	342.3	341.6	345.8	345.2
	Enthalpy, Btu/lb	336.2	333.5	332.8	337.6	336.0	335.1	335.0	320.4	319.7	317.7	317.1	315.3	314.5	318.8	318.3
IP FW Control Valve Exit Pressure	Pressure, psia	578.8	567.2	562.7	595.4	583.1	577.5	577.3	492.1	486.8	478.9	470.8	460.0	456.0	484.2	474.2
	CV dP, psi	506.6	521.5	527.2	486.2	501.2	508.2	508.5	667.4	674.5	684.2	695.4	710.0	715.4	677.1	691.6
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,477.7	3,460.1	3,455.2	3,464.1	3,473.1	3,478.3	3,478.6	3,484.9	3,488.9	3,478.3	3,480.1	3,489.0	3,504.1	3,471.7	3,480.6
	CV dP, psi	1,450.8	1,543.4	1,572.1	1,429.6	1,437.0	1,475.2	1,479.3	1,626.5	1,631.3	1,648.2	1,674.4	1,692.1	1,695.7	1,631.1	1,657.4
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	505,022	496,613	493,311	512,483	507,926	504,952	504,736	521,670	518,940	514,787	509,994	501,742	498,356	518,715	513,161
	Pressure, psia	2,026.9	1,948.6	1,923.1	2,043.5	2,036.1	2,003.1	1,999.3	1,844.5	1,838.6	1,830.0	1,811.7	1,656.9	1,636.4	1,840.6	1,823.3
	Temperature, F	370.9	369.4	368.8	373.0	371.6	370.8	370.8	357.1	356.5	354.7	354.1	352.5	351.9	355.7	355.2
	Enthalpy, Btu/lb	346.5	344.9	344.2	348.8	347.3	346.4	346.3	331.5	330.9	329.0	328.4	326.7	326.0	330.0	329.5
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	437,390	429,665	426,799	446,578	440,865	437,136	436,940	455,797	452,075	446,425	441,050	433,720	430,752	450,651	443,733
	Pressure, psia	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,895.5	1,892.1	1,509.0	1,505.1	1,498.5	1,489.0	1,443.0	1,427.3	1,506.1	1,497.8
	Temperature, F	1,053.5	1,053.4	1,053.3	1,032.9	1,050.1	1,053.4	1,053.3	1,032.2	1,038.3	1,048.0	1,053.7	1,053.7	1,053.6	1,044.1	1,053.8
	Enthalpy, Btu/lb	1,511.2	1,513.1	1,513.6	1,497.9	1,508.8	1,511.7	1,511.7	1,510.0	1,513.7	1,519.6	1,523.3	1,524.6	1,525.0	1,517.1	1,523.1
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	437,390	429,665	426,799	446,578	440,865	437,136	436,940	455,797	452,075	446,425	441,050	433,720	430,752	450,651	443,733
	Pressure, psia	1,916.7	1,845.5	1,824.4	1,929.4	1,924.7	1,895.5	1,892.1	1,509.0	1,505.1	1,498.5	1,489.0	1,443.0	1,427.3	1,506.1	1,497.8
	Temperature, F	1,053.6	1,053.4	1,053.3	1,032.9	1,050.1	1,053.4	1,053.3	1,032.2	1,038.3	1,048.0	1,053.7	1,053.7	1,053.6	1,044.1	1,053.8
	Enthalpy, Btu/lb	1,511.2	1,513.1	1,513.6	1,497.9	1,508.8	1,511.7	1,511.7	1,510.0	1,513.7	1,519.6	1,523.3	1,524.6	1,525.0	1,517.1	1,523.1
HP Bypass Steam Desuperheating Flow	Flow, lb/h	67,632	66,956	66,543	69,904	67,269	67,826	67,797	66,667	66,560	66,354	66,940	66,023	67,005	69,057	69,430
(from HP BFP)	Temperature, F	370.9	369.4	368.8	373.0	371.6	370.8	370.8	357.1	356.5	354.7	354.1	352.5	351.9	355.7	355.2
HP Steam Bypassed to Cold Reheat – CV Exit	Flow, lb/h	505,022	496,622	493,312	512,482	507,926	504,962	504,737	521,664	518,935	514,780	509,990	501,743	498,356	518,708	513,153
(per HRSG unit)	Pressure, psia	539.8	522.6	519.0	540.0	539.9	530.7	530.6	429.3	426.7	422.8	418.4	411.4	408.5	429.2	421.0
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,356.2	1,356.7	1,355.9	1,354.6	1,355.6	1,356.2	1,356.2	1,361.2	1,361.3	1,361.5	1,361.6	1,362.2	1,362.4	1,361.4	1,361.6
HP Bypass Control Valve Pressure Loss	dP, psi	1,386.0	1,322.9	1,305.4	1,389.4	1,390.8	1,354.7	1,351.6	1,079.7	1,078.4	1,076.7	1,070.6	1,031.6	1,018.8	1,081.9	1,076.8
Total HRH Steam per HRSG Unit	Flow, lb/h	571,271	560,535	556,303	583,868	575,062	570,342	570,031	595,505	591,039	584,316	577,055	566,135	561,695	589,519	580,818
	Pressure, psia	511.1	503.4	500.0	519.9	514.1	511.2	511.0	402.7	400.3	396.7	392.6	386.2	383.5	399.8	395.0
	Temperature, F	1,041.9	1,045.8	1,046.7	1,024.6	1,039.2	1,043.8	1,043.8	1,018.7	1,024.1	1,032.7	1,040.0	1,043.5	1,044.3	1,029.4	1,039.4
	Enthalpy, Btu/lb	1,543.3	1,545.6	1,546.2	1,533.7	1,541.6	1,544.3	1,544.4	1,533.8	1,536.7	1,541.5	1,545.5	1,547.5	1,548.1	1,539.6	1,545.1
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	571,271	560,535	556,303	583,868	575,062	570,342	570,031	595,505	591,039	584,316	577,055	566,135	561,695	589,519	580,818
	Pressure, psia	511.1	503.4	500.0	519.9	514.1	511.2	511.0	402.7	400.3	396.7	392.6	386.2	383.5	399.8	395.0
	Temperature, F	1,041.9	1,045.8	1,046.7	1,024.6	1,039.2	1,043.8	1,043.8	1,018.7	1,024.1	1,032.7	1,040.0	1,043.5	1,044.3	1,029.4	1,039.4
	Enthalpy, Btu/lb	1,543.3	1,545.6	1,546.2	1,533.7	1,541.6	1,544.3	1,544.4	1,533.8	1,536.7	1,541.5	1,545.5	1,547.5	1,548.1	1,539.6	1,545.1
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	172,000	170,474	169,433	168,695	172,371	172,883	172,824	169,509	170,606	171,047	173,166	171,510	170,451	171,606	174,121
(from Condensate)	Temperature, F	133.6	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.6	108.4	122.8	126.7	126.4	108.7	123.0
HRH Steam Bypassed to Condenser – CV Exit	Flow, lb/h	743,271	731,010	725,736	752,562	747,433	743,205	742,855	765,014	761,647	756,363	750,223	737,645	732,346	761,155	754,938
(per HRSG unit)	Pressure, psia	113.8	112.2	111.4	114.5	114.4	114.1	114.0	116.6	115.3	114.4	114.2	112.5	111.7	115.2	114.9
	Temperature, F	371.7	371.2	370.9	372.0	372.0	371.8	371.8	372.4	372.3	371.9	371.9	371.3	371.0	372.2	372.1
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	397.3	391.2	386.6	405.6	399.7	397.1	397.0	287.0	285.0	282.9	278.4	273.7	271.8	284.6	280.1
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	111.4	109.6	108.8	112.8	112.0	111.4	111.3	114.6	114.1	113.2	112.4	110.5	109.7	114.1	113.1
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	67,662	64,933	64,057	70,647	68,731	66,936	66,823	67,265	66,576	65,762	63,576	61,378	60,436	65,114	64,048
	Pressure, psia	141.1	138.5	137.5	144.9	142.3	141.1	141.0	114.3	113.4	111.0	109.9	107.7	106.8	112.4	111.8
	Temperature, F	633.4	628.6	627.2	634.6	633.8	631.9	631.8	610.7	610.0	610.0	607.5	603.2	601.8	610.5	608.5
	Enthalpy, Btu/lb	1,343.5	1,341.2	1,340.8	1,343.8	1,343.5	1,342.7	1,342.6	1,333.6	1,333.5	1,333.7	1,332.5	1,330.5	1,329.9	1,333.9	1,332.9
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	67,662	64,933	64,057	70,647	68,731	66,936	66,823	67,265	66,576	65,762	63,576	61,378	60,436	65,114	64,048
	Pressure, psia	141.1	138.5	137.5	144.9	142.3	141.1	141.0	114.3	113.4	111.0	109.9	107.7	106.8	112.4	111.8
	Temperature, F	633.4	628.6	627.2	634.5	633.8	631.9	631.8	610.7	610.0	610.0	607.5	603.2	601.8	610.5	608.5
	Enthalpy, Btu/lb	1,343.5	1,341.2	1,340.8	1,343.8	1,343.5	1,342.7	1,342.6	1,333.6	1,333.5	1,333.7	1,332.5	1,330.5	1,329.9	1,333.9	1,332.9
LP Bypass Steam Desuperheating Flow	Flow, lb/h	7,133	6,746	6,617	7,364	7,260	7,050	7,031	6,352	6,300	6,240	6,033	5,734	5,612	6,181	6,099
(from Condensate)	Temperature, F	133.6	137.3	137.0	120.7	134.1	138.1	138.1	103.3	108.6	108.4	122.8	126.7	126.4	108.7	123.0
LP Steam Bypassed to Condenser – CV Exit	Flow, lb/h	74,695	71,678	70,674	77,931	75,991	73,987	73,854	73,616	72,876	69,801	69,610	67,110	66,049	71,293	70,145
(per HRSG unit)	Pressure, psia	48.7	47.1	46.4	50.0	49.5	48.6	48.5	46.7	46.4	44.5	44.9	43.6	42.9	46.4	45.3
	Temperature, F	379.1	378.6	378.4	379.6	379.4	379.1	379.1	378.5	378.4	377.8	377.9	377.5	377.3	378.1	378.1
	Enthalpy, Btu/lb	1,225.0	1,226.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Bypass Control Valve Pressure Loss	dP, psi	92.4	91.4	90.9	94.9	92.8	92.5	92.5	67.7	67.0	66.5	65.0	64.1	63.8	67.0	66.5
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	46.3	44.4	43.8	48.3	47.1	45.9	45.8	46.7	46.2	43.3	43.2	41.6	41.0	44.2	43.5

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
GateCycle Model ID		8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BARTO	8BART3	8BARTO	8BART3	8BART3	8BART3	8BART3	8BART3
GateCycle Case ID		B8-59S	B8-60S	B8-71S	B8-72S	B8-73S	B8-74S	B8-75S	B8-76S	B8-77S	B8-78S	B8-79S	B8-80S	B8-81S	B8-82S	B8-83S
Ambient Temperature		90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		3@100%	3@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@50%	2@50%	2@50%
CTG Inlet Air Cooler		Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,479p/1,052F	1,477p/1,052F	1,095p/1,007F	1,091p/1,013F	1,086p/1,022F	1,081p/1,036F	1,065p/1,049F	1,057p/1,056F	1,092p/1,018F	1,086p/1,036F	1,081p/1,041F	1,081p/1,042F	824p/1,043F	819p/1,044F	810p/1,046F
STG Cold Reheat Conditions, psia/F		217p/988F	217p/988F	217p/959F	217p/965F	217p/976F	217p/991F	217p/1,006F	565p/1,032F	217p/971F	565p/1,009F	217p/996F	217p/997F	217p/1,012F	217p/1,014F	217p/1,016F
Cold Reheat Conditions after Conditioning, psia/F		217p/988F	217p/988F	217p/959F	217p/965F	217p/976F	217p/991F	217p/1,006F	565p/1,032F	217p/971F	565p/1,009F	217p/996F	217p/997F	217p/1,012F	217p/1,014F	217p/1,016F
STG Hot Reheat Conditions, psia/F		392p/1,040F	392p/1,040F	284p/983F	282p/988F	279p/995F	276p/1,007F	271p/1,018F	269p/1,022F	282p/992F	276p/1,006F	276p/1,011F	276p/1,012F	209p/1,010F	208p/1,011F	205p/1,013F
Condenser Pressure		4.05 in HgA	4.04 in HgA	1.36 in HgA	1.65 in HgA	1.63 in HgA	2.67 in HgA	2.90 in HgA	2.58 in HgA	1.65 in HgA	2.58 in HgA	2.93 in HgA	2.93 in HgA	1.08 in HgA	1.32 in HgA	1.31 in HgA
Stack Temperature		220 F	220 F	204 F	205 F	203 F	207 F	209 F	206 F	204 F	207 F	207 F	207 F	189 F	191 F	191 F
Run Date		10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Gross CTG Output (each)	kW	177,293	176,893	207,123	201,614	192,471	181,068	168,633	164,881	197,137	184,229	177,293	176,896	102,042	100,174	95,579
Gross CTG Output (total)	kW	531,879	530,068	414,246	403,228	384,942	362,136	337,266	329,762	394,274	368,458	354,586	353,392	205,084	200,348	191,158
Gross CTG Heat Rate (LHV)	Btu/kWh	9,486	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	11,390	11,474	11,649
Gross CTG Heat Rate (HHV)	Btu/kWh	10,521	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	12,475	12,567	12,759
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	5,045.40	5,032.66	3,757.63	3,679.05	3,555.71	3,409.15	3,242.14	3,189.13	3,621.01	3,453.19	3,363.60	3,355.10	2,345.02	2,298.79	2,226.60
CTG Heat Input (HHV) (total)	MMBtu/h	5,595.66	5,581.51	4,167.43	4,029.57	3,894.46	3,733.95	3,551.03	3,492.97	4,015.92	3,829.79	3,730.43	3,721.01	2,568.44	2,517.81	2,438.96
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	531,879	530,068	414,246	403,228	384,942	362,136	337,266	329,762	394,274	368,458	354,586	353,392	205,084	200,348	191,158
Gross Cycle Heat Rate (LHV)	Btu/kWh	9,486	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	11,390	11,474	11,649
Gross Cycle Heat Rate (HHV)	Btu/kWh	10,521	10,529	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	12,475	12,567	12,759
Plant Heat Input (LHV)	MMBtu/h	5,045.40	5,032.66	3,757.63	3,679.05	3,555.71	3,409.15	3,242.14	3,189.13	3,621.01	3,453.19	3,363.60	3,355.10	2,345.02	2,298.79	2,226.60
Plant Heat Input (HHV)	MMBtu/h	5,595.66	5,581.51	4,167.43	4,029.57	3,894.46	3,733.95	3,551.03	3,492.97	4,015.92	3,829.79	3,730.43	3,721.01	2,568.44	2,517.81	2,438.96
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	24,290	24,290	21,220	21,130	21,030	20,850	20,680	20,620	21,090	20,900	20,810	20,800	19,480	19,430	19,370
Total Auxiliary Power/Losses, percent of gross		4.57%	4.58%	5.12%	5.24%	5.46%	5.76%	6.13%	6.25%	5.35%	5.67%	5.87%	5.89%	9.46%	9.70%	10.13%
Net Plant Output w/ Step-Up Xfmr Losses	kW	507,589	505,808	393,026	382,098	363,912	341,286	316,586	309,142	373,184	347,558	333,776	332,592	188,404	180,918	171,788
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	9,940	9,950	9,561	9,629	9,771	9,989	10,241	10,316	9,703	9,936	10,077	10,088	12,536	12,706	12,962
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	11,024	11,035	10,603	10,546	10,702	10,941	11,217	11,299	10,761	11,019	11,178	11,188	13,779	13,917	14,197

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0
	Relative Humidity	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%
	WBT, F	76.6	76.6	30.9	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4
Compressor Inlet Conditions	Temperature, F	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3	35.0	45.0	59.0
	Relative Humidity	91.4%	86.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	95.5%	91.4%	86.4%	60.1%	59.9%	59.7%
Inlet Air Cooler Status		Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	9,622	13,119	0	0	0	0	0	0	5,631	9,605	9,622	13,119	0	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,681.8	1,677.6	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.6	1,810.5	1,726.6	1,681.8	1,677.6	1,172.5	1,149.4	1,113.4
	Flow, lb/h	80,481	80,277	89,906	88,034	84,020	80,556	76,610	75,337	86,643	82,624	80,481	80,277	56,412	54,319	52,618
Fuel LHV	Btu/lb	20,897	20,897	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	21,160	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

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Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8
	Temperature, F	985.9	986.0	956.8	963.4	973.8	988.8	1,004.4	1,029.9	969.3	1,006.8	994.4	995.3	1,010.2	1,011.7	1,013.8
	Enthalpy, Btu/lb	1,521.6	1,521.7	1,506.4	1,509.6	1,515.3	1,523.2	1,531.4	1,536.3	1,512.9	1,522.7	1,526.1	1,526.6	1,534.4	1,535.2	1,536.3
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	344.0	343.8	330.7	330.4	329.0	326.7	327.4	326.8	329.7	329.2	328.6	328.5	319.8	319.9	319.7
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	350.0	216.8	350.0	216.8	216.8	216.8	216.8	216.8
	Temperature, F	985.9	986.0	956.8	963.4	973.8	988.8	1,004.4	1,018.9	969.3	995.3	994.4	995.3	1,016.2	1,011.7	1,013.8
	Enthalpy, Btu/lb	1,521.6	1,521.7	1,506.4	1,509.8	1,515.3	1,523.2	1,531.4	1,535.3	1,512.9	1,522.7	1,526.1	1,526.6	1,534.4	1,535.2	1,536.3
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	3,775,057	3,768,327	4,201,486	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,675,066	3,775,057	3,768,327	2,944,151	2,916,993	2,872,774
	Pressure, in. H20	16.89	16.59	19.73	19.17	18.29	17.09	15.90	15.58	19.06	17.39	16.89	16.59	9.48	9.31	9.04
	Temperature, F	1,115.0	1,116.0	1,072.9	1,079.8	1,089.9	1,103.0	1,123.4	1,127.2	1,087.8	1,105.0	1,115.0	1,116.0	1,095.8	1,095.7	1,093.1
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	50%	50%
Generator Gross Output	kW	177,293	176,696	207,123	201,614	192,471	181,088	168,833	164,861	197,137	184,229	177,293	176,696	102,942	100,174	95,579
Gross Heat Rate	Btu/kWh (LHV)	9,466	9,494	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,480	9,494	11,390	11,474	11,649

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	440,694	440,548	464,494	460,483	474,415	467,128	456,271	451,773	478,939	470,076	465,564	465,192	352,572	350,017	345,994
(at HRSG terminal point)	Pressure, psia	1,479.2	1,477.0	1,094.6	1,090.8	1,085.4	1,086.8	1,084.8	1,057.2	1,092.1	1,088.0	1,081.5	1,081.4	824.5	818.8	810.1
	Temperature, F	1,053.7	1,053.7	1,008.8	1,014.6	1,023.8	1,037.3	1,050.8	1,057.4	1,020.0	1,036.8	1,042.5	1,043.3	1,044.7	1,046.8	1,047.4
	Enthalpy, Btu/lb	1,523.6	1,523.7	1,508.4	1,511.8	1,517.3	1,526.2	1,533.4	1,537.3	1,514.9	1,524.7	1,528.1	1,528.6	1,536.4	1,537.2	1,538.3
dP from HP drum to HRSG terminal point	psi	64.2	64.1	102.7	101.6	100.0	98.2	96.7	95.5	101.1	99.2	97.4	97.4	76.0	75.5	74.7
HP SH #1 Steam Outlet Temperature	Temperature, F	1,054.3	1,054.3	1,009.6	1,015.6	1,024.7	1,038.2	1,051.7	1,058.2	1,021.0	1,037.7	1,043.4	1,044.2	1,045.4	1,046.4	1,048.0
HP SH #2 Steam Outlet Temperature	Temperature, F	947.1	945.4	981.4	986.5	994.5	1,006.1	1,018.2	1,025.8	991.1	1,006.9	1,010.5	1,011.2	1,017.5	1,018.5	1,020.1
HP Steam Desuperheating Flow	Flow, lb/h	21,474	22,513	930	1,195	1,516	2,316	2,577	0	1,474	0	2,595	2,634	1,164	1,130	1,101
(from HP Feedwater)	Temperature, F	354.1	354.0	340.6	340.7	339.4	339.2	337.9	337.4	340.0	339.6	339.0	338.9	332.5	332.7	332.6
	% of inlet steam	5.1%	5.4%	0.2%	0.2%	0.3%	0.5%	0.6%	0.0%	0.3%	0.0%	0.6%	0.6%	0.3%	0.3%	0.3%
	Final Superheat, F	184.5	181.1	283.5	286.0	289.8	274.2	282.1	286.5	267.2	281.3	276.2	276.4	329.5	331.1	333.5
HP SH #3/4 Steam Outlet Temperature	Temperature, F	859.7	859.7	831.0	834.0	838.7	845.3	852.7	856.1	836.4	844.3	847.5	847.9	856.3	856.1	857.3
HP Evaporator #1 Exit	Flow, lb/h	54,195	54,060	57,467	57,492	57,473	57,463	57,298	57,444	57,595	57,849	57,489	57,508	47,183	46,968	46,615
	Pressure, psia	1,543.4	1,541.0	1,197.3	1,192.4	1,185.5	1,179.0	1,180.5	1,152.7	1,193.2	1,185.2	1,178.9	1,178.8	900.4	894.4	884.8
	Temperature, F	600.1	599.9	567.0	566.5	565.7	565.0	563.0	562.2	566.5	565.7	565.0	565.0	532.1	531.3	530.0
	Enthalpy, Btu/lb	1,188.6	1,188.7	1,184.3	1,184.6	1,184.9	1,185.2	1,188.0	1,188.3	1,184.5	1,184.9	1,185.2	1,185.2	1,196.1	1,196.3	1,196.7
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	341.0	340.8	374.8	378.9	385.3	394.9	404.6	409.4	382.7	394.6	398.6	399.1	413.1	414.2	415.9
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	356,026	353,974	426,081	421,801	415,327	407,360	396,490	394,328	419,876	412,225	405,476	405,054	304,239	301,924	298,282
	Pressure, psia	1,543.4	1,541.0	1,197.3	1,192.4	1,185.5	1,179.0	1,180.5	1,152.7	1,193.2	1,185.2	1,178.9	1,178.8	900.4	894.4	884.8
	Temperature, F	600.1	599.9	567.0	566.5	565.7	565.0	563.0	562.2	566.5	565.7	565.0	565.0	532.1	531.3	530.0
	Enthalpy, Btu/lb	1,188.6	1,188.7	1,184.3	1,184.6	1,184.9	1,185.2	1,188.0	1,188.3	1,184.5	1,184.9	1,185.2	1,185.2	1,196.1	1,196.3	1,196.7
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	19.9	19.8	21.3	21.1	20.8	20.5	20.0	19.8	21.1	20.7	20.5	20.5	15.8	15.7	15.6
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	419,221	418,034	483,568	479,293	472,800	464,813	453,699	451,772	477,470	470,074	462,965	462,562	351,422	348,892	344,898
	Temperature, F	600.1	599.9	567.0	566.5	565.7	565.0	563.0	562.2	566.5	565.7	565.0	565.0	532.1	531.3	530.0
HP Economizer #4/5 Outlet Temperature	Temperature, F	554.6	554.4	528.8	527.1	526.2	522.9	518.9	517.4	526.4	522.9	521.5	521.3	496.9	495.8	494.6
HP Economizer #6/7 Outlet Temperature	Temperature, F	469.0	469.0	444.8	443.6	441.8	439.2	436.1	434.9	442.8	439.8	438.5	438.4	414.2	413.5	412.4
HP Economizer #8 Outlet Temperature	Temperature, F	415.6	415.6	395.4	394.6	392.5	390.5	388.1	386.9	393.4	391.0	389.9	389.8	375.7	375.4	374.8
Feedwater to HP Economizer #8	Flow, lb/h	419,221	418,034	483,568	479,293	472,800	464,813	453,699	451,772	477,470	470,074	462,965	462,562	351,422	348,892	344,898
	Pressure, psia	1,699.2	1,696.6	1,271.0	1,264.8	1,256.9	1,247.0	1,225.4	1,217.1	1,266.1	1,254.8	1,246.5	1,246.3	956.6	933.0	922.6
	Temperature, F	354.1	354.0	340.9	340.7	339.4	339.2	337.9	337.4	340.0	339.6	339.0	338.9	332.5	332.7	332.6
	Enthalpy, Btu/lb	328.3	328.2	314.1	313.9	312.5	312.3	310.9	310.4	313.2	312.7	312.1	312.0	304.8	305.0	304.8
HP FW Temperature Increase Across BFP	F	12.7	12.7	12.8	12.8	12.9	13.0	13.1	13.2	12.8	12.9	13.0	13.0	15.8	15.7	15.8
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	969.2	968.8	972.0	976.1	982.6	992.6	1,002.0	1,006.6	980.5	993.0	997.0	997.5	984.2	984.7	985.5
Exit Temperature	Temperature, F	969.2	968.8	972.0	976.1	982.6	992.6	1,002.0	1,006.6	980.5	993.0	997.0	997.5	984.2	984.7	985.5
HRSG Hot Reheat Steam	Flow, lb/h	575,979	576,896	617,792	613,075	606,020	597,606	585,032	580,141	611,436	601,906	596,034	595,648	452,308	449,018	443,953
(at HRSG terminal point)	Pressure, psia	362.3	362.1	263.9	262.1	279.5	276.5	271.4	269.5	281.7	278.2	279.0	276.9	209.2	207.8	205.5
	Temperature, F	1,041.6	1,041.9	964.6	969.5	997.2	1,008.7	1,019.8	1,024.1	994.1	1,007.4	1,013.2	1,013.8	1,012.2	1,013.1	1,014.5
	Enthalpy, Btu/lb	1,546.4	1,546.5	1,519.0	1,521.8	1,525.8	1,532.0	1,538.0	1,540.3	1,524.1	1,531.2	1,534.3	1,534.7	1,535.7	1,536.2	1,537.0
HRSG RH dP -- terminal pt. to terminal pt.	psi	-175.5	-175.4	-57.2	-56.4	-52.7	-50.7	-54.7	265.8	-55.0	267.1	-59.2	-59.1	7.8	9.0	11.3
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,042.0	1,042.2	985.0	989.9	997.7	1,009.2	1,020.2	1,024.5	994.6	1,007.6	1,013.6	1,014.3	1,012.6	1,013.5	1,014.8
RHTR #3 Steam Outlet Temperature	Temperature, F	935.8	935.4	914.9	918.3	923.5	931.2	938.8	943.0	921.4	931.2	934.1	934.6	935.6	936.3	937.2
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	344.0	343.9	330.7	330.4	329.0	328.7	327.4	326.8	329.7	329.2	328.6	328.5	319.6	319.9	319.7
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	342.3	342.1	370.3	372.1	374.9	378.8	383.0	385.2	373.5	378.6	380.2	380.4	398.6	397.3	398.3
RHTR #4 Steam Outlet Temperature	Temperature, F	789.8	789.5	790.7	791.9	793.8	796.8	799.3	800.8	793.2	797.1	798.0	798.1	789.8	789.9	789.9
Cold Reheat Steam from HP Bypass	Flow, lb/h	509,684	509,530	548,298	546,248	541,019	536,667	527,509	523,897	545,633	539,952	536,154	535,632	406,843	404,115	399,776
	Pressure, psia	418.0	417.8	318.6	316.6	313.6	310.2	304.5	302.3	316.1	312.1	309.7	309.5	235.0	233.3	230.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,361.6	1,361.6	1,367.6	1,367.6	1,367.8	1,368.0	1,368.3	1,368.4	1,367.6	1,367.9	1,368.0	1,368.0	1,372.1	1,372.2	1,372.4
Cold Reheat Steam from STG to HRSG	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(at HRSG terminal point)	Pressure, psia	216.8	216.6	216.6	216.6	216.8	216.8	216.6	216.6	565.3	216.8	565.3	216.8	216.8	216.8	216.8
	Temperature, F	985.9	986.0	956.8	963.4	979.8	988.6	1,004.4	1,029.9	996.3	1,006.8	994.4	996.3	1,010.2	1,011.7	1,013.8
	Enthalpy, Btu/lb	1,521.6	1,521.7	1,506.4	1,509.6	1,515.3	1,523.2	1,531.4	1,535.3	1,512.9	1,522.7	1,526.1	1,526.6	1,534.4	1,535.2	1,536.3
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam - Cold Reheat Steam	Flow, lb/h	440,694	440,548	464,494	460,483	474,415	467,128	456,271	451,773	478,939	470,076	465,564	465,192	352,572	350,017	345,994

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
IP Steam (at HRSG terminal point)	Flow, lb/h	66,299	66,171	66,497	66,828	64,400	61,010	57,524	56,244	65,605	61,653	59,887	59,718	45,466	44,904	44,179
	Pressure, psia	417.9	417.8	316.6	316.6	313.6	310.2	304.5	302.3	316.2	312.1	309.6	309.5	235.9	233.3	230.8
	Temperature, F	597.9	597.7	571.2	570.9	570.6	570.4	569.0	568.4	571.2	571.1	570.6	570.5	538.7	538.0	536.8
	Enthalpy, Btu/lb	1,304.3	1,304.2	1,297.3	1,297.3	1,297.4	1,297.6	1,297.3	1,297.3	1,297.5	1,297.5	1,297.6	1,297.6	1,286.8	1,286.5	1,286.1
IP Evaporator Drum Exit	Flow, lb/h	66,299	66,171	66,497	66,828	64,400	61,010	57,524	56,244	65,605	61,653	59,887	59,718	45,466	44,904	44,179
	Pressure, psia	433.5	433.3	339.8	339.9	332.7	327.6	320.3	317.5	335.8	329.7	326.5	326.2	247.7	245.8	243.9
	Temperature, F	452.6	452.5	426.9	426.1	427.0	426.5	423.4	422.6	427.8	426.1	425.2	426.1	400.2	399.5	398.5
	Enthalpy, Btu/lb	1,205.2	1,205.2	1,204.3	1,204.2	1,204.2	1,204.1	1,203.9	1,203.8	1,204.2	1,204.1	1,204.0	1,204.0	1,201.5	1,201.4	1,201.3
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	27.8	27.7	27.6	27.4	26.8	26.0	25.1	24.7	27.1	26.2	25.8	25.7	22.1	22.0	21.8
IP Approach	Temperature, F	9.3	9.3	6.6	6.7	7.1	7.2	7.5	7.7	7.0	7.3	7.4	7.4	2.6	2.4	2.2
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	66,299	66,171	66,497	66,828	64,400	61,010	57,524	56,244	65,605	61,653	59,887	59,718	45,466	44,904	44,179
	Pressure, psia	433.5	433.3	339.8	339.9	332.7	327.6	320.3	317.5	335.8	329.7	326.5	326.2	247.7	245.8	243.9
	Temperature, F	443.2	443.2	422.3	421.5	419.9	418.3	415.9	415.0	420.8	418.8	417.8	417.7	397.6	397.1	396.2
	Enthalpy, Btu/lb	422.7	422.6	396.5	396.6	396.8	396.0	392.4	391.4	397.6	395.6	394.5	394.4	372.5	372.0	371.0
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	66,299	66,171	66,497	66,828	64,400	61,010	57,524	56,244	65,605	61,653	59,887	59,718	45,466	44,904	44,179
(pressure is preliminary)	Pressure, psia	469.2	468.9	376.8	372.1	365.4	357.0	346.5	342.6	369.7	359.8	354.8	354.5	284.1	281.8	278.5
	Temperature, F	344.9	344.9	331.8	331.5	330.1	329.9	328.5	328.0	330.8	330.3	329.7	329.6	321.2	321.4	321.1
	Enthalpy, Btu/lb	317.0	316.9	303.1	302.8	301.4	301.1	299.7	299.2	302.1	301.6	301.0	300.9	292.0	292.1	291.9
IP FW Temperature Increase Across BFP	F	3.6	3.6	3.6	3.6	3.7	3.7	3.7	3.8	3.8	3.7	3.7	3.7	4.4	4.4	4.4
LP Steam (at HRSG terminal point)	Flow, lb/h	63,512	63,383	54,294	53,940	51,191	50,878	48,075	46,824	52,527	51,704	50,843	50,457	29,198	29,986	29,211
	Pressure, psia	109.9	109.8	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4	82.7	82.7	82.6
	Temperature, F	606.2	606.0	582.9	582.1	581.6	580.1	578.1	577.4	582.4	580.9	580.0	580.0	546.8	546.7	544.4
	Enthalpy, Btu/lb	1,331.9	1,331.8	1,321.6	1,321.1	1,321.0	1,320.3	1,319.4	1,319.0	1,321.3	1,320.8	1,320.2	1,320.2	1,304.2	1,303.7	1,303.1
LP Evaporator Steam Exit	Flow, lb/h	63,512	63,383	54,294	53,940	51,191	50,878	48,075	46,824	52,527	51,704	50,843	50,457	29,198	29,986	29,211
	Pressure, psia	120.1	120.0	100.4	100.0	98.2	97.8	96.9	96.1	99.1	98.3	97.5	97.4	85.7	85.9	85.5
	Temperature, F	341.3	341.3	328.1	327.9	326.5	326.2	324.8	324.2	327.2	326.6	326.0	325.9	316.6	317.0	316.7
	Enthalpy, Btu/lb	1,190.8	1,190.7	1,187.6	1,187.5	1,187.2	1,187.1	1,186.7	1,186.6	1,187.3	1,187.2	1,187.0	1,187.0	1,184.6	1,184.7	1,184.6
LP Evaporator Water Exit to BFPs	Flow, lb/h	575,970	575,700	617,802	613,085	606,026	597,704	585,038	580,137	611,445	601,599	596,050	595,656	452,316	449,027	443,954
	Pressure, psia	120.1	120.0	100.4	100.0	98.2	97.8	96.9	96.1	99.1	98.3	97.5	97.4	85.7	85.9	85.5
	Temperature, F	341.3	341.3	328.1	327.9	326.5	326.2	324.8	324.2	327.2	326.6	326.0	325.9	316.6	317.0	316.7
	Enthalpy, Btu/lb	312.7	312.6	298.9	298.6	297.2	296.9	295.4	294.8	297.9	297.3	296.7	296.6	287.2	287.3	287.0
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	66,299	66,171	66,497	66,828	64,400	61,010	57,524	56,244	65,605	61,653	59,887	59,718	45,466	44,904	44,179
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #3	Flow, lb/h	419,221	418,034	483,668	479,293	472,600	464,813	453,569	451,772	477,470	470,074	462,955	462,662	351,422	348,892	344,898
HP FW to HRSG HP Desuperheater	Flow, lb/h	21,474	22,513	930	1,195	1,618	2,316	2,577	0	1,474	0	2,595	2,634	1,154	1,130	1,101
IP FW to PAC Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	66,990	66,984	54,803	65,765	67,205	69,561	71,238	72,124	66,694	69,876	70,609	70,740	54,271	54,068	53,782
LP Pinch	Temperature, F	19.4	19.4	20.9	20.5	20.1	19.4	18.7	18.4	20.4	19.6	19.3	19.2	14.5	14.3	14.1
LP Approach	Temperature, F	3.6	3.6	10.1	8.6	9.7	8.1	5.9	5.2	9.3	5.6	5.1	5.2	15.3	12.9	13.1
Condensate Recirculated	Flow, lb/h	24,034	24,096	160,042	135,392	136,259	79,548	63,730	63,994	136,065	79,316	63,058	63,105	145,611	123,718	123,061
	Temperature, F	338.0	337.9	318.2	319.4	316.6	320.1	318.9	317.9	317.9	320.8	320.9	320.7	301.3	303.8	303.2
% of Total LP Economizer Flow		4%	4%	19%	17%	17%	11%	9%	9%	17%	11%	9%	9%	23%	21%	21%
Condensate from LP Economizer	Flow, lb/h	663,540	663,168	632,134	602,410	793,475	728,128	695,844	690,967	800,030	732,635	709,739	709,215	627,123	602,723	595,250
	Temperature, F	337.4	337.2	317.6	318.8	316.3	319.6	318.4	317.5	317.4	320.3	320.4	320.2	300.9	303.4	302.9
	Enthalpy, Btu/lb	309.0	308.8	298.4	299.7	297.1	299.6	299.3	298.4	298.2	301.3	301.4	301.2	271.4	274.0	273.5
Condensate to LP Economizer	Flow, lb/h	663,540	663,168	632,134	602,410	793,475	728,128	695,844	690,967	800,030	732,635	709,739	709,215	627,123	602,723	595,250
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.2	104.2	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3
Condensate from Recirculation	Flow, lb/h	24,034	24,096	160,042	135,392	136,259	79,548	63,730	63,994	136,065	79,316	63,058	63,105	145,611	123,718	123,061
	Temperature, F	338.0	337.9	318.2	319.4	316.6	320.1	318.9	317.9	317.9	320.8	320.9	320.7	301.3	303.8	303.2
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	127.2	127.2	99.7	97.9	96.8	112.0	116.2	116.1	97.0	112.1	116.6	116.6	84.1	90.9	90.7
Condensate to HRSG	Flow, lb/h	639,506	639,073	572,092	567,017	557,216	648,580	633,114	626,973	663,965	653,318	646,661	645,109	481,512	479,005	473,189
	Pressure, psia	474.6	474.6	515.5	515.3	516.1	515.2	516.0	516.6	515.5	514.7	514.7	514.8	533.7	533.4	533.9
	Temperature, F	127.2	127.2	99.7	97.9	96.8	112.0	116.2	116.1	97.0	112.1	116.6	116.6	84.1	90.9	90.7
Stack Exit	Flow, lb/h	3,775,057	3,768,327	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,056,890	3,876,066	3,775,057	3,766,327	2,944,151	2,916,983	2,872,774
	Temperature, F	219.9	219.7	204.2	205.3	203.2	200.5	205.5	204.8	204.2	207.2	207.5	207.3	189.1	191.3	190.5

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	1,479.2	1,477.9	1,064.6	1,060.8	1,055.4	1,060.8	1,064.8	1,067.2	1,092.1	1,086.0	1,081.5	1,081.4	824.5	818.8	810.1
	Temperature, F	1,052.0	1,052.0	1,007.1	1,012.9	1,022.0	1,035.6	1,049.1	1,055.6	1,018.3	1,035.0	1,040.7	1,041.6	1,042.9	1,044.0	1,045.6
	Enthalpy, Btu/lb	1,522.6	1,522.7	1,507.4	1,510.8	1,516.3	1,524.2	1,532.4	1,536.3	1,513.9	1,523.7	1,527.1	1,527.6	1,535.4	1,536.2	1,537.3
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 840 F)	987.8	987.9	958.8	965.3	975.7	990.8	1,005.3	1,031.7	971.2	1,008.6	990.4	997.2	1,012.1	1,013.6	1,015.7
	Enthalpy, Btu/lb	1,522.6	1,522.7	1,507.4	1,510.8	1,516.3	1,524.2	1,532.4	1,536.3	1,513.9	1,523.7	1,527.1	1,527.6	1,535.4	1,536.2	1,537.3
Efficiency (THV inlet to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8
	Temperature, F	987.8	987.9	958.8	965.3	975.7	990.8	1,005.3	1,031.7	971.2	1,008.6	990.4	997.2	1,012.1	1,013.6	1,015.7
	Enthalpy, Btu/lb	1,522.6	1,522.7	1,507.4	1,510.8	1,516.3	1,524.2	1,532.4	1,536.3	1,513.9	1,523.7	1,527.1	1,527.6	1,535.4	1,536.2	1,537.3
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	344.0	343.9	330.7	330.4	329.0	326.7	327.4	326.8	329.7	329.2	328.6	328.5	319.8	319.0	319.7
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 750 F)	987.8	987.9	958.8	965.3	975.7	990.8	1,005.3	1,031.7	971.2	1,008.6	990.4	997.2	1,012.1	1,013.6	1,015.7
	Enthalpy, Btu/lb	1,522.6	1,522.7	1,507.4	1,510.8	1,516.3	1,524.2	1,532.4	1,536.3	1,513.9	1,523.7	1,527.1	1,527.6	1,535.4	1,536.2	1,537.3
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	-175.5	-175.4	-67.2	-65.4	-62.7	-59.7	-54.7	295.8	-66.0	287.1	-59.2	-59.1	7.6	9.9	11.3
Reheat System dP		-80.96%	-80.96%	-30.98%	-30.16%	-28.93%	-27.54%	-25.21%	52.33%	-29.96%	50.79%	-27.32%	-27.27%	3.49%	4.15%	5.21%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 584 psia)	392.3	392.1	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.0	275.9	209.2	207.8	205.5
	Temperature, F	1,038.8	1,040.0	982.7	987.6	995.3	1,008.6	1,017.9	1,022.2	992.3	1,005.5	1,011.9	1,012.0	1,010.3	1,011.2	1,012.6
Differential to HP Temperature	dT, F (MAX +/- 60 F)	-12.3	-12.0	-24.4	-25.3	-28.7	-28.7	-31.2	-33.4	-26.0	-29.5	-29.5	-29.6	-32.6	-32.7	-33.0
	Enthalpy, Btu/lb	1,545.4	1,546.5	1,518.9	1,520.8	1,524.8	1,531.9	1,537.0	1,539.3	1,523.1	1,530.2	1,533.3	1,533.7	1,534.7	1,535.2	1,536.0
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.4	27.4	27.4	27.4	27.4	27.4	27.4	124.9	27.4	124.9	27.4	27.4	27.4	27.4	27.4
	Temperature, F	877.8	877.8	877.8	877.8	877.8	877.8	877.8	1,014.7	877.8	997.3	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,559.3	1,471.9	1,530.2	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Efficiency (INTV inlet to IPT exit)		86.64%	86.64%	86.64%	86.64%	86.64%	86.64%	86.64%	90.79%	86.64%	90.79%	86.64%	86.64%	86.64%	86.64%	86.64%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	109.9	109.8	91.4	91.1	90.0	89.7	88.5	88.1	90.6	90.0	89.5	89.4	82.7	82.7	82.5
	Temperature, F	604.2	604.0	580.9	580.1	579.8	578.1	576.1	575.4	580.4	578.9	578.0	578.0	544.7	543.7	542.4
	Enthalpy, Btu/lb	1,330.9	1,330.8	1,320.6	1,320.1	1,320.0	1,319.3	1,318.4	1,318.0	1,320.3	1,319.8	1,319.2	1,319.2	1,303.2	1,302.7	1,302.1
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)															
LP Admission CV Pressure Loss	% loss	75.1%	75.1%	70.1%	70.0%	69.6%	69.5%	69.1%	-41.7%	69.8%	-38.7%	69.4%	69.4%	68.9%	68.9%	68.9%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.0	27.0	27.0	27.0	27.0	27.0	27.0	84.4	27.0	86.2	27.0	27.0	27.0	27.0	27.0
	Temperature, F	877.8	877.8	877.8	877.8	877.8	877.8	877.8	574.8	877.8	576.3	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,318.0	1,471.9	1,319.8	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960
	Temperature, F	875.9	875.9	875.9	875.9	875.9	875.9	875.9	562.0	875.9	565.4	875.9	875.9	875.9	875.9	875.9
ELEP Enthalpy, Btu/lb		1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,012.3	1,068.8	1,012.3	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8
UEEP Enthalpy, Btu/lb		1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,318.0	1,471.9	1,319.8	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Exhaust Loss Btu/lb		17.9	17.9	17.9	17.9	17.9	17.9	17.9	36.0	17.9	36.0	17.9	17.9	17.9	17.9	17.9
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.04%	90.52%	90.04%	90.52%	90.52%	90.52%	90.52%	90.52%
LPT Efficiency to UEEP		83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	80.02%	83.50%	80.02%	83.50%	83.50%	83.50%	83.50%	83.50%
Annulus Velocity ft/s		308.3	308.3	308.3	308.3	308.3	308.3	308.3	1,368.0	308.3	1,368.0	308.3	308.3	308.3	308.3	308.3
Volumetric Flow 1000 ft3/min per end		1,589	1,589	1,589	1,589	1,589	1,589	1,589	7,653	1,589	7,653	1,589	1,589	1,589	1,589	1,589
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	2,749.1	2,744.5	1,944.6	1,924.7	1,902.8	1,865.2	1,823.1	1,808.8	1,919.6	1,877.6	1,858.6	1,855.5	1,416.7	1,404.9	1,388.8
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	20.7	20.7	17.8	16.2	16.0	14.3	13.8	13.7	16.1	14.4	14.0	14.0	13.0	11.8	11.7
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.806	0.963	0.808	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642	1.960	1.842	1.960	1.960	1.960	1.960	1.960
	Temperature, F	875.9	875.9	875.9	875.9	875.9	875.9	875.9	862.0	875.9	865.4	875.9	875.9	875.9	875.9	875.9
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,318.0	1,471.9	1,319.6	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	44	42	8	8	6	4	7	8	8	9	11	8	6	3	7
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	2,248,068	2,247,166	1,565,783	1,558,445	1,544,841	1,534,585	1,509,647	1,499,262	1,566,916	1,543,877	1,534,205	1,533,601	1,157,802	1,151,051	1,138,591
(total, both units)	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,219.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser	Flow, lb/h	208,579	208,074	117,560	116,632	110,863	110,234	104,114	101,374	113,789	112,055	109,755	109,356	62,346	64,026	62,336
(total, both units)	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	96.4	96.4	66.2	66.4	66.2	81.3	85.6	85.4	66.4	81.5	85.9	85.9	53.6	60.3	60.2
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	96.4	96.4	66.2	66.4	66.2	81.3	85.6	85.4	66.4	81.5	85.9	85.9	53.6	60.3	60.2
Condenser Exit	Flow, lb/h	2,673,496	2,672,075	1,900,178	1,892,087	1,872,512	1,861,626	1,830,473	1,817,443	1,887,515	1,872,740	1,860,773	1,859,762	1,436,756	1,431,880	1,417,738
	Pressure, psia	1.987	1.966	0.896	0.810	0.802	1.262	1.423	1.416	0.806	1.268	1.441	1.441	0.621	0.647	0.642
	Pressure, in HgA (MIN 1.0 in. HgA)	4.046	4.043	1.357	1.649	1.633	2.569	2.898	2.883	1.645	2.581	2.934	2.933	1.661	1.317	1.308
	Temperature, F	125.8	125.8	66.5	94.7	94.4	109.6	113.8	113.6	94.7	109.6	114.2	114.2	80.8	87.5	87.3
	Enthalpy, Btu/lb	93.8	93.8	55.5	62.8	62.5	77.6	81.8	81.6	62.7	77.8	82.2	82.2	48.9	55.6	55.4
Condensate Pump Discharge	Flow, lb/h	2,673,496	2,672,075	1,900,178	1,892,087	1,872,512	1,861,626	1,830,473	1,817,443	1,887,515	1,872,740	1,860,773	1,859,762	1,436,756	1,431,880	1,417,738
	Pressure, psia	474.6	474.6	515.6	515.3	516.1	515.2	515.0	516.6	515.5	514.7	514.7	514.8	533.7	533.4	533.9
	Temperature, F	126.5	126.6	88.8	96.0	95.8	111.9	115.9	115.8	96.0	111.1	115.6	115.6	82.8	89.6	89.4
	Enthalpy, Btu/lb	95.7	95.7	56.2	65.5	65.2	80.5	84.5	84.4	65.4	80.5	84.9	84.9	52.3	59.0	58.8
Condensate after GSC	Flow, lb/h	2,673,496	2,672,075	1,900,178	1,892,087	1,872,512	1,861,626	1,830,473	1,817,443	1,887,515	1,872,740	1,860,773	1,859,762	1,436,756	1,431,880	1,417,738
	Temperature, F	127.2	127.2	90.7	97.0	96.8	112.9	116.2	116.1	97.0	112.1	116.6	116.6	84.1	90.9	90.7
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,458,505	2,457,082	1,685,177	1,677,086	1,657,518	1,646,624	1,615,472	1,602,451	1,672,516	1,657,748	1,645,774	1,644,761	1,221,756	1,216,874	1,202,737
	Temperature, F	127.2	127.2	90.7	97.0	96.8	112.9	116.2	116.1	97.0	112.1	116.6	116.6	84.1	90.9	90.7
Total Circulating Water	Flow, lb/h	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072
	Flow, gpm	389,682	389,682	392,853	389,785	389,785	389,696	389,682	389,682	389,785	389,696	389,682	389,682	389,853	389,785	389,785
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0	68.0	68.0
Circulating Water to Condenser	Flow, lb/h	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624
	Flow, gpm	374,593	374,593	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,619	374,741	374,741
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1
Circulating Water from Condenser	Flow, lb/h	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624
	Temperature, F	105.0	105.0	70.7	78.6	78.4	95.2	100.0	99.9	78.5	95.3	100.2	100.2	67.8	75.7	75.6
Total Circulating Water Discharge	Flow, lb/h	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,897,952	199,501,072	199,501,072
	Temperature, F	104.9	104.9	70.7	78.6	78.5	95.3	100.1	100.0	78.6	95.4	100.3	100.3	68.0	75.9	75.8
Circulating Water Temperature Rise	dT, F	14.84	14.93	10.72	10.62	10.50	10.33	10.11	10.04	10.59	10.39	10.29	10.26	7.98	7.91	7.82
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426
	Flow, gpm	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,006	15,013	15,013
	Temperature, F	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1	68.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426
	Temperature, F	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 59-BYP 3x100% STG Bypass Gas Fuel 90 F/EC On	Case 60-BYP 3x100% STG Bypass Gas Fuel 95 F/EC On	Case 71-BYP 2x100% STG Bypass Gas Fuel 35 F	Case 72-BYP 2x100% STG Bypass Gas Fuel 45 F	Case 73-BYP 2x100% STG Bypass Gas Fuel 59 F	Case 74-BYP 2x100% STG Bypass Gas Fuel 74 F	Case 75-BYP 2x100% STG Bypass Gas Fuel 90 F	Case 76-BYP 2x100% STG Bypass Gas Fuel 95 F	Case 77-BYP 2x100% STG Bypass Gas Fuel 59 F/EC On	Case 78-BYP 2x100% STG Bypass Gas Fuel 74 F/EC On	Case 79-BYP 2x100% STG Bypass Gas Fuel 90 F/EC On	Case 80-BYP 2x100% STG Bypass Gas Fuel 95 F/EC On	Case 81-BYP 2x50% STG Bypass Gas Fuel 35 F	Case 82-BYP 2x50% STG Bypass Gas Fuel 45 F	Case 83-BYP 2x50% STG Bypass Gas Fuel 59 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	44	42	5	8	6	4	7	6	6	9	11	8	6	3	7
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	575,979	575,790	617,892	613,085	606,026	597,704	585,038	580,137	611,446	601,699	596,050	595,656	452,316	449,027	443,964
	Pressure, psia	122.4	122.3	102.7	102.3	100.6	100.1	99.2	97.4	101.4	100.6	99.8	99.7	86.0	86.2	87.8
	Temperature, F	341.3	341.3	326.1	327.8	326.5	326.2	324.8	324.2	327.1	326.6	326.0	325.9	316.8	316.9	316.7
	Enthalpy, Btu/lb	312.7	312.6	296.9	296.6	297.2	296.9	295.4	294.8	297.9	297.3	296.7	296.6	287.2	287.3	287.0
IP Bleed (before CV)	Flow, lb/h	66,293	66,160	68,501	68,832	64,403	61,014	57,525	56,241	66,506	61,649	59,890	59,721	45,468	44,907	44,183
	Pressure, psia	1,068.7	1,066.7	1,035.6	1,038.1	1,041.0	1,045.2	1,050.7	1,052.8	1,038.5	1,043.4	1,045.9	1,046.1	1,068.5	1,069.6	1,100.9
	Temperature, F	344.0	343.9	330.7	330.4	329.0	328.7	327.4	326.8	329.7	329.2	328.6	328.5	319.8	319.9	319.7
	Enthalpy, Btu/lb	317.0	316.9	303.1	302.8	301.4	301.1	299.7	299.2	302.1	301.6	301.0	300.9	292.0	292.1	291.9
IP FW Control Valve Exit Pressure	Pressure, psia	469.2	468.9	376.8	372.1	366.4	357.0	346.5	342.5	369.7	359.8	354.8	354.5	264.1	261.8	258.5
	CV dP, psi	597.5	597.9	658.9	665.9	675.5	688.1	704.2	710.2	668.8	683.6	691.1	691.6	834.4	837.7	842.4
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,486.9	3,487.2	3,446.5	3,453.9	3,462.9	3,471.4	3,486.4	3,492.2	3,456.9	3,466.4	3,472.9	3,473.3	3,626.1	3,628.5	3,632.7
	CV dP, psi	1,867.5	1,866.7	2,177.6	2,189.0	2,207.0	2,224.4	2,261.0	2,276.1	2,190.8	2,211.6	2,226.4	2,227.1	2,888.6	2,896.5	2,910.1
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	509,666	509,631	549,301	546,253	541,622	536,660	527,513	523,896	546,837	539,951	536,159	535,937	405,848	404,119	399,781
	Pressure, psia	1,599.2	1,596.5	1,271.0	1,264.8	1,256.9	1,247.0	1,226.4	1,217.1	1,251.1	1,234.8	1,246.5	1,246.3	939.5	933.0	922.5
	Temperature, F	354.1	354.0	340.9	340.7	339.4	339.2	337.9	337.4	340.0	339.5	339.0	338.9	332.5	332.7	332.5
	Enthalpy, Btu/lb	328.3	328.2	314.1	313.9	312.6	312.3	310.9	310.4	313.2	312.7	312.1	312.0	304.8	305.0	304.8
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	440,894	440,546	484,494	480,483	474,415	467,128	456,271	451,773	478,939	470,078	465,564	465,192	352,572	350,017	345,994
	Pressure, psia	1,479.2	1,477.0	1,094.6	1,090.8	1,085.4	1,080.8	1,064.8	1,057.2	1,092.1	1,086.0	1,081.5	1,081.4	824.5	818.8	810.1
	Temperature, F	1,053.7	1,053.7	1,008.8	1,014.6	1,023.8	1,037.3	1,050.8	1,057.4	1,020.0	1,036.8	1,042.5	1,043.3	1,044.7	1,045.8	1,047.4
	Enthalpy, Btu/lb	1,523.6	1,523.7	1,508.4	1,511.8	1,517.3	1,525.2	1,533.4	1,537.3	1,514.9	1,524.7	1,528.1	1,528.6	1,536.4	1,537.2	1,538.3
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	440,894	440,546	484,494	480,483	474,415	467,126	456,271	451,773	478,939	470,078	465,564	465,192	352,572	350,017	345,994
	Pressure, psia	1,479.2	1,477.0	1,094.6	1,090.8	1,085.4	1,080.8	1,064.8	1,057.2	1,092.1	1,086.0	1,081.5	1,081.4	824.5	818.8	810.1
	Temperature, F	1,053.7	1,053.7	1,008.8	1,014.6	1,023.8	1,037.3	1,050.8	1,057.4	1,020.0	1,036.8	1,042.5	1,043.3	1,044.7	1,045.8	1,047.4
	Enthalpy, Btu/lb	1,523.6	1,523.7	1,508.4	1,511.8	1,517.3	1,525.2	1,533.4	1,537.3	1,514.9	1,524.7	1,528.1	1,528.6	1,536.4	1,537.2	1,538.3
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	66,990	66,984	64,863	65,765	67,205	69,561	71,238	72,124	66,864	69,976	70,900	70,740	54,271	54,099	53,782
	Temperature, F	354.1	354.0	340.9	340.7	339.4	339.2	337.9	337.4	340.0	339.5	339.0	338.9	332.5	332.7	332.5
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	509,884	509,530	549,296	546,248	541,619	536,687	527,509	523,897	545,833	539,952	536,164	535,932	406,843	404,115	399,776
	Pressure, psia	418.0	417.8	318.6	316.8	313.6	310.2	304.5	302.3	316.1	312.1	309.7	309.5	235.0	233.3	230.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,361.8	1,361.8	1,367.5	1,367.8	1,367.8	1,368.0	1,368.3	1,368.4	1,367.6	1,367.9	1,368.0	1,368.0	1,372.1	1,372.2	1,372.4
HP Bypass Control Valve Pressure Loss	dP, psi	1,061.3	1,059.1	776.0	774.2	771.8	770.8	760.3	754.9	776.0	773.9	771.8	771.9	569.5	565.5	579.3
Total HRH Steam per HRSG Unit	Flow, lb/h	575,979	575,696	617,792	613,075	606,020	597,698	585,032	580,141	611,436	601,606	596,034	595,648	452,306	449,018	443,953
	Pressure, psia	392.3	392.1	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.0	275.9	209.2	207.8	205.5
	Temperature, F	1,041.6	1,041.9	994.6	999.6	997.2	1,008.7	1,019.8	1,024.1	994.1	1,007.4	1,013.2	1,013.8	1,012.2	1,013.1	1,014.5
	Enthalpy, Btu/lb	1,546.4	1,546.5	1,519.0	1,521.8	1,525.8	1,532.0	1,538.0	1,540.3	1,524.1	1,531.2	1,534.3	1,534.7	1,535.7	1,536.2	1,537.0
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	575,979	575,696	617,792	613,075	606,020	597,698	585,032	580,141	611,436	601,606	596,034	595,648	452,306	449,018	443,953
	Pressure, psia	392.3	392.1	283.9	282.1	279.5	276.5	271.4	269.5	281.7	278.2	276.0	275.9	209.2	207.8	205.5
	Temperature, F	1,041.6	1,041.9	994.6	999.6	997.2	1,008.7	1,019.8	1,024.1	994.1	1,007.4	1,013.2	1,013.8	1,012.2	1,013.1	1,014.5
	Enthalpy, Btu/lb	1,546.4	1,546.5	1,519.0	1,521.8	1,525.8	1,532.0	1,538.0	1,540.3	1,524.1	1,531.2	1,534.3	1,534.7	1,535.7	1,536.2	1,537.0
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	173,961	173,959	165,996	167,051	167,384	170,494	170,642	170,389	167,925	171,231	171,972	172,053	127,391	127,406	126,242
	Temperature, F	127.2	127.2	90.7	97.0	96.8	112.0	116.2	116.1	97.0	112.1	116.6	116.8	84.1	90.9	90.7
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	749,960	749,655	783,788	780,126	773,323	768,192	755,673	750,530	779,362	772,837	768,006	767,700	579,699	576,423	570,195
	Pressure, psia	114.4	114.3	116.1	117.7	116.7	116.4	114.7	113.9	117.6	117.1	116.5	116.5	87.4	87.0	86.1
	Temperature, F	371.9	371.9	373.2	373.0	372.7	372.6	372.0	371.8	373.0	372.8	372.7	372.8	362.8	362.7	362.4
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	277.9	277.8	165.6	164.4	162.6	160.1	156.8	155.6	164.2	161.1	159.5	159.4	121.6	120.7	119.4
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	112.4	112.3	117.4	116.9	115.9	115.1	113.2	112.5	116.8	115.8	115.1	115.0	86.9	86.4	85.4
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	63,512	63,363	54,294	53,940	51,191	50,878	48,075	46,824	52,627	51,704	50,643	50,457	29,198	29,058	29,211
	Pressure, psia	109.9	109.8	91.4	91.1	90.0	89.7	88.5	88.1	90.8	90.0	89.5	89.4	82.7	82.7	82.5
	Temperature, F	608.2	608.0	582.9	582.1	581.6	580.1	578.1	577.4	582.4	580.9	580.0	580.0	546.8	545.7	544.4
	Enthalpy, Btu/lb	1,331.9	1,331.8	1,321.6	1,321.1	1,321.0	1,320.3	1,319.4	1,319.0	1,321.3	1,320.8	1,320.2	1,320.2	1,304.2	1,303.7	1,303.1
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	63,512	63,363	54,294	53,940	51,191	50,878	48,075	46,824	52,627	51,704	50,643	50,457	29,198	29,058	29,211
	Pressure, psia	109.9	109.8	91.4	91.1	90.0	89.7	88.5	88.1	90.8	90.0	89.5	89.4	82.7	82.7	82.5
	Temperature, F	608.2	608.0	582.9	582.1	581.6	580.1	578.1	577.4	582.4	580.9	580.0	580.0	546.8	545.7	544.4
	Enthalpy, Btu/lb	1,331.9	1,331.8	1,321.6	1,321.1	1,321.0	1,320.3	1,319.4	1,319.0	1,321.3	1,320.8	1,320.2	1,320.2	1,304.2	1,303.7	1,303.1
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	6,015	5,995	4,500	4,478	4,240	4,239	3,981	3,863	4,365	4,324	4,235	4,219	1,975	2,027	1,958
	Temperature, F	127.2	127.2	90.7	97.0	96.8	112.0	116.2	116.1	97.0	112.1	116.6	116.8	84.1	90.9	90.7
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	69,526	69,358	58,795	58,418	55,432	55,117	52,057	50,687	56,994	56,028	54,878	54,676	31,173	32,013	31,169
	Pressure, psia	45.1	45.0	37.1	37.0	35.2	35.5	33.7	32.9	36.1	35.6	35.4	35.4	19.9	20.5	20.0
	Temperature, F	378.0	378.0	376.5	376.4	374.9	374.9	374.4	374.1	375.1	375.1	374.9	374.9	369.9	370.1	370.0
	Enthalpy, Btu/lb	1,225.9	1,225.9	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Bypass Control Valve Pressure Loss	dP, psi	64.8	64.6	54.3	54.1	54.8	54.2	54.8	56.3	54.5	54.0	54.0	54.1	62.9	62.2	62.6
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	43.1	43.0	36.5	36.2	34.4	34.2	32.3	31.4	35.3	34.7	34.0	33.9	19.3	19.9	19.3

