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BUREAU OF AIR REGULATION

JEA Brandy Branch
Combined Cycle Conversion

JEA-Brandy Branch
Sufficiency Response

Manual Number JEA/BB - 003

Issued to Buck Oven

Location

BLACK & VEATCH

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Tel: (913) 458-2000

Black & Veatch Corporation

JEA
Brandy Branch Conversion Project

B&V Project 99262
B&V File 32.0500
March 27, 2001

Mr. Hamilton S. Oven
Administrator
Siting Coordination Office
Department of Environmental Protection
2800 Blair Stone Road
Tallahassee, FL 32399-2400

RECEIVED
MAR 30 2001
BUREAU OF AIR REGULATION

Re: JEA-Brandy Branch Conversion Project
Site Certification Application
FDEP File No. PA 00-43
DOAH Case No. 00-5120EPP
OGC Case No. 00-2321
Response to Statement of Sufficiency

Dear Mr. Oven:

On behalf of JEA, and as required by Chapter 403.5067(1)(a) of the Florida Statutes, Black & Veatch submits nine (9) copies of the response to the Statement of Sufficiency received from the Department on February 14, 2001. The nine copies correspond to Controlled Document copies 1–5 and 33-36 of the Site Certification Application.

The Final Order Granting the Petition to Determine the Need for the conversion project was issued by the Public Service Commission on February 28, 2001.

We appreciate the Department's cooperation and efforts during the review of the application. If you have any questions concerning the project or this submittal, please do not hesitate to call me at (913) 458-7563 or Bert Gianazza of JEA at (904) 665-6247.

Very truly yours,

BLACK & VEATCH CORPORATION

J. Michael Soltys
Site Certification Coordinator

Enclosures

cc: Bert Gianazza, JEA
Certificate of Service List

CERTIFICATE OF SERVICE

I Certify that a true and correct copy of the Response to Statement of Sufficiency was mailed to the following on this 27th day of March 2001:

Andrew Grayson, Esq., DCA	Cathy Bedel, GC, PSC
James Antista, Esq., FFWCC (2)	Sheauching Yu, FDOT
Bryan Teeple, NFRPC (2)	Clair Fancy, FDEP (4)
Greg Radlinsky, Esq., City of Jacksonville (2)	Paul Darst, DCA
William Congdon, SJRWMD	George Percy, DHR
Sandra Whitmire, FDOT	Pepe Menedez, DOH
Steve Pace, RESD (2)	Kris Kirts, FDEP (3)
Stacie Bucher, Jacksonville Public Library (2)	Doug Roberts, HGS&S (5)

bcc: Susan Hughes
Tim Perkins
Eddie Mims
Steve Moser
Lindsay Starner
Chuck Bond
Myron Rollins
Chuck Schutty
Mike Serafin
Ken Weiss
Tim Hillman
Ebenezer Gujjarapudi
Karen Kight
File/C. Graves
Law Library/J. Langois
CDC/K. Hay

Florida Department of Environmental Protection

1. *Please review and complete the chart (below) in order to clarify the Department's understanding of JEA's proposed BACT analysis for NO_X and CO. The right-hand column is intended to provide the Department with information necessary to analyze only those costs associated with the installation of