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Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 84-BYP 2x50% STG Bypass Gas Fuel 74 F	Case 85-BYP 2x50% STG Bypass Gas Fuel 90 F	Case 86-BYP 2x50% STG Bypass Gas Fuel 95 F	Case 101-BYP 1x100% STG Bypass Gas Fuel 35 F	Case 102-BYP 1x100% STG Bypass Gas Fuel 45 F	Case 103-BYP 1x100% STG Bypass Gas Fuel 59 F	Case 104-BYP 1x100% STG Bypass Gas Fuel 74 F	Case 105-BYP 1x100% STG Bypass Gas Fuel 90 F	Case 106-BYP 1x100% STG Bypass Gas Fuel 95 F	Case 107-BYP 1x100% STG Bypass Gas Fuel 59 F/EC On	Case 108-BYP 1x100% STG Bypass Gas Fuel 74 F/EC On	Case 109-BYP 1x100% STG Bypass Gas Fuel 90 F/EC On	Case 110-BYP 1x100% STG Bypass Gas Fuel 95 F/EC On	Case 111-BYP 1x70% STG Bypass Gas Fuel 35 F	Case 112-BYP 1x70% STG Bypass Gas Fuel 45 F
GateCycle Model ID		8BARTO	8BART3	8BARTO	8BARTO	8BART3	8BART3	8BARTO	8BART3	8BARTO	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3
GateCycle Case ID		B8-84S	B8-85S	B8-86S	B8101S	B8102S	B8103S	B8104S	B8105S	B8106S	B8107S	B8108S	B8109S	B8110S	B8111S	B8112S
Ambient Temperature		74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		2@50%	2@50%	2@50%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@70%	1@70%
CTG Inlet Air Cooler		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
HRSG Firing/DB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 5-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 5-Jun-06	Siemens 5-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		800p/1,048F	788p/1,049F	784p/1,051F	766p/1,011F	764p/1,015F	763p/1,026F	755p/1,012F	750p/982F	749p/982F	764p/1,021F	758p/1,012F	752p/987F	752p/987F	746p/1,020F	746p/1,028F
STG Cold Reheat Conditions, psia/F		665p/1,037F	217p/1,021F	585p/1,040F	585p/1,001F	217p/986F	217p/998F	585p/1,002F	217p/930F	585p/952F	217p/992F	217p/983F	217p/936F	217p/936F	217p/992F	217p/998F
Cold Reheat Conditions after Conditioning, psia/F		585p/1,037F	217p/1,021F	585p/1,040F	585p/1,001F	217p/986F	217p/998F	585p/1,002F	217p/930F	585p/952F	217p/992F	217p/983F	217p/936F	217p/936F	217p/992F	217p/998F
STG Hot Reheat Conditions, psia/F		203p/1,016F	200p/1,015F	199p/1,017F	166p/982F	166p/986F	155p/994F	155p/961F	155p/911F	154p/911F	166p/991F	155p/961F	155p/916F	155p/916F	151p/990F	151p/995F
Condenser Pressure		2.12 in HgA	2.42 in HgA	2.41 in HgA	1.02 in HgA	1.27 in HgA	1.28 in HgA	2.06 in HgA	2.35 in HgA	2.34 in HgA	1.27 in HgA	2.06 in HgA	2.37 in HgA	2.37 in HgA	1.01 in HgA	1.13 in HgA
Stack Temperature		197 F	198 F	198 F	198 F	199 F	197 F	200 F	199 F	198 F	198 F	201 F	200 F	200 F	193 F	193 F
Run Date		7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
Gross CTG Output (each)	kW	89,853	83,606	81,723	207,123	201,614	192,471	181,068	168,633	164,681	197,137	184,229	177,293	176,696	144,585	140,815
Gross CTG Output (total)	kW	179,706	167,212	163,446	207,123	201,614	192,471	181,068	168,633	164,681	197,137	184,229	177,293	176,696	144,585	140,815
Gross CTG Heat Rate (LHV)	Btu/kWh	11,921	12,263	12,371	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,824	9,892
Gross CTG Heat Rate (HHV)	Btu/kWh	13,057	13,431	13,550	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	10,799	10,834
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	2,142.28	2,050.52	2,021.99	1,878.81	1,839.53	1,777.85	1,704.57	1,621.07	1,594.56	1,810.51	1,726.50	1,681.80	1,677.55	1,421.39	1,392.94
CTG Heat Input (HHV) (total)	MMBtu/h	2,346.36	2,245.86	2,214.63	2,083.71	2,014.79	1,947.24	1,866.98	1,775.52	1,746.49	2,007.96	1,914.89	1,865.22	1,860.50	1,556.81	1,525.65
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	179,706	167,212	163,446	207,123	201,614	192,471	181,068	168,633	164,681	197,137	184,229	177,293	176,696	144,585	140,815
Gross Cycle Heat Rate (LHV)	Btu/kWh	11,921	12,263	12,371	9,071	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,486	9,494	9,824	9,892
Gross Cycle Heat Rate (HHV)	Btu/kWh	13,057	13,431	13,550	10,060	9,993	10,117	10,311	10,529	10,592	10,186	10,394	10,521	10,529	10,799	10,834
Plant Heat Input (LHV)	MMBtu/h	2,142.28	2,050.52	2,021.99	1,878.81	1,839.53	1,777.85	1,704.57	1,621.07	1,594.56	1,810.51	1,726.50	1,681.80	1,677.55	1,421.39	1,392.94
Plant Heat Input (HHV)	MMBtu/h	2,346.36	2,245.86	2,214.63	2,083.71	2,014.79	1,947.24	1,866.98	1,775.52	1,746.49	2,007.96	1,914.89	1,865.22	1,860.50	1,556.81	1,525.65
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	19,280	19,190	19,160	14,790	14,710	14,650	14,510	14,390	14,350	14,690	14,540	14,460	14,460	14,130	14,100
Total Auxiliary Power/Losses, percent of gross		10.73%	11.48%	11.72%	7.13%	7.30%	7.61%	8.01%	8.53%	8.70%	7.45%	7.89%	8.15%	8.18%	9.77%	10.01%
Net Plant Output w/ Step-Up Xfmr Losses	kW	160,426	148,022	144,286	192,333	186,904	177,821	166,558	154,253	150,331	182,447	169,689	162,843	162,246	130,455	126,715
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	13,354	13,853	14,014	9,767	9,842	9,998	10,234	10,509	10,603	9,923	10,175	10,328	10,340	10,897	10,993
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	14,626	15,173	15,346	10,832	10,780	10,951	11,200	11,510	11,617	11,006	11,285	11,454	11,467	11,935	12,040

Revision History:
Rev. 8, 9/11/06 – GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0
	Relative Humidity	79.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%
	WBT, F	69.1	78.6	79.6	30.9	39.3	51.4	69.1	78.6	78.6	51.4	69.1	78.6	78.6	30.9	39.3
Compressor Inlet Conditions	Temperature, F	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3	35.0	45.0
	Relative Humidity	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.4%	60.1%	59.9%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	0	0	0	5,831	9,605	9,622	13,119	0	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
	HC, MMBtu/h (LHV)	1,071.1	1,025.3	1,011.0	1,878.8	1,839.5	1,777.9	1,704.6	1,621.1	1,594.5	1,810.5	1,726.5	1,681.8	1,677.5	1,421.4	1,392.9
	Flow, lb/h	50,521	48,453	47,779	92,908	88,934	84,020	80,568	76,610	75,357	85,540	82,624	80,481	80,277	67,173	65,829
Fuel LHV	Btu/lb	21,160	21,160	21,160	20,897	21,160	21,160	21,160	21,160	21,160	20,897	20,897	20,897	20,897	21,160	21,160
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

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Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	565.3	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	1,035.0	1,018.6	1,038.5	998.7	984.0	994.3	1,000.5	928.6	949.7	990.2	981.5	933.9	933.9	990.0	996.4
	Enthalpy, Btu/lb	1,458.1	1,538.8	1,540.1	1,518.3	1,520.6	1,526.0	1,519.3	1,491.6	1,491.6	1,523.9	1,519.3	1,494.4	1,494.4	1,523.8	1,527.1
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	320.2	320.2	320.0	322.1	321.9	321.0	321.8	321.7	321.5	321.4	322.0	322.4	322.4	318.6	318.3
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	216.8	350.0	350.0	216.8	216.8	350.0	216.8	350.0	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	1,024.1	1,018.6	1,027.7	987.0	984.0	994.3	988.9	928.6	936.8	990.2	981.5	933.9	933.9	990.0	996.4
	Enthalpy, Btu/lb	1,538.1	1,538.8	1,540.1	1,518.3	1,520.6	1,526.0	1,519.3	1,491.6	1,491.6	1,523.9	1,519.3	1,494.4	1,494.4	1,523.8	1,527.1
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CTG Exhaust Flow	Flow, lb/h	2,611,624	2,756,485	2,742,644	4,201,488	4,127,390	4,009,011	3,838,934	3,674,902	3,630,488	4,059,590	3,876,066	3,775,067	3,768,327	3,333,034	3,277,792
	Pressure, in. H2O	8.69	8.36	8.27	19.73	19.17	18.29	17.09	16.90	16.58	18.69	17.39	18.89	18.59	12.67	12.32
	Temperature, F	1,069.5	1,101.1	1,101.7	1,072.9	1,079.8	1,060.9	1,108.0	1,123.4	1,127.2	1,087.0	1,105.0	1,116.0	1,116.0	1,072.9	1,079.8
CTG Load	% of Base Load	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	70%
Generator Gross Output	kW	89,853	83,506	81,723	207,123	201,614	192,471	181,068	166,633	164,681	197,137	184,229	177,293	176,696	144,555	140,515
Gross Heat Rate	Btu/kWh (LHV)	11,921	12,263	12,371	9,971	9,124	9,237	9,414	9,613	9,671	9,184	9,372	9,488	9,494	9,824	9,892

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Heat Recovery Steam Generator (each)																
HRSG HP Steam (at HRSG terminal point)	Flow, lb/h	341,325	336,022	334,097	492,368	488,432	481,766	455,158	432,471	426,188	486,572	458,709	443,665	443,178	391,630	388,614
	Pressure, psia	800.2	788.1	784.2	784.9	784.4	783.4	785.1	749.5	748.8	784.1	756.8	751.6	751.5	746.4	746.0
	Temperature, F	1,050.1	1,050.8	1,052.8	1,012.8	1,015.9	1,026.8	1,014.1	964.0	964.0	1,022.8	1,014.1	969.1	969.1	1,021.7	1,027.7
	Enthalpy, Btu/lb	1,540.1	1,540.8	1,542.1	1,520.9	1,522.6	1,528.0	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,496.4	1,496.4	1,525.8	1,529.1
dP from HP drum to HRSG terminal point	psi	74.0	72.7	72.6	147.8	145.4	142.6	121.0	95.9	93.8	144.8	124.1	102.9	102.5	100.2	99.0
HP SH #1 Steam Outlet Temperature	Temperature, F	1,050.6	1,051.5	1,053.5	1,014.3	1,018.4	1,028.0	1,015.4	965.2	965.2	1,024.2	1,015.4	970.4	970.4	1,022.7	1,028.7
HP SH #2 Steam Outlet Temperature	Temperature, F	1,023.5	1,023.4	1,026.1	988.7	991.2	999.9	989.5	882.1	879.4	996.4	971.4	895.8	895.2	996.8	1,002.2
HP Steam Desuperheating Flow (from HP Feedwater)	Flow, lb/h	0	1,010	0	0	2,051	1,997	25,292	57,936	59,343	2,043	22,545	51,641	52,096	1,315	1,336
	Temperature, F	333.2	333.3	333.2	332.8	332.6	331.8	332.9	333.3	333.1	332.1	333.0	333.8	333.7	330.6	330.4
	% of inlet steam	0.0%	0.3%	0.0%	0.0%	0.4%	0.4%	5.0%	18.6%	19.3%	0.4%	5.2%	16.1%	16.3%	0.3%	0.3%
	Final Superheat, F	343.1	339.7	347.5	313.6	309.2	313.7	293.2	27.0	21.2	311.0	213.5	51.5	50.0	326.6	328.7
HP SH #3/4 Steam Outlet Temperature	Temperature, F	869.1	869.8	871.2	842.9	844.7	849.7	831.1	799.8	799.4	847.5	831.3	803.3	803.3	853.4	856.5
HP Evaporator #1 Exit	Flow, lb/h	46,262	45,631	45,090	57,535	57,278	57,279	50,207	41,936	40,548	57,390	50,749	42,812	42,739	49,277	49,396
	Pressure, psia	674.2	660.8	656.8	912.7	909.7	906.0	876.8	846.4	842.4	908.9	879.9	854.5	854.1	846.5	846.0
	Temperature, F	528.6	526.8	526.2	533.7	533.3	532.8	526.9	524.7	524.3	533.2	529.4	525.9	525.9	524.8	524.6
	Enthalpy, Btu/lb	1,197.0	1,197.4	1,197.6	1,195.7	1,195.8	1,196.0	1,196.9	1,197.9	1,198.0	1,195.9	1,196.8	1,197.6	1,197.7	1,197.9	1,197.9
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	419.2	420.1	422.0	407.4	410.0	416.8	383.8	333.1	332.0	414.3	385.1	339.9	339.7	409.3	413.2
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	295,042	289,368	288,406	434,832	429,103	422,491	370,659	323,497	316,295	427,139	385,115	339,139	338,336	341,035	337,979
	Pressure, psia	674.2	660.8	656.8	912.7	909.7	906.0	876.8	846.4	842.4	908.9	879.9	854.5	854.1	846.5	846.0
	Temperature, F	528.6	526.8	526.2	533.7	533.3	532.8	526.9	524.7	524.3	533.2	529.4	525.9	525.9	524.8	524.6
	Enthalpy, Btu/lb	1,197.0	1,197.4	1,197.6	1,195.7	1,195.8	1,196.0	1,196.9	1,197.9	1,198.0	1,195.9	1,196.8	1,197.6	1,197.7	1,197.9	1,197.9
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	15.6	15.3	15.2	23.7	23.4	23.0	21.5	19.2	18.9	23.4	21.9	20.1	20.1	18.6	18.4
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	341,324	335,017	334,096	492,367	486,381	479,776	429,866	364,536	358,846	484,629	435,864	381,945	381,075	390,315	387,280
	Temperature, F	526.6	526.8	526.2	533.7	533.3	532.8	528.9	524.7	524.3	533.2	529.4	525.9	525.9	524.8	524.6
HP Economizer #4/5 Outlet Temperature	Temperature, F	492.6	491.0	490.3	502.4	501.3	499.5	501.8	505.6	505.3	500.4	502.0	506.1	506.1	492.0	491.0
HP Economizer #6/7 Outlet Temperature	Temperature, F	411.0	409.6	409.0	416.2	417.2	415.4	417.0	419.4	418.9	416.4	417.4	420.4	420.3	405.9	405.0
HP Economizer #8 Outlet Temperature	Temperature, F	374.3	373.6	373.2	378.7	378.1	374.5	378.0	383.6	383.4	375.2	378.2	383.6	383.6	370.3	369.5
Feedwater to HP Economizer #8	Flow, lb/h	341,324	335,017	334,096	492,367	486,381	479,776	429,866	364,536	358,846	484,629	435,864	381,945	381,075	390,315	387,280
	Pressure, psia	911.1	895.5	892.2	989.0	984.2	978.5	935.1	887.5	883.2	982.9	939.9	900.6	900.0	894.7	892.5
	Temperature, F	333.2	333.3	333.2	332.8	332.6	331.8	332.9	333.3	333.1	332.1	333.0	333.8	333.7	330.6	330.4
	Enthalpy, Btu/lb	305.5	305.6	305.5	305.2	305.0	304.2	305.2	305.6	305.4	304.5	305.4	305.1	305.0	302.8	302.6
HP FW Temperature Increase Across BFP	F	19.0	18.2	18.2	19.2	19.2	19.3	19.8	14.1	14.1	19.2	13.6	13.9	13.9	14.8	14.9
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	967.8	967.3	968.9	973.9	973.6	983.6	944.2	885.1	883.6	961.2	946.0	893.3	893.1	970.5	974.8
Exit Temperature	Temperature, F	967.8	967.2	968.9	973.9	973.6	983.6	944.2	885.1	883.6	961.2	946.0	893.3	893.1	970.5	974.8
HRSG Hot Reheat Steam (at HRSG terminal point)	Flow, lb/h	438,028	431,170	428,687	629,825	624,839	617,260	517,347	515,965	511,440	622,980	621,161	525,460	525,187	502,544	499,114
	Pressure, psia	202.8	199.7	198.7	155.3	155.1	154.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7
	Temperature, F	1,016.4	1,017.3	1,018.7	983.7	987.0	995.9	982.7	912.7	912.8	982.7	982.7	917.8	917.8	991.4	996.6
	Enthalpy, Btu/lb	1,536.1	1,536.6	1,539.4	1,522.3	1,524.4	1,528.6	1,511.3	1,486.4	1,486.4	1,527.0	1,511.3	1,488.0	1,488.0	1,526.4	1,529.1
HRSG RH dP -- terminal pt. to terminal pt.	psi	362.5	17.0	366.6	410.0	61.6	61.8	410.4	62.2	410.9	61.7	61.7	61.9	61.9	65.9	66.0
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,016.7	1,017.7	1,019.1	984.6	988.7	996.7	983.5	913.7	913.7	983.6	983.5	918.7	918.7	992.0	997.1
RHTR #3 Steam Outlet Temperature	Temperature, F	939.4	939.3	941.1	914.6	918.7	922.4	859.8	754.8	751.8	920.1	859.1	770.0	769.3	920.3	923.9
Reheat Steam Desuperheating Flow (from IP Feedwater)	Flow, lb/h	0	0	0	0	0	0	33,362	68,046	69,045	0	32,621	62,476	62,778	0	0
	Temperature, F	320.2	320.2	320.0	322.1	321.9	321.0	321.8	321.7	321.6	321.4	322.0	322.4	322.4	318.0	318.3
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.7%	12.4%	12.7%	0.0%	5.5%	11.1%	11.2%	0.0%	0.0%
	Final Superheat, F	400.1	400.8	401.8	404.0	404.9	407.5	276.1	134.2	128.8	409.4	279.4	158.9	157.7	409.8	411.4
RHTR #4 Steam Outlet Temperature	Temperature, F	790.6	790.0	790.6	785.7	786.3	788.6	772.5	747.5	746.7	787.8	773.4	751.2	751.1	783.6	786.0
Cold Reheat Steam from HP Bypass	Flow, lb/h	394,031	388,957	387,078	560,118	555,854	551,422	516,082	480,926	476,132	555,990	522,131	494,516	494,051	446,991	444,057
	Pressure, psia	227.8	224.3	223.2	213.2	212.4	211.2	207.5	202.9	202.0	212.2	208.4	205.2	205.1	191.2	190.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,372.5	1,372.7	1,372.8	1,373.3	1,373.4	1,373.4	1,373.6	1,373.9	1,373.9	1,373.4	1,373.6	1,373.6	1,373.6	1,374.5	1,374.6
Cold Reheat Steam from STG to HRSG (at HRSG terminal point)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	565.3	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	1,035.0	1,018.6	1,038.5	996.7	994.0	994.3	1,000.5	928.6	949.7	990.2	981.6	933.9	933.9	996.0	998.4
	Enthalpy, Btu/lb	1,536.1	1,536.6	1,540.1	1,518.3	1,520.6	1,526.0	1,519.3	1,491.6	1,491.6	1,523.9	1,519.3	1,494.4	1,494.4	1,523.8	1,527.1
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam - Cold Reheat Steam	Flow, lb/h	341,325	336,022	334,097	492,368	488,432	481,766	455,158	432,471	426,188	486,572	458,709	443,665	443,178	391,630	388,614

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 84-BYP 2x50% STG Bypass Gas Fuel 74 F	Case 85-BYP 2x50% STG Bypass Gas Fuel 90 F	Case 86-BYP 2x50% STG Bypass Gas Fuel 95 F	Case 101-BYP 1x100% STG Bypass Gas Fuel 35 F	Case 102-BYP 1x100% STG Bypass Gas Fuel 45 F	Case 103-BYP 1x100% STG Bypass Gas Fuel 59 F	Case 104-BYP 1x100% STG Bypass Gas Fuel 74 F	Case 105-BYP 1x100% STG Bypass Gas Fuel 90 F	Case 106-BYP 1x100% STG Bypass Gas Fuel 95 F	Case 107-BYP 1x100% STG Bypass Gas Fuel 59 F/EC On	Case 108-BYP 1x100% STG Bypass Gas Fuel 74 F/EC On	Case 109-BYP 1x100% STG Bypass Gas Fuel 90 F/EC On	Case 110-BYP 1x100% STG Bypass Gas Fuel 95 F/EC On	Case 111-BYP 1x70% STG Bypass Gas Fuel 36 F	Case 112-BYP 1x70% STG Bypass Gas Fuel 45 F
IP Steam (at HRSG terminal point)	Flow, lb/h	43,096	42,211	41,789	69,709	68,186	65,830	65,926	67,016	66,265	66,992	66,509	66,462	66,343	55,642	54,456
	Pressure, psia	227.9	224.3	223.2	213.2	212.4	211.2	207.6	202.9	202.1	212.2	205.3	205.2	205.1	191.3	190.6
	Temperature, F	535.6	533.8	533.3	541.1	540.8	540.5	535.2	528.4	527.9	540.9	535.8	535.1	535.1	530.8	530.7
	Enthalpy, Btu/lb	1,265.7	1,265.1	1,264.9	1,266.1	1,266.0	1,265.9	1,267.4	1,264.2	1,264.0	1,266.1	1,267.6	1,264.9	1,264.9	1,266.6	1,266.6
IP Evaporator Drum Exit	Flow, lb/h	43,096	42,211	41,789	69,709	68,186	65,830	65,926	67,016	66,265	66,992	66,509	66,462	66,343	55,642	54,456
	Pressure, psia	239.6	235.8	234.5	244.1	242.1	239.2	236.0	232.7	231.3	241.0	237.1	235.9	235.7	213.5	212.2
	Temperature, F	397.3	395.9	395.4	398.9	398.2	397.1	395.9	394.7	394.2	397.8	396.4	395.9	395.8	387.3	386.8
	Enthalpy, Btu/lb	1,201.1	1,200.9	1,200.8	1,201.3	1,201.2	1,201.1	1,200.9	1,200.7	1,200.7	1,201.2	1,201.0	1,200.9	1,200.9	1,199.7	1,199.6
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	21.6	21.3	21.2	29.9	29.5	28.9	29.4	30.3	30.1	29.2	29.6	30.6	30.6	28.4	28.1
IP Approach	Temperature, F	1.9	1.6	1.6	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	43,096	42,211	41,789	69,709	68,186	65,830	65,926	67,016	66,265	66,992	66,509	66,462	66,343	55,642	54,456
	Pressure, psia	239.6	235.8	234.5	244.1	242.1	239.2	236.0	232.7	231.3	241.0	237.1	235.9	235.7	213.5	212.2
	Temperature, F	395.4	394.3	393.8	398.9	398.2	396.9	395.9	394.7	394.2	397.8	396.4	395.9	395.8	387.3	386.8
	Enthalpy, Btu/lb	370.1	368.9	368.4	373.9	373.2	371.7	372.3	373.3	372.8	372.5	372.7	374.2	374.2	363.0	362.3
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.5%	0.5%	0.0%	0.2%	0.4%	0.4%	0.2%	0.2%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	43,096	42,211	41,789	69,709	68,186	65,830	65,926	67,016	66,265	66,992	66,509	66,462	66,343	55,642	54,456
	Pressure, psia	264.4	260.0	248.4	282.4	276.8	273.5	270.3	268.1	268.0	276.4	272.1	272.8	272.6	238.1	235.7
	Temperature, F	321.7	321.6	321.5	323.4	323.2	322.3	323.1	323.0	322.8	322.7	323.2	323.7	323.6	320.0	319.8
	Enthalpy, Btu/lb	292.5	292.4	292.3	294.3	294.0	293.2	293.9	293.9	293.6	293.5	294.1	294.6	294.5	290.7	290.4
IP FW Temperature Increase Across BFP	F	4.5	4.5	4.5	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	4.2	4.2
LP Steam (at HRSG terminal point)	Flow, lb/h	30,942	30,735	30,357	41,242	41,495	39,995	40,964	41,239	40,336	40,126	41,685	43,052	42,695	30,642	30,266
	Pressure, psia	82.8	82.6	82.6	83.4	83.0	82.8	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9
	Temperature, F	542.5	540.5	539.9	565.5	564.7	564.1	548.4	541.8	541.2	564.7	549.0	543.7	543.6	542.4	542.0
	Enthalpy, Btu/lb	1,302.1	1,301.1	1,300.8	1,308.5	1,308.1	1,307.9	1,305.0	1,301.8	1,301.5	1,305.2	1,305.3	1,302.7	1,302.7	1,302.2	1,302.0
LP Evaporator Steam Exit	Flow, lb/h	30,942	30,735	30,357	41,242	41,495	39,995	40,964	41,239	40,336	40,126	41,685	43,052	42,695	30,642	30,266
	Pressure, psia	86.2	86.0	85.9	89.2	88.9	87.8	88.7	88.7	88.4	88.3	89.0	89.5	89.6	84.5	84.2
	Temperature, F	317.2	317.1	316.9	319.6	319.4	318.5	319.3	319.2	319.0	318.9	319.5	319.9	319.8	315.8	315.6
	Enthalpy, Btu/lb	1,184.7	1,184.7	1,184.7	1,185.4	1,185.3	1,185.1	1,185.3	1,185.3	1,185.2	1,185.2	1,185.3	1,185.5	1,185.4	1,184.4	1,184.3
LP Evaporator Water Exit to BFPs	Flow, lb/h	438,025	431,177	428,665	629,620	624,836	617,249	617,351	615,999	611,450	622,979	621,165	625,454	625,172	502,541	496,113
	Pressure, psia	88.2	88.0	85.9	89.2	88.9	87.8	88.7	88.7	88.4	88.3	89.0	89.5	89.5	84.5	84.2
	Temperature, F	317.2	317.1	316.9	319.6	319.4	318.5	319.3	319.2	319.0	318.9	319.5	319.9	319.8	315.8	315.6
	Enthalpy, Btu/lb	287.5	287.4	287.3	290.0	289.8	288.9	289.7	289.6	289.4	289.3	289.9	290.3	290.3	286.1	285.9
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	43,096	42,211	41,789	69,709	68,186	65,830	65,926	67,016	66,265	66,992	66,509	66,462	66,343	55,642	54,456
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	33,362	66,048	69,045	0	32,521	62,476	62,776	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	341,324	335,017	334,098	492,367	488,981	479,770	429,868	384,636	358,846	484,529	436,864	381,945	381,075	390,315	387,280
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	1,010	0	0	2,051	1,997	25,292	87,936	89,343	2,043	22,846	61,641	62,096	1,315	1,335
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	53,607	52,935	52,582	57,750	58,222	59,656	62,004	48,483	47,944	59,418	63,422	50,931	50,881	56,271	56,043
LP Pinch	Temperature, F	13.8	13.5	13.4	18.3	17.9	17.5	17.5	18.0	17.8	17.8	17.7	18.3	18.3	14.8	14.5
LP Approach	Temperature, F	7.9	8.8	8.8	14.8	12.9	14.0	10.5	11.0	11.4	13.6	10.2	10.1	10.2	14.2	13.8
Condensate Recirculated	Flow, lb/h	76,109	62,582	62,482	197,418	167,633	167,663	104,730	87,782	87,732	168,169	104,851	87,647	87,695	157,133	145,034
	Temperature, F	309.0	310.2	310.0	304.9	305.5	304.5	308.6	308.1	307.4	305.3	309.1	309.7	309.5	301.3	301.7
% of Total LP Economizer Flow		14%	12%	12%	23%	20%	20%	14%	12%	12%	20%	14%	12%	12%	23%	22%
Condensate from LP Economizer	Flow, lb/h	545,083	524,490	521,705	868,483	833,970	823,932	763,941	745,000	736,502	831,274	767,701	758,146	755,758	690,320	674,357
	Temperature, F	303.6	303.9	303.6	304.3	305.0	304.0	303.2	302.7	302.0	304.8	303.7	303.2	303.1	301.0	301.3
	Enthalpy, Btu/lb	279.4	280.0	280.4	274.8	275.5	274.5	278.8	278.3	277.6	275.3	279.3	279.9	279.7	271.4	271.8
Condensate to LP Economizer	Flow, lb/h	545,083	524,490	521,705	868,483	833,970	823,932	763,941	745,000	736,502	831,274	767,701	758,146	755,758	690,320	674,357
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
	Enthalpy, Btu/lb	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.4	104.4
Condensate from Recirculation	Flow, lb/h	76,109	62,582	62,482	197,418	167,633	167,663	104,730	87,782	87,732	168,169	104,851	87,647	87,695	157,133	145,034
	Temperature, F	309.0	310.2	310.0	304.9	305.5	304.5	308.6	308.1	307.4	305.3	309.1	309.7	309.5	301.3	301.7
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	106.4	110.9	110.9	84.4	91.3	91.1	107.0	111.6	111.5	91.3	107.1	111.6	111.6	85.4	86.6
Condensate to HRSG	Flow, lb/h	468,974	461,908	459,224	671,066	666,337	656,249	658,811	657,216	651,771	663,105	662,850	666,499	668,063	533,186	529,322
	Pressure, psia	532.8	533.0	533.2	546.1	545.7	545.0	544.8	544.9	545.1	545.8	544.7	544.4	544.4	551.1	551.0
	Temperature, F	106.4	110.9	110.9	84.4	91.3	91.1	107.0	111.6	111.5	91.3	107.1	111.6	111.6	85.4	86.6
Stack Exit	Flow, lb/h	2,811,624	2,756,485	2,742,644	4,201,488	4,127,398	4,009,011	3,838,934	3,674,902	3,630,488	4,056,500	3,875,096	3,776,057	3,768,327	3,333,034	3,277,792
	Temperature, F	196.5	197.8	197.6	197.9	199.2	197.4	200.2	198.5	197.8	198.2	200.8	200.3	200.2	192.7	193.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 84-BYP 2x50% STG Bypass Gas Fuel 74 F	Case 85-BYP 2x50% STG Bypass Gas Fuel 90 F	Case 86-BYP 2x50% STG Bypass Gas Fuel 95 F	Case 101-BYP 1x100% STG Bypass Gas Fuel 35 F	Case 102-BYP 1x100% STG Bypass Gas Fuel 45 F	Case 103-BYP 1x100% STG Bypass Gas Fuel 59 F	Case 104-BYP 1x100% STG Bypass Gas Fuel 74 F	Case 105-BYP 1x100% STG Bypass Gas Fuel 90 F	Case 106-BYP 1x100% STG Bypass Gas Fuel 95 F	Case 107-BYP 1x100% STG Bypass Gas Fuel 59 F/EC On	Case 108-BYP 1x100% STG Bypass Gas Fuel 74 F/EC On	Case 109-BYP 1x100% STG Bypass Gas Fuel 90 F/EC On	Case 110-BYP 1x100% STG Bypass Gas Fuel 95 F/EC On	Case 111-BYP 1x70% STG Bypass Gas Fuel 35 F	Case 112-BYP 1x70% STG Bypass Gas Fuel 45 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	800.2	788.1	784.2	764.9	764.4	763.4	765.1	749.5	746.6	764.1	755.8	751.6	751.5	746.4	746.0
	Temperature, F	1,048.3	1,049.1	1,051.0	1,011.0	1,015.1	1,024.8	1,012.3	962.2	962.2	1,021.0	1,012.3	967.3	967.3	1,019.9	1,025.9
	Enthalpy, Btu/lb	1,539.1	1,539.8	1,541.1	1,519.3	1,521.6	1,527.0	1,520.3	1,492.6	1,492.6	1,524.9	1,520.3	1,495.4	1,495.4	1,524.8	1,526.1
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	565.3	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 840 F)	1,038.8	1,020.5	1,040.4	1,000.5	985.9	996.2	1,002.3	930.5	951.5	992.1	983.4	936.8	936.8	991.9	998.3
	Enthalpy, Btu/lb	1,539.1	1,539.8	1,541.1	1,519.3	1,521.6	1,527.0	1,520.3	1,492.6	1,492.6	1,524.9	1,520.3	1,495.4	1,495.4	1,524.8	1,526.1
Efficiency (THV Inlet to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	565.3	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	1,039.6	1,020.5	1,040.4	1,000.5	985.9	996.2	1,002.3	930.5	951.5	992.1	983.4	936.8	936.8	991.9	998.3
	Enthalpy, Btu/lb	1,539.1	1,539.8	1,541.1	1,519.3	1,521.6	1,527.0	1,520.3	1,492.6	1,492.6	1,524.9	1,520.3	1,495.4	1,495.4	1,524.8	1,526.1
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	320.2	320.2	320.0	322.1	321.9	321.0	321.8	321.7	321.5	321.4	322.0	322.4	322.4	318.6	318.3
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	565.3	216.8	565.3	565.3	216.8	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 750 F)	1,039.6	1,020.5	1,040.4	1,000.5	985.9	996.2	1,002.3	930.5	951.5	992.1	983.4	936.8	936.8	991.9	998.3
	Enthalpy, Btu/lb	1,539.1	1,539.8	1,541.1	1,519.3	1,521.6	1,527.0	1,520.3	1,492.6	1,492.6	1,524.9	1,520.3	1,495.4	1,495.4	1,524.8	1,526.1
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	362.5	17.0	368.6	410.0	61.8	61.8	410.4	62.2	410.9	61.7	61.7	61.9	61.9	66.9	66.0
Reheat System dP		64.12%	7.56%	64.95%	72.52%	28.43%	28.53%	72.60%	28.69%	72.59%	28.46%	28.46%	28.54%	28.54%	30.41%	30.46%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 684 psia)	202.8	199.7	198.7	155.3	155.1	154.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7
	Temperature, F	1,014.5	1,015.4	1,016.8	981.8	986.0	994.0	980.7	910.8	910.8	990.8	980.7	915.8	915.8	989.5	994.7
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-33.8	-33.6	-34.2	-29.2	-29.2	-30.9	-51.6	-51.4	-51.4	-30.2	-51.8	-51.6	-51.6	-30.4	-31.3
	Enthalpy, Btu/lb	1,537.1	1,537.6	1,538.4	1,521.3	1,523.4	1,527.6	1,510.3	1,484.4	1,484.4	1,526.0	1,510.3	1,487.0	1,487.0	1,525.4	1,526.1
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	124.9	27.4	124.9	124.9	27.4	27.4	124.9	27.4	124.9	27.4	27.4	27.4	27.4	27.4	27.4
	Temperature, F	1,010.4	877.8	1,013.0	980.1	877.8	877.8	959.0	877.8	908.9	877.8	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,637.1	1,471.9	1,638.4	1,621.3	1,471.9	1,471.9	1,510.3	1,471.9	1,484.4	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Efficiency (INTV Inlet to IPT exit)		90.79%	86.54%	90.79%	90.79%	86.54%	86.54%	90.79%	86.54%	90.79%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	82.8	82.8	82.6	83.4	83.0	82.6	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9
	Temperature, F	540.5	538.4	537.8	553.5	552.6	552.1	546.4	539.8	539.2	552.7	547.0	541.7	541.6	540.4	540.0
	Enthalpy, Btu/lb	1,301.1	1,300.1	1,299.8	1,307.5	1,307.1	1,306.8	1,304.0	1,300.8	1,300.5	1,307.2	1,304.3	1,301.7	1,301.7	1,301.2	1,301.0
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)															
LP Admission CV Pressure Loss	% loss	-50.7%	66.9%	-51.1%	-49.7%	67.1%	66.9%	-50.3%	67.6%	-50.7%	67.0%	67.1%	67.2%	67.1%	66.3%	66.2%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	79.4	27.0	79.2	79.9	27.0	27.0	79.6	27.0	79.3	27.0	27.0	27.0	27.0	27.0	27.0
	Temperature, F	539.9	877.8	537.3	552.9	877.8	877.8	545.8	877.8	538.6	877.8	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,301.1	1,471.9	1,299.8	1,307.5	1,471.9	1,471.9	1,304.0	1,471.9	1,300.5	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.806	0.963	0.806	0.806	0.963	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.642	1.960	1.642	1.642	1.960	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	526.5	875.9	523.7	540.0	875.9	875.9	532.6	875.9	525.1	875.9	875.9	875.9	875.9	875.9	875.9
ELEP Enthalpy, Btu/lb		1,012.3	1,068.8	1,012.3	1,012.3	1,068.8	1,068.8	1,012.3	1,068.8	1,012.3	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8
UEEP Enthalpy, Btu/lb		1,301.1	1,471.9	1,299.8	1,307.5	1,471.9	1,471.9	1,304.0	1,471.9	1,300.5	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Exhaust Loss Btu/lb		38.0	17.9	38.0	38.0	17.9	17.9	38.0	17.9	38.0	17.9	17.9	17.9	17.9	17.9	17.9
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.04%	90.52%	90.04%	90.04%	90.52%	90.52%	90.04%	90.52%	90.04%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%
LPT Efficiency to UEEP		80.02%	83.50%	80.02%	80.02%	83.50%	83.50%	80.02%	83.50%	80.02%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%
Annulus Velocity ft/s		1,398.0	308.3	1,398.0	1,398.0	308.3	308.3	1,398.0	308.3	1,398.0	308.3	308.3	308.3	308.3	308.3	308.3
Volumetric Flow 1000 ft3/min per end		7,853	1,589	7,853	7,853	1,589	1,589	7,853	1,589	7,853	1,589	1,589	1,589	1,589	1,589	1,589
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8
Closed Cycle Cooling Water	Temperature, F	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

DEF-19FL-FUEL-002532

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 84-BYP 2x50% STG Bypass Gas Fuel 74 F	Case 85-BYP 2x50% STG Bypass Gas Fuel 90 F	Case 86-BYP 2x50% STG Bypass Gas Fuel 95 F	Case 101-BYP 1x100% STG Bypass Gas Fuel 35 F	Case 102-BYP 1x100% STG Bypass Gas Fuel 45 F	Case 103-BYP 1x100% STG Bypass Gas Fuel 59 F	Case 104-BYP 1x100% STG Bypass Gas Fuel 74 F	Case 105-BYP 1x100% STG Bypass Gas Fuel 90 F	Case 106-BYP 1x100% STG Bypass Gas Fuel 95 F	Case 107-BYP 1x100% STG Bypass Gas Fuel 59 F/EC On	Case 108-BYP 1x100% STG Bypass Gas Fuel 74 F/EC On	Case 109-BYP 1x100% STG Bypass Gas Fuel 90 F/EC On	Case 110-BYP 1x100% STG Bypass Gas Fuel 95 F/EC On	Case 111-BYP 1x70% STG Bypass Gas Fuel 35 F	Case 112-BYP 1x70% STG Bypass Gas Fuel 45 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	1,361.8	1,337.5	1,330.5	961.4	971.1	959.8	949.9	929.2	912.8	968.3	947.2	937.2	930.7	782.5	776.4
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	10.6	10.1	10.0	10.6	9.6	9.4	8.4	8.1	8.0	9.5	8.5	8.2	8.2	12.2	7.6
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.806	0.963	0.806	0.806	0.963	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.642	1.960	1.642	1.642	1.960	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	526.5	575.9	523.7	540.0	575.9	575.9	532.6	575.9	525.1	575.9	575.9	575.9	575.9	575.9	575.9
	Enthalpy, Btu/lb	1,301.1	1,471.9	1,299.8	1,307.5	1,471.9	1,471.9	1,304.0	1,471.9	1,300.5	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	3	4	4	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	1,127,664	1,111,405	1,106,031	798,148	794,010	786,576	779,645	764,449	758,790	793,011	784,483	777,886	777,338	638,416	635,907
(total, both units)	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser	Flow, lb/h	66,040	65,558	64,738	44,183	44,458	41,771	43,818	44,006	43,033	42,993	44,602	45,975	45,805	32,884	32,199
(total, both units)	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	75.8	80.3	80.3	53.9	60.8	60.7	76.5	81.0	80.9	69.8	76.5	81.2	81.2	54.9	58.3
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	75.8	80.3	80.3	53.9	60.8	60.7	76.5	81.0	80.9	69.8	76.5	81.2	81.2	54.9	58.3
Condenser Exit	Flow, lb/h	1,410,508	1,393,759	1,387,579	1,059,131	1,055,269	1,045,149	1,040,263	1,025,258	1,018,624	1,052,805	1,045,886	1,040,462	1,039,946	857,881	854,608
	Pressure, psia	1.039	1.187	1.164	0.500	0.626	0.820	1.011	1.164	1.149	0.624	1.014	1.164	1.163	0.498	0.555
	Pressure, in HgA (MIN 1.0 in. HgA)	2.116	2.416	2.410	1.019	1.272	1.263	2.058	2.349	2.340	1.270	2.065	2.370	2.369	1.013	1.131
	Temperature, F	103.0	107.6	107.4	79.6	86.4	86.2	102.0	106.5	106.4	86.4	102.2	106.8	106.8	79.4	82.8
	Enthalpy, Btu/lb	71.9	75.5	75.4	47.8	54.5	54.3	70.1	74.5	74.4	54.5	70.2	74.8	74.8	47.5	50.8
Condensate Pump Discharge	Flow, lb/h	1,410,508	1,393,759	1,387,579	1,059,131	1,055,269	1,045,149	1,040,263	1,025,258	1,018,624	1,052,805	1,045,886	1,040,462	1,039,946	857,881	854,608
	Pressure, psia	532.6	535.0	533.2	546.1	545.7	546.0	544.6	544.9	545.1	545.8	544.7	544.4	544.4	551.1	551.0
	Temperature, F	105.1	109.6	109.5	82.6	89.5	89.4	105.2	109.8	109.7	89.5	105.3	110.0	110.0	83.3	86.7
	Enthalpy, Btu/lb	74.6	79.0	78.9	52.2	59.1	58.9	74.7	79.2	79.1	59.0	74.8	79.4	79.4	52.8	56.2
Condensate after GSC	Flow, lb/h	1,410,508	1,393,759	1,387,579	1,059,131	1,055,269	1,045,149	1,040,263	1,025,258	1,018,624	1,052,805	1,045,886	1,040,462	1,039,946	857,881	854,608
	Temperature, F	108.4	110.9	110.9	84.4	91.3	91.1	107.0	111.6	111.5	91.3	107.1	111.8	111.8	86.4	88.8
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,195,509	1,178,774	1,172,570	844,132	840,271	830,150	825,265	810,263	803,621	837,804	830,889	825,462	824,948	672,880	669,611
	Temperature, F	108.4	110.9	110.9	84.4	91.3	91.1	107.0	111.6	111.5	91.3	107.1	111.8	111.8	86.4	88.8
Total Circulating Water	Flow, lb/h	198,978,496	198,800,096	198,800,096	122,892,528	122,774,400	122,774,400	122,460,856	122,363,832	122,363,832	122,774,400	122,460,856	122,363,832	122,363,832	122,892,528	122,774,400
	Flow, gpm	389,696	389,662	389,662	239,913	239,876	239,876	239,837	239,834	239,834	239,876	239,837	239,834	239,834	239,913	239,876
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	85.0	90.0	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0	68.0
Circulating Water to Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	115,208,112	115,089,984	115,089,984	114,776,440	114,659,400	114,659,400	115,089,984	114,776,440	114,659,400	114,659,400	115,208,112	115,089,984
	Flow, gpm	374,619	374,583	374,583	224,892	224,844	224,844	224,771	224,756	224,756	224,844	224,771	224,756	224,756	224,862	224,844
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1
Circulating Water from Condenser	Flow, lb/h	191,294,048	191,115,680	191,115,680	115,208,112	115,089,984	115,089,984	114,776,440	114,659,400	114,659,400	115,089,984	114,776,440	114,659,400	114,659,400	115,208,112	115,089,984
	Temperature, F	92.6	97.4	97.3	66.0	76.9	76.8	93.6	98.5	98.4	76.9	93.7	98.6	98.6	67.2	75.1
Total Circulating Water Discharge	Flow, lb/h	198,978,496	198,800,096	198,800,096	122,892,528	122,774,400	122,774,400	122,460,856	122,363,832	122,363,832	122,774,400	122,460,856	122,363,832	122,363,832	122,892,528	122,774,400
	Temperature, F	92.7	97.6	97.5	66.2	77.1	77.0	93.9	98.7	98.6	77.1	93.9	98.8	98.8	67.5	75.5
Circulating Water Temperature Rise	dT, F	7.70	7.57	7.54	9.19	9.10	9.01	8.86	8.69	8.63	9.08	8.92	8.84	8.83	7.50	7.45
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427
	Flow, gpm	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013
	Temperature, F	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1	68.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,427
	Temperature, F	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

DEF-19FL-FUEL-002533

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 84-BYP 2x50% STG Bypass Gas Fuel 74 F	Case 85-BYP 2x50% STG Bypass Gas Fuel 90 F	Case 86-BYP 2x50% STG Bypass Gas Fuel 95 F	Case 101-BYP 1x100% STG Bypass Gas Fuel 35 F	Case 102-BYP 1x100% STG Bypass Gas Fuel 45 F	Case 103-BYP 1x100% STG Bypass Gas Fuel 59 F	Case 104-BYP 1x100% STG Bypass Gas Fuel 74 F	Case 105-BYP 1x100% STG Bypass Gas Fuel 90 F	Case 106-BYP 1x100% STG Bypass Gas Fuel 95 F	Case 107-BYP 1x100% STG Bypass Gas Fuel 59 F/EC On	Case 108-BYP 1x100% STG Bypass Gas Fuel 74 F/EC On	Case 109-BYP 1x100% STG Bypass Gas Fuel 90 F/EC On	Case 110-BYP 1x100% STG Bypass Gas Fuel 95 F/EC On	Case 111-BYP 1x70% STG Bypass Gas Fuel 35 F	Case 112-BYP 1x70% STG Bypass Gas Fuel 45 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown [each]	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown [each]	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown [each]	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	3	4	4	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	438,025	431,177	428,866	629,620	624,636	617,249	617,351	615,999	611,450	622,979	621,155	625,454	625,172	502,541	499,113
	Pressure, psia	88.5	88.3	88.1	91.5	91.2	90.1	91.0	91.6	90.7	90.5	91.3	91.8	91.6	88.8	88.5
	Temperature, F	317.2	317.1	316.9	319.6	319.4	318.5	319.3	319.2	319.0	318.9	319.5	319.9	319.8	315.8	315.6
	Enthalpy, Btu/lb	287.5	287.4	287.3	290.0	289.8	288.9	289.7	289.6	289.4	289.3	289.9	290.3	290.1	286.1	285.8
IP Blead (before CV)	Flow, lb/h	43,094	42,214	41,787	60,703	60,182	59,626	59,269	135,074	135,317	60,989	59,034	136,038	131,128	55,640	54,456
	Pressure, psia	1,103.0	1,104.9	1,105.4	1,024.3	1,027.0	1,030.7	1,031.0	1,031.7	1,034.1	1,027.8	1,029.0	1,026.9	1,027.0	1,061.9	1,062.2
	Temperature, F	326.2	326.2	326.0	322.1	321.9	321.9	321.8	321.7	321.5	321.4	322.0	322.4	322.4	318.6	318.3
	Enthalpy, Btu/lb	292.5	292.4	292.3	294.3	294.0	293.2	293.9	293.9	293.6	293.5	294.1	294.6	294.5	290.7	290.4
IP FW Control Valve Exit Pressure	Pressure, psia	254.4	256.0	246.4	282.4	278.8	273.5	270.3	268.1	266.0	276.4	272.1	272.6	272.6	238.1	235.7
	CV dP, psi	848.6	848.9	857.0	741.9	748.1	757.3	763.7	763.6	765.1	751.4	757.0	754.0	754.4	843.0	846.5
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,656.5	3,641.7	3,643.5	3,443.1	3,449.0	3,458.4	3,483.0	3,510.0	3,515.9	3,461.1	3,477.7	3,494.6	3,495.2	3,587.0	3,589.9
	CV dP, psi	2,725.4	2,745.2	2,751.3	2,464.0	2,464.8	2,460.0	2,547.9	2,622.6	2,632.7	2,468.2	2,537.5	2,594.6	2,595.1	2,992.3	2,997.5
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	394,930	388,963	387,078	560,117	555,554	551,423	518,062	480,925	476,133	555,990	522,191	494,517	494,052	446,901	444,558
	Pressure, psia	911.1	896.8	892.2	968.0	964.2	978.5	935.1	867.5	863.2	982.9	939.9	900.6	900.0	894.7	892.5
	Temperature, F	333.2	333.3	333.2	332.8	332.6	331.8	332.9	333.3	333.1	332.1	333.0	333.8	333.7	330.6	330.4
	Enthalpy, Btu/lb	305.5	305.6	305.5	305.2	305.0	304.2	305.2	305.6	305.4	304.5	305.4	306.1	306.0	302.8	302.6
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	341,325	336,022	334,097	492,368	488,432	481,766	455,158	432,471	428,188	486,672	458,709	443,585	443,170	391,830	388,614
	Pressure, psia	800.2	788.1	784.2	764.9	764.4	763.4	755.1	749.5	746.8	764.1	755.8	751.6	751.5	748.4	746.0
	Temperature, F	1,050.1	1,050.8	1,052.8	1,012.8	1,018.9	1,026.6	1,014.1	964.0	964.0	1,022.8	1,014.1	969.1	969.1	1,021.7	1,027.7
	Enthalpy, Btu/lb	1,540.1	1,540.8	1,542.1	1,520.3	1,522.6	1,528.0	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,496.4	1,496.4	1,525.8	1,529.1
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	341,325	336,022	334,097	492,368	488,432	481,766	455,158	432,471	428,188	486,672	458,709	443,585	443,170	391,830	388,614
	Pressure, psia	800.2	788.1	784.2	764.9	764.4	763.4	755.1	749.5	746.8	764.1	755.8	751.6	751.5	748.4	746.0
	Temperature, F	1,050.1	1,050.8	1,052.8	1,012.8	1,018.9	1,026.6	1,014.1	964.0	964.0	1,022.8	1,014.1	969.1	969.1	1,021.7	1,027.7
	Enthalpy, Btu/lb	1,540.1	1,540.8	1,542.1	1,520.3	1,522.6	1,528.0	1,521.3	1,493.6	1,493.6	1,525.9	1,521.3	1,496.4	1,496.4	1,525.8	1,529.1
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	53,807	52,936	52,982	67,760	68,222	69,666	62,904	48,453	47,944	69,418	63,422	59,931	58,881	55,271	55,043
	Temperature, F	333.2	333.3	333.2	332.8	332.6	331.8	332.9	333.3	333.1	332.1	333.0	333.8	333.7	330.6	330.4
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	394,631	388,957	387,076	560,118	556,654	551,422	518,062	480,925	476,132	555,990	522,191	494,516	494,051	446,901	444,557
	Pressure, psia	227.9	224.3	223.2	213.2	212.4	211.2	207.6	202.9	202.0	212.2	208.4	205.2	205.1	191.2	190.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,372.5	1,372.7	1,372.8	1,373.3	1,373.4	1,373.4	1,373.6	1,373.9	1,373.9	1,373.4	1,373.6	1,373.8	1,373.8	1,374.5	1,374.6
HP Bypass Control Valve Pressure Loss	dP, psi	572.4	563.8	561.1	551.6	551.9	562.2	547.6	546.8	546.8	551.9	547.5	546.4	546.4	555.1	555.2
Total HRH Steam per HRSG Unit	Flow, lb/h	438,026	431,170	428,867	629,825	624,839	617,250	617,347	615,985	611,440	622,980	621,161	625,450	625,167	502,544	499,114
	Pressure, psia	202.8	199.7	198.7	155.3	155.1	154.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7
	Temperature, F	1,016.4	1,017.3	1,018.7	983.7	987.9	995.9	992.7	912.7	912.8	992.7	992.7	917.8	917.8	991.4	996.6
	Enthalpy, Btu/lb	1,538.1	1,538.6	1,539.4	1,522.3	1,524.4	1,528.6	1,511.3	1,485.4	1,485.4	1,527.0	1,511.3	1,488.0	1,488.0	1,526.4	1,529.1
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	438,026	431,170	428,867	629,826	624,839	617,250	617,347	615,985	611,440	622,980	621,161	625,450	625,167	502,544	499,114
	Pressure, psia	202.8	199.7	198.7	155.3	155.1	154.9	154.9	154.6	154.4	155.1	155.0	154.9	154.9	150.8	150.7
	Temperature, F	1,016.4	1,017.3	1,018.7	983.7	987.9	995.9	992.7	912.7	912.8	992.7	992.7	917.8	917.8	991.4	996.6
	Enthalpy, Btu/lb	1,538.1	1,538.6	1,539.4	1,522.3	1,524.4	1,528.6	1,511.3	1,485.4	1,485.4	1,527.0	1,511.3	1,488.0	1,488.0	1,526.4	1,529.1
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	126,763	125,495	125,050	170,124	170,970	171,126	154,099	150,266	149,153	171,833	165,122	154,039	153,973	137,671	138,294
	Temperature, F	109.4	110.9	110.9	84.4	91.3	91.1	107.0	111.8	111.5	91.3	107.1	111.8	111.8	85.4	86.8
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	564,731	556,806	553,918	799,949	795,810	788,376	761,446	766,253	760,593	794,813	786,283	779,489	779,141	640,215	637,468
	Pressure, psia	85.7	84.6	84.2	120.5	119.9	118.8	118.1	116.0	115.1	119.7	116.8	116.0	117.9	96.5	96.1
	Temperature, F	362.2	361.9	361.7	374.0	373.8	373.4	373.2	372.5	372.2	373.7	373.4	373.1	373.1	365.9	365.8
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	117.2	115.1	114.5	34.8	35.3	36.2	39.7	38.6	39.3	35.4	36.2	36.9	37.6	54.3	54.7
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	84.8	83.4	83.0	120.0	119.3	118.1	117.1	114.8	114.0	119.1	117.8	116.8	116.8	96.0	95.5
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	30,942	30,735	30,357	41,242	41,495	38,995	40,954	41,239	40,936	40,129	41,685	43,052	42,866	30,642	30,206
	Pressure, psia	82.8	82.8	82.5	83.4	83.0	82.6	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9
	Temperature, F	542.5	540.5	539.9	555.5	554.7	554.1	548.4	541.8	541.2	554.7	549.0	543.7	543.6	542.4	542.0
	Enthalpy, Btu/lb	1,302.1	1,301.1	1,300.8	1,308.6	1,308.1	1,307.9	1,305.9	1,301.8	1,301.5	1,308.2	1,305.3	1,302.7	1,302.7	1,302.2	1,302.0
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	30,942	30,735	30,357	41,242	41,495	38,995	40,954	41,239	40,936	40,129	41,685	43,052	42,866	30,642	30,206
	Pressure, psia	82.8	82.8	82.5	83.4	83.0	82.6	83.1	82.9	82.8	82.8	83.1	83.3	83.3	81.2	80.9
	Temperature, F	542.5	540.5	539.9	555.5	554.7	554.1	548.4	541.8	541.2	554.7	549.0	543.7	543.6	542.4	542.0
	Enthalpy, Btu/lb	1,302.1	1,301.1	1,300.8	1,308.6	1,308.1	1,307.9	1,305.9	1,301.8	1,301.5	1,308.2	1,305.3	1,302.7	1,302.7	1,302.2	1,302.0
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	2,077	2,044	2,011	2,642	2,954	2,776	2,854	2,768	2,697	2,687	2,916	2,924	2,912	2,022	1,996
	Temperature, F	109.4	110.9	110.9	84.4	91.3	91.1	107.0	111.8	111.5	91.3	107.1	111.8	111.8	85.4	86.8
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	33,020	32,779	32,369	44,183	44,450	41,771	43,816	44,008	43,033	42,963	44,602	45,976	45,808	32,664	32,199
	Pressure, psia	21.5	21.5	21.3	27.9	28.2	28.5	28.2	28.4	27.8	27.3	28.7	29.7	29.6	20.8	20.5
	Temperature, F	370.5	370.5	370.4	372.5	372.6	372.1	372.8	372.7	372.5	372.3	372.8	373.1	373.1	370.2	370.1
	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0	1,225.0
LP Bypass Control Valve Pressure Loss	dP, psi	91.2	91.2	91.4	56.8	54.8	56.1	54.9	54.5	55.0	55.5	54.4	53.8	53.7	80.5	80.4
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	21.5	20.3	20.1	27.4	27.6	25.9	27.2	27.3	26.7	26.7	27.7	28.5	28.4	20.1	20.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
GateCycle Model ID		8BART3 B8113S	8BARTO B8114S	8BART3 B8115S	8BARTO B8116S	8BART3 B8221S	8BART3 B8222S	8BART3 B8223S	8BART3 B8224S	8BART3 B8225S	8BART3 B8226S	8BART3 B8227S	8BARTO B8228S	8BART3 B8229S	8BART3 B8230S	8BART3 B8251S
GateCycle Case ID		59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH
Ambient Temperature		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Atmospheric Pressure		1@70%	1@70%	1@70%	1@70%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	4@100%	3@100%
Number of CTG/HRSG Units Operating		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off
CTG Inlet Air Cooler		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
Fuel Type		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
HRSG Firing/DB Exit Temperature																
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		745p/1,036F	736p/946F	734p/901F	733p/896F	1,819p/998F	1,818p/1,004F	1,814p/1,013F	1,814p/1,028F	1,799p/1,042F	1,790p/1,046F	1,821p/1,009F	1,821p/1,025F	1,816p/1,033F	1,817p/1,034F	1,427p/1,006F
STG Cold Reheat Conditions, psia/F		217p/1,009F	565p/936F	217p/866F	565p/865F	217p/905F	217p/913F	217p/924F	217p/941F	217p/956F	217p/964F	217p/919F	565p/958F	217p/947F	217p/948F	217p/938F
Cold Reheat Conditions after Conditioning, psia/F		217p/1,009F	565p/936F	217p/866F	565p/865F	217p/905F	217p/913F	217p/924F	217p/941F	217p/956F	217p/964F	217p/919F	565p/958F	217p/947F	217p/948F	217p/938F
STG Hot Reheat Conditions, psia/F		151p/1,003F	151p/896F	150p/851F	150p/846F	502p/990F	500p/995F	495p/1,004F	491p/1,017F	483p/1,029F	480p/1,032F	499p/1,000F	494p/1,014F	490p/1,022F	490p/1,022F	387p/993F
Condenser Pressure		1.12 in HgA	1.68 in HgA	2.14 in HgA	2.13 in HgA	2.43 in HgA	2.83 in HgA	2.80 in HgA	4.14 in HgA	4.58 in HgA	4.55 in HgA	2.82 in HgA	4.16 in HgA	4.65 in HgA	4.65 in HgA	1.75 in HgA
Stack Temperature		191 F	193 F	191 F	190 F	318 F	318 F	315 F	317 F	316 F	314 F	317 F	319 F	318 F	318 F	301 F
Run Date		10-Sep-06	7-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	7-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		1	1	1	1	4	4	4	4	4	4	4	4	4	4	3
Gross CTG Output (each)	kW	134,395	128,388	117,658	115,025	198,774	193,463	184,606	173,546	161,444	157,783	189,138	176,617	169,872	169,286	198,774
Gross CTG Output (total)	kW	134,395	128,388	117,658	115,025	795,096	773,852	738,424	694,184	645,776	631,132	756,552	706,468	679,488	677,144	596,322
Gross CTG Heat Rate (LHV)	Btu/kWh	10,026	10,234	10,487	10,585	9,353	9,405	9,523	9,708	9,920	9,982	9,467	9,663	9,784	9,793	9,353
Gross CTG Heat Rate (HHV)	Btu/kWh	10,581	11,209	11,486	11,572	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	9,979
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Stk, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	1,347.44	1,293.45	1,233.86	1,215.24	7,436.53	7,278.85	7,032.01	6,739.14	6,405.10	6,299.96	7,162.26	6,826.60	6,646.11	6,631.27	5,577.40
CTG Heat Input (HHV) (total)	MMBtu/h	1,476.82	1,416.69	1,351.44	1,331.02	7,934.20	7,765.97	7,502.61	7,190.14	6,834.81	6,721.57	7,641.59	7,283.45	7,093.02	7,075.05	5,950.65
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	134,395	128,388	117,658	115,026	795,096	773,852	738,424	694,184	645,776	631,132	756,552	706,468	679,488	677,144	596,322
Gross Cycle Heat Rate (LHV)	Btu/kWh	10,026	10,234	10,487	10,565	9,353	9,405	9,523	9,708	9,920	9,982	9,467	9,663	9,784	9,793	9,353
Gross Cycle Heat Rate (HHV)	Btu/kWh	10,981	11,209	11,486	11,572	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	9,979
Plant Heat Input (LHV)	MMBtu/h	1,347.44	1,293.45	1,233.88	1,215.24	7,436.53	7,278.85	7,032.01	6,739.14	6,405.10	6,299.96	7,162.26	6,826.60	6,646.11	6,631.27	5,577.40
Plant Heat Input (HHV)	MMBtu/h	1,475.82	1,416.69	1,351.44	1,331.02	7,934.20	7,765.97	7,502.61	7,190.14	6,834.81	6,721.57	7,641.59	7,283.45	7,093.02	7,075.05	5,950.65
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	14,060	13,920	13,840	13,830	31,430	31,310	31,130	30,890	30,800	30,510	31,240	30,970	30,820	30,810	26,990
Total Auxiliary Power/Losses, percent of gross		10.46%	11.01%	11.76%	12.02%	3.95%	4.05%	4.22%	4.45%	4.74%	4.83%	4.13%	4.38%	4.54%	4.55%	4.53%
Net Plant Output w/ Step-Up Xfmr Losses	kW	120,335	112,468	103,818	101,195	763,666	742,542	707,294	663,294	615,176	600,622	725,312	675,498	648,668	646,334	569,332
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	11,197	11,501	11,885	12,009	9,738	9,803	9,942	10,160	10,413	10,489	9,875	10,106	10,249	10,260	9,793
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	12,264	12,596	13,017	13,153	10,390	10,459	10,607	10,840	11,110	11,191	10,536	10,782	10,936	10,946	10,452

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0
	Relative Humidity	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%
	WBT, F	51.4	69.1	76.8	76.8	30.9	36.3	51.4	69.1	76.8	76.8	51.4	69.1	76.8	76.8	30.9
Compressor Inlet Conditions	Temperature, F	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	52.8	69.8	78.5	79.3	35.0
	Relative Humidity	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	98.5%	91.4%	88.4%	60.1%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	6,831	3,606	9,623	13,120	0
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,347.4	1,293.5	1,233.9	1,215.2	1,859.1	1,819.7	1,758.0	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8	1,859.1
	Flow, lb/h	63,679	61,127	58,312	57,431	100,416	98,288	94,956	91,001	86,503	85,070	99,714	92,182	89,771	89,544	100,416
Fuel LHV	Btu/lb	21,160	21,160	21,160	21,160	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	216.8	216.8
	Temperature, F	1,006.7	934.4	864.4	883.4	903.3	916.6	922.3	939.4	957.0	962.0	916.9	956.5	945.5	946.6	936.9
	Enthalpy, Btu/lb	1,532.6	1,483.3	1,456.2	1,455.4	1,478.4	1,482.2	1,488.3	1,497.2	1,506.4	1,509.1	1,485.5	1,495.3	1,500.5	1,501.0	1,495.4
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	317.6	319.2	318.7	318.4	288.0	289.2	288.3	288.5	289.2	288.1	287.5	291.3	291.7	291.4	271.2
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	350.0	216.8	350.0	216.8	216.8	216.8	216.8	216.8	216.8	216.8	350.0	216.8	216.8	216.8
	Temperature, F	1,006.7	921.1	864.4	868.5	903.3	916.6	922.3	939.4	957.0	962.0	916.9	943.7	945.5	946.6	936.9
	Enthalpy, Btu/lb	1,532.6	1,483.3	1,456.2	1,455.4	1,478.4	1,482.2	1,488.3	1,497.2	1,506.4	1,509.1	1,485.5	1,495.3	1,500.5	1,501.0	1,495.4
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	40,160	39,310	37,978	36,398	34,599	34,026	36,884	36,871	35,906	35,616	40,160
CTG Exhaust Flow	Flow, lb/h	3,185,950	3,052,983	2,932,422	2,901,331	4,252,224	4,177,052	4,056,906	3,884,963	3,718,719	3,673,002	4,136,498	3,921,685	3,820,488	3,813,647	4,252,224
	Pressure, in. H2O	11.76	10.99	10.27	10.07	19.68	19.02	18.14	16.95	15.77	15.43	18.59	17.19	16.49	16.49	19.58
	Temperature, F	1,060.9	1,107.9	1,123.4	1,127.2	1,039.9	1,046.5	1,057.1	1,073.6	1,088.5	1,092.3	1,053.0	1,071.0	1,060.0	1,061.0	1,039.9
CTG Load	% of Base Load	70%	70%	70%	70%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	134,395	126,386	117,658	115,026	198,774	193,463	184,605	173,546	161,444	157,783	189,138	176,617	169,872	169,266	198,774
Gross Heat Rate	Btu/kWh (LHV)	10,026	10,234	10,487	10,585	9,353	9,406	9,523	9,705	9,923	9,962	9,487	9,663	9,764	9,793	9,353

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Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	353,319	344,287	329,947	328,224	435,766	432,757	427,672	422,163	413,032	409,508	431,356	425,046	420,670	420,413	440,482
(at HRSG terminal point)	Pressure, psia	745.4	736.8	733.6	733.3	1,819.5	1,817.6	1,813.7	1,814.0	1,798.9	1,790.2	1,820.8	1,821.1	1,816.9	1,816.7	1,427.3
	Temperature, F	1,037.5	948.3	903.2	898.2	999.6	1,005.5	1,015.1	1,029.5	1,043.6	1,047.5	1,010.9	1,026.6	1,034.8	1,035.9	1,007.2
	Enthalpy, Btu/lb	1,534.8	1,485.3	1,460.2	1,457.4	1,460.4	1,464.2	1,469.3	1,469.2	1,508.5	1,511.1	1,487.5	1,497.3	1,502.5	1,503.0	1,497.4
dP from HP drum to HRSG terminal point	psi	97.0	61.1	53.1	52.3	51.2	50.7	50.0	49.0	47.9	47.4	50.4	49.4	48.6	48.7	69.5
HP SH #1 Steam Outlet Temperature	Temperature, F	1,038.4	949.1	904.0	899.0	1,000.1	1,006.0	1,015.6	1,029.9	1,044.1	1,048.0	1,011.4	1,027.1	1,035.2	1,036.1	1,007.9
HP SH #2 Steam Outlet Temperature	Temperature, F	1,011.0	852.1	796.5	750.8	930.8	935.3	942.8	953.0	964.4	967.8	939.0	950.4	956.8	957.2	947.9
HP Steam Desuperheating Flow	Flow, lb/h	1,321	83,078	76,617	71,575	0	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	330.0	332.5	332.6	332.4	297.8	296.0	296.3	300.5	299.3	298.3	297.5	301.3	301.6	301.4	281.7
	% of inlet steam	0.3%	22.4%	27.3%	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	333.9	0.0	0.0	0.0	196.8	196.6	203.0	209.2	217.4	220.6	200.9	208.8	210.7	211.0	251.0
HP SH #3/4 Steam Outlet Temperature	Temperature, F	861.5	783.2	771.8	772.4	822.2	824.7	828.6	834.2	841.1	843.6	826.4	832.3	835.8	836.1	845.4
HP Evaporator #1 Exit	Flow, lb/h	49,298	32,036	29,872	29,736	65,171	55,267	55,294	55,610	55,527	55,411	55,432	55,713	55,896	55,734	54,213
	Pressure, psia	842.4	796.9	786.8	785.5	1,870.6	1,858.3	1,863.7	1,863.0	1,846.7	1,837.7	1,871.2	1,870.5	1,865.0	1,865.4	1,496.8
	Temperature, F	524.3	517.8	516.4	516.2	626.4	626.3	625.9	625.9	624.6	624.0	626.5	626.4	626.0	626.0	596.0
	Enthalpy, Btu/lb	1,198.0	1,199.4	1,199.7	1,199.7	1,145.9	1,146.0	1,146.4	1,146.4	1,147.5	1,148.1	1,145.8	1,145.9	1,146.3	1,146.2	1,189.2
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	16.1	15.0	14.0	13.8	18.0	17.9	17.7	17.5	17.2	17.0	17.9	17.7	17.6	17.5	20.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	332,702	248,674	229,258	225,914	380,594	377,468	372,477	365,553	357,504	354,094	375,923	369,334	364,974	364,678	388,268
	Pressure, psia	842.4	796.9	786.8	785.5	1,870.6	1,858.3	1,863.7	1,863.0	1,846.7	1,837.7	1,871.2	1,870.5	1,865.0	1,865.4	1,496.8
	Temperature, F	524.3	517.8	516.4	516.2	626.4	626.3	625.9	625.9	624.6	624.0	626.5	626.4	626.0	626.0	596.0
	Enthalpy, Btu/lb	1,198.0	1,199.4	1,199.7	1,199.7	1,145.9	1,146.0	1,146.4	1,146.4	1,147.5	1,148.1	1,145.8	1,145.9	1,146.3	1,146.2	1,189.2
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	16.1	15.0	14.0	13.8	18.0	17.9	17.7	17.5	17.2	17.0	17.9	17.7	17.6	17.5	20.8
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	382,000	281,209	259,130	256,650	435,765	432,756	427,671	422,163	413,031	409,505	431,356	425,046	420,670	420,412	440,480
	Temperature, F	524.3	517.8	516.4	516.2	626.4	626.3	625.9	625.9	624.6	624.0	626.5	626.4	626.0	626.0	596.0
HP Economizer #4/5 Outlet Temperature	Temperature, F	489.6	500.6	501.0	500.7	590.1	588.9	587.0	584.4	581.3	580.2	588.0	585.3	583.6	583.5	587.2
HP Economizer #6/7 Outlet Temperature	Temperature, F	403.6	410.8	410.1	409.5	490.5	489.3	487.0	484.7	481.4	480.3	488.2	485.6	483.9	483.8	488.6
HP Economizer #8 Outlet Temperature	Temperature, F	366.3	361.3	362.3	361.9	405.6	404.9	401.7	401.0	397.8	396.6	403.1	401.9	400.6	400.3	385.3
Feedwater to HP Economizer #8	Flow, lb/h	382,000	281,209	259,130	256,650	435,765	432,756	427,671	422,163	413,031	409,505	431,356	425,046	420,670	420,412	440,480
	Pressure, psia	888.5	822.0	806.2	805.5	1,930.7	1,927.6	1,921.6	1,919.5	1,900.8	1,890.8	1,930.1	1,927.7	1,921.1	1,921.4	1,559.2
	Temperature, F	330.0	332.5	332.6	332.4	297.8	299.0	298.3	300.5	299.3	298.3	297.5	301.3	301.6	301.4	281.7
	Enthalpy, Btu/lb	302.2	304.7	304.7	304.5	271.0	272.2	269.4	270.7	272.5	271.4	270.6	274.5	274.9	274.7	253.9
HP FW Temperature Increase Across BFP	F	15.0	16.1	16.7	16.7	12.3	12.3	12.4	12.5	12.6	12.7	12.3	12.4	12.5	12.5	12.8
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	681.7	649.6	631.2	631.6	939.9	943.8	950.0	959.4	968.1	970.4	947.6	957.6	963.0	963.5	946.3
Exit Temperature	Temperature, F	981.7	949.6	931.2	931.6	939.9	943.8	950.0	959.4	968.1	970.4	947.6	957.6	963.0	963.5	946.3
HRSG Hot Reheat Steam	Flow, lb/h	493,139	504,906	506,364	504,510	566,033	562,998	556,654	550,065	538,945	534,602	551,007	553,616	548,339	548,020	572,600
(at HRSG terminal point)	Pressure, psia	150.6	150.7	150.5	150.4	502.2	499.8	495.5	491.3	483.1	479.6	498.8	494.1	490.3	490.2	386.5
	Temperature, F	1,094.8	897.6	852.6	847.6	991.8	997.1	1,005.7	1,018.5	1,030.9	1,034.3	1,002.1	1,018.2	1,023.4	1,024.2	995.3
	Enthalpy, Btu/lb	1,533.4	1,477.7	1,454.6	1,452.0	1,516.4	1,519.3	1,524.1	1,531.2	1,538.2	1,540.0	1,522.1	1,529.9	1,533.6	1,534.3	1,521.7
HRSG RH dP -- terminal pt. to terminal pt.	psi	66.2	414.6	66.3	414.9	-285.5	-283.0	-276.7	-274.5	-266.3	-262.9	-282.0	71.2	-273.6	-273.4	-166.8
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,005.4	895.2	853.3	848.3	992.0	997.3	1,005.9	1,018.6	1,031.2	1,034.5	1,002.4	1,018.4	1,023.6	1,024.4	995.6
RHTR #3 Steam Outlet Temperature	Temperature, F	929.7	723.0	696.0	624.9	913.2	918.7	922.4	930.5	938.7	941.1	919.9	928.8	933.4	933.9	916.3
Reheat Steam Desuperheating Flow	Flow, lb/h	0	88,848	92,944	94,444	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	317.8	319.2	318.7	318.4	288.0	289.2	288.3	290.5	289.2	288.1	287.6	291.3	291.7	291.4	271.2
	% of inlet steam	0.0%	15.2%	22.5%	23.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	413.9	81.6	0.0	0.0	315.4	317.0	319.9	323.6	327.8	329.2	318.4	322.5	324.8	325.0	336.2
RHTR #4 Steam Outlet Temperature	Temperature, F	787.2	731.9	723.6	723.8	785.9	787.0	788.9	791.7	794.2	794.9	788.2	791.2	792.7	792.9	784.2
Cold Reheat Steam from HP Bypass	Flow, lb/h	440,503	376,788	356,192	353,466	485,854	484,004	480,995	477,849	470,743	467,572	483,643	480,465	477,447	477,347	494,242
	Pressure, psia	188.9	184.4	181.8	181.4	521.5	519.0	514.5	510.1	501.5	498.0	517.9	513.0	509.1	508.9	412.0
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,374.6	1,374.9	1,375.0	1,375.1	1,355.7	1,355.9	1,356.2	1,356.4	1,356.9	1,357.1	1,355.9	1,356.2	1,356.5	1,356.5	1,362.2
Cold Reheat Steam from STG to HRSG	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(at HRSG terminal point)	Pressure, psia	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	216.8	216.8
	Temperature, F	1,006.7	934.4	864.4	863.4	903.3	910.6	922.3	939.4	957.0	962.0	918.9	956.5	945.5	946.6	935.9
	Enthalpy, Btu/lb	1,532.6	1,483.3	1,458.2	1,455.4	1,478.4	1,482.2	1,488.3	1,497.2	1,506.4	1,509.1	1,485.6	1,495.3	1,500.5	1,501.0	1,495.4
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam - Cold Reheat Steam	Flow, lb/h	353,319	344,287	329,947	328,224	435,766	432,757	427,672	422,163	413,032	409,508	431,356	425,046	420,670	420,413	440,482

DECLASSIFIED

Bibb and Associates -- Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
IP Steam (at HRSG terminal point)	Flow, lb/h	52,635	58,274	57,229	56,603	80,779	78,994	75,958	72,207	68,202	67,031	77,365	73,152	70,892	70,673	78,558
	Pressure, psia	189.9	194.4	181.8	181.3	521.5	519.0	514.5	510.1	501.5	498.0	517.9	513.0	509.1	508.9	412.0
	Temperature, F	530.5	519.4	517.1	516.9	616.6	616.8	616.3	617.0	616.9	616.6	616.4	617.3	617.5	617.5	592.7
	Enthalpy, Btu/lb	1,286.6	1,281.1	1,280.2	1,280.1	1,306.3	1,306.7	1,307.3	1,308.1	1,308.8	1,308.6	1,307.1	1,308.1	1,308.5	1,308.6	1,301.7
IP Evaporator Drum Exit	Flow, lb/h	52,635	58,274	57,229	56,603	80,779	78,994	75,958	72,207	68,202	67,031	77,365	73,152	70,892	70,673	78,558
	Pressure, psia	210.1	209.3	206.2	205.3	540.0	536.8	531.1	525.3	515.4	511.5	535.0	528.5	523.8	523.6	433.8
	Temperature, F	386.0	385.6	384.4	384.0	475.1	474.4	473.3	472.2	470.2	469.4	474.1	472.8	471.9	471.8	452.6
	Enthalpy, Btu/lb	1,199.5	1,199.4	1,199.2	1,199.1	1,204.7	1,204.7	1,204.8	1,204.8	1,204.9	1,204.9	1,204.7	1,204.8	1,204.8	1,204.8	1,205.2
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	25.8	26.4	26.3	26.1	31.9	30.6	29.9	29.1	28.1	27.8	30.3	29.3	28.6	28.9	31.7
IP Approach	Temperature, F	0.0	0.0	0.0	0.0	30.2	30.0	30.7	30.0	30.1	30.3	30.5	29.9	29.9	29.9	27.4
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	52,635	58,274	57,229	56,603	80,779	78,994	75,958	72,207	68,202	67,031	77,365	73,152	70,892	70,673	78,558
	Pressure, psia	210.1	209.3	206.2	205.3	540.0	536.8	531.1	525.3	515.4	511.5	535.0	528.5	523.8	523.6	433.8
	Temperature, F	386.0	385.6	384.4	384.0	444.8	444.4	442.6	442.2	440.0	439.1	443.5	442.0	442.0	441.9	425.2
	Enthalpy, Btu/lb	361.2	365.6	364.9	364.5	424.5	424.0	422.0	421.5	419.1	418.1	423.0	422.3	421.3	421.2	402.7
	% Steam in Feedwater	0.1%	0.7%	0.8%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	52,635	58,274	57,229	56,603	80,779	78,994	75,958	72,207	68,202	67,031	77,365	73,152	70,892	70,673	78,558
(pressure is preliminary)	Pressure, psia	232.1	236.2	232.1	230.5	592.8	587.3	577.9	567.6	553.2	548.0	583.5	571.9	564.6	564.1	483.6
	Temperature, F	319.3	320.6	320.1	319.9	288.8	290.0	287.2	291.4	290.2	289.1	288.5	292.2	292.6	292.4	272.3
	Enthalpy, Btu/lb	288.9	291.3	290.8	290.5	259.3	260.5	257.6	261.9	260.6	259.4	258.9	262.7	263.1	262.8	242.2
IP FW Temperature Increase Across BFP	F	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.4	3.5	3.5	3.3	3.4	3.4	3.4	3.4
LP Steam (at HRSG terminal point)	Flow, lb/h	28,360	33,204	31,751	30,928	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	60.7	61.4	61.0	60.9	63.7	54.7	52.3	55.8	54.7	53.8	53.4	56.5	56.8	56.6	41.1
	Temperature, F	541.4	531.6	529.3	529.0	285.5	288.7	283.9	288.0	286.7	285.6	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	1,301.8	1,298.8	1,295.7	1,295.6	1,175.8	1,176.0	1,175.1	1,176.4	1,176.0	1,175.7	1,175.5	1,176.6	1,176.7	1,176.7	1,170.4
LP Evaporator Steam Exit	Flow, lb/h	28,360	33,204	31,751	30,928	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	63.5	65.2	64.6	64.3	53.7	54.7	52.3	55.8	54.7	53.8	53.4	56.5	56.8	56.6	41.1
	Temperature, F	315.0	316.4	315.9	315.7	285.5	288.7	283.9	288.0	286.7	285.6	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	1,184.2	1,184.5	1,184.4	1,184.3	1,175.8	1,176.0	1,175.1	1,176.4	1,176.0	1,175.7	1,175.5	1,176.6	1,176.7	1,176.7	1,170.4
LP Evaporator Water Exit to BFPs	Flow, lb/h	483,136	504,615	506,375	504,621	556,028	602,990	556,648	560,049	538,940	534,602	561,001	553,808	548,335	548,015	572,708
	Pressure, psia	63.5	65.2	64.6	64.3	53.7	54.7	52.3	55.8	54.7	53.8	53.4	56.5	56.8	56.6	41.1
	Temperature, F	316.0	316.4	315.9	315.7	285.5	288.7	283.9	288.0	286.7	285.6	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	285.3	286.7	286.2	286.0	254.9	256.1	253.2	257.4	256.1	254.9	254.5	258.3	258.6	258.4	237.9
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	52,635	58,274	57,229	56,603	80,779	78,994	75,958	72,207	68,202	67,031	77,365	73,152	70,892	70,673	78,558
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	66,843	92,944	94,444	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #3	Flow, lb/h	382,000	281,299	259,130	256,656	436,756	432,756	427,871	422,163	413,031	409,505	431,355	425,948	420,570	420,412	440,480
HP FW to HRSG HP Desuperheater	Flow, lb/h	1,321	63,078	70,817	71,575	0	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	57,194	35,501	26,245	26,241	50,088	51,248	52,824	55,686	57,711	56,967	52,287	55,417	56,777	56,935	59,700
LP Pinch	Temperature, F	14.2	15.6	15.4	15.3	32.3	31.5	31.1	29.5	28.4	28.2	31.4	29.7	29.1	29.0	32.2
LP Approach	Temperature, F	14.6	12.1	12.9	13.5	175.6	171.6	169.1	159.2	154.0	153.2	170.1	159.8	155.9	155.7	169.4
Condensate Recirculated	Flow, lb/h	144,604	94,973	80,860	80,969	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	300.1	304.0	302.7	301.9	109.1	114.3	114.0	128.0	131.9	131.8	114.2	128.3	132.4	132.4	96.4
% of Total LP Economizer Flow		22%	15%	13%	13%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	666,104	633,079	618,987	616,424	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	299.7	303.7	302.3	301.5	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	96.3
	Enthalpy, Btu/lb	270.2	274.3	272.9	272.1	78.1	83.3	82.9	96.9	100.8	100.5	83.2	97.2	101.3	101.3	67.5
Condensate to LP Economizer	Flow, lb/h	666,104	633,079	618,987	616,424	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	135.0	135.0	135.0	135.0	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	96.3
	Enthalpy, Btu/lb	104.4	104.4	104.4	104.4	78.1	83.3	82.9	96.9	100.8	100.5	83.2	97.2	101.3	101.3	67.5
Condensate from Recirculation	Flow, lb/h	144,604	94,973	80,860	80,969	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	300.1	304.0	302.7	301.9	109.1	114.3	114.0	128.0	131.9	131.8	114.2	128.3	132.4	132.4	96.4
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	596,632	602,995	556,653	560,053	538,943	534,597	561,004	553,616	548,336	548,023	572,797
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Temperature, F	86.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	96.3
Condensate to HRSG	Flow, lb/h	521,501	538,106	536,116	535,434	596,632	602,995	556,653	560,053	538,943	534,597	561,004	553,616	548,336	548,023	572,797
	Pressure, psia	551.2	550.0	549.8	550.0	451.2	451.3	452.8	452.0	454.2	455.4	451.6	450.9	451.5	451.6	491.9
	Temperature, F	98.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	96.3
Stack Exit	Flow, lb/h	3,186,950	3,052,963	2,932,422	2,901,331	4,262,224	4,177,052	4,056,998	3,864,963	3,716,719	3,673,602	4,198,466	3,921,685	3,820,488	3,813,647	4,252,224
	Temperature, F	191.4	192.9	191.1	190.3	317.8	316.2	315.0	317.5	316.1	313.5	316.6	318.5	316.2	318.0	301.1

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	745.4	735.8	733.6	733.3	1,819.6	1,817.6	1,813.7	1,814.0	1,798.9	1,790.2	1,820.8	1,821.1	1,816.3	1,816.7	1,427.3
	Temperature, F	1,035.7	946.5	901.4	886.4	999.0	1,003.9	1,013.5	1,027.8	1,042.0	1,045.9	1,009.3	1,025.0	1,033.2	1,034.0	1,005.6
	Enthalpy, Btu/lb	1,539.6	1,484.3	1,459.2	1,456.4	1,479.4	1,483.2	1,489.3	1,498.2	1,507.5	1,510.1	1,486.5	1,496.9	1,501.5	1,502.0	1,496.4
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	565.3	216.8	565.9	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	216.8	216.8
	Temperature, F (MAX 640 F)	1,008.6	936.3	866.3	865.3	905.2	912.5	924.2	941.3	958.9	963.9	918.8	958.3	947.4	948.5	937.8
	Enthalpy, Btu/lb	1,533.6	1,484.3	1,459.2	1,456.4	1,479.4	1,483.2	1,489.3	1,498.2	1,507.5	1,510.1	1,486.5	1,496.9	1,501.5	1,502.0	1,496.4
Efficiency (THV inlet to HPT exit)		0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 35.5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	216.8	216.8
	Temperature, F	1,008.6	936.3	866.3	865.3	905.2	912.5	924.2	941.3	958.9	963.9	918.8	958.3	947.4	948.5	937.8
	Enthalpy, Btu/lb	1,533.6	1,484.3	1,459.2	1,456.4	1,479.4	1,483.2	1,489.3	1,498.2	1,507.5	1,510.1	1,486.5	1,496.9	1,501.5	1,502.0	1,496.4
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	317.8	319.2	318.7	318.4	288.9	289.2	288.3	290.5	289.2	288.1	287.6	291.3	291.7	291.4	271.2
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	565.3	216.8	565.3	216.8	216.8	216.8	216.8	216.8	216.8	216.8	565.3	216.8	216.8	216.8
	Temperature, F (MAX 750 F)	1,008.6	936.3	866.3	865.3	905.2	912.5	924.2	941.3	958.9	963.9	918.8	958.3	947.4	948.5	937.8
	Enthalpy, Btu/lb	1,533.6	1,484.3	1,459.2	1,456.4	1,479.4	1,483.2	1,489.3	1,498.2	1,507.5	1,510.1	1,486.5	1,496.9	1,501.5	1,502.0	1,496.4
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	68.2	414.8	66.3	414.9	-266.5	-283.0	-278.7	-274.5	-266.3	-262.9	-282.0	71.2	-273.6	-273.4	-199.8
Reheat System dP		30.52%	73.35%	30.58%	73.39%	-131.70%	-130.56%	-128.58%	-126.63%	-122.85%	-121.27%	-130.10%	12.60%	-126.20%	-126.13%	-78.32%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 564 psia)	150.8	150.7	150.5	150.4	502.2	499.8	495.5	491.3	483.1	479.5	498.8	494.1	490.3	490.2	388.5
	Temperature, F	1,002.9	895.6	850.6	845.6	889.9	895.2	1,003.8	1,016.7	1,029.1	1,032.4	1,000.3	1,014.3	1,021.5	1,022.3	993.4
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-32.8	-50.8	-50.8	-50.8	-8.0	-8.7	-9.6	-11.1	-12.9	-13.5	-9.1	-10.7	-11.6	-11.7	-12.2
	Enthalpy, Btu/lb	1,532.4	1,476.7	1,453.6	1,451.0	1,616.4	1,618.3	1,623.1	1,630.2	1,637.2	1,639.0	1,621.1	1,628.9	1,632.8	1,633.3	1,620.7
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.4	124.9	27.4	124.9	27.4	27.4	27.4	27.4	27.4	27.4	27.4	124.9	27.4	27.4	27.4
	Temperature, F	877.8	893.9	877.8	843.7	877.8	877.8	877.8	877.8	877.8	877.8	877.8	894.7	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,476.7	1,471.9	1,451.0	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,628.9	1,471.9	1,471.9	1,471.9
Efficiency (INTV inlet to IPT exit)		86.54%	90.79%	86.54%	90.79%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	90.79%	86.54%	86.54%	86.54%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 45.0 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 76.2 psia)	60.7	61.4	61.0	60.9	53.7	54.7	52.3	55.8	54.7	53.8	53.4	56.5	56.8	56.6	41.1
	Temperature, F	539.4	529.6	527.3	527.0	285.5	286.7	283.9	288.0	286.7	285.6	285.1	288.5	289.2	288.9	268.9
	Enthalpy, Btu/lb	1,360.8	1,295.8	1,294.7	1,294.6	1,174.6	1,175.0	1,174.1	1,175.4	1,175.0	1,174.7	1,174.5	1,175.8	1,175.7	1,175.7	1,169.4
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 100 F)															
LP Admission CV Pressure Loss	% loss	66.1%	-53.5%	66.2%	-54.3%	49.0%	50.0%	47.7%	51.0%	50.0%	49.1%	48.7%	-120.8%	51.8%	51.7%	33.4%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.0	77.9	27.0	77.8	27.0	27.0	27.0	27.0	27.0	27.0	27.0	56.7	27.0	27.0	27.0
	Temperature, F	877.8	529.0	877.8	528.4	877.8	877.8	877.8	877.8	877.8	877.8	877.8	288.4	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,295.8	1,471.9	1,294.6	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,176.6	1,471.9	1,471.9	1,471.9
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.806	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642	1.960	1.960	1.960
	Temperature, F	875.9	515.3	875.9	512.7	875.9	875.9	875.9	875.9	875.9	875.9	875.9	258.3	875.9	875.9	875.9
ELEP Enthalpy, Btu/lb		1,068.8	1,012.3	1,068.8	1,012.3	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,012.3	1,068.8	1,068.8	1,068.8
UEEP Enthalpy, Btu/lb		1,471.9	1,295.8	1,471.9	1,294.6	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,176.6	1,471.9	1,471.9	1,471.9
Exhaust Loss Btu/lb		17.9	38.0	17.9	38.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	38.0	17.9	17.9	17.9
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.52%	90.04%	90.52%	90.04%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.04%	90.52%	90.52%	90.52%
LPT Efficiency to UEEP		83.50%	80.02%	83.50%	80.02%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	80.02%	83.50%	83.50%	83.50%
Annulus Velocity ft/s		308.3	1,368.0	308.3	1,368.0	308.3	308.3	308.3	308.3	308.3	308.3	308.3	1,368.0	308.3	308.3	308.3
Volumetric Flow 1000 ft3/min per end		1,589	7,853	1,589	7,853	1,589	1,589	1,589	1,589	1,589	1,589	1,589	7,853	1,589	1,589	1,589
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

DEF-19FL-FUEL-002539

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	787.5	763.9	736.9	735.1	3,265.3	3,239.3	3,214.3	3,151.0	3,103.9	3,093.5	3,234.2	3,178.0	3,147.3	3,148.4	2,503.8
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	7.6	6.7	6.5	6.4	29.9	27.2	27.0	24.3	23.4	23.3	27.2	24.4	23.8	23.8	22.9
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.806	0.963	0.806	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.806	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.642	1.960	1.642	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.642	1.960	1.960	1.960
	Temperature, F	876.9	515.3	876.9	512.7	875.9	875.9	875.9	875.9	875.9	875.9	875.9	258.3	875.9	875.9	875.9
	Enthalpy, Btu/lb	1,471.9	1,295.8	1,471.9	1,294.6	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,176.6	1,471.9	1,471.9	1,471.9
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser (total, both units)	Flow, lb/h	629,811	622,117	614,050	610,647	2,878,239	2,858,471	2,845,409	2,833,371	2,791,760	2,772,732	2,863,750	2,849,149	2,832,237	2,831,444	2,185,985
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser (total, both units)	Flow, lb/h	30,226	35,276	33,711	32,833	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,175.6	1,176.0	1,176.1	1,176.4	1,176.0	1,175.7	1,175.6	1,176.6	1,176.7	1,176.7	1,176.4
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	58.2	74.3	78.9	78.9	76.1	83.3	82.9	90.9	100.8	100.5	83.2	97.2	101.3	101.3	67.6
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	58.2	74.3	78.9	78.9	76.1	83.3	82.9	90.9	100.8	100.5	83.2	97.2	101.3	101.3	67.6
Condenser Exit	Flow, lb/h	876,839	874,194	864,561	860,281	3,095,039	3,085,271	3,082,209	3,050,171	3,008,560	2,989,532	3,080,550	3,065,949	3,049,037	3,048,265	2,402,185
	Pressure, psia	0.552	0.913	1.049	1.046	1.195	1.366	1.375	2.031	2.252	2.236	1.366	2.044	2.286	2.285	0.858
	Pressure, in HgA (MIN 1.0 in. HgA)	1.124	1.860	2.136	2.131	2.434	2.827	2.799	4.136	4.584	4.552	2.821	4.161	4.654	4.652	1.747
	Temperature, F	82.8	98.7	103.3	103.2	107.7	112.9	112.6	126.6	130.4	130.2	112.9	126.8	131.0	131.0	96.6
	Enthalpy, Btu/lb	50.7	66.7	71.3	71.2	75.8	80.9	80.6	94.6	98.4	98.2	80.9	94.8	99.0	99.0	64.7
Condensate Pump Discharge	Flow, lb/h	876,839	874,194	864,561	860,281	3,095,039	3,085,271	3,082,209	3,050,171	3,008,560	2,989,532	3,080,550	3,065,949	3,049,037	3,048,265	2,402,185
	Pressure, psia	551.2	550.0	549.8	550.0	451.2	451.3	452.8	452.0	454.2	455.4	451.6	450.9	451.5	451.6	401.9
	Temperature, F	86.5	102.7	107.3	107.3	108.3	113.5	113.2	127.2	131.1	130.8	113.4	127.4	131.6	131.6	97.5
	Enthalpy, Btu/lb	56.1	72.1	76.8	76.7	77.5	82.7	82.3	96.3	100.2	99.9	82.6	96.6	100.7	100.7	66.8
Condensate after GSC	Flow, lb/h	876,839	874,194	864,561	860,281	3,095,039	3,085,271	3,082,209	3,050,171	3,008,560	2,989,532	3,080,550	3,065,949	3,049,037	3,048,265	2,402,185
	Temperature, F	86.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	98.3
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	661,840	658,191	649,563	645,280	2,880,036	2,870,264	2,847,206	2,835,165	2,793,556	2,774,520	2,865,544	2,850,946	2,834,031	2,833,258	2,187,178
	Temperature, F	86.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	98.3
Total Circulating Water	Flow, lb/h	122,774,400	122,460,656	122,353,832	122,353,832	196,697,952	196,501,072	196,501,072	196,978,496	196,800,096	196,800,096	196,501,072	196,978,496	196,800,096	196,800,096	196,697,952
	Flow, gpm	239,676	239,037	238,834	238,834	383,983	383,785	383,785	383,595	383,562	383,562	383,785	383,595	383,562	383,562	383,553
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	68.0	85.0	90.0	90.0	60.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0	60.0
Circulating Water to Condenser (after CWP)	Flow, lb/h	115,089,984	114,776,440	114,669,400	114,669,400	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504
	Flow, gpm	224,644	224,771	224,756	224,756	374,819	374,741	374,741	374,819	374,593	374,593	374,741	374,819	374,593	374,593	374,819
	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1
Circulating Water from Condenser	Flow, lb/h	115,089,984	114,776,440	114,669,400	114,669,400	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504
	Temperature, F	75.1	91.9	96.6	96.6	77.8	85.7	85.5	102.3	107.0	106.9	85.6	102.4	107.2	107.2	73.7
Total Circulating Water Discharge	Flow, lb/h	122,774,400	122,460,856	122,353,832	122,353,832	196,697,952	196,501,072	196,501,072	196,978,496	196,800,096	196,800,096	196,501,072	196,978,496	196,800,096	196,800,096	196,997,952
	Temperature, F	75.4	92.3	97.2	97.1	77.6	85.5	85.3	102.1	106.8	106.7	85.4	102.2	107.0	107.0	73.6
Circulating Water Temperature Rise	dT, F	7.38	7.28	7.18	7.12	17.60	17.47	17.34	17.09	16.81	16.70	17.44	17.18	17.03	17.03	13.65
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427
	Flow, gpm	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000
	Temperature, F	68.1	85.1	90.1	90.1	60.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1	60.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427
	Temperature, F	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

Case Name		Case 113-BYP 1x70% STG Bypass Gas Fuel 59 F	Case 114-BYP 1x70% STG Bypass Gas Fuel 74 F	Case 115-BYP 1x70% STG Bypass Gas Fuel 90 F	Case 116-BYP 1x70% STG Bypass Gas Fuel 95 F	Case 221-BYP 4x100% STG Bypass Oil Fuel 35 F	Case 222-BYP 4x100% STG Bypass Oil Fuel 45 F	Case 223-BYP 4x100% STG Bypass Oil Fuel 59 F	Case 224-BYP 4x100% STG Bypass Oil Fuel 74 F	Case 225-BYP 4x100% STG Bypass Oil Fuel 90 F	Case 226-BYP 4x100% STG Bypass Oil Fuel 95 F	Case 227-BYP 4x100% STG Bypass Oil Fuel 59 F/EC On	Case 228-BYP 4x100% STG Bypass Oil Fuel 74 F/EC On	Case 229-BYP 4x100% STG Bypass Oil Fuel 90 F/EC On	Case 230-BYP 4x100% STG Bypass Oil Fuel 95 F/EC On	Case 251-BYP 3x100% STG Bypass Oil Fuel 35 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	493,138	504,915	508,375	504,521	556,828	562,990	556,648	550,049	538,949	534,602	551,001	553,605	548,335	548,015	572,798
	Pressure, psia	66.8	67.5	66.9	66.6	56.0	57.0	54.8	56.1	57.0	56.1	55.7	56.8	56.1	56.9	43.4
	Temperature, F	315.0	316.4	315.9	315.7	285.5	286.7	289.9	288.0	286.7	285.5	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	285.3	286.7	286.2	286.0	254.9	256.1	253.2	257.4	256.1	254.9	254.5	258.3	258.6	258.4	237.9
IP Bleed (before CV)	Flow, lb/h	52,632	125,127	150,183	151,054	80,774	78,057	75,954	72,200	68,198	67,031	77,359	73,145	70,888	70,658	78,658
	Pressure, psia	1,084.0	1,080.5	1,079.7	1,080.2	1,044.9	1,046.8	1,049.0	1,052.6	1,056.9	1,058.4	1,047.3	1,051.2	1,053.5	1,053.5	1,046.5
	Temperature, F	317.8	319.2	318.7	318.4	288.0	289.2	288.3	290.5	289.2	288.1	287.8	291.3	291.7	291.4	271.2
	Enthalpy, Btu/lb	289.9	291.3	290.8	290.5	259.3	260.5	257.6	261.9	260.6	259.4	258.9	262.7	263.1	262.8	242.2
IP FW Control Valve Exit Pressure	Pressure, psia	232.1	236.2	232.1	230.6	592.8	587.3	577.9	567.6	553.2	548.0	583.5	571.9	564.6	564.1	488.8
	CV dP, psi	851.9	844.3	847.6	849.6	452.1	459.5	471.1	485.0	503.7	510.5	463.8	479.3	488.9	489.5	556.7
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,585.2	3,623.4	3,605.2	3,537.4	3,579.7	3,575.0	3,583.8	3,582.9	3,583.8	3,599.0	3,578.2	3,576.5	3,582.3	3,582.6	3,588.4
	CV dP, psi	2,766.6	2,801.4	2,827.0	2,830.9	1,643.0	1,647.4	1,662.1	1,653.4	1,653.0	1,708.2	1,648.1	1,650.8	1,661.2	1,661.4	2,030.8
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	440,504	379,788	356,192	353,467	485,853	484,003	480,894	477,848	470,742	467,572	483,642	480,463	477,447	477,347	494,240
	Pressure, psia	888.6	822.0	808.2	808.5	1,930.7	1,927.6	1,921.6	1,919.5	1,900.8	1,890.8	1,930.1	1,927.7	1,921.1	1,921.4	1,668.2
	Temperature, F	330.0	332.5	332.6	332.4	297.8	299.0	296.3	300.5	299.3	298.3	297.5	301.3	301.6	301.4	281.7
	Enthalpy, Btu/lb	302.2	304.7	304.7	304.5	271.0	272.2	269.4	273.7	272.5	271.4	270.6	274.5	274.9	274.7	253.9
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	383,319	344,287	329,947	328,224	435,786	432,757	427,872	422,163	413,032	409,606	431,356	425,048	420,670	420,413	440,482
	Pressure, psia	745.4	736.8	733.6	733.3	1,819.5	1,817.6	1,813.7	1,814.0	1,798.9	1,790.2	1,820.8	1,821.1	1,816.3	1,816.7	1,427.3
	Temperature, F	1,037.5	948.3	903.2	898.2	999.8	1,005.5	1,015.1	1,029.5	1,043.6	1,047.5	1,019.9	1,028.6	1,034.8	1,035.5	1,007.2
	Enthalpy, Btu/lb	1,534.6	1,485.3	1,460.2	1,457.4	1,480.4	1,484.2	1,490.3	1,499.2	1,508.5	1,511.1	1,487.5	1,497.3	1,502.5	1,503.0	1,487.4
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	383,319	344,287	329,947	328,224	435,786	432,757	427,872	422,163	413,032	409,606	431,356	425,048	420,670	420,413	440,482
	Pressure, psia	745.4	736.8	733.6	733.3	1,819.5	1,817.6	1,813.7	1,814.0	1,798.9	1,790.2	1,820.8	1,821.1	1,816.3	1,816.7	1,427.3
	Temperature, F	1,037.5	948.3	903.2	898.2	999.8	1,005.5	1,015.1	1,029.5	1,043.6	1,047.5	1,019.9	1,028.6	1,034.8	1,035.5	1,007.2
	Enthalpy, Btu/lb	1,534.6	1,485.3	1,460.2	1,457.4	1,480.4	1,484.2	1,490.3	1,499.2	1,508.5	1,511.1	1,487.5	1,497.3	1,502.5	1,503.0	1,487.4
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	57,184	35,501	26,245	26,241	50,886	51,248	52,824	56,886	57,711	58,067	52,287	55,417	55,777	55,935	53,760
	Temperature, F	330.0	332.5	332.6	332.4	297.8	299.0	296.3	300.5	299.3	298.3	297.5	301.3	301.6	301.4	281.7
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	440,503	379,788	356,192	353,466	485,854	484,004	480,695	477,849	470,743	467,572	483,643	480,465	477,447	477,347	494,242
	Pressure, psia	189.9	184.4	181.8	181.4	521.6	519.0	514.5	510.1	501.6	498.0	517.9	513.0	509.1	508.9	412.0
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,374.6	1,374.9	1,375.0	1,375.1	1,356.7	1,356.9	1,356.2	1,356.4	1,356.9	1,357.1	1,356.2	1,356.2	1,356.5	1,356.5	1,362.2
HP Bypass Control Valve Pressure Loss	dP, psi	555.5	551.4	551.8	551.9	1,297.0	1,298.6	1,299.2	1,303.9	1,297.3	1,292.3	1,302.9	1,308.1	1,307.2	1,307.7	1,015.3
Total HRH Steam per HRSG Unit	Flow, lb/h	493,139	504,906	506,364	504,510	566,833	562,998	556,954	550,055	538,945	534,602	551,007	553,615	548,339	548,020	572,809
	Pressure, psia	150.6	150.7	150.5	150.4	502.2	499.6	495.6	491.3	483.1	479.6	498.8	494.1	490.3	490.2	386.5
	Temperature, F	1,004.8	897.6	852.6	847.6	961.8	967.1	1,005.7	1,018.5	1,030.9	1,034.3	1,002.1	1,016.2	1,023.4	1,024.2	995.3
	Enthalpy, Btu/lb	1,533.4	1,477.7	1,454.6	1,452.0	1,516.4	1,519.3	1,524.1	1,531.2	1,538.2	1,540.0	1,522.1	1,529.9	1,533.6	1,534.3	1,521.7
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	493,139	504,906	506,364	504,510	566,833	562,998	556,954	550,055	538,945	534,602	551,007	553,615	548,339	548,020	572,809
	Pressure, psia	150.6	150.7	150.5	150.4	502.2	499.6	495.5	491.3	483.1	479.6	498.8	494.1	490.3	490.2	386.5
	Temperature, F	1,004.8	897.6	852.6	847.6	961.8	967.1	1,005.7	1,018.5	1,030.9	1,034.3	1,002.1	1,016.2	1,023.4	1,024.2	995.3
	Enthalpy, Btu/lb	1,533.4	1,477.7	1,454.6	1,452.0	1,516.4	1,519.3	1,524.1	1,531.2	1,538.2	1,540.0	1,522.1	1,529.9	1,533.6	1,534.3	1,521.7
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	138,473	119,013	109,487	107,941	153,377	154,671	156,149	158,739	159,446	159,033	156,382	159,121	160,172	160,292	166,283
	Temperature, F	88.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	98.3
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	631,612	623,918	615,851	612,451	720,210	717,669	711,803	708,794	698,391	693,635	716,389	712,736	708,510	708,312	729,092
	Pressure, psia	95.2	94.4	93.3	92.8	109.2	109.0	108.2	108.4	107.0	106.3	108.8	108.9	108.6	108.5	110.2
	Temperature, F	365.5	365.2	364.9	364.7	370.2	370.2	369.9	369.9	369.5	369.2	370.1	370.1	370.0	370.0	370.6
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	55.4	56.2	57.1	57.6	393.0	390.8	387.3	382.9	376.0	373.3	389.9	385.2	381.8	381.6	278.3
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	94.6	93.5	92.3	91.8	108.0	107.6	106.8	106.3	104.8	104.1	107.5	106.8	106.3	106.3	109.4
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	28,360	33,204	31,751	30,926	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	89.7	81.4	81.0	80.9	63.7	64.7	62.3	65.8	64.7	63.8	63.4	66.5	66.6	66.6	41.1
	Temperature, F	641.4	631.6	629.3	629.0	285.5	286.7	289.9	288.0	286.7	285.5	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	1,301.6	1,296.6	1,295.7	1,295.6	1,175.8	1,176.0	1,175.1	1,176.4	1,176.0	1,175.7	1,175.5	1,176.6	1,176.7	1,176.7	1,170.4
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	28,360	33,204	31,751	30,926	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	89.7	81.4	81.0	80.9	63.7	64.7	62.3	65.8	64.7	63.8	63.4	66.5	66.6	66.6	41.1
	Temperature, F	641.4	631.6	629.3	629.0	285.5	286.7	289.9	288.0	286.7	285.5	285.1	288.8	289.2	288.9	268.9
	Enthalpy, Btu/lb	1,301.6	1,296.6	1,295.7	1,295.6	1,175.8	1,176.0	1,175.1	1,176.4	1,176.0	1,175.7	1,175.5	1,176.6	1,176.7	1,176.7	1,170.4
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	1,866	2,072	1,859	1,905	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	88.7	104.8	109.5	109.4	108.9	114.1	113.8	127.8	131.7	131.4	114.0	128.0	132.2	132.2	98.3
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	30,226	35,276	33,711	32,833	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	19.3	22.8	22.0	21.4	1.2	1.4	1.4	2.0	2.3	2.2	1.4	2.0	2.3	2.3	0.9
	Temperature, F	389.7	370.9	370.6	370.4	256.3	257.2	255.3	258.4	257.7	258.9	256.1	259.0	259.4	259.2	244.5
	Enthalpy, Btu/lb	1,225.0	1,225.0	1,225.0	1,225.0	1,175.8	1,176.0	1,175.1	1,176.4	1,176.0	1,175.7	1,175.5	1,176.6	1,176.7	1,176.7	1,170.4
LP Bypass Control Valve Pressure Loss	dP, psi	61.4	58.6	59.1	59.5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	18.7	21.9	20.9	20.4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

DEF-19FL-FUEL-002541

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 59 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 35 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
GateCycle Model ID		8BART3 B8252S	8BART3 B8253S	8BART3 B8254S	8BART3 B8255S	8BART3 B8256S	8BART3 B8257S	8BART3 B8258S	8BART3 B8259S	8BART3 B8260S	8BART3 B8271S	8BART3 B8272S	8BART3 B8273S	8BART3 B8274S	8BART3 B8275S	8BART3 B8276S
GateCycle Case ID		45 F/60%RH	59 F/60%RH	74 F/70%RH	90 F/65%RH	95 F/44%RH	59 F/60%RH	74 F/70%RH	90 F/65%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/70%RH	90 F/65%RH	95 F/44%RH
Ambient Temperature		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Atmospheric Pressure		3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	3@100%	2@100%	2@100%	2@100%	2@100%	2@100%	2@100%
Number of CTG/HRSG Units Operating		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
CTG Inlet Air Cooler		Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
Fuel Type		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
HRSG Firing/DB Exit Temperature																
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,425p/1,012F	1,420p/1,021F	1,418p/1,036F	1,404p/1,050F	1,396p/1,054F	1,428p/1,017F	1,424p/1,033F	1,418p/1,042F	1,419p/1,042F	1,039p/984F	1,038p/990F	1,031p/999F	1,027p/1,013F	1,016p/1,020F	1,010p/1,030F
STG Cold Reheat Conditions, psia/F		217p/945F	217p/956F	217p/973F	217p/990F	217p/994F	217p/951F	217p/970F	217p/979F	217p/980F	217p/937F	217p/943F	217p/953F	217p/969F	217p/984F	217p/988F
Cold Reheat Conditions after Conditioning, psia/F		217p/945F	217p/956F	217p/979F	217p/990F	217p/994F	217p/951F	217p/970F	217p/979F	217p/980F	217p/937F	217p/943F	217p/953F	217p/969F	217p/984F	217p/988F
STG Hot Reheat Conditions, psia/F		388p/999F	381p/1,008F	377p/1,021F	371p/1,033F	368p/1,036F	384p/1,004F	380p/1,018F	377p/1,026F	377p/1,026F	272p/992F	270p/997F	268p/975F	265p/987F	260p/998F	258p/1,001F
Condenser Pressure		2.08 In HgA	2.08 In HgA	3.16 In HgA	3.54 In HgA	3.62 In HgA	2.08 In HgA	3.18 In HgA	3.58 In HgA	3.58 In HgA	1.22 In HgA	1.50 In HgA	1.49 In HgA	2.37 In HgA	2.69 In HgA	2.68 In HgA
Stack Temperature		302 F	299 F	302 F	300 F	299 F	300 F	303 F	303 F	303 F	277 F	278 F	275 F	279 F	277 F	276 F
Run Date		10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06
Performance Summary																
Number of CTG/HRSG Units Operating		3	3	3	3	3	3	3	3	3	2	2	2	2	2	2
Gross CTG Output (each)	kW	193,463	184,606	173,546	161,444	157,783	189,138	178,617	169,672	169,286	198,774	193,463	184,606	173,546	161,444	157,783
Gross CTG Output (total)	kW	580,389	553,818	520,638	484,332	473,349	567,414	529,851	509,016	507,858	397,548	386,926	369,212	347,092	322,888	315,566
Gross CTG Heat Rate (LHV)	Btu/kWh	9,406	9,523	9,708	9,920	9,962	9,467	9,663	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,962
Gross CTG Heat Rate (HHV)	Btu/kWh	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	5,456.14	5,274.01	5,054.35	4,804.57	4,724.97	5,371.71	5,119.95	4,980.08	4,973.45	3,718.27	3,639.43	3,516.01	3,369.57	3,203.05	3,149.68
CTG Heat Input (HHV) (total)	MMBtu/h	5,824.48	5,626.96	5,392.66	5,128.11	5,041.18	5,731.20	5,462.50	5,319.76	5,306.29	3,967.10	3,882.99	3,751.31	3,595.07	3,417.40	3,360.78
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	580,389	553,818	520,638	484,332	473,349	567,414	529,851	509,016	507,858	397,548	386,926	369,212	347,092	322,888	315,566
Gross Cycle Heat Rate (LHV)	Btu/kWh	9,406	9,523	9,708	9,920	9,962	9,467	9,663	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,962
Gross Cycle Heat Rate (HHV)	Btu/kWh	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650
Plant Heat Input (LHV)	MMBtu/h	5,456.14	5,274.01	5,054.35	4,804.57	4,724.97	5,371.71	5,119.95	4,980.08	4,973.45	3,718.27	3,639.43	3,516.01	3,369.57	3,203.05	3,149.68
Plant Heat Input (HHV)	MMBtu/h	5,824.48	5,626.96	5,392.66	5,128.11	5,041.18	5,731.20	5,462.50	5,319.76	5,306.29	3,967.10	3,882.99	3,751.31	3,595.07	3,417.40	3,360.78
Calculations Based on High-Side of Generator Step-Up Transformers																
Total Auxiliary Power/Losses	kW	26,900	26,760	26,580	26,360	26,290	26,640	26,640	26,520	26,510	22,590	22,530	22,430	22,300	22,150	22,100
Total Auxiliary Power/Losses, percent of gross		4.63%	4.83%	5.11%	5.44%	5.55%	4.73%	5.03%	5.20%	5.22%	5.68%	5.82%	6.08%	6.42%	6.86%	7.00%
Net Plant Output w/ Step-Up Xfmr Losses	kW	553,489	527,058	494,058	457,972	447,059	540,674	503,211	483,096	481,348	374,958	364,396	346,782	324,792	300,738	293,466
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	9,863	10,007	10,230	10,491	10,569	9,937	10,175	10,321	10,332	9,918	9,988	10,139	10,376	10,651	10,734
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	10,523	10,676	10,915	11,193	11,276	10,602	10,855	11,012	11,024	10,590	10,655	10,817	11,069	11,368	11,452

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)																
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0
	Relative Humidity	59.0%	59.7%	78.5%	54.8%	43.8%	59.7%	78.5%	54.8%	43.8%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%
	WBT, F	39.3	51.4	69.1	76.6	76.6	51.4	69.1	76.6	76.6	30.9	39.3	51.4	69.1	76.6	76.6
Compressor Inlet Conditions	Temperature, F	45.0	59.0	74.0	90.0	95.0	52.6	69.8	76.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0
	Relative Humidity	59.9%	59.7%	78.5%	54.8%	43.8%	92.8%	90.5%	91.4%	88.4%	60.1%	59.9%	59.7%	78.5%	54.8%	43.8%
Inlet Air Cooler Status		Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off
Saturation Efficiency		0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Evaporation Rate	Flow, lb/h	0	0	0	0	0	5,631	3,900	9,623	13,120	0	0	0	0	0	0
Fuel Flow	Fuel Type	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,919.7	1,768.9	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8	1,859.1	1,819.7	1,758.0	1,684.8	1,601.5	1,575.0
	Flow, lb/h	96,286	94,955	91,001	86,503	85,070	96,714	92,182	89,771	89,544	100,418	98,288	94,955	91,001	86,503	85,070
Fuel LHV	Btu/lb	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

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4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091105-8 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 59 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 35 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	943.0	954.3	971.1	987.7	992.2	949.4	967.8	977.3	978.4	934.8	941.1	951.5	966.9	982.2	986.4
	Enthalpy, Btu/lb	1,499.1	1,505.0	1,513.9	1,522.6	1,525.0	1,502.5	1,512.1	1,517.1	1,517.7	1,494.7	1,498.1	1,503.6	1,511.7	1,519.7	1,521.9
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	272.9	270.2	275.0	274.1	273.0	271.5	276.8	276.4	276.2	243.8	245.9	243.4	249.3	248.0	248.0
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	943.0	954.3	971.1	987.7	992.2	949.4	967.8	977.3	978.4	934.8	941.1	951.5	966.9	982.2	986.4
	Enthalpy, Btu/lb	1,499.1	1,505.0	1,513.9	1,522.6	1,525.0	1,502.5	1,512.1	1,517.1	1,517.7	1,494.7	1,498.1	1,503.5	1,511.7	1,519.7	1,521.9
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	39,310	37,978	36,398	34,599	34,026	38,684	36,871	35,006	35,616	40,160	39,310	37,978	36,398	34,599	34,026
CTG Exhaust Flow	Flow, lb/h	4,177,052	4,056,998	3,884,963	3,718,719	3,673,602	4,108,466	3,921,585	3,820,488	3,813,647	4,252,224	4,177,052	4,056,998	3,884,963	3,718,719	3,673,602
	Pressure, in. H2O	19.02	18.14	16.95	15.77	15.43	18.59	17.19	16.49	16.49	19.58	19.02	18.14	16.95	15.77	15.43
	Temperature, F	1,048.5	1,057.1	1,073.6	1,088.6	1,092.3	1,053.0	1,071.0	1,080.0	1,081.0	1,039.9	1,048.5	1,057.1	1,073.6	1,088.6	1,092.3
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	193,463	184,606	173,546	161,444	157,783	189,138	178,617	169,872	169,286	196,774	193,463	184,606	173,546	161,444	157,783
Gross Heat Rate	Btu/kWh (LHV)	9,496	9,523	9,708	9,920	9,982	9,487	9,683	9,784	9,793	9,353	9,496	9,523	9,708	9,920	9,982

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 59 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 35 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
Heat Recovery Steam Generator (each)																
HRSG HP Steam	Flow, lb/h	437,250	432,050	425,772	416,385	412,884	435,522	428,615	424,012	423,725	468,282	464,773	459,066	452,279	442,174	438,397
(at HRSG terminal point)	Pressure, psia	1,424.7	1,419.9	1,417.6	1,403.7	1,398.5	1,426.1	1,423.6	1,418.5	1,418.5	1,038.6	1,035.8	1,031.0	1,027.4	1,015.4	1,009.9
	Temperature, F	1,013.3	1,023.0	1,037.7	1,051.8	1,056.5	1,019.0	1,035.1	1,049.3	1,044.2	985.8	991.4	1,000.6	1,014.5	1,028.0	1,031.6
	Enthalpy, Btu/lb	1,501.1	1,507.0	1,515.9	1,524.6	1,527.0	1,504.5	1,514.1	1,519.1	1,519.7	1,496.7	1,500.1	1,505.6	1,513.7	1,521.7	1,523.9
dP from HP drum to HRSG terminal point	psi	66.8	67.9	66.6	64.9	64.3	66.5	67.0	66.1	66.1	100.6	99.8	98.5	96.8	94.3	93.4
HP SH #1 Steam Outlet Temperature	Temperature, F	1,013.9	1,023.6	1,038.3	1,052.4	1,056.0	1,019.6	1,035.7	1,049.9	1,044.8	986.5	992.4	1,001.6	1,015.5	1,028.9	1,032.4
HP SH #2 Steam Outlet Temperature	Temperature, F	952.6	960.3	971.6	982.7	985.9	959.9	969.2	976.6	976.2	962.2	967.4	976.7	988.2	1,000.4	1,003.8
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP Feedwater)	Temperature, F	283.4	280.8	285.7	284.9	283.9	282.0	286.4	287.0	286.8	254.8	255.9	254.5	260.5	260.2	259.3
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	264.2	259.3	256.1	274.7	277.6	256.4	264.0	266.3	266.7	265.9	269.2	274.6	281.9	290.6	293.5
HP SH #3/4 Steam Outlet Temperature	Temperature, F	848.3	852.9	859.5	866.6	868.8	850.6	857.8	861.7	862.1	823.7	826.6	831.4	838.1	845.3	847.5
HP Evaporator #1 Exit	Flow, lb/h	54,279	54,357	54,500	54,367	54,254	54,400	54,500	54,555	54,588	54,659	54,721	54,787	54,921	54,804	54,698
	Pressure, psia	1,493.6	1,487.8	1,484.2	1,468.6	1,460.8	1,494.6	1,490.6	1,484.6	1,484.7	1,139.2	1,135.6	1,129.4	1,124.0	1,109.7	1,103.3
	Temperature, F	595.7	595.2	594.9	593.5	592.7	595.8	595.4	594.9	594.9	560.7	560.3	559.6	559.0	557.4	556.7
	Enthalpy, Btu/lb	1,169.4	1,169.7	1,169.9	1,170.7	1,171.2	1,169.3	1,169.5	1,169.9	1,169.9	1,166.9	1,167.1	1,167.3	1,167.6	1,168.2	1,168.4
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	327.9	333.5	342.4	351.4	353.9	330.8	340.6	345.8	346.3	361.8	366.0	372.6	382.6	392.2	394.8
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	382,978	377,692	371,271	362,017	358,629	381,120	374,023	369,457	369,138	413,622	410,051	404,281	397,356	387,369	383,699
	Pressure, psia	1,493.6	1,487.8	1,484.2	1,468.6	1,460.8	1,494.6	1,490.6	1,484.6	1,484.7	1,139.2	1,135.6	1,129.4	1,124.0	1,109.7	1,103.3
	Temperature, F	595.7	595.2	594.9	593.5	592.7	595.8	595.4	594.9	594.9	560.7	560.3	559.6	559.0	557.4	556.7
	Enthalpy, Btu/lb	1,169.4	1,169.7	1,169.9	1,170.7	1,171.2	1,169.3	1,169.5	1,169.9	1,169.9	1,166.9	1,167.1	1,167.3	1,167.6	1,168.2	1,168.4
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	20.7	20.4	20.2	19.8	19.6	20.6	20.4	20.2	20.2	21.1	20.9	20.6	20.3	19.8	19.6
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	437,257	432,049	425,771	416,383	412,883	435,522	428,613	424,012	423,724	468,280	464,772	459,066	452,278	442,173	438,397
	Temperature, F	595.7	595.2	594.9	593.5	592.7	595.8	595.4	594.9	594.9	560.7	560.3	559.6	559.0	557.4	556.7
HP Economizer #4/5 Outlet Temperature	Temperature, F	566.0	563.9	561.4	558.1	557.0	565.1	562.3	560.6	560.6	534.0	532.7	530.4	527.7	524.2	523.1
HP Economizer #6/7 Outlet Temperature	Temperature, F	467.4	465.1	462.5	459.5	458.4	466.3	463.7	462.1	461.9	437.5	436.4	434.0	431.8	428.5	427.3
HP Economizer #8 Outlet Temperature	Temperature, F	384.9	381.8	381.6	378.6	377.4	383.2	382.5	381.3	381.1	354.1	354.1	351.1	351.5	348.8	347.7
Feedwater to HP Economizer #8	Flow, lb/h	437,257	432,049	425,771	416,383	412,883	435,522	428,613	424,012	423,724	468,280	464,772	459,066	452,278	442,173	438,397
	Pressure, psia	1,554.1	1,548.9	1,541.6	1,523.5	1,514.8	1,554.6	1,548.8	1,541.6	1,541.6	1,208.9	1,203.7	1,195.8	1,188.4	1,171.4	1,164.0
	Temperature, F	283.4	280.8	285.7	284.9	283.9	282.0	286.4	287.0	286.8	254.8	258.9	254.5	260.5	260.2	259.3
	Enthalpy, Btu/lb	255.6	252.9	257.9	257.0	256.0	254.2	258.7	259.3	259.1	225.7	228.1	226.6	231.8	231.3	230.4
HP FW Temperature Increase Across BFP	F	12.9	13.0	13.0	13.2	13.3	12.9	13.0	13.1	13.1	13.2	13.2	13.3	13.4	13.6	13.6
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	949.2	955.7	965.4	974.3	976.5	953.2	963.9	969.2	969.8	951.6	956.9	962.7	973.3	982.9	985.1
Exit Temperature	Temperature, F	949.2	955.7	965.4	974.3	976.5	953.2	963.9	969.2	969.8	951.6	955.9	962.7	973.3	982.9	985.1
HRSG Hot Reheat Steam	Flow, lb/h	568,962	562,279	556,225	543,711	539,290	566,731	558,840	553,316	552,964	591,737	587,727	580,617	573,175	561,103	556,511
(at HRSG terminal point)	Pressure, psia	384.5	381.0	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.6
	Temperature, F	1,000.7	1,009.4	1,022.6	1,035.0	1,038.3	1,005.6	1,020.2	1,027.5	1,028.3	984.2	989.1	998.9	998.6	999.6	1,002.8
	Enthalpy, Btu/lb	1,524.6	1,529.4	1,536.5	1,543.4	1,545.2	1,527.4	1,535.2	1,539.2	1,539.6	1,508.6	1,511.2	1,516.4	1,521.3	1,527.7	1,529.3
HRSG RH dP -- terminal pt. to terminal pt.	psi	-167.7	-164.3	-160.7	-154.2	-151.5	-166.8	-162.9	-159.9	-159.8	-56.2	-53.7	-51.0	-46.4	-43.6	-41.7
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,001.0	1,009.7	1,022.9	1,035.3	1,038.6	1,006.2	1,020.8	1,027.8	1,028.6	984.7	989.5	977.4	988.0	1,000.2	1,003.2
RHTR #3 Steam Outlet Temperature	Temperature, F	921.9	927.8	936.4	944.8	947.1	926.3	934.7	939.5	940.1	901.3	904.8	910.5	918.7	925.7	928.9
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from IP Feedwater)	Temperature, F	272.9	270.2	275.0	274.1	273.0	271.5	275.8	276.4	276.2	243.6	245.9	243.4	249.3	248.9	248.0
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Final Superheat, F	340.0	342.9	348.7	361.0	362.4	341.4	346.7	348.1	348.0	367.3	369.1	372.3	378.5	381.0	382.3
RHTR #4 Steam Outlet Temperature	Temperature, F	785.4	787.5	790.4	793.0	793.6	786.7	789.9	791.5	791.7	783.6	785.0	787.2	790.5	793.4	794.1
Cold Reheat Steam from HP Bypass	Flow, lb/h	492,111	488,329	484,787	477,160	473,913	491,374	487,456	484,089	483,949	520,940	518,488	514,125	509,944	501,519	497,990
	Pressure, psia	409.8	406.1	402.3	395.3	392.4	408.8	404.6	401.4	401.2	305.0	303.3	300.3	297.3	291.9	289.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,362.3	1,362.6	1,362.7	1,363.1	1,363.3	1,362.4	1,362.6	1,362.8	1,362.8	1,368.3	1,368.4	1,368.5	1,368.7	1,369.0	1,369.1
Cold Reheat Steam from STG to HRSG	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(at HRSG terminal point)	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	943.0	954.3	971.1	987.7	992.2	948.4	967.8	977.3	978.4	934.6	941.1	951.5	966.9	982.2	986.4
	Enthalpy, Btu/lb	1,499.1	1,505.6	1,513.9	1,522.0	1,525.0	1,502.5	1,512.1	1,517.1	1,517.7	1,494.7	1,498.1	1,503.6	1,511.7	1,519.7	1,521.9
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam + Cold Reheat Steam	Flow, lb/h	437,250	432,050	425,772	416,385	412,884	435,522	428,615	424,012	423,725	468,282	464,773	459,066	452,279	442,174	438,397

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1997 Steam Tables

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IP Steam (at HRSG terminal point)	Flow, lb/h	76,870	73,950	70,439	66,561	65,378	75,359	71,391	69,229	69,016	70,797	69,240	66,493	63,231	59,585	58,521
	Pressure, psia	409.8	406.0	402.3	398.9	392.4	408.6	404.6	401.4	401.2	305.0	303.3	300.3	297.3	291.9	289.8
	Temperature, F	592.7	592.6	593.1	592.6	592.1	593.1	593.5	593.4	593.5	595.4	595.2	595.0	594.8	593.7	593.1
	Enthalpy, Btu/lb	1,301.9	1,302.3	1,302.8	1,303.0	1,303.0	1,302.2	1,302.6	1,303.0	1,303.0	1,295.2	1,295.2	1,295.4	1,295.6	1,295.4	1,295.3
IP Evaporator Drum Exit	Flow, lb/h	76,870	73,950	70,439	66,561	65,378	75,359	71,391	69,229	69,016	70,797	69,240	66,493	63,231	59,585	58,521
	Pressure, psia	430.9	425.8	420.4	411.8	408.5	429.1	423.1	419.0	418.7	328.4	325.9	321.4	316.6	309.5	306.8
	Temperature, F	452.0	450.8	449.5	447.5	446.7	451.6	450.2	449.2	449.1	425.7	425.0	423.7	422.3	420.2	419.4
	Enthalpy, Btu/lb	1,205.2	1,205.2	1,205.1	1,205.1	1,205.1	1,205.2	1,205.2	1,205.1	1,205.1	1,204.1	1,204.0	1,203.9	1,203.8	1,203.6	1,203.6
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	31.3	30.6	29.8	28.8	28.6	31.0	30.0	29.0	29.6	29.4	28.9	28.3	27.6	26.5	26.2
IP Approach	Temperature, F	27.0	27.7	28.8	26.9	27.0	27.6	26.7	26.6	26.7	27.0	26.5	27.2	26.1	26.1	26.3
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	76,870	73,950	70,439	66,561	65,378	75,359	71,391	69,229	69,016	70,797	69,240	66,493	63,231	59,585	58,521
	Pressure, psia	430.9	425.8	420.4	411.8	408.5	429.1	423.1	419.0	418.7	328.4	325.9	321.4	316.6	309.5	306.8
	Temperature, F	424.9	423.0	422.7	420.6	419.7	424.0	423.4	422.6	422.4	398.7	398.5	396.5	395.3	394.1	393.2
	Enthalpy, Btu/lb	402.4	400.3	400.0	397.6	396.6	401.4	400.7	399.8	399.7	373.6	373.5	371.4	371.2	368.8	367.8
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	76,870	73,950	70,439	66,561	65,378	75,359	71,391	69,229	69,016	70,797	69,240	66,493	63,231	59,585	58,521
(pressure is preliminary)	Pressure, psia	478.7	470.1	460.7	447.8	443.2	475.2	464.5	457.9	457.4	367.9	363.7	356.3	348.2	337.6	334.0
	Temperature, F	274.0	271.3	276.2	275.3	274.2	272.6	277.0	277.5	277.3	245.0	247.3	244.8	250.7	250.3	249.5
	Enthalpy, Btu/lb	243.9	241.2	246.1	246.1	244.1	242.5	246.9	247.5	247.3	214.2	216.6	214.1	220.0	219.6	218.7
IP FW Temperature Increase Across BFP	F	3.5	3.5	3.6	3.6	3.6	3.5	3.5	3.6	3.6	3.6	3.6	3.5	3.7	3.5	3.8
LP Steam (at HRSG terminal point)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.5	25.6	26.7	25.6	28.3	28.1	27.7
	Temperature, F	270.5	267.6	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.6	245.7
	Enthalpy, Btu/lb	1,170.9	1,170.0	1,171.6	1,171.3	1,170.9	1,170.4	1,171.6	1,172.0	1,171.9	1,161.0	1,161.6	1,160.9	1,163.0	1,162.8	1,162.5
LP Evaporator Steam Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.5	25.6	26.7	25.6	28.3	28.1	27.7
	Temperature, F	270.5	267.6	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.6	245.7
	Enthalpy, Btu/lb	1,170.9	1,170.0	1,171.6	1,171.3	1,170.9	1,170.4	1,171.6	1,172.0	1,171.9	1,161.0	1,161.6	1,160.9	1,163.0	1,162.8	1,162.5
LP Evaporator Water Exit to BFPs	Flow, lb/h	566,978	562,276	556,226	543,705	539,289	566,726	558,839	553,310	552,964	591,735	587,727	580,611	573,174	561,103	556,507
	Pressure, psia	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.5	25.6	26.7	25.5	28.3	28.1	27.7
	Temperature, F	270.5	267.6	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.6	245.7
	Enthalpy, Btu/lb	239.5	236.8	241.7	240.7	239.6	238.1	242.5	243.0	242.8	209.9	212.2	209.7	215.6	215.2	214.2
Boiler Feed Pumps Flow Detail:																
IP FW to HRSG IP Economizer	Flow, lb/h	76,870	73,950	70,439	66,561	65,378	75,359	71,391	69,229	69,016	70,797	69,240	66,493	63,231	59,585	58,521
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HRSG HP Economizer #8	Flow, lb/h	437,257	432,049	425,771	416,383	412,883	435,522	428,613	424,012	423,724	468,280	464,772	456,068	452,276	442,173	438,397
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to PAG Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	54,851	56,279	59,015	60,776	61,026	55,852	58,835	60,076	60,224	52,957	53,715	55,056	57,665	59,345	59,593
LP Pinch	Temperature, F	31.4	31.0	29.3	28.2	27.9	31.8	29.5	28.8	28.8	35.6	34.6	34.2	32.1	30.8	30.5
LP Approach	Temperature, F	165.2	162.8	162.9	147.8	146.9	163.9	153.8	149.7	149.5	182.2	148.0	145.7	138.2	131.3	130.6
Condensate Recirculated	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	104.3	104.0	118.7	122.8	122.6	104.2	118.9	123.3	123.2	88.0	94.5	94.3	109.7	114.1	114.0
% of Total LP Economizer Flow		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
	Enthalpy, Btu/lb	73.4	73.2	87.8	91.9	91.7	73.4	88.0	92.3	92.3	57.3	63.8	63.6	79.0	83.4	83.2
Condensate to LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
	Enthalpy, Btu/lb	73.4	73.2	87.8	91.9	91.7	73.4	88.0	92.3	92.3	57.3	63.8	63.6	79.0	83.4	83.2
Condensate from Recirculation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	104.3	104.0	118.7	122.8	122.6	104.2	118.9	123.3	123.2	88.0	94.5	94.3	109.7	114.1	114.0
Condensate Bypassing LP Economizer	Flow, lb/h	566,981	562,275	556,221	543,712	539,287	566,726	558,837	553,313	552,964	591,735	587,725	580,614	573,173	561,100	556,510
	% of Total Condensate Flow	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
Condensate to HRSG	Flow, lb/h	566,981	562,275	556,221	543,712	539,287	566,726	558,837	553,313	552,964	591,735	587,725	580,614	573,173	561,100	556,510
	Pressure, psia	491.7	492.7	491.7	492.9	493.6	491.9	491.1	491.3	491.3	523.6	523.3	523.8	522.7	523.2	523.6
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
Stack Exit	Flow, lb/h	4,177,052	4,056,998	3,884,963	3,716,719	3,673,602	4,105,466	3,921,585	3,820,486	3,813,647	4,252,224	4,177,052	4,056,998	3,884,963	3,716,719	3,673,602
	Temperature, F	301.9	298.6	301.9	299.8	298.5	309.4	302.9	302.8	302.5	277.0	278.3	275.3	279.1	277.4	276.2

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Bibb and Associates -- Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC581-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 59 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 35 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
Steam Turbine Generator																
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	1,424.7	1,419.9	1,417.6	1,403.7	1,398.5	1,426.1	1,423.6	1,418.5	1,418.6	1,038.6	1,035.8	1,031.0	1,027.4	1,015.4	1,009.9
	Temperature, F	1,011.6	1,021.3	1,026.0	1,050.1	1,059.9	1,017.3	1,033.4	1,041.6	1,042.5	983.9	989.8	998.9	1,012.8	1,028.2	1,029.8
	Enthalpy, Btu/lb	1,500.1	1,506.0	1,514.9	1,523.6	1,526.0	1,503.5	1,513.1	1,516.1	1,516.7	1,495.7	1,499.1	1,504.6	1,512.7	1,520.7	1,522.9
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 640 F)	944.9	958.2	973.0	989.6	994.2	951.3	969.7	979.3	980.3	936.5	943.0	953.4	966.8	984.1	986.3
	Enthalpy, Btu/lb	1,500.1	1,506.0	1,514.9	1,523.6	1,526.0	1,503.5	1,513.1	1,516.1	1,516.7	1,495.7	1,499.1	1,504.6	1,512.7	1,520.7	1,522.9
Efficiency (THV Inlet to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	944.9	958.2	973.0	989.6	994.2	951.3	969.7	979.3	980.3	936.5	943.0	953.4	966.8	984.1	986.3
	Enthalpy, Btu/lb	1,500.1	1,506.0	1,514.9	1,523.6	1,526.0	1,503.5	1,513.1	1,516.1	1,516.7	1,495.7	1,499.1	1,504.6	1,512.7	1,520.7	1,522.9
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	272.9	270.2	275.0	274.1	273.0	271.5	275.6	276.4	276.2	243.6	245.9	243.4	249.3	248.9	248.0
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 750 F)	944.9	958.2	973.0	989.6	994.2	951.3	969.7	979.3	980.3	936.5	943.0	953.4	966.8	984.1	986.3
	Enthalpy, Btu/lb	1,500.1	1,506.0	1,514.9	1,523.6	1,526.0	1,503.5	1,513.1	1,516.1	1,516.7	1,495.7	1,499.1	1,504.6	1,512.7	1,520.7	1,522.9
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	-167.7	-154.3	-150.7	-154.2	-151.5	-166.8	-162.9	-159.9	-159.8	-56.2	-53.7	-51.0	-46.4	-43.6	-41.7
Reheat System dP		-77.38%	-75.77%	-74.15%	-71.13%	-69.90%	-76.97%	-75.16%	-73.77%	-73.71%	-25.46%	-24.75%	-23.55%	-22.33%	-20.12%	-19.24%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 684 psia)	384.5	381.0	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.5
	Temperature, F	998.8	1,007.5	1,020.7	1,039.2	1,036.4	1,004.0	1,018.4	1,025.7	1,026.5	962.3	967.2	976.0	988.7	997.9	1,000.9
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-12.8	-13.8	-15.3	-15.9	-17.3	-13.3	-15.0	-15.9	-16.0	-21.5	-22.5	-25.8	-26.1	-28.3	-28.9
	Enthalpy, Btu/lb	1,523.6	1,528.4	1,535.5	1,542.4	1,544.2	1,526.4	1,534.2	1,538.2	1,538.6	1,507.6	1,510.2	1,514.4	1,520.6	1,526.7	1,528.3
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4
	Temperature, F	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Efficiency (INTV Inlet to IPT exit)		86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.6	25.8	26.7	25.5	26.3	28.1	27.7
	Temperature, F	270.5	267.8	272.6	271.6	270.8	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.8	245.7
	Enthalpy, Btu/lb	1,169.9	1,169.0	1,170.6	1,170.3	1,169.9	1,169.4	1,170.8	1,171.0	1,170.9	1,169.0	1,169.8	1,169.0	1,169.2	1,169.1	1,168.5
LP Steam Temperature Mismatch to IPT Exhaust	dT, F(MAX 108 F)															
LP Admission CV Pressure Loss	% loss	36.2%	32.3%	37.4%	36.4%	35.3%	33.7%	38.2%	36.6%	36.5%	-5.9%	-2.5%	-7.2%	3.4%	2.6%	1.1%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	25.2	26.3	25.1	27.0	27.0	27.0
	Temperature, F	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	241.1	243.4	240.9	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.8	1,471.9	1,471.9	1,471.9	1,471.9	1,161.0	1,161.8	1,160.9	1,471.9	1,471.9	1,471.9
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	875.9	875.9	875.9	875.9	875.9	875.9	875.9	875.9	875.9	224.0	225.8	223.9	875.9	875.9	875.9
ELEP Enthalpy, Btu/lb		1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8
UEEP Enthalpy, Btu/lb		1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,161.0	1,161.8	1,160.9	1,471.9	1,471.9	1,471.9
Exhaust Loss Btu/lb		17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%
LPT Efficiency to UEEP		83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%
Annulus Velocity ft/s		308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3
Volumetric Flow 1000 ft3/min per end		1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 50 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 35 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
Condenser/Circulating Water																
Condenser Duty	MMBtu/h	2,482.3	2,461.6	2,416.2	2,372.7	2,356.6	2,477.3	2,431.5	2,406.9	2,406.1	1,722.5	1,706.3	1,690.8	1,656.7	1,625.8	1,614.5
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	20.9	20.7	18.8	17.9	17.8	20.8	18.7	18.2	18.2	15.8	14.4	14.2	12.8	12.3	12.2
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	875.9	875.9	875.9	875.9	875.9	875.9	875.9	875.9	875.9	224.0	225.8	223.9	875.9	875.9	875.9
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,161.0	1,161.8	1,160.9	1,471.9	1,471.9	1,471.9
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	2,177,637	2,158,940	2,148,553	2,116,728	2,101,960	2,173,145	2,160,670	2,147,088	2,146,388	1,488,214	1,482,607	1,468,795	1,460,410	1,436,859	1,428,666
(total, both units)	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,170.9	1,170.0	1,171.6	1,171.3	1,170.9	1,170.4	1,171.8	1,172.0	1,171.9	1,161.0	1,161.8	1,160.9	1,163.0	1,162.8	1,162.5
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	73.4	73.2	87.8	91.9	91.7	73.4	88.0	92.3	92.3	57.3	83.8	83.6	79.0	83.4	83.2
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	73.4	73.2	87.8	91.9	91.7	73.4	88.0	92.3	92.3	57.3	83.8	83.6	79.0	83.4	83.2
Condenser Exit	Flow, lb/h	2,364,437	2,375,740	2,365,353	2,332,528	2,317,860	2,389,945	2,377,470	2,363,888	2,363,181	1,705,014	1,699,307	1,685,585	1,677,210	1,653,659	1,643,466
	Pressure, psia	1.023	1.014	1.552	1.739	1.729	1.021	1.560	1.761	1.760	0.801	0.738	0.733	1.188	1.323	1.317
	Pressure, in HgA (MIN 1.0 in. HgA)	2.082	2.065	3.160	3.542	3.521	2.078	3.175	3.586	3.584	1.224	1.502	1.492	2.374	2.693	2.682
	Temperature, F	102.4	102.2	116.9	120.9	120.7	102.4	117.0	121.4	121.4	88.2	91.7	91.5	106.9	111.2	111.1
	Enthalpy, Btu/lb	70.5	70.2	84.9	88.9	88.7	70.4	85.0	89.4	89.4	53.3	69.5	69.6	74.9	79.2	79.1
Condensate Pump Discharge	Flow, lb/h	2,364,437	2,375,740	2,365,353	2,332,528	2,317,860	2,389,945	2,377,470	2,363,888	2,363,181	1,705,014	1,699,307	1,685,585	1,677,210	1,653,659	1,643,466
	Pressure, psia	491.7	492.7	491.7	492.9	493.6	491.9	491.1	491.3	491.3	523.6	523.3	523.8	522.7	523.2	523.5
	Temperature, F	103.3	103.1	117.8	121.9	121.7	103.3	117.9	122.3	122.3	88.8	93.3	93.1	108.5	112.9	112.8
	Enthalpy, Btu/lb	72.6	72.4	87.0	91.1	90.9	72.6	87.2	91.6	91.5	56.2	62.7	62.5	77.9	82.2	82.1
Condensate after GSC	Flow, lb/h	2,364,437	2,375,740	2,365,353	2,332,528	2,317,860	2,389,945	2,377,470	2,363,888	2,363,181	1,705,014	1,699,307	1,685,585	1,677,210	1,653,659	1,643,466
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,179,431	2,160,731	2,150,345	2,117,529	2,102,851	2,174,936	2,162,464	2,148,861	2,148,171	1,499,013	1,494,304	1,470,579	1,462,208	1,438,655	1,428,465
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
Total Circulating Water	Flow, lb/h	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,607,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096
	Flow, gpm	389,785	389,785	389,696	389,662	389,662	389,785	389,696	389,662	389,662	389,853	389,785	389,785	389,696	389,662	389,662
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	88.0	88.0	88.0	90.0	90.0	88.0	88.0	90.0	90.0	88.0	88.0	88.0	88.0	90.0	90.0
Circulating Water to Condenser	Flow, lb/h	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680
	Flow, gpm	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593	374,819	374,741	374,741	374,619	374,593	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	88.1	88.1	88.1	90.1	90.1	88.1	88.1	90.1	90.1	88.1	88.1	88.1	88.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680
	Temperature, F	81.6	81.5	96.2	103.0	102.9	81.5	96.3	103.2	103.2	89.4	77.4	77.3	94.1	99.0	98.9
Total Circulating Water Discharge	Flow, lb/h	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096	199,607,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096
	Temperature, F	81.5	81.4	96.2	103.0	102.9	81.5	96.3	103.2	103.2	89.6	77.5	77.4	94.2	99.1	99.0
Circulating Water Temperature Rise	dT, F	13.52	13.42	13.21	12.98	12.90	13.50	13.28	13.18	13.18	9.56	9.48	9.40	9.25	9.08	9.02
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427
	Flow, gpm	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062
	Temperature, F	88.1	88.1	88.1	90.1	90.1	88.1	88.1	90.1	90.1	88.1	88.1	88.1	88.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427
	Temperature, F	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-5 BJScrivner
1997 Steam Tables

Case Name		Case 252-BYP 3x100% STG Bypass Oil Fuel 45 F	Case 253-BYP 3x100% STG Bypass Oil Fuel 59 F	Case 254-BYP 3x100% STG Bypass Oil Fuel 74 F	Case 255-BYP 3x100% STG Bypass Oil Fuel 90 F	Case 256-BYP 3x100% STG Bypass Oil Fuel 95 F	Case 257-BYP 3x100% STG Bypass Oil Fuel 59 F/EC On	Case 258-BYP 3x100% STG Bypass Oil Fuel 74 F/EC On	Case 259-BYP 3x100% STG Bypass Oil Fuel 90 F/EC On	Case 260-BYP 3x100% STG Bypass Oil Fuel 95 F/EC On	Case 271-BYP 2x100% STG Bypass Oil Fuel 95 F	Case 272-BYP 2x100% STG Bypass Oil Fuel 45 F	Case 273-BYP 2x100% STG Bypass Oil Fuel 59 F	Case 274-BYP 2x100% STG Bypass Oil Fuel 74 F	Case 275-BYP 2x100% STG Bypass Oil Fuel 90 F	Case 276-BYP 2x100% STG Bypass Oil Fuel 95 F
Miscellaneous (Blowdown, Boiler Feed Pumps)																
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	566,979	562,278	555,225	543,706	539,269	566,726	556,839	553,310	552,964	561,735	557,727	550,611	573,174	561,103	556,507
	Pressure, psia	44.5	42.7	46.0	45.3	44.6	43.5	46.6	47.0	46.8	27.9	29.0	27.8	30.5	30.4	30.0
	Temperature, F	270.5	267.6	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.9	245.7
	Enthalpy, Btu/lb	239.5	236.8	241.7	240.7	239.6	238.1	242.5	243.0	242.8	209.9	212.2	209.7	215.8	215.2	214.2
IP Bleed (before CV)	Flow, lb/h	76,870	73,960	70,439	66,547	65,378	75,353	71,391	69,222	69,016	70,797	69,240	66,486	63,231	59,585	59,518
	Pressure, psia	1,042.2	1,045.0	1,048.3	1,053.0	1,054.7	1,043.2	1,046.8	1,049.2	1,049.3	1,033.3	1,034.9	1,038.4	1,041.0	1,046.2	1,048.2
	Temperature, F	272.9	270.2	275.0	274.1	273.0	271.5	275.8	276.4	276.2	243.6	245.9	243.4	249.3	248.9	248.0
	Enthalpy, Btu/lb	243.9	241.2	246.1	245.1	244.1	242.6	246.9	247.5	247.3	214.2	216.6	214.1	220.0	219.6	218.7
IP FW Control Valve Exit Pressure	Pressure, psia	476.7	470.1	460.7	447.8	443.2	479.2	464.5	457.9	457.4	357.9	363.7	356.3	348.2	337.6	334.0
	CV dP, psi	563.5	574.9	587.6	605.2	611.4	566.0	582.4	591.3	591.9	665.4	671.2	662.1	692.8	708.7	714.9
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,589.2	3,598.5	3,607.1	3,606.2	3,613.6	3,592.6	3,592.7	3,596.5	3,597.0	3,601.7	3,601.8	3,611.8	3,609.3	3,620.9	3,625.5
	CV dP, psi	2,035.2	2,051.7	2,055.5	2,084.7	2,098.7	2,038.2	2,043.9	2,054.9	2,058.4	2,393.4	2,398.1	2,416.9	2,420.8	2,449.5	2,462.6
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	492,109	488,328	484,786	477,159	473,911	491,374	487,448	484,088	483,948	520,938	518,487	514,124	509,943	501,517	497,989
	Pressure, psia	1,554.1	1,546.9	1,541.6	1,523.5	1,514.6	1,554.6	1,548.8	1,541.6	1,541.6	1,208.3	1,203.7	1,196.8	1,188.4	1,171.4	1,164.0
	Temperature, F	283.4	280.8	285.7	284.9	283.9	282.0	286.4	287.0	286.8	254.6	256.9	254.5	260.5	260.2	259.3
	Enthalpy, Btu/lb	255.6	252.9	257.9	257.0	256.0	254.2	258.7	259.3	259.1	225.7	228.1	225.6	231.6	231.3	230.4
STG Bypass System																
Total HP Steam per HRSG Unit	Flow, lb/h	437,260	432,050	425,772	416,385	412,884	435,522	428,615	424,012	423,725	468,282	464,773	459,099	452,279	442,174	438,397
	Pressure, psia	1,424.7	1,419.9	1,417.6	1,403.7	1,396.5	1,426.1	1,423.6	1,418.5	1,418.6	1,038.6	1,035.8	1,031.0	1,027.4	1,015.4	1,009.9
	Temperature, F	1,013.3	1,023.0	1,037.7	1,051.8	1,055.6	1,019.0	1,035.1	1,043.3	1,044.2	985.6	991.4	1,000.8	1,014.5	1,028.0	1,031.6
	Enthalpy, Btu/lb	1,501.1	1,507.0	1,515.9	1,524.6	1,527.0	1,504.5	1,514.1	1,519.1	1,519.7	1,496.7	1,500.1	1,505.9	1,513.7	1,521.7	1,523.9
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	437,260	432,050	425,772	416,385	412,884	435,522	428,615	424,012	423,725	468,282	464,773	459,099	452,279	442,174	438,397
	Pressure, psia	1,424.7	1,419.9	1,417.6	1,403.7	1,396.5	1,426.1	1,423.6	1,418.5	1,418.6	1,038.6	1,035.8	1,031.0	1,027.4	1,015.4	1,009.9
	Temperature, F	1,013.3	1,023.0	1,037.7	1,051.8	1,055.6	1,019.0	1,035.1	1,043.3	1,044.2	985.6	991.4	1,000.8	1,014.5	1,028.0	1,031.6
	Enthalpy, Btu/lb	1,501.1	1,507.0	1,515.9	1,524.6	1,527.0	1,504.5	1,514.1	1,519.1	1,519.7	1,496.7	1,500.1	1,505.9	1,513.7	1,521.7	1,523.9
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	54,851	56,279	59,015	60,776	61,028	56,852	56,835	60,976	60,224	52,657	53,715	56,956	57,665	59,345	59,593
	Temperature, F	283.4	280.8	285.7	284.9	283.9	282.0	286.4	287.0	286.8	254.6	256.9	254.5	260.5	260.2	259.3
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	492,111	488,329	484,787	477,160	473,913	491,374	487,450	484,089	483,949	520,940	518,488	514,125	509,944	501,519	497,996
	Pressure, psia	409.8	406.1	402.3	395.3	392.4	406.8	404.6	401.4	401.2	305.0	303.3	300.3	297.3	291.9	289.8
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,362.3	1,362.5	1,362.7	1,363.1	1,363.3	1,362.4	1,362.6	1,362.8	1,362.8	1,368.3	1,368.4	1,368.5	1,368.7	1,369.0	1,369.1
HP Bypass Control Valve Pressure Loss	dP, psi	1,014.9	1,013.9	1,016.3	1,008.4	1,004.1	1,017.3	1,019.0	1,017.1	1,017.4	733.6	732.5	730.7	730.0	723.6	720.1
Total HRH Steam per HRSG Unit	Flow, lb/h	568,962	562,279	555,225	543,711	539,290	566,731	558,840	553,316	552,964	561,737	557,727	550,617	573,175	561,103	556,511
	Pressure, psia	384.5	381.0	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.5
	Temperature, F	1,000.7	1,009.4	1,022.8	1,036.0	1,038.3	1,005.8	1,020.2	1,027.5	1,028.3	984.2	989.1	978.9	988.6	999.8	1,002.8
	Enthalpy, Btu/lb	1,524.8	1,529.4	1,536.5	1,543.4	1,545.2	1,527.4	1,535.2	1,539.2	1,539.6	1,508.8	1,511.2	1,515.4	1,521.6	1,527.7	1,529.3
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	568,962	562,279	555,225	543,711	539,290	566,731	558,840	553,316	552,964	561,737	557,727	550,617	573,175	561,103	556,511
	Pressure, psia	384.5	381.0	377.5	371.0	368.3	383.6	379.7	376.7	376.5	271.9	270.4	267.8	265.2	260.4	258.5
	Temperature, F	1,000.7	1,009.4	1,022.8	1,036.0	1,038.3	1,005.8	1,020.2	1,027.5	1,028.3	984.2	989.1	978.9	988.6	999.8	1,002.8
	Enthalpy, Btu/lb	1,524.8	1,529.4	1,536.5	1,543.4	1,545.2	1,527.4	1,535.2	1,539.2	1,539.6	1,508.8	1,511.2	1,515.4	1,521.6	1,527.7	1,529.3
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	167,495	167,969	161,561	162,131	161,664	158,253	161,984	162,981	163,093	153,270	154,428	154,677	157,931	158,226	157,723
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	726,478	720,248	716,786	705,842	700,954	724,984	720,824	716,298	716,057	745,007	742,155	735,294	731,105	719,330	714,233
	Pressure, psia	110.0	109.1	109.1	107.8	106.9	108.5	109.7	109.2	109.2	102.0	102.0	102.0	102.9	101.8	103.5
	Temperature, F	370.5	370.2	370.2	369.7	369.4	367.3	370.4	370.2	370.2	367.8	367.8	368.0	368.1	367.7	370.0
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	274.5	272.0	268.4	263.3	261.4	283.1	270.0	267.5	267.4	166.9	166.5	165.2	162.2	158.6	159.0
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	109.0	108.0	107.5	105.9	105.1	99.5	108.1	107.4	107.4	101.4	101.2	101.6	101.6	100.4	107.1
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.5	25.8	26.7	26.5	28.3	28.1	27.7
	Temperature, F	270.5	267.8	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.8	245.7
	Enthalpy, Btu/lb	1,170.9	1,170.9	1,171.6	1,171.3	1,170.9	1,170.4	1,171.6	1,172.0	1,171.9	1,161.0	1,161.6	1,160.9	1,163.6	1,162.8	1,162.5
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	42.2	40.4	43.7	43.0	42.3	41.3	44.3	44.7	44.5	25.8	26.7	26.5	28.3	28.1	27.7
	Temperature, F	270.5	267.8	272.6	271.6	270.6	269.1	273.4	274.0	273.8	241.4	243.7	241.2	247.1	246.8	245.7
	Enthalpy, Btu/lb	1,170.9	1,170.9	1,171.6	1,171.3	1,170.9	1,170.4	1,171.6	1,172.0	1,171.9	1,161.0	1,161.6	1,160.9	1,163.6	1,162.8	1,162.5
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	104.1	103.8	118.6	122.7	122.5	104.0	118.7	123.1	123.1	87.9	94.4	94.2	109.6	114.0	113.9
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	1.0	1.0	1.6	1.7	1.7	0.9	1.6	1.8	1.8	0.6	0.7	0.7	1.1	1.3	1.3
	Temperature, F	245.6	243.9	247.6	247.6	246.3	244.7	248.2	248.7	248.5	223.7	225.6	223.7	228.5	228.3	227.6
	Enthalpy, Btu/lb	1,170.9	1,170.9	1,171.6	1,171.3	1,170.9	1,170.4	1,171.6	1,172.0	1,171.9	1,161.0	1,161.6	1,160.9	1,163.6	1,162.8	1,162.5
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
GateCycle Model ID		8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3	8BART3
GateCycle Case ID		B8277S	B8278S	B8279S	B8280S	B8301S	B8302S	B8303S	B8304S	B8305S	B8306S	B8307S	B8308S	B8309S	B8310S
Ambient Temperature		59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	35 F/60%RH	45 F/60%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH	59 F/60%RH	74 F/79%RH	90 F/55%RH	95 F/44%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		2@100%	2@100%	2@100%	2@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%	1@100%
CTG Inlet Air Cooler		Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Fuel Type		Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
HRSG Firing/UB Exit Temperature		Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F	S6000F
CTG Performance Reference		Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW	0.0 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		1,036p/995F	1,032p/1,010F	1,027p/1,018F	1,027p/1,010F	781p/986F	780p/991F	759p/1,001F	751p/987F	745p/942F	744p/942F	760p/997F	751p/967F	747p/947F	747p/947F
STG Cold Reheat Conditions, psia/F		217p/949F	217p/998F	217p/974F	217p/976F	217p/955F	217p/961F	217p/971F	217p/957F	217p/909F	217p/909F	217p/957F	217p/957F	217p/914F	217p/914F
Cold Reheat Conditions after Conditioning, psia/F		217p/949F	217p/998F	217p/974F	217p/975F	217p/955F	217p/961F	217p/971F	217p/957F	217p/909F	217p/909F	217p/957F	217p/957F	217p/914F	217p/914F
STG Hot Reheat Conditions, psia/F		270p/972F	267p/986F	264p/991F	264p/992F	154p/961F	154p/967F	154p/976F	154p/936F	153p/891F	153p/891F	154p/971F	154p/936F	154p/886F	154p/886F
Condenser Pressure		1.50 In HgA	2.38 In HgA	2.72 In HgA	2.72 In HgA	1.02 In HgA	1.04 In HgA	1.03 In HgA	1.72 In HgA	1.98 In HgA	1.98 In HgA	1.04 In HgA	1.73 In HgA	1.99 In HgA	1.99 In HgA
Stack Temperature		277 F	280 F	280 F	280 F	262 F	261 F	260 F	267 F	272 F	271 F	261 F	267 F	273 F	273 F
Run Date		10-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	11-Sep-06	11-Sep-06	11-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06	11-Sep-06	10-Sep-06	10-Sep-06	10-Sep-06
Performance Summary															
Number of CTG/HRSG Units Operating		2	2	2	2	1	1	1	1	1	1	1	1	1	1
Gross CTG Output (each)	kW	189,138	176,617	169,872	169,286	198,774	193,463	184,806	173,546	161,444	157,783	189,138	176,617	169,872	169,286
Gross CTG Output (total)	kW	378,276	353,234	339,744	338,572	198,774	193,463	184,806	173,546	161,444	157,783	189,138	176,617	169,872	169,286
Gross CTG Heat Rate (LHV)	Btu/kWh	9,467	9,863	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,982	9,467	9,863	9,784	9,793
Gross CTG Heat Rate (HHV)	Btu/kWh	10,101	10,310	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448
Fuel Gas Temperature to CTG, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60
Fuel Gas Temperature to Site, F		60	60	60	60	60	60	60	60	60	60	60	60	60	60
CTG Heat Input (LHV) (total)	MMBtu/h	3,581.14	3,413.30	3,324.06	3,315.64	1,859.13	1,819.71	1,758.00	1,684.78	1,601.52	1,574.99	1,790.57	1,706.65	1,662.03	1,657.82
CTG Heat Input (HHV) (total)	MMBtu/h	3,820.80	3,641.73	3,546.51	3,537.53	1,983.55	1,941.49	1,875.65	1,797.53	1,708.70	1,680.39	1,910.40	1,820.86	1,773.25	1,768.76
Duct Burner Heat Input (LHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Output, percent of CTG Output		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross Plant Output	kW	378,276	353,234	339,744	338,572	198,774	193,463	184,806	173,546	161,444	157,783	189,138	176,617	169,872	169,286
Gross Cycle Heat Rate (LHV)	Btu/kWh	9,467	9,863	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,982	9,467	9,863	9,784	9,793
Gross Cycle Heat Rate (HHV)	Btu/kWh	10,101	10,310	10,439	10,448	9,979	10,035	10,160	10,358	10,584	10,650	10,101	10,310	10,439	10,448
Plant Heat Input (LHV)	MMBtu/h	3,581.14	3,413.30	3,324.06	3,315.64	1,859.13	1,819.71	1,758.00	1,684.78	1,601.52	1,574.99	1,790.57	1,706.65	1,662.03	1,657.82
Plant Heat Input (HHV)	MMBtu/h	3,820.80	3,641.73	3,546.51	3,537.53	1,983.55	1,941.49	1,875.65	1,797.53	1,708.70	1,680.39	1,910.40	1,820.86	1,773.25	1,768.76
Calculations Based on High-Side of Generator Step-Up Transformers															
Total Auxiliary Power/Losses	kW	22,490	22,340	22,260	22,260	17,960	17,930	17,880	17,750	17,620	17,590	17,910	17,770	17,690	17,690
Total Auxiliary Power/Losses, percent of gross		5.95%	6.32%	6.55%	6.57%	9.04%	9.27%	9.68%	10.23%	10.91%	11.15%	9.47%	10.06%	10.41%	10.45%
Net Plant Output w/ Step-Up Xfmr Losses	kW	355,786	330,894	317,484	316,312	180,814	175,533	166,926	155,796	143,824	140,193	171,228	158,847	152,182	151,596
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	10,065	10,315	10,470	10,482	10,282	10,367	10,544	10,814	11,135	11,235	10,457	10,744	10,921	10,936
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	10,739	11,006	11,171	11,184	10,970	11,061	11,250	11,538	11,881	11,997	11,157	11,463	11,652	11,668

Revision History:
Rev. 8, 9/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat

Combustion Turbine Generator (each)															
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	59.0	74.0	90.0	95.0	35.0	45.0	59.0	74.0	90.0	95.0	59.0	74.0	90.0	95.0
	Relative Humidity	59.7%	76.5%	54.8%	43.8%	60.1%	59.9%	59.7%	76.5%	54.8%	43.8%	59.7%	76.5%	54.8%	43.8%
	WBT, F	51.4	69.1	76.5	76.5	30.9	39.3	51.4	69.1	76.5	76.5	51.4	69.1	76.5	76.5
Compressor Inlet Conditions	Temperature, F	52.6	69.8	78.5	79.3	35.0	45.0	59.0	74.0	90.0	95.0	52.6	69.8	78.5	79.3
	Relative Humidity	92.8%	96.5%	91.4%	88.4%	60.1%	59.9%	59.7%	76.5%	54.8%	43.8%	92.8%	96.5%	91.4%	88.4%
Inlet Air Cooler Status		Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Saturation Efficiency		85.0%	85.0%	85.0%	85.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	85.0%	85.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	5,631	3,606	9,623	13,120	0	0	0	0	0	0	5,631	3,606	9,623	13,120
Fuel Flow	Fuel Type	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,790.6	1,706.7	1,662.0	1,657.8	1,859.1	1,819.7	1,758.0	1,684.8	1,601.5	1,575.0	1,790.6	1,706.7	1,662.0	1,657.8
	Flow, lb/h	96,714	92,182	89,771	89,544	100,416	98,268	94,956	91,001	86,503	85,070	96,714	92,182	89,771	89,544
Fuel LHV	Btu/lb	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091108-8 BJScrivner
1997 Steam Tables

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Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	946.9	963.9	972.6	973.5	952.8	959.1	969.0	965.0	907.2	907.2	954.9	955.0	912.5	912.5
	Enthalpy, Btu/lb	1,501.2	1,510.1	1,514.6	1,515.1	1,504.3	1,507.5	1,512.7	1,505.4	1,480.4	1,480.4	1,510.6	1,505.4	1,483.2	1,483.2
Desuperheating Flow for PAC Steam (from IP FW)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	244.5	250.0	251.0	250.8	230.1	230.1	230.1	236.5	241.6	241.1	230.1	236.8	242.3	242.2
Steam Injection for Power Augmentation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	946.9	963.9	972.6	973.5	952.8	959.1	969.0	965.0	907.2	907.2	954.9	955.0	912.5	912.5
	Enthalpy, Btu/lb	1,501.2	1,510.1	1,514.6	1,515.1	1,504.3	1,507.5	1,512.7	1,505.4	1,480.4	1,480.4	1,510.6	1,505.4	1,483.2	1,483.2
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	36,684	36,671	36,906	36,816	48,160	39,310	37,978	35,399	34,599	34,026	38,684	36,871	35,906	36,816
CTG Exhaust Flow	Flow, lb/h	4,108,466	3,921,685	3,620,486	3,613,647	4,252,224	4,177,052	4,066,998	3,954,063	3,718,719	3,673,602	4,108,466	3,921,685	3,620,486	3,613,647
	Pressure, in. H2O	18.59	17.19	16.49	16.49	19.56	19.02	18.14	16.95	15.77	15.43	18.59	17.19	16.49	16.49
	Temperature, F	1,083.0	1,071.0	1,060.0	1,061.0	1,039.9	1,046.5	1,057.1	1,073.6	1,088.6	1,092.3	1,053.0	1,071.0	1,060.9	1,061.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Generator Gross Output	kW	169,138	176,617	169,972	169,266	196,774	193,403	184,008	173,646	161,444	157,783	169,138	176,617	169,872	169,286
Gross Heat Rate	Btu/kWh (LHV)	9,487	9,663	9,784	9,793	9,353	9,406	9,523	9,708	9,920	9,982	9,457	9,663	9,784	9,793

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
Heat Recovery Steam Generator (each)															
HRSG HP Steam	Flow, lb/h	462,875	455,340	450,368	450,070	476,339	472,736	466,875	433,103	407,941	403,706	470,788	436,519	418,798	418,338
(at HRSG terminal point)	Pressure, psia	1,036.0	1,032.1	1,027.2	1,027.3	761.6	760.2	758.3	750.6	745.1	744.6	760.1	751.2	747.0	746.9
	Temperature, F	996.7	1,012.0	1,019.7	1,020.6	987.4	993.2	1,002.6	988.9	943.6	943.7	998.7	988.9	948.8	948.6
	Enthalpy, Btu/lb	1,503.2	1,512.0	1,516.6	1,517.1	1,506.3	1,509.6	1,514.7	1,507.4	1,492.4	1,492.4	1,512.6	1,507.4	1,495.2	1,495.2
dP from HP drum to HRSG terminal point	psi	90.2	97.3	99.1	96.0	138.4	137.1	134.8	110.5	85.9	83.7	136.4	112.7	92.5	92.2
HP SH #1 Steam Outlet Temperature	Temperature, F	997.7	1,012.9	1,020.6	1,021.5	988.8	994.6	1,003.9	990.1	944.9	944.8	1,000.1	990.1	950.0	950.0
HP SH #2 Steam Outlet Temperature	Temperature, F	972.1	985.8	992.8	993.6	958.2	971.5	979.9	946.6	884.6	881.8	976.3	948.3	878.9	876.2
HP Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	23,052	60,389	61,659	0	21,027	54,395	54,647
(from HP Feedwater)	Temperature, F	255.5	261.1	262.1	261.9	241.5	241.5	241.6	246.8	254.2	253.8	241.6	246.9	254.7	254.6
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.6%	17.4%	18.0%	0.0%	5.1%	14.9%	15.1%
	Final Superheat, F	271.7	279.7	284.2	284.7	304.1	307.5	312.7	189.5	17.9	12.1	310.3	198.2	43.3	41.6
HP SH #3/4 Steam Outlet Temperature	Temperature, F	829.1	836.5	840.4	840.8	831.4	834.4	839.3	816.4	780.2	785.7	837.1	816.8	790.1	790.0
HP Evaporator #1 Exit	Flow, lb/h	54,829	55,012	54,971	55,004	54,733	54,766	54,820	48,812	38,293	37,819	54,671	47,305	40,012	39,929
	Pressure, psia	1,135.3	1,129.4	1,123.3	1,123.3	899.9	897.3	894.1	881.0	831.0	828.2	896.5	883.8	839.5	839.1
	Temperature, F	560.3	559.6	559.0	559.0	532.0	531.7	531.2	526.8	522.7	522.3	531.6	527.2	523.9	523.8
	Enthalpy, Btu/lb	1,187.1	1,187.3	1,187.6	1,187.6	1,186.2	1,186.2	1,186.4	1,187.4	1,188.4	1,188.5	1,186.3	1,187.3	1,186.1	1,186.1
HP Evaporator #1 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #1 Pinch	Temperature, F	369.8	380.6	386.3	386.9	389.2	393.4	399.9	361.0	313.6	312.6	387.4	352.2	320.4	320.2
HP Evaporator #1 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Evaporator #2/3/4/5 Exit	Flow, lb/h	408,044	400,326	395,396	395,066	421,606	417,969	412,056	383,245	309,265	304,236	416,914	368,195	324,397	323,570
	Pressure, psia	1,135.3	1,129.4	1,123.3	1,123.3	899.9	897.3	894.1	881.0	831.0	828.2	896.5	883.8	839.5	839.1
	Temperature, F	560.3	559.6	559.0	559.0	532.0	531.7	531.2	526.8	522.7	522.3	531.6	527.2	523.9	523.8
	Enthalpy, Btu/lb	1,187.1	1,187.3	1,187.6	1,187.6	1,186.2	1,186.2	1,186.4	1,187.4	1,188.4	1,188.5	1,186.3	1,187.3	1,186.1	1,186.1
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	20.8	20.5	20.3	20.3	23.1	22.9	22.5	20.9	18.6	18.3	22.8	21.1	19.5	19.4
HP Evaporator #2/3/4/5 Approach	Temperature, F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	462,873	455,338	450,367	450,069	476,338	472,736	466,875	410,058	347,559	342,054	470,785	415,500	364,410	363,499
	Temperature, F	560.3	559.6	559.0	559.0	532.0	531.7	531.2	526.8	522.7	522.3	531.6	527.2	523.9	523.8
HP Economizer #4/5 Outlet Temperature	Temperature, F	531.7	526.7	526.5	526.7	506.1	506.7	504.7	500.0	513.1	512.7	505.7	509.3	513.6	513.5
HP Economizer #6/7 Outlet Temperature	Temperature, F	435.3	432.7	431.0	430.9	411.0	409.3	406.9	412.6	417.6	417.2	408.2	413.1	416.4	416.3
HP Economizer #8 Outlet Temperature	Temperature, F	352.4	352.4	351.4	351.2	332.2	330.6	329.0	341.0	354.2	354.1	329.6	341.0	353.3	353.3
Feedwater to HP Economizer #8	Flow, lb/h	462,873	455,338	450,367	450,069	476,338	472,736	466,875	410,058	347,559	342,054	470,785	415,500	364,410	363,499
	Pressure, psia	1,202.8	1,194.7	1,187.3	1,187.1	971.4	967.7	962.8	914.1	859.3	855.3	958.3	918.4	881.5	880.9
	Temperature, F	255.5	261.1	262.1	261.9	241.5	241.5	241.6	246.8	254.2	253.8	241.6	246.9	254.7	254.6
	Enthalpy, Btu/lb	228.7	232.3	233.3	233.1	212.0	212.0	212.1	219.0	224.6	224.2	212.0	219.3	225.1	225.0
HP FW Temperature Increase Across BFP	F	13.3	13.3	13.4	13.4	13.6	13.6	13.7	14.2	14.9	15.0	13.6	14.2	14.6	14.6
Duct Burner	HC, MMBtu/h (LHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	980.1	971.7	977.4	978.1	962.4	958.8	963.8	917.2	881.6	880.3	961.2	916.8	870.0	869.6
Exit Temperature	Temperature, F	980.1	971.7	977.4	978.1	962.4	958.8	963.8	917.2	881.6	880.3	961.2	916.8	870.0	869.6
HRSG Hot Reheat Steam	Flow, lb/h	595,316	576,991	571,150	570,700	600,356	595,140	586,331	587,891	582,932	578,459	591,749	591,626	561,857	561,551
(at HRSG terminal point)	Pressure, psia	269.7	266.7	264.5	264.4	164.2	164.1	163.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6
	Temperature, F	973.7	986.5	993.0	993.7	963.4	968.5	976.8	937.6	892.7	892.6	973.3	937.6	897.7	897.7
	Enthalpy, Btu/lb	1,513.9	1,520.5	1,524.0	1,524.4	1,511.7	1,514.4	1,518.7	1,498.3	1,475.1	1,475.1	1,519.9	1,498.3	1,477.7	1,477.7
HRSG RH dP -- terminal pt. to terminal pt.	psi	-52.9	-50.0	-47.7	-47.6	62.6	62.7	62.9	53.1	53.6	53.6	62.7	62.9	53.1	53.1
RHTR #1/2 Steam Outlet Temperature	Temperature, F	974.1	986.9	993.4	994.1	964.2	969.3	977.5	938.4	893.5	893.5	974.1	938.4	898.6	898.6
RHTR #3 Steam Outlet Temperature	Temperature, F	908.1	917.1	921.7	922.3	900.8	904.6	910.7	875.8	735.0	731.8	908.1	828.1	751.0	750.3
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	36,185	66,029	67,010	0	35,519	60,869	60,930
(from IP Feedwater)	Temperature, F	244.6	250.0	251.0	250.8	230.1	230.1	230.1	236.5	241.6	241.1	230.1	236.6	242.3	242.2
	% of inlet steam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.6%	12.8%	13.1%	0.0%	6.4%	11.4%	11.5%
	Final Superheat, F	370.8	376.4	378.0	378.2	399.7	401.8	404.7	242.0	105.9	99.8	403.4	246.1	132.4	131.0
RHTR #4 Steam Outlet Temperature	Temperature, F	786.4	790.1	791.8	792.0	779.4	781.0	783.7	763.4	738.7	738.0	782.7	764.2	742.7	742.5
Cold Reheat Steam from HP Bypass	Flow, lb/h	517,823	512,829	509,033	508,879	530,721	528,021	523,540	483,142	446,941	441,674	527,064	486,980	459,297	458,785
	Pressure, psia	302.5	296.1	296.8	296.4	207.6	206.8	205.5	201.6	196.9	196.0	206.4	202.3	199.0	198.9
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,368.4	1,368.6	1,368.7	1,368.7	1,373.6	1,373.7	1,373.8	1,374.0	1,374.2	1,374.3	1,373.7	1,373.9	1,374.1	1,374.1
Cold Reheat Steam from STG to HRSG	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(at HRSG terminal point)	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	948.9	963.9	972.6	973.5	952.8	959.1	969.0	955.0	907.2	907.2	964.9	956.0	912.5	912.5
	Enthalpy, Btu/lb	1,501.2	1,510.1	1,514.6	1,515.1	1,504.3	1,507.5	1,512.7	1,506.4	1,480.4	1,480.4	1,510.5	1,506.4	1,483.2	1,483.2
Cold Reheat Steam, % of HP Steam		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HP Steam + Cold Reheat Steam	Flow, lb/h	462,875	455,340	450,368	450,070	476,339	472,736	466,875	433,103	407,941	403,706	470,788	436,519	418,798	418,338

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DEF-19FL-FUEL-002551

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 36 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
IP Steam (at HRSG terminal point)	Flow, lb/h	67,794	64,131	62,126	61,912	69,933	67,119	62,791	58,587	70,567	69,780	64,666	60,130	71,954	71,839
	Pressure, psia	302.4	299.1	296.6	296.4	209.5	207.7	206.5	201.6	196.9	196.0	208.0	202.3	196.9	196.9
	Temperature, F	585.4	585.3	584.9	584.9	540.2	540.5	541.3	532.4	525.3	524.6	541.2	532.9	526.9	526.9
	Enthalpy, Btu/lb	1,295.5	1,295.7	1,295.7	1,295.7	1,289.9	1,290.2	1,290.8	1,288.5	1,283.1	1,282.9	1,290.6	1,286.7	1,283.6	1,283.7
IP Evaporator Drum Exit	Flow, lb/h	67,794	64,131	62,126	61,912	70,573	69,212	66,969	66,567	70,567	69,780	67,960	66,130	71,954	71,839
	Pressure, psia	324.2	318.6	315.3	315.1	240.7	237.2	232.8	232.8	230.3	228.9	235.6	234.0	233.4	233.2
	Temperature, F	424.5	423.6	422.6	421.9	397.7	396.4	394.7	394.5	393.3	393.3	395.6	395.0	394.9	394.9
	Enthalpy, Btu/lb	1,204.0	1,203.9	1,203.8	1,203.8	1,201.2	1,201.0	1,200.8	1,200.8	1,200.6	1,200.6	1,200.9	1,200.8	1,200.8	1,200.8
IP Evaporator Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	28.6	27.7	27.3	27.2	30.8	30.5	30.0	31.9	32.1	31.9	30.3	31.2	32.5	32.4
IP Approach	Temperature, F	27.0	26.0	25.8	25.9	23.0	22.9	23.0	17.9	12.7	12.8	23.1	18.1	13.5	13.5
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	67,794	64,131	62,126	61,912	70,573	69,212	66,969	66,567	70,567	69,780	67,960	66,130	71,954	71,839
	Pressure, psia	324.2	318.6	315.3	315.1	240.7	237.2	232.8	232.8	230.3	228.9	235.6	234.0	233.4	233.2
	Temperature, F	397.5	397.0	396.1	396.0	374.7	373.5	371.8	370.8	381.1	380.6	372.7	377.1	381.5	381.5
	Enthalpy, Btu/lb	372.6	371.9	371.0	370.8	348.0	348.7	344.9	350.3	354.6	354.4	345.9	350.5	355.2	355.2
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer (pressure is preliminary)	Flow, lb/h	67,794	64,131	62,126	61,912	70,573	69,212	66,969	66,567	70,567	69,780	67,960	66,130	71,954	71,839
	Pressure, psia	360.4	351.3	346.8	345.4	280.9	275.0	268.2	269.9	269.6	267.3	272.0	271.6	274.2	273.9
	Temperature, F	246.9	251.4	252.4	252.2	231.7	231.7	231.7	238.2	243.2	242.7	231.7	236.5	243.9	243.8
	Enthalpy, Btu/lb	215.2	220.8	221.7	221.5	200.6	200.6	200.6	207.1	212.2	211.7	200.6	207.4	212.9	212.8
IP FW Temperature Increase Across BFP	F	3.6	3.7	3.7	3.7	3.7	3.8	3.8	3.9	3.8	3.8	3.8	3.8	3.8	3.8
LP Steam (at HRSG terminal point)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	26.0	26.7	29.2	29.1	20.0	20.0	20.0	22.5	24.7	24.5	20.0	22.7	25.0	25.0
	Temperature, F	242.3	247.6	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,158.2	1,158.2	1,158.2	1,158.5	1,160.3	1,160.1	1,158.2	1,158.6	1,160.6	1,160.5
LP Evaporator Steam Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	26.0	26.7	29.2	29.1	20.0	20.0	20.0	22.5	24.7	24.5	20.0	22.7	25.0	25.0
	Temperature, F	242.3	247.6	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,158.2	1,158.2	1,158.2	1,158.5	1,160.3	1,160.1	1,158.2	1,158.6	1,160.6	1,160.5
LP Evaporator Water Exit to BFPs	Flow, lb/h	585,316	576,958	571,154	570,790	601,296	597,238	589,510	587,909	582,954	578,486	596,022	591,647	591,674	591,572
	Pressure, psia	26.0	26.7	29.2	29.1	20.0	20.0	20.0	22.5	24.7	24.5	20.0	22.7	25.0	25.0
	Temperature, F	242.3	247.6	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	210.8	216.4	217.3	217.1	196.2	196.2	196.2	202.8	207.8	207.3	196.2	203.1	208.6	208.5
Boiler Feed Pumps Flow Detail:															
IP FW to HRSG IP Economizer	Flow, lb/h	67,794	64,131	62,126	61,912	70,573	69,212	66,969	66,567	70,567	69,780	67,960	66,130	71,954	71,839
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	36,185	66,029	67,010	0	35,619	60,669	60,930
HP FW to HRSG HP Economizer #8	Flow, lb/h	462,873	455,336	450,367	450,069	476,338	472,736	466,675	410,058	347,559	342,054	470,785	415,600	384,410	383,469
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	23,052	66,386	61,659	0	21,027	54,395	54,647
IP FW to PAC Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP FW to HP-to-CRH Bypass Desuperheater	Flow, lb/h	54,648	57,480	59,655	59,809	54,383	56,286	55,885	50,039	38,400	37,969	55,278	50,461	40,469	40,447
LP Pinch	Temperature, F	34.5	32.3	31.6	31.5	34.1	33.5	32.5	32.3	32.2	32.0	33.1	32.5	32.6	32.6
LP Approach	Temperature, F	146.6	136.6	133.1	132.9	141.4	140.9	141.0	131.3	131.6	131.1	140.9	131.8	132.2	132.1
Condensate Recirculated	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.4	109.8	114.4	114.4	85.1	85.6	85.6	101.8	106.5	106.4	85.6	101.8	106.6	106.6
% of Total LP Economizer Flow		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.6
	Enthalpy, Btu/lb	63.7	79.1	83.6	83.6	54.6	55.1	55.0	71.2	75.9	75.8	55.1	71.2	76.0	76.0
Condensate to LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.6
	Enthalpy, Btu/lb	63.7	79.1	83.6	83.6	54.6	55.1	55.0	71.2	75.9	75.8	55.1	71.2	76.0	76.0
Condensate from Recirculation	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.4	109.8	114.4	114.4	85.1	85.6	85.6	101.8	106.5	106.4	85.6	101.8	106.6	106.6
Condensate Bypassing LP Economizer	Flow, lb/h	585,312	576,962	571,167	570,797	600,356	595,140	588,330	587,888	582,921	578,447	591,750	591,617	591,850	591,557
	% of Total Condensate Flow	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.6
Condensate to HRSG	Flow, lb/h	585,312	576,962	571,167	570,797	600,356	595,140	588,330	587,888	582,921	578,447	591,750	591,617	591,850	591,557
	Pressure, psia	523.4	522.4	522.3	522.4	548.7	548.8	549.1	548.0	548.1	548.2	548.9	547.8	547.7	547.7
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.5
Stack Exit	Flow, lb/h	4,108,466	3,921,665	3,820,486	3,813,647	4,252,224	4,177,052	4,056,998	3,864,963	3,715,719	3,673,602	4,108,466	3,921,665	3,820,486	3,813,647
	Temperature, F	278.8	280.1	280.2	280.0	262.0	261.4	260.5	256.6	271.6	270.9	261.0	267.1	272.7	272.6

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
Steam Turbine Generator															
HP Turbine Stage 1 Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Remainder Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Turbine Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Shaft Power	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STG Throttle Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 2270 psia)	1,036.0	1,032.1	1,027.2	1,027.3	761.5	760.2	759.3	760.8	745.1	744.5	760.1	761.2	747.0	746.9
	Temperature, F	995.0	1,010.2	1,018.0	1,018.8	985.9	991.4	1,000.7	987.1	942.0	941.9	995.9	987.1	947.1	947.0
	Enthalpy, Btu/lb	1,502.2	1,511.0	1,515.8	1,516.1	1,505.3	1,508.5	1,513.7	1,506.4	1,481.4	1,481.4	1,511.6	1,506.4	1,484.2	1,484.2
THV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leak 1 Leakage Flow to HRH	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 940 F)	940.9	966.8	974.5	976.4	954.7	961.0	970.9	956.9	909.1	909.1	966.8	956.9	914.4	914.4
	Enthalpy, Btu/lb	1,502.2	1,511.1	1,515.8	1,516.1	1,505.3	1,508.5	1,513.7	1,506.4	1,481.4	1,481.4	1,511.6	1,506.4	1,484.2	1,484.2
Efficiency (THV inlet to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Efficiency (THV exit to HPT exit)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Leaks 3&5 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRH Steam to Steam Seals	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F	940.9	966.8	974.5	976.4	954.7	961.0	970.9	956.9	909.1	909.1	966.8	956.9	914.4	914.4
	Enthalpy, Btu/lb	1,502.2	1,511.1	1,515.8	1,516.1	1,505.3	1,508.5	1,513.7	1,506.4	1,481.4	1,481.4	1,511.6	1,506.4	1,484.2	1,484.2
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	244.5	250.0	251.0	250.8	230.1	230.1	230.1	236.5	241.6	241.1	230.1	236.8	242.3	242.2
Final Cold Reheat Steam after Conditioning	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8	216.8
	Temperature, F (MAX 750 F)	948.9	966.8	974.5	976.4	954.7	961.0	970.9	956.9	909.1	909.1	966.8	956.9	914.4	914.4
	Enthalpy, Btu/lb	1,502.2	1,511.1	1,515.8	1,516.1	1,505.3	1,508.5	1,513.7	1,506.4	1,481.4	1,481.4	1,511.6	1,506.4	1,484.2	1,484.2
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reheat System dP	psi	-52.9	-50.0	-47.7	-47.6	62.5	62.7	62.9	63.1	63.6	63.6	62.7	62.9	63.1	63.1
Reheat System dP		-24.42%	-23.06%	-22.02%	-21.96%	28.85%	28.92%	29.02%	29.09%	29.27%	29.35%	28.95%	29.03%	29.12%	29.13%
Hot Reheat Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia (MAX 564 psia)	268.7	268.7	264.5	264.4	164.2	164.1	163.9	163.7	163.3	163.2	164.0	163.8	163.6	163.6
	Temperature, F	971.8	984.6	991.1	991.8	961.5	966.6	974.8	935.7	890.7	890.7	971.4	935.7	895.8	895.7
Differential to HP Temperature	dT, F (MAX +/- 50 F)	-23.2	-25.6	-26.9	-27.0	-24.1	-24.8	-25.9	-51.4	-51.2	-51.2	-25.5	-51.4	-51.3	-51.3
	Enthalpy, Btu/lb	1,512.6	1,519.5	1,523.0	1,523.4	1,510.7	1,513.4	1,517.7	1,497.3	1,474.1	1,474.1	1,515.9	1,497.3	1,478.7	1,478.7
INTV Pressure Loss	psi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
IP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4
	Temperature, F	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8	877.8
	Enthalpy, Btu/lb	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9	1,471.9
Efficiency (INTV inlet to IPT exit)		86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%	86.54%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&6 Leakage Flow to SSR	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Steam Admitted to STG (total)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 78.2 psia)	26.0	26.7	26.2	29.1	20.0	20.0	20.0	22.5	24.7	24.5	20.0	22.7	25.0	25.0
	Temperature, F	242.3	247.8	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	1,160.3	1,162.3	1,162.6	1,162.6	1,155.2	1,155.2	1,155.2	1,157.6	1,159.3	1,159.1	1,155.2	1,157.6	1,159.6	1,159.6
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 108 F)														
LP Admission CV Pressure Loss	% loss	-5.1%	4.7%	6.2%	5.8%	-36.8%	-36.8%	-36.8%	-21.4%	-10.8%	-11.7%	-36.6%	-20.8%	-9.3%	-9.5%
LP Turbine Inlet Steam	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	25.8	27.0	27.0	27.0	19.7	19.7	19.7	22.2	24.3	24.1	19.7	22.3	24.7	24.8
	Temperature, F	242.0	877.8	877.8	877.8	227.7	227.7	227.7	234.1	239.1	238.6	227.7	234.4	239.8	239.7
	Enthalpy, Btu/lb	1,161.3	1,471.9	1,471.9	1,471.9	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.8	1,160.5
LP Turbine Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	224.7	875.9	875.9	876.9	213.4	213.4	213.4	218.5	222.5	222.1	213.4	218.6	223.0	222.9
ELEP Enthalpy, Btu/lb		1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8	1,068.8
UEEP Enthalpy, Btu/lb		1,161.3	1,471.9	1,471.9	1,471.9	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.8	1,160.5
Exhaust Loss Btu/lb		17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
Moisture @ UEEP (MIN 1.7%)		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LSB, in.		40	40	40	40	40	40	40	40	40	40	40	40	40	40
# ends		2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annulus Area ft2/end		84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
LPT Efficiency to ELEP		90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%	90.52%
LPT Efficiency to UEEP		83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%	83.50%
Annulus Velocity ft/s		308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3	308.3
Volumetric Flow 1000 ft3/min per end		1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589	1,589
Gross Generator Output	kW	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Generator MVA		447.8	447.8	430.5	430.5	447.8	447.8	447.8	447.8	430.5	430.5	447.8	447.8	430.5	430.5
Closed Cycle Cooling Water	Temperature, F	100.0	100.0	105.0	105.0	100.0	100.0	100.0	100.0	105.0	105.0	100.0	100.0	105.0	105.0
Generator pf		0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

DEF-18FL-FUEL-002553

Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
Condenser/Circulating Water															
Condenser Duty	MMBtu/h	1,702.2	1,668.2	1,650.3	1,649.6	879.6	873.2	863.0	843.6	820.4	814.1	869.8	849.1	834.3	833.9
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	14.3	12.8	12.5	12.5	14.8	7.3	7.3	6.5	6.2	6.1	7.3	6.5	6.3	6.3
LP Turbine Exit Steam to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963	0.963
	Pressure, in. HgA	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960	1.960
	Temperature, F	224.7	875.9	875.9	875.9	213.4	213.4	213.4	218.5	222.5	222.1	213.4	218.8	223.0	222.9
	Enthalpy, Btu/lb	1,161.3	1,471.9	1,471.9	1,471.9	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.6	1,160.5
Miscellaneous STG Leaks to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1
GSC Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
Makeup Water to Condenser	Flow, lb/h	0	0	0	25	0	0	0	0	0	0	0	0	0	15
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser (total, both units)	Flow, lb/h	1,478,900	1,468,903	1,468,918	1,468,370	755,331	750,192	741,236	734,929	717,361	711,855	747,196	739,612	729,753	729,384
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
LP Steam Bypassed to Condenser (total, both units)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.6	1,160.5
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
	Enthalpy, Btu/lb	69.7	79.1	83.6	83.6	54.6	55.1	55.0	71.2	75.9	75.8	55.1	71.2	75.0	75.0
Condenser Curtain Spray to Condenser	Flow, lb/h	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000
	Enthalpy, Btu/lb	69.7	79.1	83.6	83.6	54.6	55.1	55.0	71.2	75.9	75.8	55.1	71.2	75.0	75.0
Condenser Exit	Flow, lb/h	1,695,700	1,685,703	1,675,718	1,675,195	972,131	956,991	956,036	951,729	934,161	926,655	963,996	956,412	946,553	946,180
	Pressure, psia	0.736	1.170	1.335	1.335	0.503	0.511	0.508	0.847	0.973	0.970	0.510	0.848	0.978	0.978
	Pressure, in HgA (MIN 1.0 in. HgA)	1.499	2.383	2.718	2.717	1.023	1.040	1.035	1.724	1.980	1.976	1.038	1.726	1.991	1.991
	Temperature, F	91.7	107.0	111.5	111.5	79.7	80.2	80.1	96.2	100.8	100.7	80.1	96.3	101.0	100.9
	Enthalpy, Btu/lb	59.7	75.0	79.6	79.6	47.8	48.3	48.1	64.2	68.8	68.7	48.2	64.3	69.0	69.0
Condensate Pump Discharge	Flow, lb/h	1,695,700	1,685,703	1,675,718	1,675,195	972,131	956,991	956,036	951,729	934,161	926,655	963,996	956,412	946,553	946,180
	Pressure, psia	523.4	522.4	522.3	522.4	548.7	548.8	549.1	548.0	548.1	548.2	548.9	547.8	547.7	547.7
	Temperature, F	93.2	108.6	113.2	113.2	83.1	83.6	83.5	99.7	104.4	104.4	83.6	99.8	104.5	104.5
	Enthalpy, Btu/lb	62.7	78.0	82.5	82.5	52.7	53.2	53.1	69.2	73.9	73.8	53.2	69.3	74.0	74.0
Condensate after GSC	Flow, lb/h	1,695,700	1,685,703	1,675,718	1,675,195	972,131	956,991	956,036	951,729	934,161	926,655	963,996	956,412	946,553	946,180
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.5
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	1,480,687	1,470,703	1,460,718	1,460,188	757,131	751,991	743,036	738,729	719,173	713,646	748,996	741,407	731,548	731,177
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	106.4	106.4	85.5	101.7	106.5	106.5
Total Circulating Water	Flow, lb/h	199,501,072	198,978,496	198,800,096	198,800,096	199,667,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Flow, gpm	389,785	389,696	389,682	389,682	389,853	389,785	389,785	389,666	389,682	389,682	389,785	389,666	389,682	389,682
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	68.0	85.0	90.0	90.0	90.0	68.0	68.0	85.0	90.0	90.0	68.0	85.0	90.0	90.0
Circulating Water to Condenser	Flow, lb/h	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Flow, gpm	374,741	374,619	374,593	374,593	374,619	374,741	374,741	374,619	374,593	374,593	374,741	374,619	374,593	374,593
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	68.1	85.1	90.1	90.1	90.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,816,624	191,294,048	191,115,680	191,115,680	192,013,504	191,816,624	191,816,624	191,294,048	191,115,680	191,115,680	191,816,624	191,294,048	191,115,680	191,115,680
	Temperature, F	77.3	94.2	99.1	99.1	84.9	72.8	72.8	89.7	94.6	94.5	72.8	89.7	94.7	94.6
Total Circulating Water Discharge	Flow, lb/h	199,501,072	198,978,496	198,800,096	198,800,096	199,667,952	199,501,072	199,501,072	198,978,496	198,800,096	198,800,096	199,501,072	198,978,496	198,800,096	198,800,096
	Temperature, F	77.5	94.3	99.2	99.2	85.2	73.1	73.1	90.0	94.9	94.8	73.1	90.0	94.9	94.9
Circulating Water Temperature Rise	dT, F	9.46	9.30	9.21	9.21	5.17	5.14	5.08	4.99	4.87	4.84	5.12	5.02	4.95	4.94
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Flow, gpm	15,013	15,049	15,062	15,062	15,000	15,013	15,013	15,049	15,062	15,062	15,013	15,049	15,062	15,062
	Temperature, F	68.1	85.1	90.1	90.1	80.1	68.1	68.1	85.1	90.1	90.1	68.1	85.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,426	7,684,426	7,684,427	7,684,427	7,684,427	7,684,426	7,684,426	7,684,426	7,684,427	7,684,427	7,684,426	7,684,426	7,684,427	7,684,427
	Temperature, F	80.3	97.3	102.3	102.3	72.3	80.3	80.3	97.3	102.3	102.3	80.3	97.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-5 BJScrivner
1997 Steam Tables

Case Name		Case 277-BYP 2x100% STG Bypass Oil Fuel 59 F/EC On	Case 278-BYP 2x100% STG Bypass Oil Fuel 74 F/EC On	Case 279-BYP 2x100% STG Bypass Oil Fuel 90 F/EC On	Case 280-BYP 2x100% STG Bypass Oil Fuel 95 F/EC On	Case 301-BYP 1x100% STG Bypass Oil Fuel 35 F	Case 302-BYP 1x100% STG Bypass Oil Fuel 45 F	Case 303-BYP 1x100% STG Bypass Oil Fuel 59 F	Case 304-BYP 1x100% STG Bypass Oil Fuel 74 F	Case 305-BYP 1x100% STG Bypass Oil Fuel 90 F	Case 306-BYP 1x100% STG Bypass Oil Fuel 95 F	Case 307-BYP 1x100% STG Bypass Oil Fuel 59 F/EC On	Case 308-BYP 1x100% STG Bypass Oil Fuel 74 F/EC On	Case 309-BYP 1x100% STG Bypass Oil Fuel 90 F/EC On	Case 310-BYP 1x100% STG Bypass Oil Fuel 95 F/EC On
Miscellaneous (Blowdown, Boiler Feed Pumps)															
HP Evaporator #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	0	0	0	25	0	0	0	0	0	0	0	0	0	16
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	585,316	576,958	571,154	570,790	601,299	597,238	590,510	587,909	582,954	578,486	595,022	591,647	591,674	591,572
	Pressure, psia	29.3	31.0	31.5	31.4	22.3	22.3	22.3	24.8	27.0	26.8	22.3	25.0	27.3	27.3
	Temperature, F	242.3	247.8	248.7	248.5	227.9	227.9	227.9	234.4	239.3	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	210.8	216.4	217.3	217.1	196.2	196.2	196.2	202.8	207.8	207.3	196.2	203.1	208.6	208.5
IP Blead (before CV)	Flow, lb/h	67,794	64,131	62,121	61,912	70,578	69,217	66,970	104,760	136,606	138,804	67,959	104,658	132,672	132,779
	Pressure, psia	1,036.1	1,036.3	1,041.7	1,041.9	1,031.1	1,033.0	1,035.1	1,035.1	1,037.6	1,039.7	1,034.0	1,034.4	1,033.4	1,033.6
	Temperature, F	244.5	250.0	251.0	250.8	230.1	230.1	230.1	236.5	241.6	241.1	230.1	236.6	242.3	242.2
	Enthalpy, Btu/lb	215.2	220.8	221.7	221.5	200.8	200.8	200.8	207.1	212.2	211.7	200.8	207.4	212.9	212.8
IP FW Control Valve Exit Pressure	Pressure, psia	390.4	391.3	345.8	345.4	280.0	276.0	268.2	269.9	269.8	267.3	272.0	271.6	274.2	273.9
	CV dP, psi	676.7	687.9	696.9	696.5	751.1	756.0	767.9	766.2	768.0	772.3	762.0	762.7	759.3	759.7
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,505.7	3,504.5	3,908.4	3,908.9	3,510.4	3,514.2	3,520.5	3,539.3	3,556.9	3,562.3	3,515.9	3,534.7	3,543.9	3,544.5
	CV dP, psi	2,402.9	2,409.8	2,421.1	2,421.8	2,630.0	2,646.5	2,657.7	2,726.2	2,787.6	2,797.0	2,649.6	2,716.3	2,762.4	2,763.6
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	517,522	512,827	509,033	508,878	530,721	528,021	523,540	483,140	446,347	441,682	527,063	486,988	459,303	458,793
	Pressure, psia	1,202.6	1,194.7	1,187.3	1,187.1	971.4	967.7	962.8	914.1	869.3	865.3	956.3	918.4	881.5	880.9
	Temperature, F	255.5	261.1	262.1	261.9	241.5	241.5	241.5	246.5	254.2	253.8	241.5	248.9	254.7	254.5
	Enthalpy, Btu/lb	226.7	232.3	233.3	233.1	212.6	212.6	212.1	218.0	224.5	224.2	212.0	219.3	225.1	225.0
STG Bypass System															
Total HP Steam per HRSG Unit	Flow, lb/h	462,875	455,340	450,368	450,070	476,339	472,736	466,875	433,103	407,941	403,706	470,786	436,519	418,798	418,338
	Pressure, psia	1,036.0	1,032.1	1,027.2	1,027.3	781.5	780.2	779.3	750.6	745.1	744.5	760.1	751.2	747.0	746.9
	Temperature, F	998.7	1,012.0	1,019.7	1,020.6	987.4	993.2	1,002.5	988.9	943.8	943.7	998.7	958.9	948.8	948.8
	Enthalpy, Btu/lb	1,503.2	1,512.0	1,518.6	1,517.1	1,506.3	1,509.5	1,514.7	1,507.4	1,482.4	1,482.4	1,512.6	1,507.4	1,485.2	1,485.2
HRSG HP Steam Bypassed -- CV Inlet	Flow, lb/h	462,875	455,340	450,368	450,070	476,339	472,736	466,875	433,103	407,941	403,706	470,786	436,519	418,798	418,338
	Pressure, psia	1,036.0	1,032.1	1,027.2	1,027.3	781.5	780.2	779.3	750.6	745.1	744.5	760.1	751.2	747.0	746.9
	Temperature, F	998.7	1,012.0	1,019.7	1,020.6	987.4	993.2	1,002.5	988.9	943.8	943.7	998.7	958.9	948.8	948.8
	Enthalpy, Btu/lb	1,503.2	1,512.0	1,518.6	1,517.1	1,506.3	1,509.5	1,514.7	1,507.4	1,482.4	1,482.4	1,512.6	1,507.4	1,485.2	1,485.2
HP Bypass Steam Desuperheating Flow (from HP BFP)	Flow, lb/h	54,648	57,489	58,665	58,809	54,383	55,266	56,665	60,039	38,400	37,969	56,278	50,481	40,499	40,447
	Temperature, F	255.5	261.1	262.1	261.9	241.5	241.5	241.5	246.5	254.2	253.8	241.5	248.9	254.7	254.5
HP Steam Bypassed to Cold Reheat -- CV Exit (per HRSG unit)	Flow, lb/h	517,523	512,829	509,033	508,879	530,721	528,021	523,540	483,142	446,341	441,674	527,064	486,980	459,297	458,785
	Pressure, psia	302.5	299.1	296.6	296.4	207.6	206.8	205.5	201.6	198.9	198.0	206.4	202.3	199.0	198.9
	Temperature, F	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0
	Enthalpy, Btu/lb	1,368.4	1,368.6	1,368.7	1,368.7	1,373.6	1,373.7	1,373.8	1,374.0	1,374.2	1,374.3	1,373.7	1,373.9	1,374.1	1,374.1
HP Bypass Control Valve Pressure Loss	dP, psi	733.6	733.0	730.7	730.9	563.9	563.3	553.9	549.0	548.3	548.4	563.7	548.9	548.0	548.0
Total HRH Steam per HRSG Unit	Flow, lb/h	585,316	576,981	571,159	570,799	600,356	595,140	586,331	587,891	582,932	578,459	591,749	591,626	591,557	591,551
	Pressure, psia	269.7	266.7	264.5	264.4	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6
	Temperature, F	973.7	986.5	993.0	993.7	963.4	968.5	976.8	937.6	892.7	892.6	973.3	937.6	897.7	897.7
	Enthalpy, Btu/lb	1,513.6	1,520.5	1,524.0	1,524.4	1,511.7	1,514.4	1,518.7	1,498.3	1,475.1	1,475.1	1,518.9	1,498.9	1,477.7	1,477.7
HRSG HRH Steam Bypassed -- CV Inlet	Flow, lb/h	585,316	576,981	571,159	570,799	600,356	595,140	586,331	587,891	582,932	578,459	591,749	591,626	591,557	591,551
	Pressure, psia	269.7	266.7	264.5	264.4	154.2	154.1	153.9	153.7	153.3	153.2	154.0	153.8	153.6	153.6
	Temperature, F	973.7	986.5	993.0	993.7	963.4	968.5	976.8	937.6	892.7	892.6	973.3	937.6	897.7	897.7
	Enthalpy, Btu/lb	1,513.6	1,520.5	1,524.0	1,524.4	1,511.7	1,514.4	1,518.7	1,498.3	1,475.1	1,475.1	1,518.9	1,498.9	1,477.7	1,477.7
HRH Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	155,037	158,390	159,202	159,298	158,775	158,652	158,706	148,643	136,253	135,290	157,246	149,792	139,097	139,521
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	105.4	105.4	85.5	101.7	105.5	105.5
HRH Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	740,352	735,351	730,360	730,087	757,130	751,992	743,037	736,734	719,185	713,659	748,996	741,420	731,564	731,172
	Pressure, psia	101.9	102.2	103.1	103.1	114.4	113.3	112.0	102.1	99.4	98.7	112.8	102.7	100.9	100.9
	Temperature, F	367.8	367.9	368.2	368.2	371.9	371.5	371.1	367.8	366.9	366.7	371.4	368.0	367.4	367.4
	Enthalpy, Btu/lb	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0	1,210.0
HRH Bypass Control Valve Pressure Loss	dP, psi	167.8	164.6	161.4	161.3	39.9	40.8	41.9	51.6	53.9	54.4	41.2	51.2	52.7	52.6
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	101.2	101.0	101.8	101.8	113.9	112.6	111.4	101.2	98.4	97.8	112.3	101.8	99.9	99.9
HRH Bypass Steam Diverted to GSC	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Total LP Steam per HRSG Unit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	28.0	28.7	29.2	29.1	20.9	20.9	20.0	22.5	24.7	24.5	20.9	22.7	25.0	25.0
	Temperature, F	242.3	247.6	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.5	1,160.5
HRSG LP Steam Bypassed -- CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	28.0	28.7	29.2	29.1	20.9	20.9	20.0	22.5	24.7	24.5	20.9	22.7	25.0	25.0
	Temperature, F	242.3	247.6	248.7	248.5	227.9	227.9	227.9	234.4	239.4	238.9	227.9	234.7	240.1	240.0
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.5	1,160.5
LP Bypass Steam Desuperheating Flow (from Condensate)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	94.3	109.7	114.3	114.3	85.1	85.6	85.5	101.7	105.4	105.4	85.5	101.7	105.5	105.5
LP Steam Bypassed to Condenser -- CV Exit (per HRSG unit)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	0.7	1.1	1.3	1.3	0.6	0.5	0.5	0.8	0.9	0.9	0.5	0.8	1.0	1.0
	Temperature, F	224.5	229.1	229.9	229.7	213.1	213.0	213.0	218.4	222.4	222.1	213.0	218.7	223.0	222.9
	Enthalpy, Btu/lb	1,161.3	1,163.3	1,163.6	1,163.5	1,156.2	1,156.2	1,156.2	1,158.5	1,160.3	1,160.1	1,156.2	1,158.6	1,160.5	1,160.5
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 99 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
GateCycle Model ID		8BARTO	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART2	8BART3	8BART3
GateCycle Case ID		B8-9	B8-159	B8-29	B8-39	B8-49	B8-59	B8-69	B8-79	B8-85	B8-99	B8-109	B8-115	B8-229	B8-259	B8-279	B8-309
Ambient Temperature		90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH	90 F/55%RH
Atmospheric Pressure		14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.690 psia	14.590 psia	14.590 psia	14.690 psia	14.690 psia
Number of CTG/HRSG Units Operating		4@100%/augm	4@100%	4@100%	3@100%/augm	3@100%	3@100%	2@100%	2@100%	2@50%	1@100%	1@100%	1@70%	4@100%	3@100%	2@100%	1@100%
CTG Inlet Air Cooler		Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler On	Cooler On	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
HRSG Firing/DB Exit Temperature		Fired/1050 F	Fired/1036 F	Unfired	Fired/1239 F	Fired/1281 F	Unfired	Fired/1175 F	Unfired	Unfired	Fired/1091 F	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
CTG Model		S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F	S5000F
CTG Performance Reference		Siemens 12-May-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 12-May-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 6-Jun-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06	Siemens 2-Mar-06
HRSG Performance Reference		Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06	Vogt 7/17/06
STG Output		405.7 MW	420.0 MW	385.7 MW	389.4 MW	420.0 MW	269.7 MW	237.7 MW	190.5 MW	133.3 MW	100.8 MW	79.5 MW	57.0 MW	346.3 MW	262.9 MW	169.6 MW	70.7 MW
STG Performance Reference		MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI	MHI
STG Throttle Conditions, psia/F		2,257p/1,023F	2,090p/1,037F	1,899p/1,050F	2,270p/1,032F	2,253p/1,036F	1,436p/1,050F	1,308p/1,036F	1,020p/1,038F	743p/1,047F	711p/1,015F	711p/968F	711p/900F	1,781p/1,030F	1,376p/1,038F	969p/1,014F	711p/646F
STG Cold Reheat Conditions, psia/F		559p/857F	503p/707F	552p/728F	577p/871F	543p/702F	430p/738F	414p/736F	334p/749F	242p/759F	272p/799F	224p/766F	196p/733F	539p/712F	422p/730F	319p/730F	217p/753F
Cold Reheat Conditions after Conditioning, psia/F		559p/857F	503p/707F	552p/728F	577p/871F	543p/702F	439p/738F	414p/736F	334p/749F	242p/760F	272p/780F	224p/760F	196p/733F	539p/712F	422p/730F	319p/730F	217p/753F
STG Hot Reheat Conditions, psia/F		495p/1,044F	544p/1,046F	509p/1,050F	486p/1,043F	551p/1,043F	380p/1,060F	320p/1,031F	260p/1,028F	188p/1,030F	163p/965F	142p/915F	142p/860F	479p/1,029F	364p/1,035F	249p/1,003F	142p/895F
Condenser Pressure		3.31 In HgA	3.59 In HgA	3.41 In HgA	3.14 In HgA	3.45 In HgA	2.60 In HgA	2.47 In HgA	2.27 In HgA	2.01 In HgA	2.13 In HgA	2.03 In HgA	1.93 In HgA	3.02 In HgA	2.56 In HgA	2.51 In HgA	1.96 In HgA
Stack Temperature		221 F	227 F	233 F	201 F	202 F	233 F	197 F	212 F	204 F	193 F	204 F	195 F	317 F	309 F	284 F	277 F
Run Date		7-Sep-06	9-Sep-06	7-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	8-Sep-06	9-Sep-06	9-Sep-06	8-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06	9-Sep-06
Performance Summary																	
Number of CTG/HRSG Units Operating		4	4	4	3	3	3	2	2	2	1	1	1	4	3	2	1
Gross CTG Output (each)	kW	196,207	177,293	177,293	196,207	177,293	177,293	177,293	177,293	88,606	177,293	177,293	117,668	169,672	169,672	169,672	169,672
Gross CTG Output (total)	kW	784,828	709,172	709,172	588,621	531,879	531,879	354,586	354,586	167,212	177,293	177,293	117,668	679,488	509,016	339,744	169,672
Gross CTG Heat Rate (LHV)	Btu/kWh	9,136	9,486	9,486	9,136	9,486	9,486	9,486	9,486	12,263	9,486	9,486	10,467	9,784	9,784	9,784	9,784
Gross CTG Heat Rate (HHV)	Btu/kWh	10,008	10,521	10,521	10,008	10,521	10,521	10,521	10,521	13,431	10,521	10,521	11,465	10,439	10,439	10,439	10,439
Fuel Gas Temperature to CTG, F		90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Fuel Gas Temperature to Stk, F		90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
CTG Heat Input (LHV) (total)	MMBtu/h	7,170.19	6,727.21	6,727.21	5,377.64	5,045.40	5,045.40	3,363.60	3,363.60	2,050.52	1,681.80	1,681.80	1,233.88	6,648.11	4,986.08	3,324.06	1,662.03
CTG Heat Input (HHV) (total)	MMBtu/h	7,893.32	7,460.87	7,460.87	5,888.00	5,595.65	5,595.65	3,730.43	3,730.43	2,245.88	1,865.22	1,865.22	1,351.44	7,063.02	5,319.76	3,546.51	1,773.25
Duct Burner Heat Input (LHV) (each)	MMBtu/h	75.00	61.76	0.00	280.50	223.35	0.00	176.00	0.00	0.00	160.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (each)	MMBtu/h	82.43	68.42	0.00	317.53	368.56	0.00	194.09	0.00	0.00	186.38	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (LHV) (total)	MMBtu/h	312.50	246.80	0.00	878.00	669.96	0.00	352.00	0.00	0.00	160.00	0.00	0.00	0.00	0.00	0.00	0.00
Duct Burner Heat Input (HHV) (total)	MMBtu/h	341.73	273.72	0.00	962.89	1,075.68	0.00	388.17	0.00	0.00	186.38	0.00	0.00	0.00	0.00	0.00	0.00
Gross STG Output	kW	405,700	420,020	385,720	389,410	420,000	268,700	237,670	190,490	133,270	100,750	79,510	58,900	348,310	263,640	169,590	70,720
STG Output, percent of CTG Output		51.7%	59.2%	54.4%	66.2%	79.0%	64.5%	67.0%	53.7%	79.7%	56.8%	44.8%	48.4%	51.3%	51.8%	49.9%	41.7%
Gross Plant Output	kW	1,190,528	1,129,192	1,094,892	978,031	951,879	821,579	592,256	546,076	300,482	278,043	259,803	174,548	1,027,798	772,656	509,334	240,992
Gross Cycle Heat Rate (LHV)	Btu/kWh	6,385	6,176	6,144	6,388	6,316	6,141	6,270	6,171	6,824	6,588	6,540	7,065	6,468	6,454	6,526	6,908
Gross Cycle Heat Rate (HHV)	Btu/kWh	6,684	6,860	6,814	6,997	7,009	6,811	6,954	6,844	7,474	7,307	7,263	7,736	6,901	6,886	6,960	7,370
Plant Heat Input (LHV)	MMBtu/h	7,482.19	6,974.01	6,727.21	6,247.64	6,015.30	5,045.40	3,713.60	3,363.60	2,050.52	1,821.80	1,681.80	1,233.88	6,648.11	4,986.08	3,324.06	1,662.03
Plant Heat Input (HHV)	MMBtu/h	8,195.05	7,734.68	7,460.87	6,842.68	6,671.33	5,595.65	4,118.60	3,730.43	2,245.88	2,031.58	1,865.22	1,351.44	7,063.02	5,319.76	3,546.51	1,773.25
Calculations Based on High-Side of Generator Step-Up Transformers																	
Total Auxiliary Power/Losses	kW	30,510	29,480	28,680	28,890	28,520	24,920	22,300	21,180	19,480	15,080	14,800	13,090	31,640	27,130	20,080	16,316
Total Auxiliary Power/Losses, percent of gross		2.56%	2.61%	2.62%	2.96%	3.00%	3.03%	3.77%	3.80%	6.48%	5.42%	5.69%	8.01%	3.06%	3.51%	3.94%	6.90%
Net Plant Output w/ Step-Up Xfmr Losses	kW	1,160,018	1,099,732	1,066,232	949,141	923,360	796,658	569,956	523,896	281,002	262,963	245,003	160,658	995,158	745,526	489,254	226,382
Net Plant Heat Rate (LHV) w/ Step-Up Xfmr Losses	Btu/kWh	6,450	6,342	6,309	6,582	6,515	6,333	6,516	6,420	7,297	6,926	6,844	7,680	6,674	6,689	6,794	7,378
Net Plant Heat Rate (HHV) w/ Step-Up Xfmr Losses	Btu/kWh	7,065	7,033	6,997	7,210	7,226	7,024	7,226	7,121	7,992	7,726	7,701	8,412	7,100	7,137	7,249	7,871

Revision History:
Rev. 8, 8/11/06 -- GateCycle model revised to incorporate Vogt HRSG proposal, additional MHI STG heat balance information, HP/CRH/HRH pipe calculations, and modified pumps; model uses same condenser as Rev. 7.

7/22/2019
DEF-10FC-FUEL-002558

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC551-091109-8 BJScriver
1967 Steam Tables

Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 89 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
Combustion Turbine Generator (each)																	
Ambient Conditions	Pressure, psia	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690	14.690
	Temperature, F	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
	Relative Humidity	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%	54.8%
	WBT, F	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.6
Compressor Inlet Conditions	Temperature, F	78.5	78.5	78.5	78.5	78.5	78.5	78.5	78.5	90.0	78.5	78.5	90.0	78.5	78.5	78.5	78.5
	Relative Humidity	91.4%	91.4%	91.4%	91.4%	91.4%	91.4%	91.4%	91.4%	54.8%	91.4%	91.4%	54.8%	91.4%	91.4%	91.4%	91.4%
Inlet Air Cooler Status		Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler On	Cooler Off	Cooler On	Cooler On	Cooler Off	Cooler On	Cooler On	Cooler On	Cooler On
Saturation Efficiency		85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	0.0%	85.0%	85.0%	0.0%	85.0%	85.0%	85.0%	85.0%
Water Evaporation Rate	Flow, lb/h	9,622	9,622	9,622	9,622	9,622	9,622	9,622	9,622	0	9,622	9,622	0	9,623	9,623	9,623	9,623
Fuel Flow	Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Dist. Oil	Dist. Oil	Dist. Oil	Dist. Oil
	HC, MMBtu/h (LHV)	1,792.6	1,681.8	1,681.8	1,792.5	1,681.8	1,681.8	1,681.8	1,681.8	1,026.9	1,681.8	1,681.8	1,233.9	1,662.0	1,662.0	1,662.0	1,662.0
	Flow, lb/h	84,714	80,481	80,481	84,714	80,481	80,481	80,481	80,481	48,483	80,481	80,481	58,312	89,771	89,771	89,771	89,771
Fuel LHV	Btu/lb	21,160	20,897	20,897	21,160	20,897	20,897	20,897	20,897	21,166	20,897	20,897	21,150	18,514	18,514	18,514	18,514
Fuel Gas Temperature	Temperature, F	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Cold Reheat Steam to CTG Power Augmentation	Flow, lb/h	109,605	0	0	109,161	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	522.1	573.7	627.0	629.6	900.4	413.4	374.4	304.0	236.6	235.5	198.6	178.8	696.8	397.3	281.4	193.6
	Temperature, F	650.5	702.4	723.3	654.4	656.8	734.5	732.5	744.1	746.0	744.7	746.7	729.3	707.5	725.8	735.7	746.9
	Enthalpy, Btu/lb	1,327.1	1,384.2	1,398.8	1,334.7	1,346.4	1,381.0	1,381.9	1,391.6	1,396.8	1,396.3	1,397.6	1,390.2	1,380.9	1,376.9	1,382.6	1,391.0
Desuperheating Flow for PAG Steam (from IP FW)	Flow, lb/h	10,220	0	0	10,604	0	0	0	0	0	0	0	0	0	0	0	0
	Temperature, F	366.1	362.9	361.5	343.3	350.8	344.1	323.6	324.9	320.7	317.9	322.9	319.0	290.5	277.0	284.7	243.1
Steam Injection for Power Augmentation	Flow, lb/h	120,085	0	0	120,085	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	304.0	220.0	235.5	198.6	178.8	350.0	350.0	281.4	193.6
	Temperature, F	486.0	678.3	705.4	486.0	658.0	728.5	730.2	744.1	746.0	744.7	746.7	729.3	691.1	720.9	735.7	746.9
	Enthalpy, Btu/lb	1,242.2	1,364.0	1,388.9	1,242.2	1,348.4	1,381.0	1,381.9	1,391.6	1,396.8	1,396.3	1,397.6	1,390.2	1,380.9	1,376.9	1,382.6	1,391.0
Water Injection (NOx Control on Oil Fuel)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	36,906	36,906	36,906	36,906
CTG Exhaust Flow	Flow, lb/h	3,899,406	3,778,067	3,776,067	3,899,406	3,776,067	3,776,067	3,776,067	3,776,067	2,766,485	3,778,067	3,776,067	2,932,422	3,820,488	3,820,488	3,820,488	3,820,488
	Pressure, in. H2O	16.02	16.69	16.66	16.02	16.69	16.69	16.69	16.69	8.36	16.69	16.69	10.27	16.49	16.49	16.49	16.49
	Temperature, F	1,112.8	1,115.0	1,115.0	1,112.8	1,116.0	1,116.0	1,115.0	1,115.0	1,101.1	1,115.0	1,116.0	1,123.4	1,080.0	1,080.0	1,080.0	1,080.0
CTG Load	% of Base Load	100%	100%	100%	100%	100%	100%	100%	100%	50%	100%	100%	70%	100%	100%	100%	100%
Generator Gross Output	kW	196,207	177,293	177,293	196,297	177,293	177,293	177,293	177,293	93,606	177,293	177,293	117,868	169,872	169,872	169,872	169,872
Gross Heat Rate	Btu/kWh (LHV)	9,136	9,486	9,486	9,136	9,486	9,486	9,486	9,486	12,263	9,486	9,486	10,467	9,784	9,784	9,784	9,784
Heat Recovery Steam Generator (each)																	
HRSG HP Steam	Flow, lb/h	560,268	508,676	448,803	743,937	734,642	466,556	623,197	482,450	348,248	575,898	443,703	335,445	431,236	438,313	461,886	410,728
(at HRSG terminal point)	Pressure, psia	2,312.2	2,131.5	1,895.5	2,339.2	2,321.4	1,470.5	1,386.9	1,081.8	788.2	778.5	751.6	733.6	1,816.9	1,418.5	1,027.2	747.0
	Temperature, F	1,026.3	1,040.8	1,063.3	1,026.7	1,040.6	1,063.7	1,044.0	1,042.8	1,051.0	1,029.3	969.1	903.2	1,033.7	1,041.9	1,018.8	948.9
	Enthalpy, Btu/lb	1,462.0	1,466.9	1,511.6	1,488.0	1,491.0	1,523.8	1,520.5	1,525.2	1,540.9	1,524.1	1,496.4	1,480.2	1,501.8	1,518.3	1,516.0	1,486.2
~VELOCITY	FT/SEC	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
dP from HP drum to HRSG terminal point	psi	62.5	58.2	51.8	112.3	111.7	69.2	136.0	104.6	78.0	107.6	103.3	56.1	51.2	70.8	100.7	83.2
HP SH #1 Steam Outlet Temperature	Temperature, F	1,027.0	1,041.4	1,063.8	1,037.8	1,041.6	1,064.4	1,046.2	1,043.6	1,061.7	1,022.2	979.4	904.1	1,034.2	1,042.0	1,019.6	950.1
HP SH #2 Steam Outlet Temperature	Temperature, F	932.2	949.3	966.5	978.8	963.9	963.0	1,023.6	1,012.3	1,025.2	988.5	896.8	772.4	957.0	975.8	992.3	879.2
HP Steam Desuperheating Flow	Flow, lb/h	0	0	4,723	0	0	18,280	0	0	0	23,476	59,476	75,717	0	0	0	52,574
(from HP Feedwater)	Temperature, F	364.4	372.0	371.6	363.7	368.4	364.6	332.8	336.0	334.7	328.0	334.9	333.6	301.5	288.3	295.5	251.1
	% of Inlet steam	0.0%	0.0%	1.1%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	4.3%	15.5%	26.7%	0.0%	0.0%	0.0%	14.4%
	Final Superheat, F	192.0	197.2	186.2	249.8	266.3	196.4	333.0	282.7	346.4	307.2	53.3	0.0	210.6	268.3	282.0	46.0
HP SH #3/4 Steam Outlet Temperature	Temperature, F	821.7	836.1	831.6	913.6	929.0	856.1	926.3	846.6	870.2	924.2	706.4	771.5	836.0	862.0	838.5	763.0
HP Evaporator #1 Exit	Flow, lb/h	83,274	72,464	68,173	129,553	126,883	65,469	90,817	68,738	46,562	72,251	41,726	30,060	66,782	66,886	65,602	39,067
	Pressure, psia	2,374.7	2,189.7	1,947.2	2,461.5	2,433.1	1,648.6	1,522.9	1,186.4	868.2	867.4	844.0	788.7	1,857.4	1,488.9	1,127.9	840.2
	Temperature, F	660.6	648.8	652.1	666.3	664.2	660.6	608.3	605.8	627.5	640.6	626.0	616.8	626.2	606.3	580.5	524.0
	Enthalpy, Btu/lb	1,104.4	1,121.3	1,140.4	1,096.7	1,098.8	1,136.3	1,167.7	1,164.8	1,197.3	1,193.8	1,197.0	1,196.8	1,146.1	1,109.6	1,167.4	1,198.1
HP Evaporator #2/3/4/5 Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evaporator #2/3/4/5 Pinch	Temperature, F	16.2	17.8	18.0	17.4	18.8	20.6	23.1	21.1	16.7	22.2	20.9	14.5	17.9	20.7	20.8	19.6
HP Evaporator #2/3/4/5 Approach	Temperature, F	15.1	9.4	1.9	34.1	36.6	0.0	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP Economizer #1/2/3 Outlet	Flow, lb/h	560,268	508,676	442,176	743,938	734,642	437,197	623,197	482,450	348,248	552,122	384,226	264,729	431,234	438,313	461,886	387,052
	Temperature, F	545.5	536.4	530.2	551.2	527.7	500.5	586.7	566.8	527.5	540.6	526.0	516.6	526.2	506.3	559.8	524.0
HP Economizer #4/5 Outlet Temperature	Temperature, F	561.4	587.0	571.2	527.1	533.3	580.9	606.6	617.5	487.6	486.8	505.2	499.9	581.1	557.6	524.5	513.0
HP Economizer #6/7 Outlet Temperature	Temperature, F	474.2	485.6	457.1	460.7	459.7	465.1	431.6	439.2	407.9	407.9	418.8	408.7	461.5	459.1	428.8	417.3
HP Economizer #8 Outlet Temperature	Temperature, F	414.6	426.9	431.4	389.8	397.3	412.7	376.0	387.3	371.8	364.5	382.9	381.0	397.8	378.2	351.7	364.5
Feedwater to HP Economizer #8	Flow, lb/h	560,268	508,676	442,176	743,938	734,642	437,197	623,197	482,450	348,248	552,122	384,226	264,729	431,234	438,313	461,886	387,052
	Pressure, psia	2,473.5	2,271.4	2,009.2	2,624.8	2,602.2	1,609.1	1,644.6	1,268.7	904.9	1,083.1	901.8	811.0	1,926.3	1,549.6	1,195.1	882.9
	Temperature, F	364.4	372.0	371.6	360.7	358.4	364.8	332.8	336.0	334.7	328.0	334.9	333.6	301.5	288.3	295.5	251.1
	Enthalpy, Btu/lb	340.4	348.0	347.3	326.5	334.4	329.1	306.3	313.0	307.1	300.4	307.2	306.7	274.7	260.6	239.7	231.7
HP FW Temperature Increase Across BFP	F	11.0	11.0	13.1	10.2	10.3	13.6	11.7	13.6	17.4	12.6	14.6	17.3	13.3	13.9	14.1	15.3
Duct Burner	HC, MMBtu/h (LHV)	78.00	61.70	0.00	280.00	323.30	0.00	176.00	0.00	0.00	160.00	0.00	0.00	0.00	0.00	0.00	0.00
	HC, MMBtu/h (HHV)	85.43	68.43	0.00	317.63	368.66	0.00	194.09	0.00	0.00	186.36	0.00	0.00	0.00	0.00	0.00	0.00
Inlet Temperature	Temperature, F	883.6	882.1	978.2	998.9	997.7	977.3	1,019.8	1,006.5	996.6	996.5	885.2	833.1	969.0	976.2	982.4	963.0
Exit Temperature	Temperature, F	1,040.8	1,037.7	978.2	1,230.4	1,281.8	977.3	1,174.9	1,006.5	996.6	1,081.3	885.2	833.1	969.0	976.2	982.4	963.0

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Bibb and Associates – Progress Energy Barlow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC501-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 99 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
HRSG Hot Reheat Steam	Flow, lb/h	606,171	557,344	610,976	563,622	764,547	616,360	566,769	533,221	364,961	683,284	553,587	479,367	464,612	499,611	516,146	566,436
(at HRSG terminal point)	Pressure, psia	506.9	556.3	511.2	502.4	509.4	392.3	339.7	276.9	199.7	178.9	154.9	190.5	490.3	375.7	264.5	193.6
	Temperature, F	1,048.8	1,046.8	1,062.4	1,045.7	1,046.8	1,052.6	1,033.6	1,030.7	1,032.6	967.5	917.8	952.6	1,031.6	1,035.9	1,006.8	897.7
	Enthalpy, Btu/lb	1,546.1	1,545.8	1,549.1	1,545.7	1,543.8	1,552.2	1,543.4	1,543.6	1,546.7	1,513.3	1,488.0	1,494.6	1,536.3	1,543.7	1,530.6	1,477.7
+VELOCITY	FT/SEC	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
HRSG RH dP – terminal pt. to terminal pt.	psi	18.7	17.4	15.8	27.0	31.0	21.1	34.6	27.9	20.3	56.0	43.7	28.2	15.5	20.8	26.9	39.9
RHTR #1/2 Steam Outlet Temperature	Temperature, F	1,047.0	1,048.7	1,062.6	1,046.1	1,046.9	1,052.7	1,033.9	1,031.0	1,032.8	968.7	918.6	953.2	1,031.7	1,036.1	1,006.2	898.5
RHTR #3 Steam Outlet Temperature	Temperature, F	957.3	956.8	960.3	970.6	973.1	951.0	974.3	956.7	958.6	951.4	754.4	818.2	947.0	954.6	936.9	737.0
Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	6,237	0	0	2,909	0	0	0	62,891	76,832	94,606	0	0	0	72,406
(from IP Feedwater)	Temperature, F	358.1	362.9	381.6	343.3	360.8	344.1	333.6	328.9	320.7	317.6	322.9	318.0	290.6	277.0	288.7	248.1
	% of inlet steam	0.0%	0.0%	1.2%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	8.4%	15.2%	24.6%	0.0%	0.0%	0.0%	16.0%
	Final Superheat, F	354.7	340.8	376.8	309.6	400.6	350.8	429.5	424.9	422.4	278.2	186.4	0.0	336.0	364.0	394.3	83.6
RHTR #4 Steam Outlet Temperature	Temperature, F	825.8	827.5	811.6	871.2	885.6	808.9	875.5	821.3	810.3	842.0	763.0	732.3	803.4	866.7	808.8	753.0
Cold Reheat Steam from HP Bypass	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
	Temperature, F	618.7	946.8	974.5	629.8	936.7	997.0	961.0	1,005.5	1,029.4	997.8	948.8	877.6	956.0	967.0	992.6	924.8
	Enthalpy, Btu/lb	1,482.0	1,496.9	1,511.8	1,468.0	1,491.0	1,523.8	1,520.5	1,528.2	1,540.9	1,524.1	1,496.4	1,460.2	1,501.8	1,518.3	1,516.0	1,488.2
Cold Reheat Steam from STG to HRSG	Flow, lb/h	442,890	501,786	440,806	624,731	724,705	449,930	514,031	474,970	343,741	576,200	438,051	327,716	425,261	431,946	464,612	411,498
(at HRSG terminal point)	Pressure, psia	622.1	673.7	627.0	629.6	626.4	413.4	374.4	304.6	220.0	235.6	198.6	178.8	606.6	367.3	291.4	193.6
	Temperature, F	650.6	702.4	723.3	664.4	686.8	734.8	732.6	744.1	746.0	744.7	746.7	729.3	707.5	725.6	735.7	748.9
	Enthalpy, Btu/lb	1,327.1	1,354.0	1,368.8	1,334.7	1,348.4	1,361.0	1,361.9	1,361.8	1,368.8	1,366.3	1,367.6	1,360.2	1,360.6	1,376.9	1,362.8	1,368.0
+VELOCITY	FT/SEC	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
Cold Reheat Steam % of HP Steam		79.06%	98.86%	98.64%	83.98%	98.86%	98.57%	98.53%	98.46%	98.71%	100.46%	98.73%	97.70%	98.81%	98.66%	98.43%	98.04%
HP Steam – Cold Reheat Steam	Flow, lb/h	117,376	6,880	6,097	119,205	9,837	6,827	9,167	7,480	4,605	7,602	5,862	7,731	6,974	6,568	7,974	6,230
IP Steam (at HRSG terminal point)	Flow, lb/h	63,281	55,668	63,936	38,890	29,841	64,442	42,727	58,302	41,222	52,196	69,004	57,050	60,362	67,667	61,534	72,634
	Pressure, psia	522.1	573.7	527.0	529.6	526.4	413.4	374.4	304.6	220.1	235.6	198.6	178.8	506.6	367.3	291.4	193.6
	Temperature, F	647.3	644.4	626.4	668.8	676.1	699.6	698.7	672.4	636.0	651.4	629.8	617.5	618.7	634.8	666.8	626.7
	Enthalpy, Btu/lb	1,326.3	1,319.8	1,311.8	1,337.9	1,338.0	1,356.8	1,313.8	1,299.2	1,286.1	1,293.8	1,288.4	1,280.7	1,309.6	1,304.2	1,296.8	1,284.2
IP Evaporator Drum Exit	Flow, lb/h	63,281	55,668	63,936	38,890	29,841	64,442	42,727	58,302	41,222	52,196	69,004	57,050	60,362	67,667	61,534	72,634
	Pressure, psia	533.8	581.9	538.7	533.9	532.8	428.3	381.8	320.2	231.2	262.0	230.6	203.2	520.0	414.2	310.1	229.2
	Temperature, F	473.8	483.0	474.8	473.9	486.7	461.4	440.1	423.4	384.2	401.7	393.9	383.2	471.1	448.1	429.4	393.4
	Enthalpy, Btu/lb	1,204.7	1,204.1	1,204.7	1,204.7	1,203.8	1,206.2	1,204.9	1,203.9	1,200.7	1,201.7	1,200.6	1,199.0	1,204.8	1,205.1	1,203.5	1,200.6
IP Economizer Blowdown	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Pinch	Temperature, F	21.8	21.6	25.0	12.7	10.8	27.2	17.1	25.3	21.0	22.3	31.0	28.3	28.3	29.0	27.1	32.5
IP Approach	Temperature, F	22.8	19.8	13.1	36.4	39.4	9.9	34.1	7.7	1.7	8.5	0.0	0.0	30.6	27.2	24.9	12.0
IP FW to IP Evaporator (after IPCV)	Flow, lb/h	63,281	55,668	63,936	38,890	29,841	64,442	42,727	58,302	41,222	52,196	69,004	57,050	60,362	67,667	61,534	72,634
	Pressure, psia	533.8	581.9	538.7	533.9	532.8	428.3	381.8	320.2	231.2	262.0	230.6	203.2	520.0	414.2	310.1	229.2
	Temperature, F	461.2	463.2	461.7	436.5	447.3	441.5	418.0	415.7	382.4	393.2	393.9	383.2	440.6	420.9	395.8	381.4
	Enthalpy, Btu/lb	451.6	446.1	443.6	417.4	427.3	420.7	392.6	392.1	386.9	387.7	372.6	363.7	419.8	398.0	370.4	368.1
	% Steam in Feedwater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.8%	0.0%	0.0%	0.0%	0.0%
Feedwater to IP Economizer	Flow, lb/h	63,281	55,668	63,936	38,890	29,841	64,442	42,727	58,302	41,222	52,196	69,004	57,050	60,362	67,667	61,534	72,634
(pressure is preliminary)	Pressure, psia	566.3	607.0	571.9	546.3	610.1	462.0	396.3	347.1	244.8	273.6	268.1	229.0	669.1	451.3	340.1	270.7
	Temperature, F	366.8	363.6	362.2	343.8	361.3	346.1	324.6	330.1	322.2	319.9	324.2	320.6	291.8	278.2	288.2	248.7
	Enthalpy, Btu/lb	329.9	336.7	336.3	319.0	323.9	317.2	296.7	301.4	293.0	289.5	295.1	291.2	292.2	248.1	277.9	218.8
IP FW Temperature Increase Across BFP	F	3.4	3.6	3.7	3.3	3.2	3.8	3.6	3.9	4.8	3.7	3.8	4.3	3.8	3.8	3.9	3.9
LP Steam (at HRSG terminal point)	Flow, lb/h	58,051	60,369	67,133	32,312	30,410	63,464	40,141	51,745	32,349	29,513	44,917	33,274	0	0	0	0
	Pressure, psia	133.7	148.8	141.1	116.2	129.2	109.9	85.8	69.5	62.7	60.5	63.3	61.0	56.0	45.0	32.2	27.7
	Temperature, F	663.3	656.7	632.0	679.4	680.2	666.8	614.6	560.7	541.1	561.9	543.6	529.6	288.2	274.4	284.3	248.8
	Enthalpy, Btu/lb	1,359.1	1,352.0	1,342.9	1,368.2	1,367.9	1,332.2	1,337.8	1,330.6	1,301.4	1,311.9	1,302.6	1,295.8	1,176.4	1,172.1	1,166.6	1,162.8
LP Evaporator Steam Exit	Flow, lb/h	58,051	60,369	67,133	32,312	30,410	63,464	40,141	51,745	32,349	29,513	44,917	33,274	0	0	0	0
	Pressure, psia	140.6	153.2	160.3	116.9	131.3	120.1	91.0	97.9	85.4	83.7	90.6	84.9	65.0	45.0	32.2	27.7
	Temperature, F	363.4	360.1	358.6	340.6	348.1	341.3	321.1	326.3	317.4	316.1	320.3	316.2	288.2	274.4	284.3	246.8
	Enthalpy, Btu/lb	1,193.4	1,194.8	1,194.5	1,190.8	1,192.3	1,190.8	1,185.8	1,187.1	1,184.8	1,184.2	1,186.8	1,184.5	1,176.4	1,172.1	1,166.6	1,167.6
LP Evaporator Water Exit to RFPs	Flow, lb/h	633,771	564,231	617,068	763,731	764,482	622,806	565,924	540,747	360,876	693,610	562,816	487,097	500,586	605,875	523,419	566,136
	Pressure, psia	140.6	153.2	160.3	116.9	131.3	120.1	91.0	97.9	85.4	83.7	90.6	84.9	65.0	45.0	32.2	27.7
	Temperature, F	353.4	350.1	358.6	340.6	348.1	341.3	321.1	326.3	317.4	316.1	320.3	316.2	288.2	274.4	284.3	246.8
	Enthalpy, Btu/lb	326.4	332.4	330.8	311.9	319.8	312.7	291.6	297.0	287.7	285.4	290.8	286.6	267.6	243.6	223.0	214.4
Boiler Feed Pumps Flow Detail:																	
IP FW to HRSG IP Economizer	Flow, lb/h	63,281	55,668	63,936	38,890	29,841	64,442	42,727	58,302	41,222	52,196	69,004	57,050	60,362	67,667	61,534	72,634
IP FW to HRSG RH Desuperheater	Flow, lb/h	0	0	6,237	0	0	2,909	0	0	0	62,891	76,832	94,606	0	0	0	72,406
HP FW to HRSG HP Economizer #8	Flow, lb/h	660,269	508,676	442,178	743,938	734,642	437,197	523,197	482,450	348,248	562,122	384,226	264,729	431,234	458,313	461,869	367,062
HP FW to HRSG HP Desuperheater	Flow, lb/h	0	0	4,723	0	0	18,389	0	0	0	23,476	69,476	70,717	0	0	0	52,678
IP FW to FAG Steam Desuperheater	Flow, lb/h	10,220	0	0	10,604	0	0	0	0	0	0	0	0	0	0	0	0
IP FW to Cold Reheat Steam Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	1,404	13,138	3,286	0	0	0	0	470
HP FW to HP-to-CRH Spray Desuperheater	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LP Pinch	Temperature, F	18.0	18.2	19.0	17.8	16.7	19.0	18.6	18.7	13.2	18.4	18.0	15.2	28.9	28.2	30.1	31.4
LP Approach	Temperature, F	19.3	6.3	9.2	27.1	27.5	1.6	14.2	1.5	2.1	18.1	5.9	9.6	169.4	160.4	139.0	133.4
Condensate Recirculated	Flow, lb/h	48,736	32,938	34,783	76,056	56,593	55,630	94,033	77,180	62,662	104,631	84,864	70,560	0	0	0	0
	Temperature, F	343.6	355.1	356.6	313.9	321.0	338.6	305.8	324.6	314.9	296.9	313.2	308.2	117.7	112.8	114.1	111.1
% of Total LP Economizer Flow		7%	5%	5%	9%	7%	8%	12%	12%	13%	13%	12%	12%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Condensate from LP Economizer	Flow, lb/h	738,496	667,536	618,984	902,087	850,504	641,836	800,149	668,710	486,936	827,865	722,506	590,928	0	0	0	0
	Temperature, F	342.6	364.6	368.9	313.2	320.3	336.3	306.3	324.2	314.8	296.6	312.8	306.9	117.6	112.7	114.0	111.0
	Enthalpy, Btu/lb	314.6	329.8	330.8	283.7	291.2	311.1	278.8	298.4	285.6	266.8	283.8	278.6	86.9	82.1	83.4	80.5
Condensate to LP Economizer	Flow, lb/h	738,496	667,536	618,984	902,087	850,504	641,836	800,149	668,710	486,936	827,865	722,506	590,928	0	0	0	0
	Temperature, F	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	117.6	112.7	114.0	111.0
	Enthalpy, Btu/lb	104.2	104.2	104.2	104.2	104.2	104.3	104.3	104.3	104.4	104.4	104.4	104.4	86.9	82.1	83.4	80.5
Condensate from Recirculation	Flow, lb/h	48,736	32,938	34,783	76,056	56,593	55,630	94,033	77,180	62,662	104,631	84,864	70,560	0	0	0	0
	Temperature, F	343.6	355.1	356.6	313.9	321.0	338.6	305.8	324.6	314.9	296.9	313.2	308.2	117.7	112.8	114.1	111.1
Condensate Bypassing LP Economizer	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	% of Total Condensate Flow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Temperature, F	120.0	123.2	121.4	118.3	121.8	115.3	111.8	109.9	108.0	111.3	111.0	111.6	117.6	112.7	114.0	111.0

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC951-091106-6 BJScrivner
1997 Steam Tables

Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 99 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
Condensate to HRSG	Flow, lb/h	589,750	624,599	584,221	626,048	704,041	586,406	708,115	582,536	423,253	723,334	637,746	520,362	590,585	605,878	623,421	595,137
	Pressure, psia	470.5	464.4	492.8	466.0	490.4	519.0	532.3	540.1	580.5	563.7	566.1	528.4	508.7	528.4	544.0	555.0
	Temperature, F	120.0	123.2	121.4	118.3	121.5	118.3	111.8	109.9	108.9	111.3	111.0	111.5	117.5	112.7	114.0	111.0
Stack Ext	Flow, lb/h	3,903,091	3,778,610	3,776,067	3,913,110	3,790,928	3,775,057	3,783,432	3,776,067	2,758,485	3,782,236	3,775,057	2,932,422	3,820,488	3,820,488	3,820,488	3,820,488
	Temperature, F	220.8	227.1	232.5	201.5	201.8	222.7	197.2	212.2	204.2	192.6	203.9	194.6	317.0	302.7	284.5	277.2
Steam Turbine Generator																	
HP Turbine Stage 1 Shaft Power	kW	8,786	9,068	7,217	6,784	8,863	6,611	5,662	3,969	2,920	3,256	1,643	1,121	6,850	5,358	3,736	1,819
HP Turbine Remainder Shaft Power	kW	80,489	74,006	65,823	66,091	81,131	60,069	44,235	30,645	24,856	14,662	8,723	5,487	82,638	47,763	31,436	8,858
IP Turbine Shaft Power	kW	109,312	120,254	109,958	111,365	126,702	83,782	72,748	57,933	42,358	38,697	29,622	21,188	118,530	86,035	66,201	36,073
LP Turbine Shaft Power	kW	203,236	222,979	209,166	186,183	209,780	185,117	120,091	99,120	87,028	69,672	42,227	30,849	171,810	128,566	81,256	36,129
Total Shaft Power	kW	401,036	418,238	384,361	368,629	417,813	288,987	237,076	191,668	134,241	102,262	81,572	59,625	346,886	262,254	169,614	73,887
STG Throttle Steam	Flow, lb/h	2,241,066	2,034,701	1,767,610	2,231,511	2,203,927	1,366,668	1,248,305	964,900	666,492	675,698	442,703	336,446	1,724,936	1,314,940	823,771	419,728
	Pressure, psia (MAX 2270 psia)	2,267.2	2,060.3	1,858.6	2,260.8	2,252.9	1,436.6	1,308.2	1,020.1	743.1	711.2	711.2	711.2	1,761.1	1,376.4	868.6	711.2
	Temperature, F	1,022.7	1,007.3	1,050.0	1,031.9	1,038.8	1,050.0	1,038.6	1,037.8	1,047.0	1,015.0	965.0	900.0	1,030.4	1,038.2	1,013.8	945.0
	Enthalpy, Btu/lb	1,481.0	1,466.9	1,513.6	1,487.0	1,490.0	1,502.6	1,519.5	1,527.2	1,539.9	1,523.1	1,496.4	1,458.2	1,500.8	1,517.3	1,515.0	1,484.2
THV Pressure Loss	psi	45.4	41.5	36.8	45.3	44.8	28.4	26.9	20.1	14.6	104.5	248.7	363.4	36.3	27.2	19.1	276.9
		2.00%	1.99%	1.98%	2.00%	1.99%	1.95%	1.97%	1.97%	1.97%	14.69%	34.97%	51.10%	1.98%	1.98%	1.97%	38.79%
Leak 1 Leakage Flow to HRH	Flow, lb/h	29,152	25,886	22,504	28,062	27,811	17,392	16,795	12,247	8,838	7,476	5,810	4,614	21,802	16,840	11,731	5,526
HP Turbine Exit	Flow, lb/h	2,212,913	2,009,915	1,765,036	2,203,743	2,176,118	1,349,276	1,230,501	952,653	657,651	668,123	437,867	330,031	1,703,138	1,298,300	812,040	414,201
	Pressure, psia	658.4	602.8	552.3	677.0	642.9	426.0	413.6	333.7	241.9	271.9	224.1	194.9	530.0	421.8	319.4	218.0
	Temperature, F (MAX 840 F)	855.5	797.2	727.5	871.5	701.8	738.9	738.2	748.7	758.7	799.2	766.1	732.8	711.8	729.8	730.3	762.7
	Enthalpy, Btu/lb	1,328.1	1,356.0	1,386.8	1,335.7	1,340.4	1,382.0	1,382.9	1,392.6	1,402.3	1,422.0	1,407.0	1,391.2	1,391.9	1,377.9	1,383.6	1,400.4
Efficiency (THV inlet to HPT exit)		86.00%	86.83%	85.79%	85.97%	85.84%	86.74%	86.70%	86.85%	86.66%	73.94%	67.10%	42.07%	86.79%	86.74%	86.64%	53.93%
Efficiency (THV exit to HPT exit)		87.06%	87.04%	87.03%	87.06%	87.04%	87.02%	87.02%	87.01%	87.01%	88.93%	88.00%	88.83%	87.03%	87.02%	87.01%	86.89%
Leaks 3&6 Leakage Flow to SSR	Flow, lb/h	1,778	1,880	1,698	1,823	2,005	1,338	1,246	998	717	793	662	563	1,832	1,270	983	644
CRH Steam to Steam Seals	Flow, lb/h	114	0	163	188	0	986	1,295	1,717	2,263	2,267	2,462	2,628	457	1,184	1,853	2,534
Cold Reheat Flow at STG Terminal Point	Flow, lb/h	2,211,021	2,007,146	1,763,184	2,201,732	2,174,113	1,347,089	1,228,068	949,938	654,681	666,063	434,703	327,719	1,701,039	1,296,837	809,224	411,022
	Pressure, psia	658.4	602.6	552.3	677.0	642.9	426.0	413.6	333.7	241.9	271.8	224.1	194.9	530.0	421.8	319.4	216.9
	Temperature, F	855.5	797.2	727.5	871.5	701.8	738.9	738.2	748.7	758.7	799.2	766.1	732.8	711.8	729.8	730.3	762.7
	Enthalpy, Btu/lb	1,328.1	1,356.0	1,386.8	1,335.7	1,340.4	1,382.0	1,382.9	1,392.6	1,402.3	1,422.0	1,407.0	1,391.2	1,391.9	1,377.9	1,383.6	1,400.4
Cold Reheat Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	2,800	13,136	3,289	0	0	0	0	479
	Temperature, F	355.1	362.9	361.6	343.3	350.8	344.1	323.6	328.9	320.7	317.6	322.9	310.0	290.8	277.0	258.7	248.1
Final Cold Reheat Steam after Conditioning	Flow, lb/h	2,211,021	2,007,146	1,763,184	2,201,732	2,174,113	1,347,089	1,228,068	949,938	657,490	679,201	438,046	327,719	1,701,039	1,296,837	809,224	411,501
	Pressure, psia	658.4	602.6	552.3	677.0	642.9	426.0	413.6	333.7	241.9	271.8	224.1	194.9	530.0	421.8	319.4	216.9
	Temperature, F (MAX 760 F)	658.5	707.2	727.6	671.5	701.8	738.9	738.2	748.7	760.0	760.0	760.0	732.8	711.8	729.8	730.3	760.0
	Enthalpy, Btu/lb	1,328.1	1,358.0	1,389.6	1,336.7	1,340.4	1,382.0	1,382.9	1,392.6	1,397.8	1,399.3	1,396.9	1,391.2	1,391.9	1,377.9	1,383.6	1,396.9
Hot Reheat Flow minus Cold Reheat Flow	Flow, lb/h	-188,334	221,230	240,729	-210,867	69,628	201,961	85,480	118,564	85,241	116,221	149,126	151,648	277,407	223,695	121,068	146,414
Reheat System dP	psi	63.4	60.2	62.7	60.8	61.9	59.5	53.6	73.6	83.9	108.9	82.1	52.9	50.8	57.4	70.6	74.9
Reheat System dP		11.36%	9.82%	9.65%	15.74%	14.29%	13.95%	22.94%	22.11%	22.29%	40.06%	36.65%	27.14%	9.90%	13.61%	22.06%	34.92%
Hot Reheat Flow	Flow, lb/h	2,024,685	2,229,376	2,043,904	1,990,865	2,263,640	1,549,140	1,313,518	1,068,542	769,922	683,284	583,887	479,367	1,978,446	1,498,532	1,032,289	566,436
	Pressure, psia (MAX 684 psia)	496.0	643.8	489.5	488.2	551.0	378.5	319.9	259.0	188.0	183.0	142.0	142.0	479.1	364.4	249.0	142.0
	Temperature, F	1,044.4	1,046.1	1,050.0	1,043.1	1,042.8	1,050.0	1,030.0	1,028.0	1,030.1	965.0	915.0	850.0	1,029.1	1,033.4	1,003.1	895.0
Differential to HP Temperature	dT, F (MAX +/- 60 F)	21.7	8.8	0.0	11.2	7.0	0.0	-7.0	-0.8	-17.0	-60.0	-60.0	-60.0	-1.3	-4.6	-10.8	-60.0
	Enthalpy, Btu/lb	1,545.1	1,544.8	1,548.1	1,544.7	1,542.8	1,551.2	1,542.4	1,542.6	1,546.7	1,512.3	1,487.0	1,463.6	1,537.3	1,542.7	1,529.8	1,476.7
INTV Pressure Loss	psi	0.0	10.8	10.0	9.7	11.0	7.6	6.4	5.2	3.8	9.3	8.0	34.9	9.6	7.3	5.0	15.4
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	5.64%	28.48%	2.01%	2.01%	10.87%
IP Turbine Exit	Flow, lb/h	2,052,837	2,256,082	2,060,498	2,019,927	2,291,451	1,566,433	1,329,313	1,078,789	778,760	690,760	589,705	483,881	2,000,245	1,516,172	1,044,020	561,961
	Pressure, psia	117.9	129.1	121.1	108.0	122.4	91.2	72.6	60.9	43.4	36.2	31.4	24.9	101.9	77.5	62.9	27.4
	Temperature, F	668.0	668.7	677.4	663.2	650.5	676.7	648.4	654.7	654.2	594.2	581.7	507.5	630.9	635.8	613.2	529.0
	Enthalpy, Btu/lb	1,362.4	1,362.1	1,366.9	1,355.5	1,363.3	1,369.2	1,356.3	1,360.1	1,360.0	1,331.0	1,315.6	1,290.9	1,344.6	1,348.7	1,339.2	1,300.1
Efficiency (INTV inlet to IPT exit)		90.81%	90.81%	90.76%	90.86%	90.87%	90.80%	90.85%	90.82%	90.83%	90.87%	88.93%	79.46%	90.90%	90.90%	90.90%	86.66%
Efficiency (INTV exit to IPT exit)		91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%	91.91%
Leaks 4&5 Leakage Flow to SSR	Flow, lb/h	1,708	1,872	1,748	1,680	1,799	1,314	1,067	885	630	540	478	368	1,821	1,137	784	422
LP Steam Admitted to STG (total)	Flow, lb/h	224,206	241,436	268,531	98,638	81,231	190,363	80,283	103,486	64,899	29,513	44,017	33,274	0	0	0	0
(upstream of LP admission CV)	Pressure, psia (MIN 76.2 psia)	121.2	133.8	124.5	112.0	125.9	93.7	76.8	78.2	78.2	78.2	78.2	78.2	56.0	45.0	32.2	27.7
	Temperature, F	669.9	647.1	627.6	676.9	677.8	902.9	911.8	577.0	536.3	569.6	540.6	527.0	288.2	274.4	264.3	246.6
	Enthalpy, Btu/lb	1,356.1	1,351.0	1,341.8	1,357.2	1,356.6	1,331.2	1,336.8	1,319.9	1,300.4	1,310.9	1,301.6	1,294.8	1,178.4	1,171.1	1,164.5	1,151.6
LP Steam Temperature Mismatch to IPT Exhaust	dT, F (MAX 108 F)	-8.6	-22.0	-40.9	23.4	28.9	-74.4	-36.6	-77.7	-116.9	-34.8	-21.1	19.6				
LP Admission CV Pressure Loss	% loss	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	7.4%	22.2%	44.5%	53.7%	59.9%	68.1%	-82.1%	-72.2%	-64.5%	1.3%
LP Turbine Inlet Steam	Flow, lb/h	2,276,334	2,494,625	2,333,281	2,114,274	2,380,893	1,756,481	1,408,538	1,181,394	842,828	719,732	634,147	516,767	1,998,747	1,514,036	1,043,236	681,638
	Pressure, psia	116.1	127.2	119.3	107.3	120.6	89.8	71.4	60.0	42.8	35.6	30.9	24.6	100.4	76.3	62.1	27.0
	Temperature, F	668.9	666.4	671.4	664.0	661.3	668.4	646.1	647.5	644.8	592.4	559.5	508.0	630.7	636.7	613.1	528.9
	Enthalpy, Btu/lb	1,362.0	1,361.0	1,364.0	1,360.0	1,363.8	1,364.2	1,364.2	1,356.9	1,356.9	1,330.2	1,314.8	1,290.3	1,344.8	1,348.7	1,339.2	1,300.1

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Bibb and Associates -- Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance -- Revision 8
Model Revision: GC561-091106-8 BJScrivner
1997 Steam Tables

Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 99 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
LP Turbine Exit	Flow, lb/h	2,275,337	2,494,625	2,333,280	2,114,273	2,380,886	1,755,478	1,408,634	1,181,392	842,826	710,732	634,147	516,767	1,998,747	1,614,035	1,043,236	681,639
	Pressure, psia	1.827	1.795	1.674	1.641	1.695	1.374	1.212	1.117	0.987	1.046	0.999	0.947	1.485	1.256	1.231	0.963
	Pressure, in. HgA	3.313	3.594	3.409	3.138	3.451	2.798	2.467	2.275	2.009	2.130	2.034	1.928	3.023	2.558	2.507	1.960
	Temperature, F	118.5	121.5	110.6	116.6	120.0	112.5	108.2	106.4	101.3	103.2	101.7	99.9	116.3	109.5	108.8	100.4
ELEP	Enthalpy, Btu/lb	1,049.2	1,047.9	1,060.2	1,047.0	1,046.2	1,056.7	1,056.8	1,062.7	1,074.2	1,074.1	1,071.2	1,067.4	1,044.0	1,052.3	1,066.8	1,066.7
UEEP	Enthalpy, Btu/lb	1,057.2	1,056.0	1,068.2	1,055.0	1,053.2	1,062.7	1,063.3	1,068.3	1,084.0	1,086.5	1,087.4	1,086.6	1,051.5	1,060.0	1,076.7	1,086.7
Exhaust Loss	Btu/lb	8.0	8.1	7.9	7.7	8.0	7.0	6.5	6.7	9.8	14.4	18.2	19.2	7.4	8.7	9.9	17.9
	Moisture @ UEEP (MIN 1.7%)	6.40%	9.64%	5.35%	6.47%	6.65%	4.60%	4.35%	3.96%	2.68%	1.70%	1.74%	1.74%	5.81%	4.82%	3.08%	1.76%
	LSE, in.	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	# ends	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Annulus Area ft2/end	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.4
	LPT Efficiency to ELEP	90.78%	90.73%	90.80%	90.68%	90.60%	90.92%	90.85%	90.99%	91.24%	90.97%	90.74%	90.37%	90.48%	90.70%	90.90%	90.62%
	LPT Efficiency to UEEP	88.48%	88.37%	88.51%	88.41%	88.28%	88.89%	88.87%	88.93%	88.07%	88.89%	88.70%	82.00%	88.24%	88.00%	87.99%	83.61%
	Annulus Velocity ft/s	741.1	760.5	740.1	724.4	742.7	677.0	613.1	589.2	464.4	396.9	336.8	287.6	705.8	633.7	461.7	368.4
	Volumetric Flow 1000 ft3/min per end	3,783	3,832	3,778	3,697	3,791	3,462	3,124	2,950	2,373	1,884	1,733	1,466	3,606	3,236	2,310	1,880
Gross Generator Output	kW	408,702	420,026	386,722	369,415	420,003	289,705	237,676	190,490	135,260	100,747	79,506	56,958	348,300	282,940	186,586	70,719
Generator NVA		430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5	430.5
Closed Cycle Cooling Water	Temperature, F	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0	106.0
Generator pf		0.842	0.975	0.806	0.976	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900	0.900
Generator Efficiency		98.52%	98.53%	98.50%	98.51%	98.53%	98.34%	98.15%	97.95%	97.16%	96.30%	95.84%	93.97%	98.46%	98.25%	97.66%	95.04%
Condenser/Circulating Water																	
Condenser Duty	MMBtu/h	2,187.8	2,413.8	2,267.1	2,038.5	2,300.7	1,726.7	1,392.8	1,179.1	857.8	734.5	647.9	529.0	1,937.9	1,488.8	1,045.6	674.3
Condenser Surface Area	ft2	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,975	137,977
Condenser Cleanliness		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Tube Velocity	ft/sec	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of Passes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Condenser TTD	Temperature, F (MIN 5 F)	18.5	16.2	17.1	18.4	17.4	13.0	10.5	8.9	6.5	5.4	5.7	5.0	14.5	11.2	9.2	6.1
LP Turbine Exit Steam to Condenser	Flow, lb/h	2,275,337	2,494,625	2,333,280	2,114,273	2,380,886	1,755,479	1,408,634	1,181,392	842,826	710,732	634,147	516,767	1,998,747	1,614,036	1,043,236	681,639
	Pressure, psia	1.827	1.795	1.674	1.641	1.695	1.374	1.212	1.117	0.987	1.046	0.999	0.947	1.485	1.256	1.231	0.963
	Pressure, in. HgA	3.313	3.594	3.409	3.138	3.451	2.798	2.467	2.275	2.009	2.130	2.034	1.928	3.023	2.558	2.507	1.960
	Temperature, F	118.5	121.5	110.6	116.6	120.0	112.5	108.2	106.4	101.3	103.2	101.7	99.9	116.3	109.5	108.8	100.4
	Enthalpy, Btu/lb	1,057.2	1,056.0	1,068.2	1,055.0	1,053.2	1,062.7	1,063.3	1,068.3	1,084.0	1,086.5	1,087.4	1,086.6	1,051.5	1,060.0	1,076.7	1,086.7
Miscellaneous STG Leaks to Condenser	Flow, lb/h	1,800	1,041	1,800	1,800	1,994	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	1,344.4	1,356.6	1,368.3	1,344.4	1,361.3	1,377.0	1,374.8	1,384.4	1,394.9	1,408.4	1,394.9	1,360.3	1,354.8	1,366.7	1,373.6	1,388.6
HRSG Drain to Condenser	Flow, lb/h	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Enthalpy, Btu/lb	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5	179.5
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Enthalpy, Btu/lb	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
Hot Reheat Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,646.1	1,646.5	1,649.1	1,646.7	1,643.8	1,652.2	1,643.4	1,643.6	1,646.7	1,613.3	1,498.0	1,464.6	1,638.3	1,643.7	1,630.7	1,477.7
LP Steam Bypassed to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(total, both units)	Enthalpy, Btu/lb	1,359.1	1,362.0	1,342.8	1,368.2	1,367.9	1,332.2	1,337.8	1,320.6	1,301.4	1,311.9	1,302.6	1,295.8	1,178.4	1,172.1	1,165.6	1,162.6
LP Turbine Exhaust Hood Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	89.2	92.4	90.7	87.5	91.1	84.6	81.2	79.4	77.5	80.8	80.4	81.0	86.9	82.1	83.4	80.5
Condenser Curtain Spray to Condenser	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Enthalpy, Btu/lb	89.2	92.4	90.7	87.5	91.1	84.6	81.2	79.4	77.5	80.8	80.4	81.0	86.9	82.1	83.4	80.5
Condenser Exit	Flow, lb/h	2,759,062	2,498,392	2,336,912	2,478,136	2,384,806	1,759,202	1,412,213	1,186,068	846,492	723,332	637,747	520,367	2,002,347	1,617,636	1,046,842	686,139
	Pressure, psia	1.827	1.795	1.674	1.641	1.695	1.374	1.212	1.117	0.987	1.046	0.999	0.947	1.485	1.256	1.231	0.963
	Pressure, in HgA (MIN 1.0 in. HgA)	3.313	3.594	3.409	3.137	3.451	2.797	2.467	2.275	2.013	2.130	2.034	1.929	3.023	2.558	2.507	1.960
	Temperature, F	118.5	121.5	110.6	116.6	120.0	112.5	108.2	106.4	101.3	103.2	101.7	99.8	116.3	109.5	108.8	100.4
	Enthalpy, Btu/lb	88.6	89.5	87.5	84.6	88.0	80.6	78.2	73.6	66.3	71.2	69.7	67.8	83.3	77.5	78.8	68.6
Condensate Pump Discharge	Flow, lb/h	2,759,062	2,498,392	2,336,912	2,478,136	2,384,806	1,759,202	1,412,213	1,186,068	846,492	723,332	637,747	520,367	2,002,347	1,617,636	1,046,842	686,139
	Pressure, psia	478.6	484.4	492.8	488.0	480.4	518.0	532.3	540.1	560.6	553.7	556.1	559.2	508.7	528.4	544.0	558.0
	Temperature, F	119.3	122.3	120.5	117.4	120.9	114.0	110.3	108.1	105.4	106.5	107.3	106.5	111.3	111.9	111.8	107.2
	Enthalpy, Btu/lb	88.4	91.5	89.6	85.7	90.2	83.4	79.7	77.5	74.9	77.0	77.0	75.8	85.8	80.7	81.3	78.7
Condensate after GSC	Flow, lb/h	2,759,062	2,498,392	2,336,912	2,478,136	2,384,806	1,759,202	1,412,213	1,186,068	846,492	723,332	637,747	520,367	2,002,347	1,617,636	1,046,842	686,139
	Temperature, F	129.0	123.2	121.4	118.3	121.8	115.3	111.8	109.6	106.0	107.1	107.9	107.1	112.7	114.0	114.0	111.0
Condensate after GSC, after Hood/Curtain Sprays	Flow, lb/h	2,759,038	2,498,394	2,336,885	2,478,144	2,384,823	1,759,218	1,412,233	1,186,072	846,506	723,334	637,745	520,362	2,002,341	1,617,633	1,046,842	686,137
	Temperature, F	129.0	123.2	121.4	118.3	121.8	115.3	111.8	109.6	106.0	107.1	107.9	107.1	112.7	114.0	114.0	111.0
Total Circulating Water	Flow, lb/h	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	122,363,832	122,363,832	122,363,832	198,800,096	198,800,096	122,363,832	122,363,832
	Flow, gpm	380,682	380,682	380,682	380,682	380,682	380,682	380,682	380,682	380,682	239,834	239,834	239,834	380,682	380,682	239,834	239,834
	Salinity, per mille	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
	Temperature, F	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Circulating Water to Condenser	Flow, lb/h	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	114,669,400	114,669,400	114,669,400	191,115,680	191,115,680	114,669,400	114,669,400
	Flow, gpm	374,693	374,693	374,693	374,693	374,693	374,693	374,693	374,693	374,693	224,756	224,756	224,756	374,693	374,693	224,756	224,756
(after CWP)	Pressure, psia	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7
	Temperature, F	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1
Circulating Water from Condenser	Flow, lb/h	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	191,115,680	114,669,400	114,669,400	114,669,400	191,115,680	191,115,680	114,669,400	114,669,400
	Temperature, F	102.9	103.2	102.4	101.2	102.6	99.8	97.7	96.8	94.8	96.5	96.8	94.9	100.6	98.2	99.6	95.3
Total Circulating Water Discharge	Flow, lb/h	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	198,800,096	122,363,832	122,363,832	122,363,832	198,800,096	198,800,096	122,363,832	122,363,832
	Temperature, F	102.9	103.2	102.4	101.2	102.6	99.8	97.9	96.7	95.1	97.1	96.4	95.4	100.7	98.4	99.8	96.8
Circulating Water Temperature Rise	dT, F	12.02	13.20	12.43	11.24	12.61	9.61	7.86	6.75	5.07	7.12	6.38	5.37	10.71	8.56	9.78	6.76
Circulating Water to Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427
	Flow, gpm	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062	15,062
	Temperature, F	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1
Circulating Water from Aux Cooling Water HX	Flow, lb/h	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427	7,684,427
	Temperature, F	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3	102.3
Aux Cooling Water HX Duty	MMBtu/h	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Miscellaneous (Blowdown, Boiler Feed Pumps)																	

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Bibb and Associates – Progress Energy Bartow Repowering Project
4x1 F-Class Combined Cycle
Estimated Performance – Revision 8
Model Revision: GC661-091106-8 BJScrivner
1997 Steam Tables

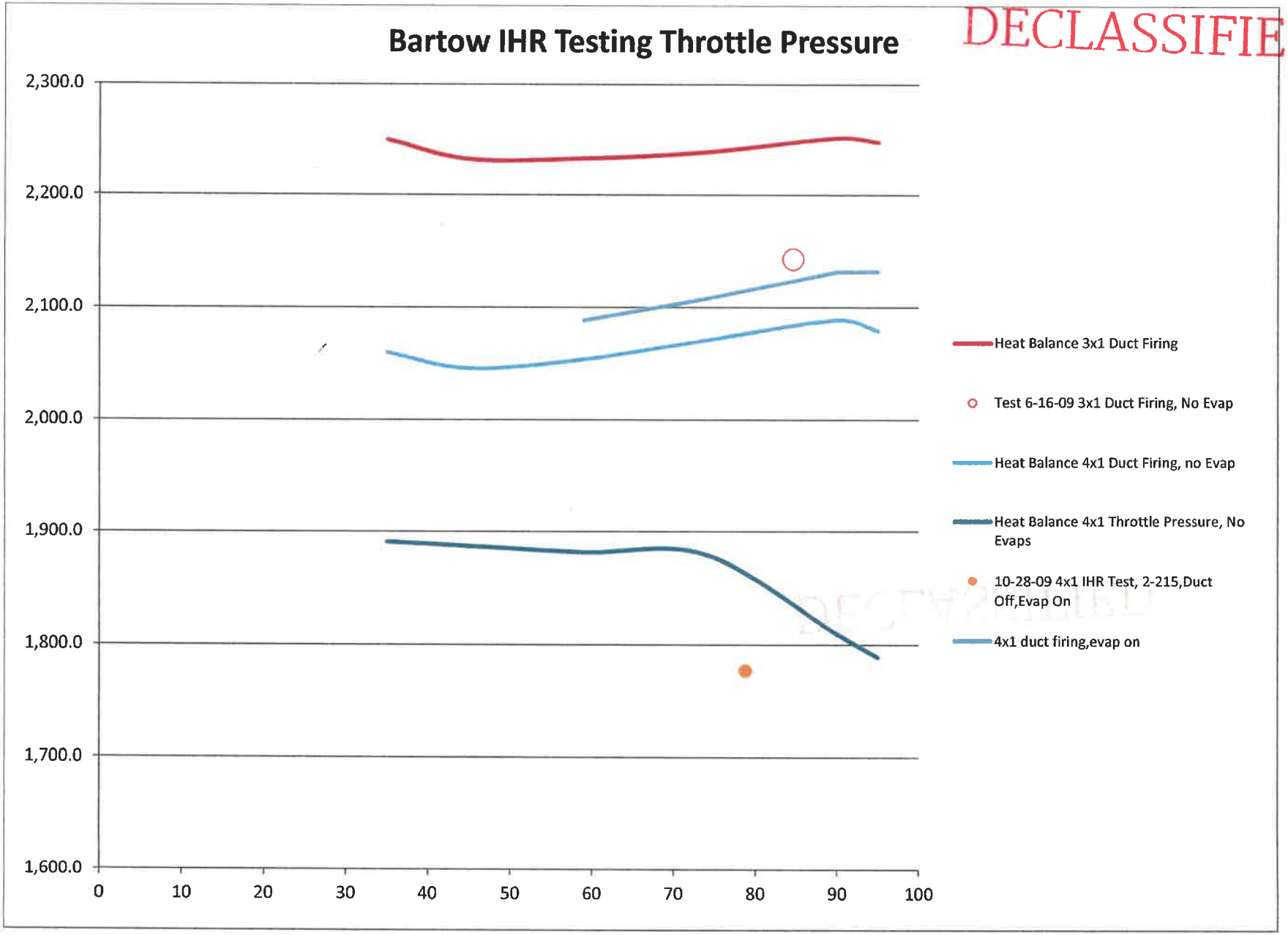
Case Name		Case 9 4x100% PAG Fired Gas Fuel 90 F/EC On	Case 159 4x100% Fired Gas Fuel 90 F/EC On	Case 29 4x100% Unfired Gas Fuel 90 F/EC On	Case 39 3x100% PAG Fired Gas Fuel 90 F/EC On	Case 49 3x100% Fired Gas Fuel 90 F/EC On	Case 59 3x100% Unfired Gas Fuel 90 F/EC On	Case 69 2x100% Fired Gas Fuel 90 F/EC On	Case 79 2x100% Unfired Gas Fuel 90 F/EC On	Case 85 2x50% Unfired Gas Fuel 90 F	Case 99 1x100% Fired Gas Fuel 90 F/EC On	Case 109 1x100% Unfired Gas Fuel 90 F/EC On	Case 115 1x70% Unfired Gas Fuel 90 F	Case 229 4x100% Unfired Oil Fuel 90 F/EC On	Case 259 3x100% Unfired Oil Fuel 90 F/EC On	Case 279 2x100% Unfired Oil Fuel 90 F/EC On	Case 309 1x100% Unfired Oil Fuel 90 F/EC On
HP Evap #1 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HP Evap #2/3/4/5 Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP Evaporator Blowdown (each)	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Makeup Flow	Flow, lb/h	480,116	26	32	360,282	123	124	79	67	66	0	0	0	0	2	6	0
	Temperature, F	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Boiler Feed Pump Suction	Flow, lb/h	833,771	594,231	617,068	793,731	764,482	522,906	686,924	540,747	390,675	692,613	692,815	487,097	600,580	605,675	523,419	586,138
	Pressure, psia	142.9	166.5	162.6	121.2	133.0	122.4	93.3	100.2	85.7	88.0	92.3	87.2	68.3	47.3	34.6	30.9
	Temperature, F	352.4	360.1	358.5	340.6	346.1	341.3	321.1	328.3	317.4	316.1	320.3	316.2	288.2	274.4	264.3	246.8
	Enthalpy, Btu/lb	326.4	332.4	330.8	311.8	319.6	312.7	291.5	297.0	287.7	286.4	290.8	286.5	257.6	243.6	223.0	214.4
IP Bleed (before CV)	Flow, lb/h	73,805	56,566	70,171	49,793	29,640	67,349	42,728	58,297	42,627	118,215	149,114	161,650	89,362	67,563	51,834	146,405
	Pressure, psia	1,046.1	1,060.4	1,109.5	912.6	944.9	1,000.3	1,003.3	1,071.8	1,116.8	982.3	1,044.4	1,096.8	1,071.8	1,087.6	1,060.6	1,044.6
	Temperature, F	566.1	562.9	561.5	543.3	550.8	544.1	523.9	528.9	520.7	517.6	522.0	519.0	490.8	477.0	466.7	448.1
	Enthalpy, Btu/lb	329.5	328.7	328.3	318.0	323.9	317.2	295.7	301.4	293.0	289.5	295.1	291.2	262.2	248.1	227.5	218.8
IP FW Control Valve Exit Pressure	Pressure, psia	586.3	607.0	671.0	548.3	610.1	462.0	396.3	347.1	244.8	273.5	288.1	229.0	568.1	461.3	340.1	270.7
	CV dP, psi	479.8	453.3	537.6	368.1	354.7	626.2	607.0	724.7	870.8	708.7	778.2	867.8	612.7	816.3	720.5	773.9
Boiler Feed Pump Discharge (before CV)	Pressure, psia	3,404.6	3,477.4	3,641.9	3,105.0	3,136.2	3,647.8	3,364.4	3,537.5	3,672.0	3,306.5	3,644.8	3,851.5	3,630.6	3,642.8	3,550.3	3,670.4
	CV dP, psi	931.0	1,208.0	1,532.7	481.2	532.9	1,038.7	1,719.5	2,277.7	2,767.4	2,332.4	2,643.2	2,840.4	1,704.5	2,063.0	2,466.1	2,787.5
Boiler Feed Pump Discharge (after CV)	Flow, lb/h	660,266	608,675	446,898	743,938	734,642	455,559	623,197	482,460	348,248	576,598	443,700	336,447	431,234	438,313	461,886	419,730
	Pressure, psia	2,473.6	2,271.4	2,009.2	2,624.6	2,602.2	1,809.1	1,644.8	1,259.7	904.6	1,063.1	931.0	811.0	1,926.3	1,946.3	1,196.1	882.9
	Temperature, F	364.4	372.0	371.8	360.7	358.4	354.8	332.8	339.2	334.7	328.0	334.9	333.5	301.6	288.3	288.5	251.1
	Enthalpy, Btu/lb	340.4	348.0	347.3	328.5	334.4	329.1	308.3	313.0	307.1	300.4	307.2	305.7	274.7	260.8	239.7	231.7
STG Bypass System																	
Total HP Steam per HRSG Unit	Flow, lb/h	660,266	608,675	446,903	743,937	734,642	455,558	623,197	482,460	348,245	576,595	443,703	336,446	431,238	438,313	461,886	419,725
	Pressure, psia	2,312.2	2,131.5	1,895.5	2,339.2	2,321.4	1,479.5	1,388.9	1,081.6	788.2	779.5	751.5	733.6	1,818.3	1,418.5	1,027.2	747.0
	Temperature, F	1,026.3	1,040.8	1,053.3	1,036.7	1,040.6	1,053.7	1,044.0	1,042.5	1,051.0	1,020.3	980.1	903.2	1,033.7	1,041.9	1,018.6	948.9
	Enthalpy, Btu/lb	1,482.0	1,496.0	1,511.8	1,488.0	1,491.0	1,523.8	1,520.5	1,528.2	1,540.9	1,524.1	1,496.4	1,460.2	1,501.8	1,518.3	1,516.0	1,485.2
HRSG HP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	2,312.2	2,131.5	1,895.5	2,339.2	2,321.4	1,479.5	1,388.9	1,081.6	788.2	779.5	751.5	733.6	1,818.3	1,418.5	1,027.2	747.0
	Temperature, F	1,026.3	1,040.8	1,053.3	1,036.7	1,040.6	1,053.7	1,044.0	1,042.5	1,051.0	1,020.3	980.1	903.2	1,033.7	1,041.9	1,018.6	948.9
	Enthalpy, Btu/lb	1,482.0	1,496.0	1,511.8	1,488.0	1,491.0	1,523.8	1,520.5	1,528.2	1,540.9	1,524.1	1,496.4	1,460.2	1,501.8	1,518.3	1,516.0	1,485.2
HP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from HP BFP)	Temperature, F	364.4	372.0	371.8	360.7	358.4	354.8	332.8	339.2	334.7	328.0	334.9	333.5	301.5	288.3	288.5	251.1
HP Steam Bypassed to Cold Reheat – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	350.0	380.0	360.0	350.0	350.0	350.0	350.0	360.0	360.0	350.0	350.0	360.0	360.0	360.0	350.0	360.0
	Temperature, F	918.7	946.8	974.6	920.9	936.7	997.0	991.0	1,005.5	1,029.4	997.5	948.8	877.5	899.0	987.0	952.6	924.8
	Enthalpy, Btu/lb	1,482.0	1,496.0	1,511.8	1,488.0	1,491.0	1,523.8	1,520.5	1,528.2	1,540.9	1,524.1	1,496.4	1,460.2	1,501.8	1,518.3	1,516.0	1,485.2
HP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total HRH Steam per HRSG Unit	Flow, lb/h	506,171	557,344	610,976	583,822	764,647	516,380	656,769	533,271	384,061	683,284	583,887	479,357	484,612	499,611	516,146	556,436
	Pressure, psia	508.6	566.3	611.2	602.4	669.4	392.3	336.7	278.0	199.7	178.8	164.9	150.5	490.3	376.7	264.6	163.6
	Temperature, F	1,046.8	1,048.5	1,052.4	1,046.7	1,046.6	1,052.5	1,033.5	1,030.7	1,032.6	987.8	917.8	852.6	1,031.5	1,035.9	1,005.6	907.7
	Enthalpy, Btu/lb	1,546.1	1,546.8	1,548.1	1,546.7	1,543.8	1,552.2	1,543.4	1,543.6	1,546.7	1,513.3	1,488.0	1,464.6	1,536.3	1,543.7	1,530.8	1,477.7
HRSG HRH Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	508.6	566.3	611.2	602.4	669.4	392.3	336.7	278.0	199.7	178.8	164.9	150.5	490.3	376.7	264.6	163.6
	Temperature, F	1,046.8	1,048.5	1,052.4	1,046.7	1,046.6	1,052.5	1,033.5	1,030.7	1,032.6	987.8	917.8	852.6	1,031.5	1,035.9	1,005.6	907.7
	Enthalpy, Btu/lb	1,546.1	1,546.8	1,548.1	1,546.7	1,543.8	1,552.2	1,543.4	1,543.6	1,546.7	1,513.3	1,488.0	1,464.6	1,536.3	1,543.7	1,530.8	1,477.7
HRH Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	120.0	123.2	121.4	118.3	121.5	116.3	111.8	109.9	108.0	111.3	111.0	111.5	117.5	112.7	114.0	111.0
HRH Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	178.8	164.9	150.5	200.0	200.0	200.0	163.6
	Temperature, F	1,031.5	1,030.5	1,037.1	1,030.7	1,027.1	1,043.1	1,028.4	1,029.5	1,032.6	987.8	917.8	852.6	1,018.7	1,026.9	1,002.4	907.7
	Enthalpy, Btu/lb	1,546.1	1,546.8	1,548.1	1,546.7	1,543.8	1,552.2	1,543.4	1,543.6	1,546.7	1,513.3	1,488.0	1,464.6	1,536.3	1,543.7	1,530.8	1,477.7
HRH Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
HRH Bypass Steam Diverted to GSC	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total LP Steam per HRSG Unit	Flow, lb/h	59,051	60,369	67,133	32,312	30,410	63,464	40,141	51,745	32,340	29,513	44,917	33,274	0	0	0	0
	Pressure, psia	133.7	145.8	141.1	116.2	129.2	109.9	85.6	80.5	82.7	80.5	83.3	81.0	56.0	45.0	32.2	27.7
	Temperature, F	863.3	850.7	832.0	579.4	680.2	606.8	614.8	580.7	541.1	561.9	543.5	529.5	288.2	274.4	264.3	246.8
	Enthalpy, Btu/lb	1,359.1	1,360.0	1,342.8	1,338.2	1,367.8	1,332.2	1,337.8	1,330.6	1,301.4	1,311.9	1,302.6	1,295.8	1,176.4	1,172.1	1,186.5	1,162.6
HRSG LP Steam Bypassed – CV Inlet	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pressure, psia	133.7	145.8	141.1	116.2	129.2	109.9	85.6	80.5	82.7	80.5	83.3	81.0	56.0	45.0	32.2	27.7
	Temperature, F	863.3	850.7	832.0	579.4	680.2	606.8	614.8	580.7	541.1	561.9	543.5	529.5	288.2	274.4	264.3	246.8
	Enthalpy, Btu/lb	1,359.1	1,360.0	1,342.8	1,338.2	1,367.8	1,332.2	1,337.8	1,330.6	1,301.4	1,311.9	1,302.6	1,295.8	1,176.4	1,172.1	1,186.5	1,162.6
LP Bypass Steam Desuperheating Flow	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(from Condensate)	Temperature, F	120.0	123.2	121.4	118.3	121.5	116.3	111.8	109.9	108.0	111.3	111.0	111.5	117.5	112.7	114.0	111.0
LP Steam Bypassed to Condenser – CV Exit	Flow, lb/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(per HRSG unit)	Pressure, psia	133.7	145.8	141.1	116.2	129.2	109.9	85.6	80.5	82.7	80.5	83.3	81.0	56.0	45.0	32.2	27.7
	Temperature, F	863.3	850.7	832.0	579.4	680.2	606.8	614.8	580.7	541.1	561.9	543.5	529.5	288.2	274.4	264.3	246.8
	Enthalpy, Btu/lb	1,359.1	1,360.0	1,342.8	1,338.2	1,367.8	1,332.2	1,337.8	1,330.6	1,301.4	1,311.9	1,302.6	1,295.8	1,176.4	1,172.1	1,186.5	1,162.6
LP Bypass Control Valve Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
LP BYP Condenser Sparger Pipe Pressure Loss	dP, psi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

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9,622	Heat Balan Test 6-16-(4x1, Duct Off,Evap on			
109,865		74	84.6	78.8
120,085		2238	2143	1777
119,487				
598				

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mbtu/h	Btu/h	Btu/scf	scf/h	Btu/Lbm	Lbm/H
57.1	57100000	1040	54903.85	20800	2745.192
62.5	62500000	1040	60096.15	20800	3004.808
293.6	2.94E+08	1040	282307.7	20800	14115.38
321.6	3.22E+08	1040	309230.8	20800	15461.54

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Attached are the GEII answers to questions that Duke Energy had asked on January 5, 2018 regarding our proposal #1188106 Rev. 0, issued 12/15/2017 for the retrofit of the low pressure section of Unit 4S steam turbine at the Bartow station.

1) Duke Questions: Can you provide an exhaust loss curve and/or thermal kit?
    a. GE Response: Attached is an Exhaust loss curve. A thermal kit will be developed during the final design phase of the project.



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2) Duke Question: Can you provide the last stage blade geometry and annulus area of your design
    a. GE Response: Last stage blade geometry:
        i. LSB active length – 40.2 in.
        ii. LSB pitch diameter – 101.9 in.
        iii. LSB annulus area / end – 89.38 sqft.
3) Duke Question: Can you provide additional heat balance data at low load condition. This will help verify that our model is tracking well.
    a. GEII Response: Low load heat balance attached. This HB was generated using low load operational data provided by Duke Energy.



4) In addition, due to updates to the GE turbine model, and GE switching from 1967 to 1997 steam properties, the Heat Balances referenced in "Section 5-LP Turbine Performance Upgrade" of the proposal have changed—the GE Guarantee has not changed. The actual Heat Balances are contained in the proposal Section 10-Attachments to the Technical Proposal". The updated heat balances are attached here. The primary changes is that the new Heat Balance numbers have a "B" at the end, whereas the originals, contained in the proposal, had an "A" at the end. There are minor data changes on the "B" heat balances. All Heat Balance references in the GEII Proposal should be changed to those that end in a "B" (with the same base #).

    Updated Post Retrofit HB's:



    Updated PreRetrofit HB's"



1.2 *DESIGN CRITERIA*

1.2.1 GENERAL

The power plant is designed based on site conditions described in this O&M manual. The actual power plant performance may change from the guaranteed performance due to actual site conditions such as cooling water temperature, condenser vacuum etc.

The power plant is designed primarily for long term continuous duty operation at base load but is also capable of daily cycling duty operation. The equipment is designed to operate over a range of specified site conditions and these conditions are identified in the following sections.

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1.2.2 SITE CONDITIONS

Meteorological Data

Ambient Dry Bulb Temperatures	Maximum: 95°F Average: 74°F Minimum: 35°F
Relative Humidity	Average: 80 %
Barometric Pressure	Design: 14.7 psia
Site Elevation	13 ft (AMSL)
Seismic Zone	0 UBC
Precipitation	Annual average in one year: 49 Inches Maximum un 24-hours : 13 Inches (100 Year event)
Ground snow load	0 pounds per square foot
Wind velocity	130 mph
Frost load	0 Inches

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1.2.3 CODES AND STANDARDS

In general, the design, manufacturing methods and testing methods of the Steam turbine and auxiliaries will conform to the following codes and standards in effect on the date of contract signing; If any other codes and standards are required due to local or governmental requirements, then the Operator must conform the equipment to the appropriate variances.

1.2.3.1 GENERAL CODES AND STANDARDS FOR EQUIPMENT IN PLANT

JAPANESE CODES AND STANDARDS

JIS, JEC, JEM, JCS, JCMAS, JASS, AIJ, RIIS and METI (old MITI) Code

OTHER CODES AND STANDARDS

ACI, AISC, ANSI, API, ASME, ASTM, BS, DIN, FEM, HEI, ICEA, IEEE, NEC, NEMA, NFPA, TEMA and UL

In addition to the above standards, other International Standards like ISO, manufacturer's standards and country or origin standards will be applied.

1.2.3.2 MANUFACTURER'S STANDARDS

Unless otherwise specified, manufacturer's standard design, materials, sub-venders' etc. will be applied to the plant as much as applicable.

1.2.3.3 STEAM TURBINE

- ASME, ANSI, ASTM, JIS, JSME, JEC, JEM, IEC, API, HEI, TEMA, NEMA/IEEE and MS

1.2.3.4 OTHER AUXILIARY EQUIPMENT

- ASME, ANSI, ASTM, AWWA, API, AWS, ASHRAE, AFBMA, HEI, HI, MSS, TEMA, PFI, SMACNA, SSPC, GGS, AMCA and MS1.2.3.5 GENERATOR AND ELECTRICAL EQUIPMENT
- IEC, ANSI, IEEE, NEMA, JIS, JEC, JEM, RIIS and MS (MELCO)

1.2.3.6 INSTRUMENT AND CONTROL

JIS, JEC, JEM, IEC, JEAC or equivalent US standards will be applied.

The steam turbine package control system philosophy, control concept, protection, monitoring, supervising and number of sensors etc., will be as per MHI standards.

1.2.3.7 HAZARDOUS AREA CLASSIFICATION

Hazardous classification is done as per API RP500-1998.**1.2.3.8 NOISE EMISSION**

- ASME B 133.8 Procedure A for sound level tests

1.2.3.9 ABBREVIATIONS

Abbr.	Codes & Standards
MS	Manufacturers' Standard (MHI standards and MHI's sub-suppliers' standards)
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AIJ	Architectural Institute of Japan[情報サービス課1]
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standard Institute
API	American Petroleum Institute
ASCE	American Society for Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BS	British Standard
DIN	Deutsches Institute für Normung (Deutsche Normen)
FEM	Fédération Européenne de la Manutation
GGS	Compressed Gas Association
HEI	Heat Exchange Institute Standards
HI	Hydraulic Institute Standards
ICEA	Insulated Cable Engineers Association
IEC	Intentional Electro-technical Committee
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Organization for Standardization
JASS	Japanese Agricultural Standard Specification
JCMAS	Japan Construction Mechanization Association Standard
JCS	Japan Cable Makers' Association Standard
JEAC	Japan Electric Association Code
JEC	Japanese Electro-technical Committee
JEM	Japan Electrical Manufacturer's Association
JIS	Japanese Industrial Standard

Abbr.	Codes & Standards
JSME	Japan Society Mechanical Engineering
METI	Ministry of Economy, Trade and Industry (Japan)
MSS	Standard Practices of the Manufacturers Standardization Society of the Valve and Fittings Industry
NEC	National Electric Code
NEMA	National Electric Manufacturer's Association
NFPA	National Fire Protection Association
PFI	Pipe Fabrication Institute
RIIS	The Research Institute of Industrial Safety (Japan)
SMACNA	Sheet Metal and Air-Conditioning Constructors Associations
SSPC	Steel Structure Painting Council
TEMA	Tubular Exchanger Manufacturers Association
UL	Underwriters Laboratories

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1.2.4 CUSTOMER SUPPLIED CONNECTIONS

1.2.4.1 STEAM PURITY REQUIREMENTS

The presence of unwanted corrosive impurities in steam can cause damage to turbine components by corrosion, stress corrosion and corrosion fatigue. Deposition of impurities can also cause distress by lowering the efficiency of blades, upsetting pressure distributions and clogging seals and clearances in valves. If the extensive damage, lengthy outages and costly repairs caused by these occurrences are to be avoided, the purity of the steam throughout the turbine must be rigorously controlled. In addition, positive steps must be taken to assure that impurities from chemical cleaning procedures for plant piping and equipment do not get into the turbine.

For the best control of steam purity, continuous analysis of sodium, chlorides, cation conductivity, and oxygen, in the high pressure turbine inlet steam is recommended. If control of steam purity through the analysis of steam generator water is utilized, then the effects of chemical concentration due to mechanical and vaporous carryover, hideout, forward pumped drains and attemperation water chemistry must be known and considered. If cases where chemicals or additional water are injected into the steam after the HP inlet, additional analysis should be made of the steam beyond the point of injection to assure that the steam purity is maintained. Water injections should utilize condensate quality water.

From the point of view of steam turbine operation, ammonia, cyclohexylamine and morphaline may be used for pH adjustment.

Recommended limits for impurities commonly found in turbine steam are given in Table 1. The normal values represent MHI recommendations for reliable turbine operation. These values represent limits where the impurity concentration in steam is below its expected solubility limit everywhere in the dry regions of the turbine. The limiting conditions represent undesirable conditions which should be corrected to normal within the time periods indicated. In plants where better steam purity can be maintained, every effort should be made to do so.

MITSUBISHI HEAVY INDUSTRIES, LTD.

Steam Purity Requirements

	Normal Operations	Limiting Conditions		Notes
		Two Weeks	24 Hours	
Cation Conductivity, micro mho s/cm	< 0. 3	0.3 - 0.5	0.5 - 1.0	b, c
Dissolved Oxygen, ppb	< 10	10 - 30	30 - 100	b, c
Sodium, ppb	< 5	5 - 10	10 - 20	b, c
Chlorides, ppb	< 5	5 - 10	10 - 20	b, c
Silica, ppb	< 10	10 - 20	20 - 50	b
Copper, ppb				
Iron, ppb	< 20			a
Na/PO_4 Molar Ratio	2.3 - 2.7			a, e
Sulfites and Sulfates				d

Operation beyond the upper limits must be avoided for any duration. Immediate corrective action must be taken.

NOTES

a. Typical value, must be analyzed at least once at week.

b. Used for chemistry control by continuous direct analysis of condensed inlet steam or as recalculated from steam generator water and mechanical plus vaporous carryover.

c. Continuous analysis recommended.

d. Less than minimum detectable, must be analyzed at least once a week.

e. For units with phosphate water treatment.

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1.2.5 PLANT PERFORMANCE DATA

1.2.5.1 INDEX OF THE HEAT BALANCE DIAGRAMS

Point	GT Load	Duct Firing	Cal. Point	Drawing No.	Rev No.
Steam Turbine Generator Net Equipment Electrical Output	4x100%	OFF	Case28	KA3-0068-1	0
Steam Turbine Generator Net Equipment Maximum Electrical Output	3 x 100%	ON	Case48	KA3-0068-2	0
Steam Turbine Generator Net Equipment Minimum Electrical Output	1 x 70%	OFF	Case114	KA3-0068-3	0

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1.2.5.2 HEAT BALANCE DIAGRAMS

Refer to Annex-2.

1.2.6 ANNEX

Annex-1 Lubricant Specification for Steam and Low-Temperature Turbine Applications, MS04-MA-CL001 R0

Annex-2 Heat Balance Diagrams

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Annex-1 LUBRICANT SPECIFICATION FOR STEAM AND LOW-TEMPERATURE TURBINE APPLICATIONS, MS04-MA-CL001 R0

(Refer to section 6.1.11 of this Manual)

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Annex-2 HEAT BALANCE DIAGRAM

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Progress Energy Florida

Bartow Repowering Project

STEAM TURBINE THERMAL KIT

出図
2007. 03. 22

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CONTENT		REMARKS	PURCHASER	ORDER No.	DATE	STEAM TURBINE ENGINEERING DEPARTMENT	
DESCRIPTION	– PAGE			ITEM No.	REFERENCE	STEAM TURBINE ENGINEERING GROUP	
FIGURE	– SHEET		Bartow Repowering	6704335	17 Nov. 06	APPROVED BY	T. Suzuki
TOTAL	36 SHEET			6000	M. M.	CHECKED BY	R. Iwamoto
						DESIGNED BY	M. Makino
						DRAWN BY	--
						ISSUE	–
						DATE	17 Nov. 06

ORDER or R No.	PHOTO DATE	COPY FOR	Bluk	MPS	MELCO	高圧PM	蒸計設	製・試	試験	建設	据付	計電	プ建設	タ技タ	タ機設	タ機制	控
		*	1	1	1	1		1	1	○	1	1	1	1	1	1	

DRAWING No. T4-A7032

DEV.No R-2

MITSUBISHI HEAVY INDUSTRIES, LTD.

管理コード	T35A35172	
PA CODE	T35A3517002	

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PLAN RECORD

Rev. No	Date	DESIGNED By	CHECKED By	APPRVED By	DECRIPTION
R−0	17 Nov. 06	———	———	———	First Issue
R−1	25 Jan. 07	M. Makino	Y. Tarutani	T. Suzuki	Revised as per Bibb's comments.
R−2	15 Mar. 07	M. Makino	R. Iwamoto	[signature]	Added comment reply sheets to reply Bibb's comments (Transmittal No. 202−150).

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PROGRESS ENERGY FLORIDA
BARTOW REPOWERING PROJECT

REVIEW OF DRAWINGS					
DRAWING TITLE	DRAWING No.	REV.	STATUS	DATE OF ISSUE (Latest revision)	DATE OF DRAWING RETURN
STEAM TURBINE THERMAL KIT	T4-A7032	1	AAN	31 Jan. 2007	28 Feb. 2007

Comment No.	Bibb's COMMENTS	MHI's RESPONSE
1	Some of the correction curves changes degree of order right at the design point. 3rd to 4th or 2nd to 3rd, etc. Please explain to why a correction curve would change right at the design point.	Each equation is decided to match each correction curve with minimum discrepancy. Therefore its polynomial order doesn't have special meaning. Regarding ST back pressure correction, STG load generally increases as the back pressure decreases because the STG heat drop increases due to the low back pressure. However, the volumetric exhaust flow increases as the back pressure decreases. As shown in the curve C15-A886, the exhaust loss increases as the volumetric exhaust flow increases due to the high exhaust speed. Therefore the STG load gain decreases as the back pressure decreases. Finally, the STG load is decreased by the very low back pressure. As a result, the back pressure correction curve becomes like KA3-0068-C10A or KA3-0068-C10B.
2	Provide a sample "as tested" performance which applies all the correction equations in the subject document including detailed corrections back to the design condition for each correction parameter with a pass/fail judgment. The sample calculation will help everyone to understand how each one is applied.	We will submit the performance test procedure separately which includes the applying procedure of correction curves. However Bibb' calculation method in the sent spreadsheet is basically correct except for the Reheater and Reheater Steam Piping Pressure Drop Correction. Please refer to our reply for Comment No. 5.

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REVIEW OF DRAWINGS					
DRAWING TITLE	DRAWING No.	REV.	STATUS	DATE OF ISSUE (Latest revision)	DATE OF DRAWING RETURN
STEAM TURBINE THERMAL KIT	T4-A7032	1	AAN	31 Jan. 2007	28 Feb. 2007

Comment No.	Bibb's COMMENTS	MHI's RESPONSE
3	Provide a clarification to why there is both a flow and a pressure curve – PTC6 page 77 section 5.8.3 only supports a pressure curve.	In PTC6, the primary flow correction is not included for the Heat Rate correction. Because the Heat Rate is calculated based on the measured primary flow. However, in this project, we guarantee the STG output. The output is not calculated by the measured steam flow. Therefore, in this project, it should be corrected by the measured steam flow according to the contract.
4	1x70% heat balance should not be included in this packet.	In the contract, Minimum Load Test is required as demonstration test. 1x70% heat balance shows this operating condition. Therefore it is included in this packet. We won't separate it from this packet.

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REVIEW OF DRAWINGS					
DRAWING TITLE	DRAWING No.	REV.	STATUS	DATE OF ISSUE (Latest revision)	DATE OF DRAWING RETURN
STEAM TURBINE THERMAL KIT	T4-A7032	1	AAN	31 Jan. 2007	28 Feb. 2007

Comment No.	Bibb's COMMENTS	MHI's RESPONSE
5	Bibb has taken the heat balance values determined by MHI (Provided in the attached) and corrected cases 23, 24, and 30 to the basis condition of case 28 for the 4x100% condition and case 44 to the basis condition of case 48 for the 3x100% fired condition. As shown in the attached analysis spreadsheet, the corrections have unacceptably high inaccuracies. For the 4x100% case 28 conditions, the corrections are off by as much as 823kW for a correction of only 2,200kW. For the 3x100% case 48 conditions the corrections are off by 73kW for a correction of only 100kW. Please verify/explain.	Our calculation result for Case 23 is compared with Bibb's calculation in the next page. Bibb has a misunderstanding for the application of the Reheater and Reheater Steam Piping Pressure Drop Correction curve. The horizontal line of the correction curves KA3-0068-C9A and KA3-0068-C9B shows the difference from the guaranteed pressure drop (9.65% for Case 28, 14.25% for Case 48). Therefore the pressure drop deviation for Case 23 is -0.07% (= 9.58% - 9.65%), and the correction is 0.01% from KA3-0068-C9A equation. According to our calculation result, the deviation for Case 23 is 0.12%. The STG load difference between Case 28 and Case 23 is small, but the flow and temperature differences are relatively large. As shown in next page, the summation of absolute correction for Case 23 is 2.68%. We think the deviation 0.12% for total absolute correction 2.68% is reasonably small. Regarding Case 44, as you can see, our calculation result of STG load is rounded to the 100kW. That means each calculated load has 100kW error. Therefore, even if the total correction is very small, the deviation which is less than 100kW is inevitable.

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Added 5

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Case 23 heat balance values correction based on Case 28

	Bibb's Calculation	MHI's Calculation
Power	394000	394000
HP Steam Flow, lb/h	0.74	0.74
IP Steam Flow, lb/h	0.55	0.55
LP Admission Steam Flow, lb/h	0.17	0.17
HP Steam Pres, psia	0.02	0.02
HP Steam Temp, F	-0.35	-0.35
RH Steam Temp, F	-0.77	-0.77
LP Steam Pres, psia	0.00	0.00
LP Steam Temp, F	0.00	0.00
Reheater Pres Drop, %	-0.08	0.01
LP Back Pres, in HgA	0.07	0.07
MU Flow, lb/h	0.00	0.00
Summation of Corrections, %	0.35	0.44

Summation of absolute correction : 2.68%

Corrected Output	392623	392274
Design Power	391800	391800
Deviation, %	0.21	0.12

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BARTOW REPOWERING PROJECT

REVIEW OF DRAWINGS					
DRAWING TITLE	DRAWING No.	REV.	STATUS	DATE OF ISSUE (Latest revision)	DATE OF DRAWING RETURN
STEAM TURBINE THERMAL KIT	T4-A7032	0	AAN	21 Nov. 2006	29 Dec. 2006

Comment No.	Bibb's COMMENTS	MHI's RESPONSE
1	A curve is missing: The Turbine exhaust loss curve should be included in the thermal kit. If it has been submitted separately there should be a note or comment in the thermal kit that gives the exhaust loss curve title, date and revision that is associated with the thermal kit.	We added the exhaust loss curve.
2	When the corrections for one STG design case are used to predict the output of a different design case for the same steam turbine our experience has been to achieve a mismatch that is typically within 0.25%. In other words the correction curves for various cases are consistent with each other. When we attempt to predict 3x1 fired performance from the 4x1 unfired performance using the curves for the 4x1 unfired case the mismatch is greater than 1%. These correction curves appear to be inconsistent with respect to each other. Please correct.	3x1 fired condition is far from 4x1 unfired condition. We will never make such a wide range correction curves, and we can never guarantee such a wide range correction curves. It is Bibb's responsibility to coordinate that the performance test is carried out at close point to the heat balance condition.
3	Curve title "IP Steam Flow (IP SH Outlet)" Change to "Net IP Steam addition (includes IPSH outlet steam flow and RH interstage desuperheater spray water)".	We changed the title.

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REVIEW OF DRAWINGS					
DRAWING TITLE	DRAWING No.	REV.	STATUS	DATE OF ISSUE (Latest revision)	DATE OF DRAWING RETURN
STEAM TURBINE THERMAL KIT	T4-A7032	0	AAN	21 Nov. 2006	29 Dec. 2006

Comment No.	Bibb's COMMENTS	MHI's RESPONSE
4	Curve titles "LP Steam Pressure at LPSV inlet" and "LP Steam Temperature at LPSV inlet" Change to "LP Admission Steam Pressure" and "LP Admission Steam Temperature". LP admission steam conditions to be measured at strainer inlet.	We changed the title.
5	Provide equations for each curve or tabular data at 0.5% increments to interpolate correction value	We added equations.
6	Make-up Flow Correction to Load Delete this curve and Quantifiable cycle losses will be deducted from the steam flow of the appropriate pressure level of steam.	According to the contract, Make-up Flow Correction should be included.

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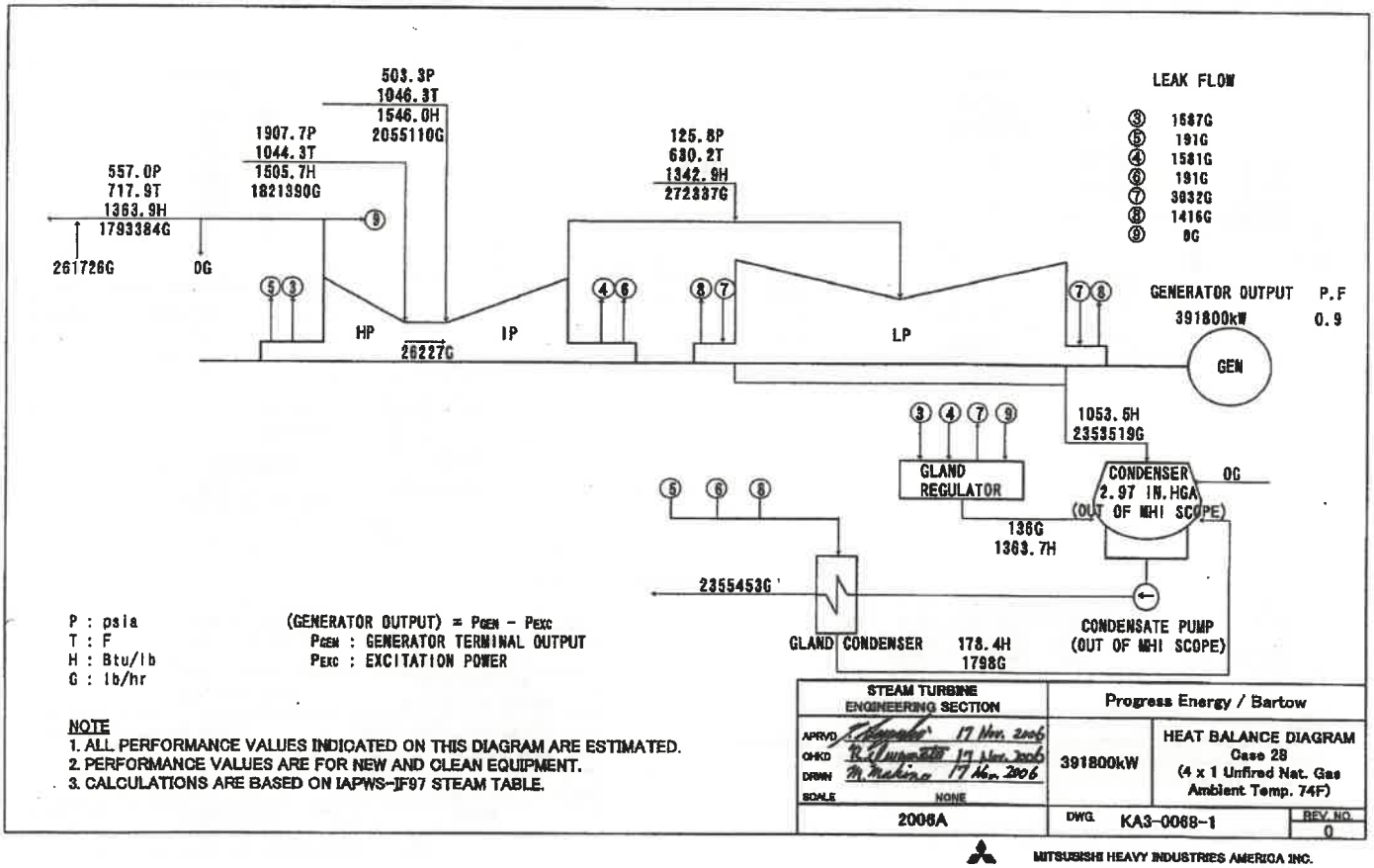
Heat Balance Diagram

Heat Balance Diagram of Steam Turbine

Point	GT Load	Duct Firing	Cal. Point	Drawing No.	Rev. No.
Steam Turbine Generator Net Equipment Electrical Output	4 x 100%	OFF	Case28	KA3-0068-1	0
Steam Turbine Generator Net Equipment Maximum Electrical Output	3 x 100%	ON	Case48	KA3-0068-2	0
Steam Turbine Generator Net Equipment Minimum Electrical Output	1 x 70%	OFF	Case114	KA3-0068-3	0

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P : psia
T : F
H : Btu/lb
G : lb/hr

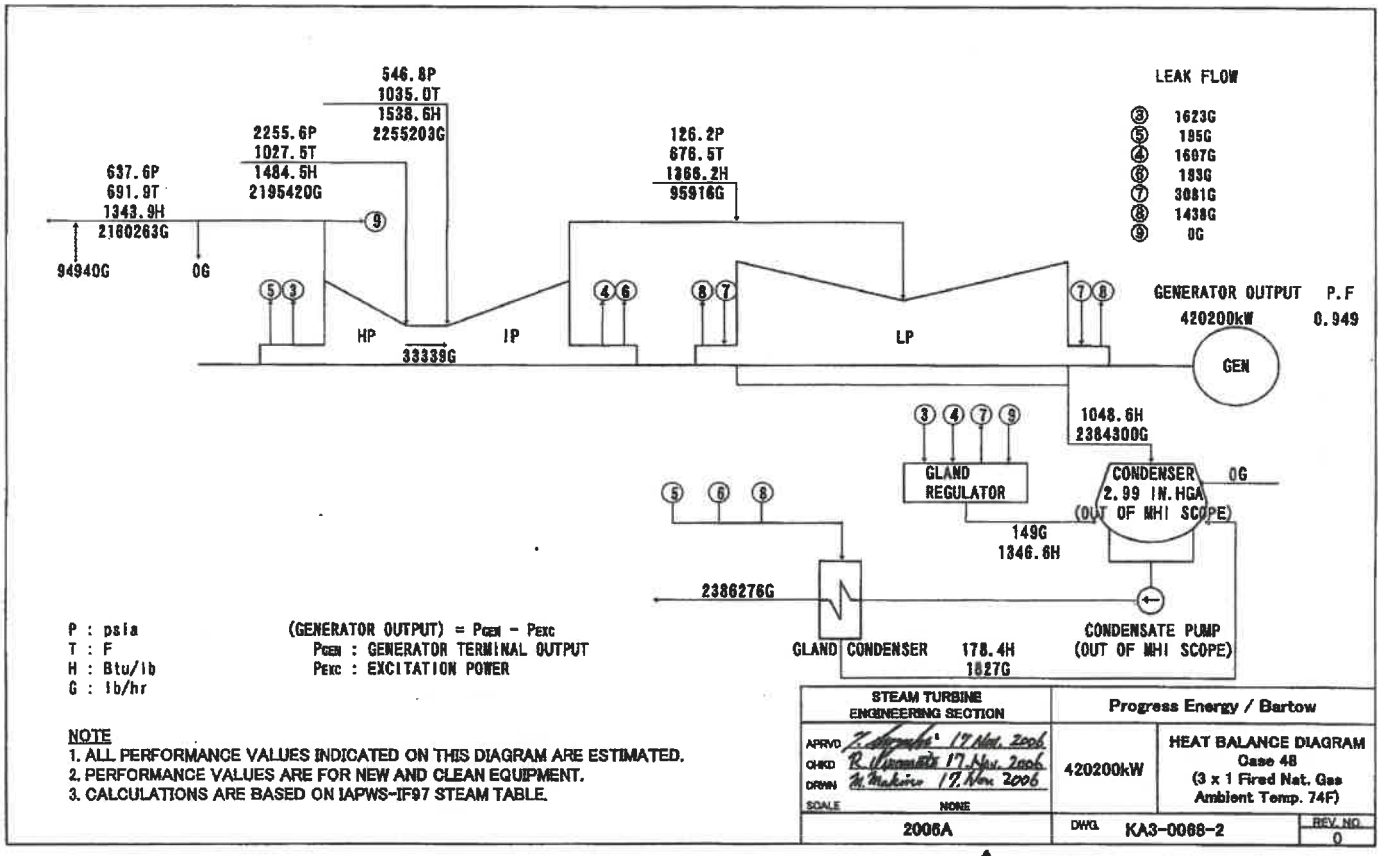
(GENERATOR OUTPUT) = P_{GEN} − P_{EXC}
P_{GEN} : GENERATOR TERMINAL OUTPUT
P_{EXC} : EXCITATION POWER

NOTE
1. ALL PERFORMANCE VALUES INDICATED ON THIS DIAGRAM ARE ESTIMATED.
2. PERFORMANCE VALUES ARE FOR NEW AND CLEAN EQUIPMENT.
3. CALCULATIONS ARE BASED ON IAPWS-IF97 STEAM TABLE.

STEAM TURBINE ENGINEERING SECTION		Progress Energy / Bartow	
APRVD	17 Nov. 2006	391800kW	HEAT BALANCE DIAGRAM Case 28 (4 x 1 Unfired Nat. Gas Ambient Temp. 74F)
CHKD	17 Nov. 2006		
DRWN	17 Nov. 2006		
SCALE NONE			
2006A		DWG. KA3-0068-1	REV. NO. 0

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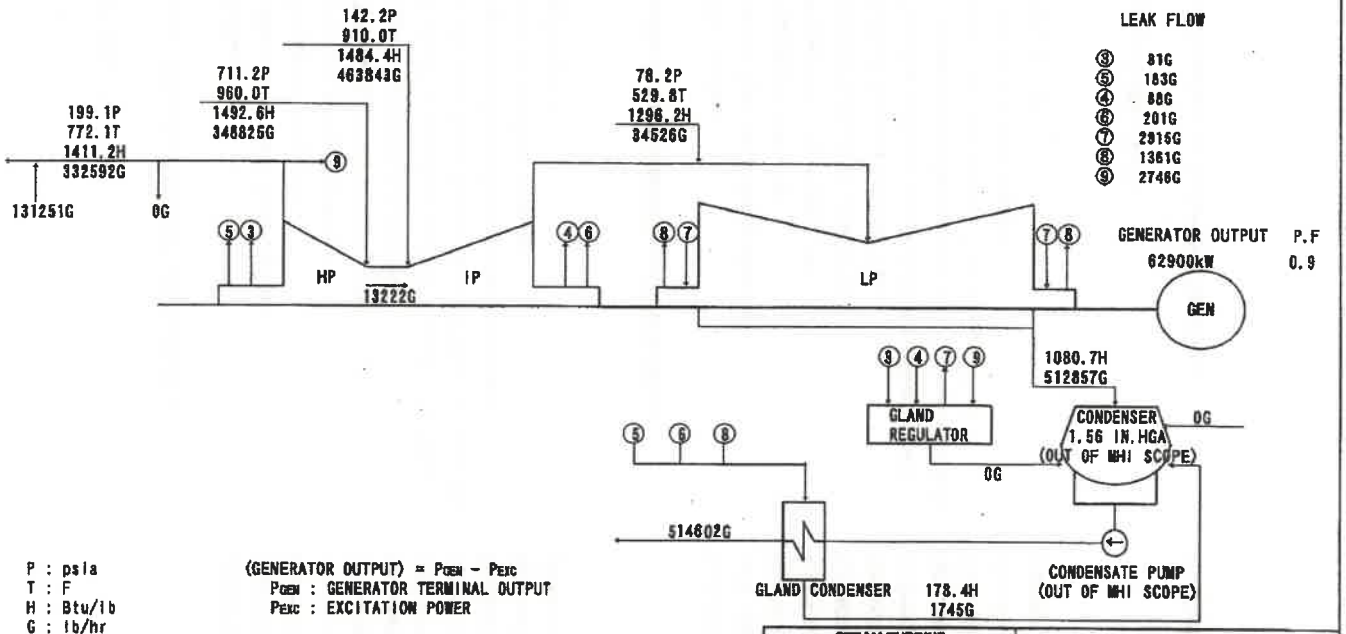


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P : psia
T : F
H : Btu/lb
G : lb/hr

(GENERATOR OUTPUT) = PGEN − PEXC
PGEN : GENERATOR TERMINAL OUTPUT
PEXC : EXCITATION POWER

NOTE
1. ALL PERFORMANCE VALUES INDICATED ON THIS DIAGRAM ARE ESTIMATED.
2. PERFORMANCE VALUES ARE FOR NEW AND CLEAN EQUIPMENT.
3. CALCULATIONS ARE BASED ON IAPWS-IF97 STEAM TABLE.

STEAM TURBINE ENGINEERING SECTION		Progress Energy / Bartow	
APRVD	T. Ogawa 17 Nov. 2006	62900kW	HEAT BALANCE DIAGRAM Case 114 (1 x 1 Unfired Nat. Gas Ambient Temp. 74F)
CHKD	R. Yamamoto 17 Nov. 2006		
DRWN	M. Nakano 17 Nov. 2006		
SCALE	NONE		
2006A		DWG. KA3-0068-3	REV. NO. 0

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Correction Curves

Correction Curves for Heat Balance No. KA3-0068-1

1) HP Steam Flow	KA3-0068-C1A
2) IP Steam Flow (Net IP Steam Addition)	KA3-0068-C2A
3) LP Admission Steam Flow	KA3-0068-C3A
4) HP Steam Pressure at HPSV inlet	KA3-0068-C4A
5) HP Steam Temperature at HPSV inlet	KA3-0068-C5A
6) RH Steam Temperature at RSV inlet	KA3-0068-C6A
7) LP Admission Steam Pressure at LP Steam Strainer inlet	KA3-0068-C7A
8) LP Admission Steam Temperature at LP Steam Strainer inlet	KA3-0068-C8A
9) Reheater and Reheat Steam Piping Pressure Drop	KA3-0068-C9A
10) Steam Turbine Back Pressure	KA3-0068-C10A
11) Make-up Flow	KA3-0068-C11A

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Correction Curves for Heat Balance No. KA3-0068-2

1) HP Steam Flow	KA3-0068-C1B
2) IP Steam Flow (Net IP Steam Addition)	KA3-0068-C2B
3) LP Admission Steam Flow	KA3-0068-C3B
4) HP Steam Pressure at HPSV inlet	KA3-0068-C4B
5) HP Steam Temperature at HPSV inlet	KA3-0068-C5B
6) RH Steam Temperature at RSV inlet	KA3-0068-C6B
7) LP Admission Steam Pressure at LP Steam Strainer inlet	KA3-0068-C7B
8) LP Admission Steam Temperature at LP Steam Strainer inlet	KA3-0068-C8B
9) Reheater and Reheat Steam Piping Pressure Drop	KA3-0068-C9B
10) Steam Turbine Back Pressure	KA3-0068-C10B
11) Make-up Flow	KA3-0068-C11B

Exhaust Loss Curve

Total Exhaust Loss v.s. Volumetric Exhaust Flow	C15-A886

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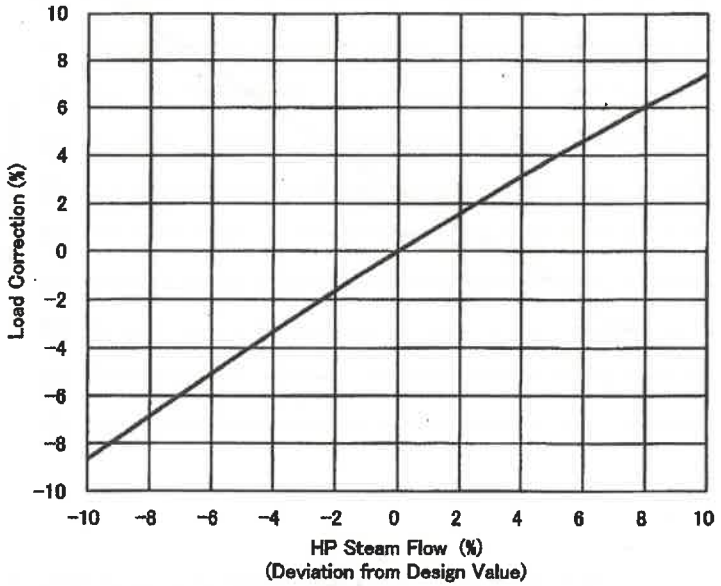
KA3-0068-C1A

HP Steam Flow Correction to Load

Equation :

$$y = -4.53 \times 10^{-5}x^3 - 6.14 \times 10^{-3}x^2 + 0.809x \quad [\ -10 \leqq x \leqq 10\ (\%)\ ]$$

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NOTE : Operating Condition (DWG No. KA3-0068-1)

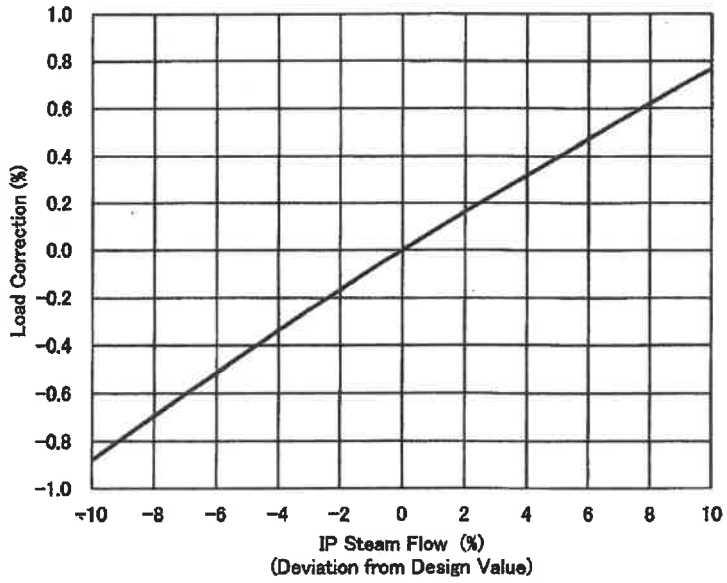
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KA3-0068-C2A

IP Steam Flow Correction to Load
(Net IP Steam Addition including desuperheater spraywater)

Equation :

$$y = 1.499 \times 10^{-6}x^3 - 5.456 \times 10^{-4}x^2 + 8.211 \times 10^{-2}x \quad [\,-10 \leqq x \leqq 10\ (\%)\,]$$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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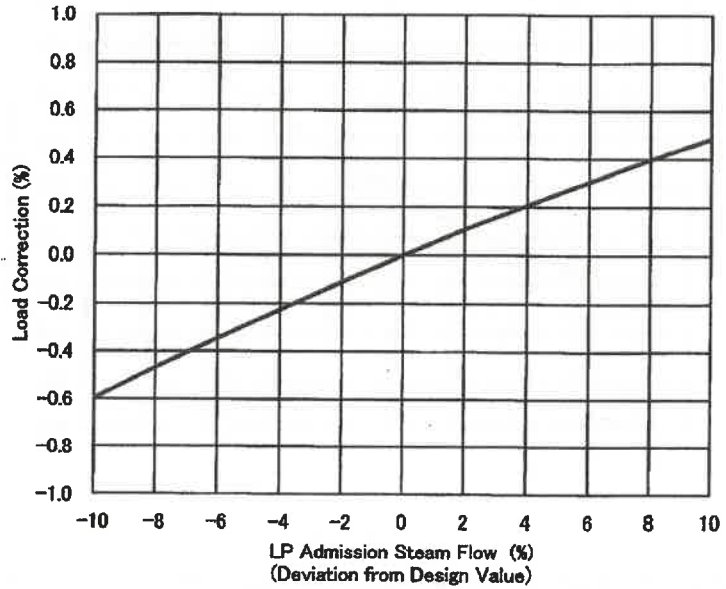
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KA3-0068-C3A

LP Admission Steam Flow Correction to Load

Equation :

$$y = -5.579 \times 10^{-4} x^2 + 5.404 \times 10^{-2} x \quad [\, -10 \leqq x \leqq 10 \ (\%) \,]$$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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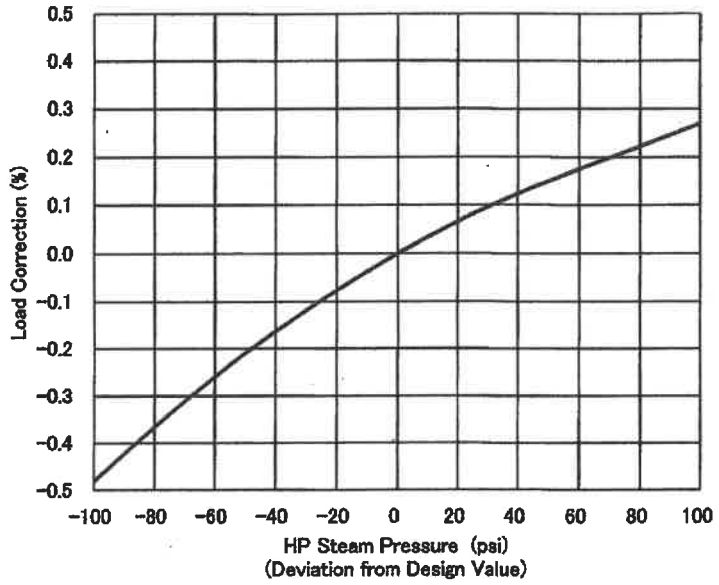
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KA3-0068-C4A

HP Steam Pressure at HPSV inlet Correction to Load

Equation :

$$y = 2.00 \times 10^{-10} x^4 + 2.00 \times 10^{-6} x^3 - 1.25 \times 10^{-3} x^2 + 3.55 \times 10^{-3} x \quad [\, -100 \leq x \leq 100 \ (\text{psi}) \,]$$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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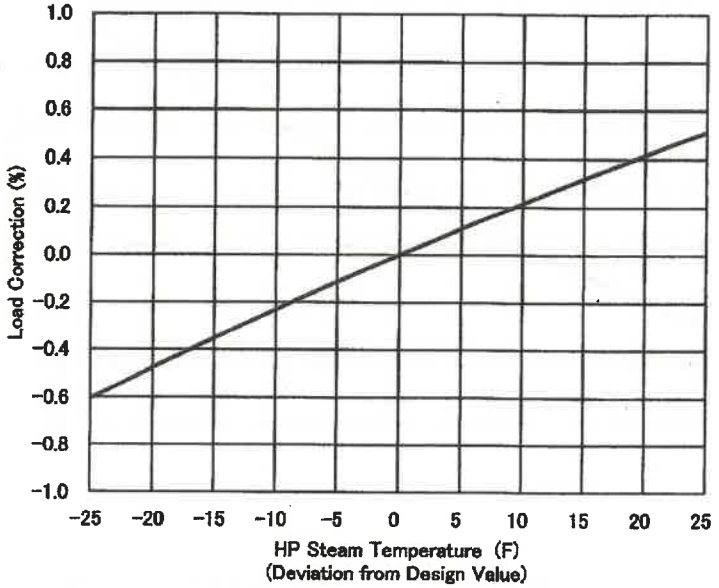
KA3-0068-C5A

HP Steam Temperature at HPSV inlet Correction to Load

Equation :

$$y = -3.273 \times 10^{-9}x^4 - 1.408 \times 10^{-10}x^3 - 7.423 \times 10^{-6}x^2 + 2.234 \times 10^{-2}x \quad [\ -25 \leqq x \leqq 25\ (F)\ ]$$

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NOTE : Operating Condition (DWG No. KA3-0068-1)

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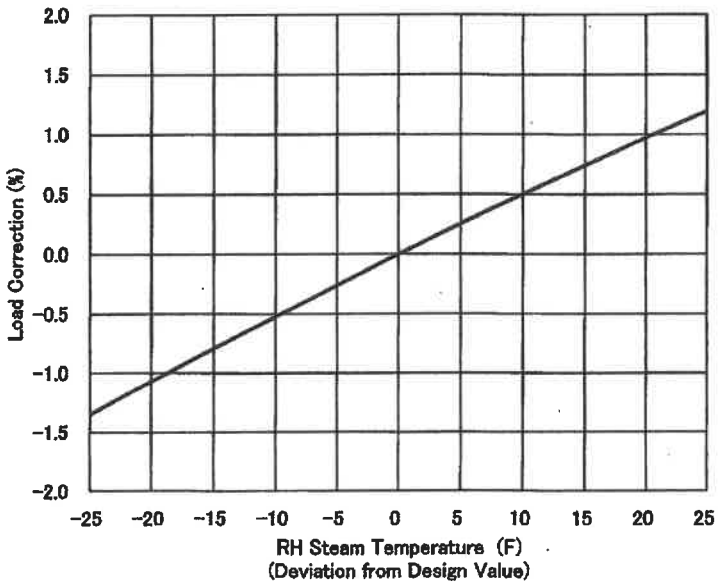
KA3-0068-C6A

RH Steam Temperature at RSV inlet Correction to Load

Equation :

$$y = -6.40 \times 10^{-7}x^3 - 1.23 \times 10^{-4}x^2 + 5.13 \times 10^{-2}x \quad [\, -25 \leqq x \leqq 25 \ (F) \,]$$

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NOTE : Operating Condition (DWG No. KA3-0068-1)

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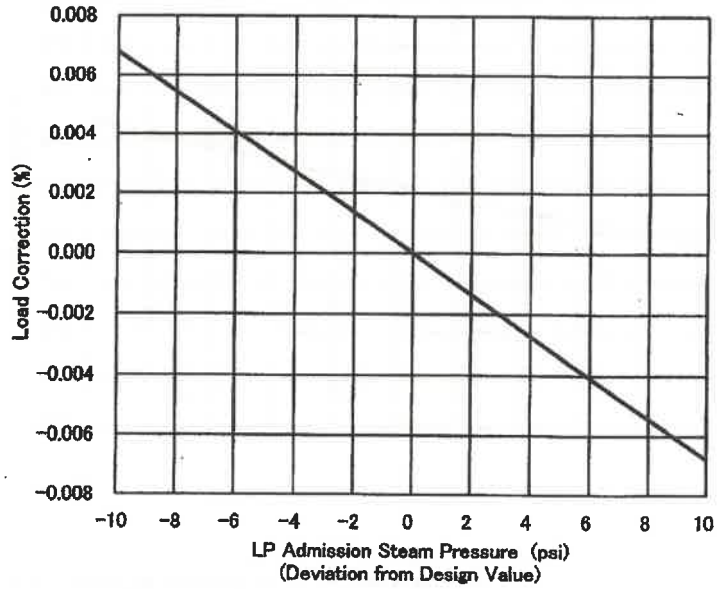
KA3-0068-C7A

LP Admission Steam Pressure Correction to Load
(at LP Steam Strainer Inlet)

Equation :

$y = -6.8 \times 10^{-4} x \quad [\, -10 \leqq x \leqq 10 \ (\text{psi}) \,]$

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NOTE : Operating Condition (DWG No. KA3-0068-1)

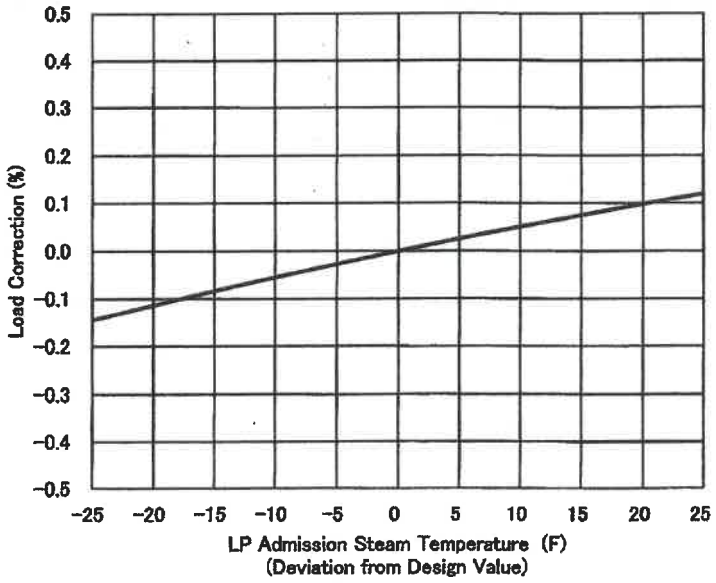
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KA3-0068-C8A

LP Steam Temperature at LPSV inlet Correction to Load (at LP Steam Strainer Inlet)

Equation :

$$y = -1.95 \times 10^{-5} x^2 + 5.30 \times 10^{-3} x \quad [\, -25 \leqq x \leqq 25 \ (F) \,]$$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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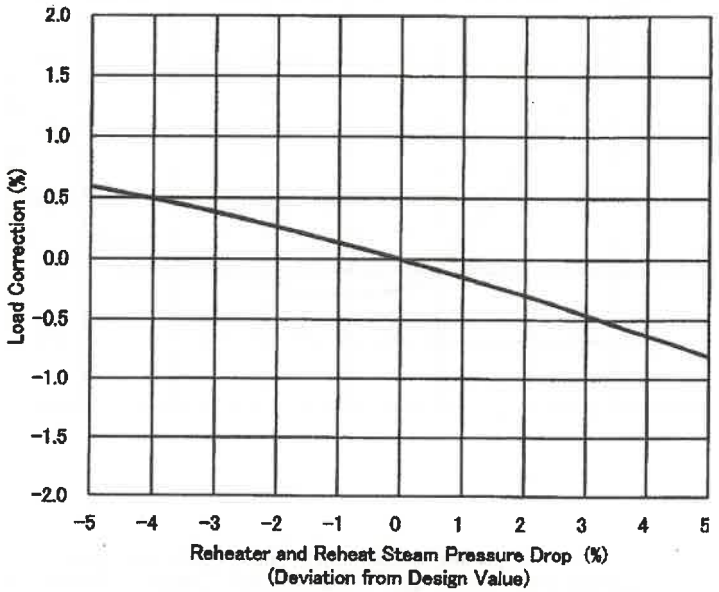
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KA3-0068-C9A

Reheater and Reheat Steam Piping Pressure Drop Correction to Load

Equation :

$$y = -4.372 \times 10^{-3}x^2 - 0.1404x \quad [\ -5 \leqq x \leqq 5\ (\%)\ ]$$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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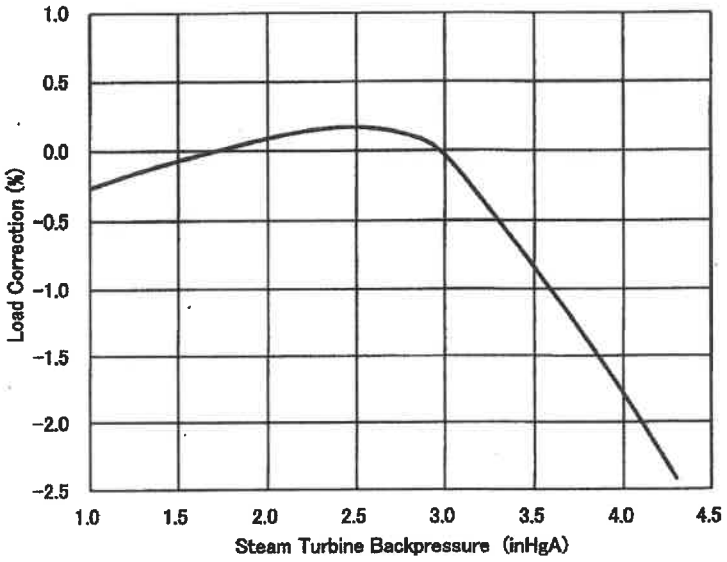
KA3-0068-C10A

Steam Turbine Back Pressure Correction to Load

Equation :

$y = -0.1045x^4 + 0.6736x^3 - 1.665x^2 + 2.204x - 1.375$ 〔 $1 \leqq x \leqq 3$ (inHgA) 〕

$y = -0.264x^2 + 9.12 \times 10^{-2}x + 2.07$ 〔 $3 < x \leqq 4.3$ (inHgA) 〕



NOTE : Operating Condition (DWG No. KA3-0068-1)

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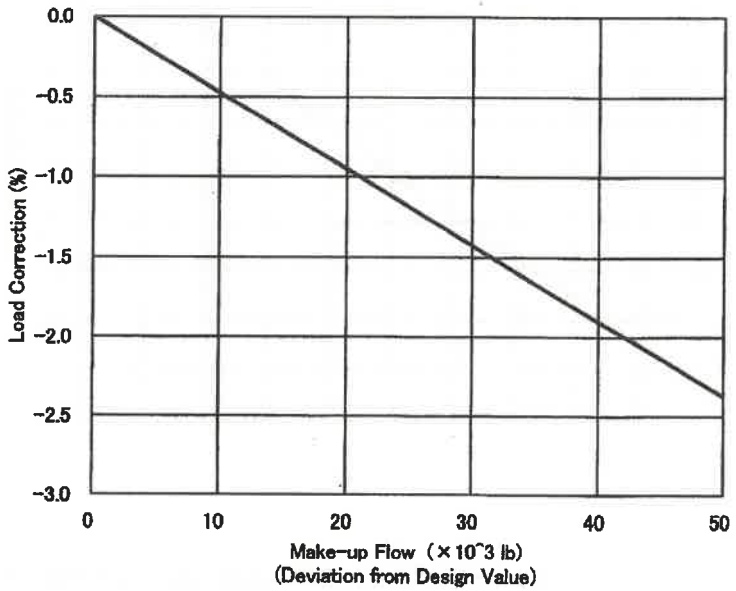
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KA3-0068-C11A

Make-up Flow Correction to Load

Equation :

$y = -4.75 \times 10^{-2} x \quad [\, 0 \leqq x \leqq 50 \ (\times 10^3 \text{ lb}) \,]$



NOTE : Operating Condition (DWG No. KA3-0068-1)

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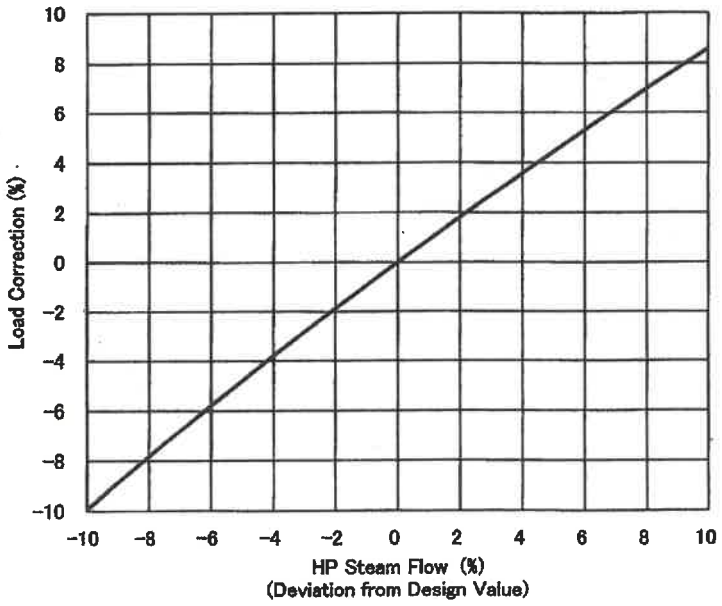
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KA3-0068-C1B

HP Steam Flow Correction to Load

Equation :

$$y = 3.98 \times 10^{-5}x^3 - 6.62 \times 10^{-3}x^2 + 0.922x \quad [\ -10 \leqq x \leqq 10\ (\%)\ ]$$



NOTE : Operating Condition (DWG No. KA3-0068-2)

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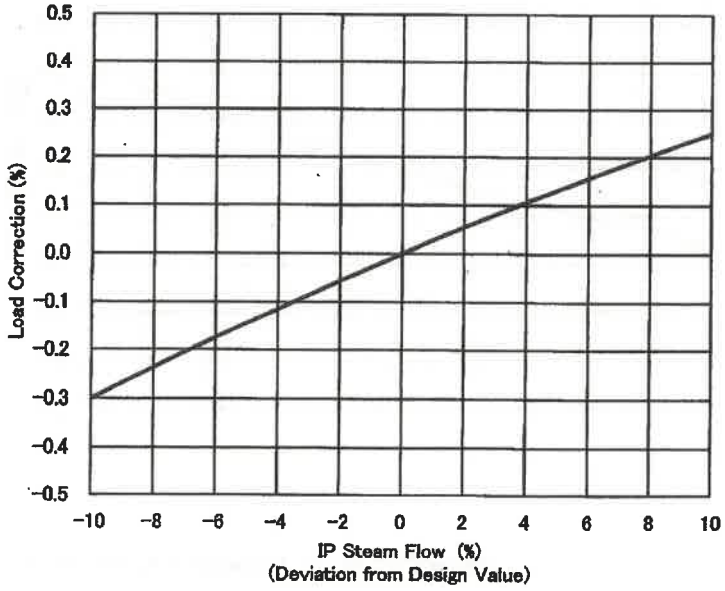
KA3-0068-C2B

IP Steam Flow Correction to Load
(Net IP Steam Addition including desuperheater spraywater)

Equation :

$$y = -3.140 \times 10^{-7} x^3 - 2.567 \times 10^{-4} x^2 + 2.758 \times 10^{-2} x \quad [\, -10 \leqq x \leqq 10 \ (\%) \,]$$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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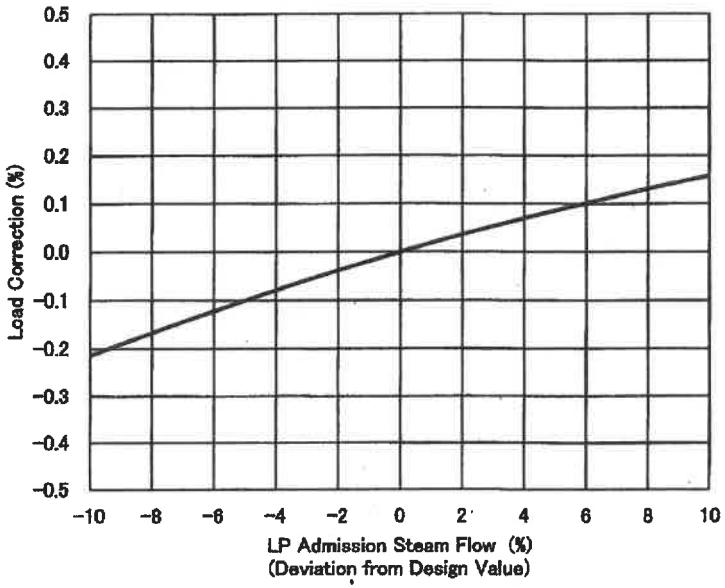
KA3-0068-C3B

LP Admission Steam Flow Correction to Load

Equation :

$y = -2.817 \times 10^{-4}x^2 + 1.856 \times 10^{-2}x \quad [-10 \leqq x \leqq 10 \ (\%)]$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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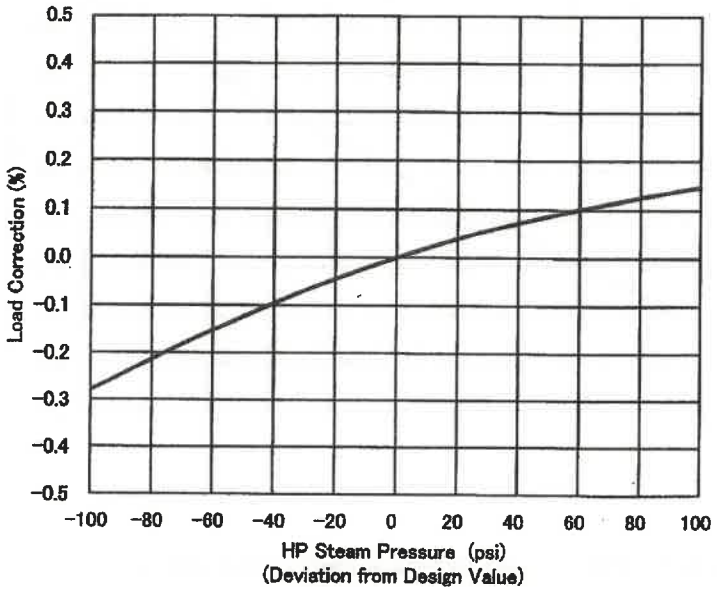
KA3-0068-C4B

HP Steam Pressure at HPSV inlet Correction to Load

Equation :

$$y = 6.33 \times 10^{-11} x^4 + 4.22 \times 10^{-9} x^3 - 7.26 \times 10^{-6} x^2 + 2.09 \times 10^{-3} x \quad [\, -100 \leqq x \leqq 100 \ (\text{psi}) \,]$$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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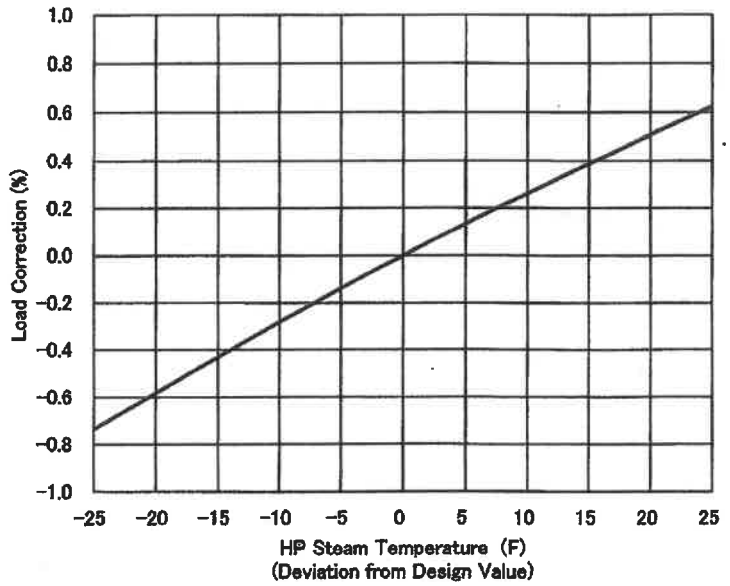
KA3-0068-C5B

HP Steam Temperature at HPSV inlet Correction to Load

Equation :

$$y = 1.428 \times 10^{-8}x^4 + 1.010 \times 10^{-7}x^3 - 9.940 \times 10^{-5}x^2 + 2.721 \times 10^{-2}x \quad [\ -25 \leqq x \leqq 25\ (F)\ ]$$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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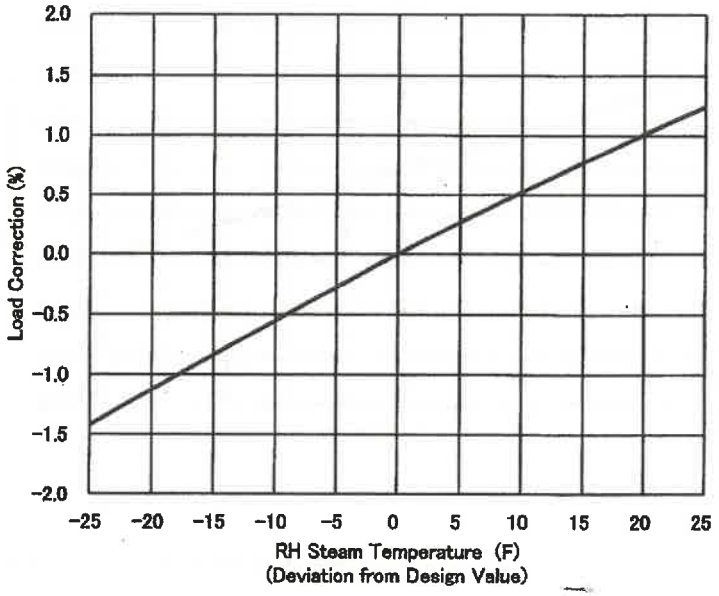
KA3-0068-C6B

RH Steam Temperature at RSV inlet Correction to Load

Equation :

$$y = -1.11 \times 10^{-6}x^3 - 1.44 \times 10^{-4}x^2 + 5.39 \times 10^{-2}x \quad [\ -25 \leqq x \leqq 25\ (F)\ ]$$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

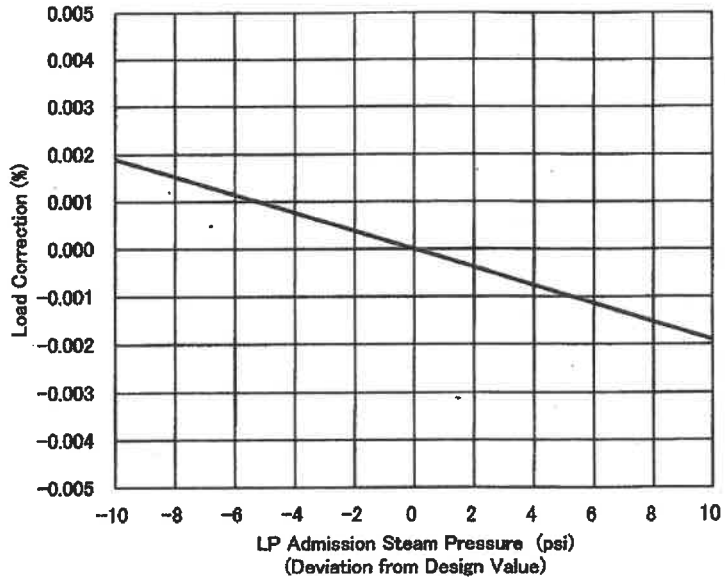
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KA3-0068-C7B

LP Admission Steam Pressure Correction to Load (at LP Steam Strainer Inlet)

Equation :

$y = -1.9 \times 10^{-4} x \quad [\, -10 \leqq x \leqq 10 \ (\text{psi}) \,]$



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NOTE : Operating Condition (DWG No. KA3-0068-2)

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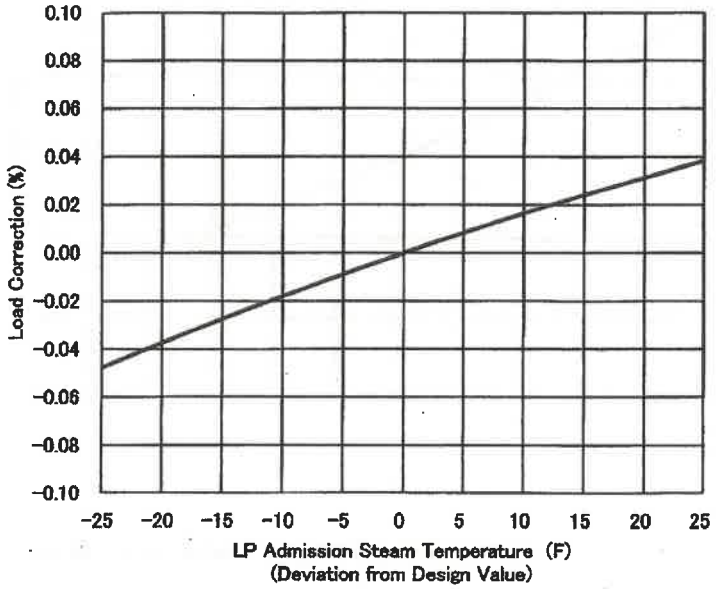
KA3-0068-C8B

LP Steam Temperature at LPSV inlet Correction to Load
(at LP Steam Strainer Inlet)

Equation :

$$y = -7.48 \times 10^{-4} x^2 + 1.72 \times 10^{-3} x \quad [\, -25 \leqq x \leqq 25 \ (F) \,]$$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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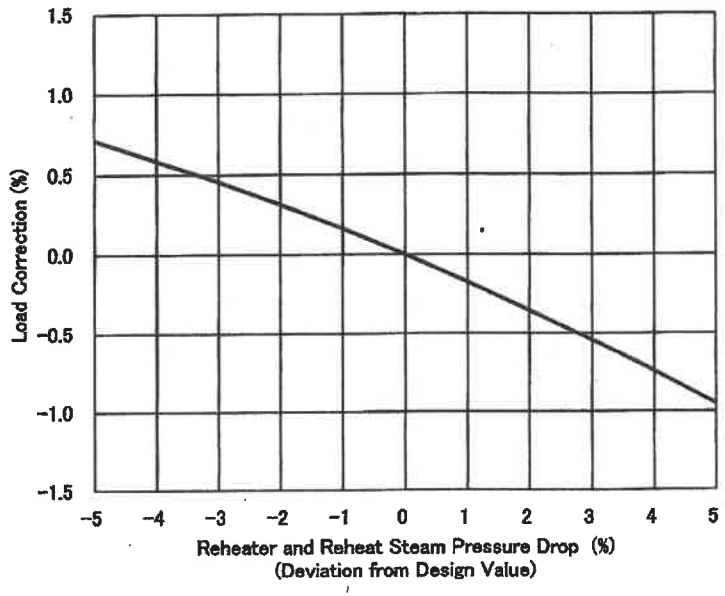
KA3-0068-C9B

Reheater and Reheat Steam Piping Pressure Drop Correction to Load

Equation :

$y = -4.791 \times 10^{-3}x^2 - 0.1666x \quad [\, -5 \leqq x \leqq 5 \ (\%) \,]$

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NOTE : Operating Condition (DWG No. KA3-0068-2)

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KA3-0068-C10B

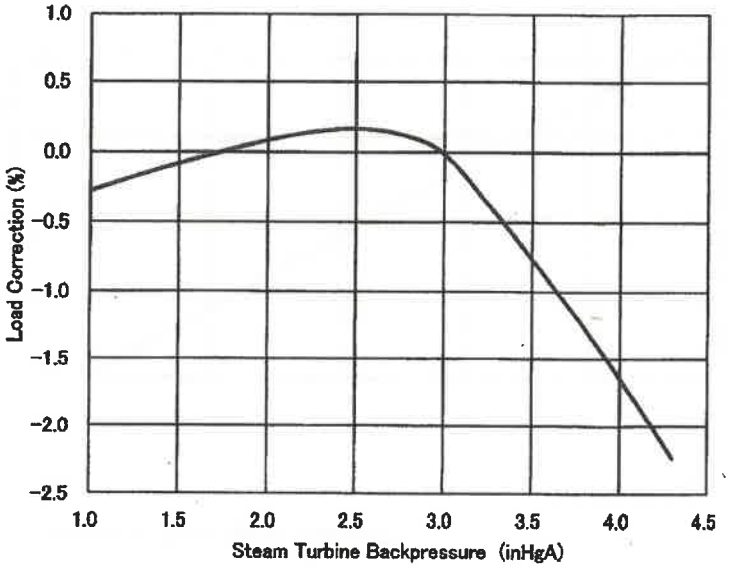
Steam Turbine Back Pressure Correction to Load

Equation :

$y = -8.759 \times 10^{-2}x^4 + 0.5459x^3 - 1.313x^2 + 1.791x - 1.213$ 〔 $1 \leqq x \leqq 3$ (inHgA) 〕

$y = -0.246x^2 + 8.01 \times 10^{-2}x + 1.97$ 〔 $3 < x \leqq 4.3$ (inHgA) 〕

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NOTE : Operating Condition (DWG No. KA3-0068-2)

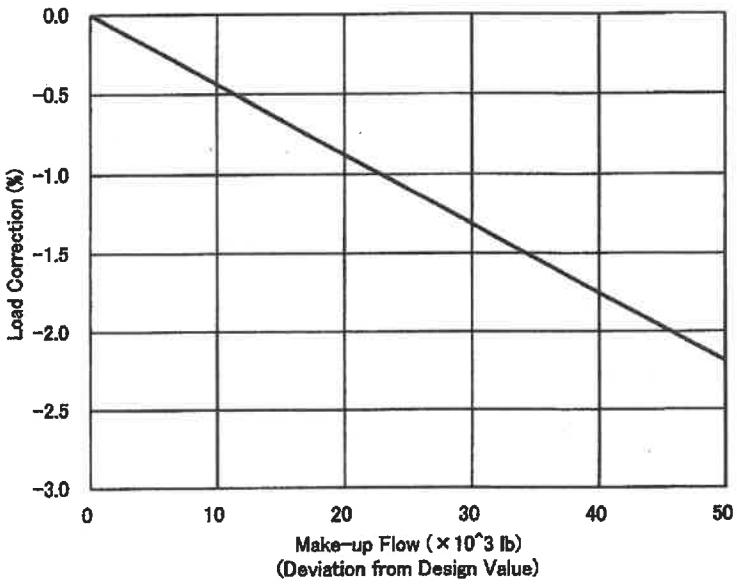
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KA3-0068-C11B

Make-up Flow Correction to Load

Equation :

$y = -4.38 \times 10^{-2} x \quad [\, 0 \leqq x \leqq 50 \ (\times 10^3 \text{ lb}) \,]$



NOTE : Operating Condition (DWG No. KA3-0068-2)

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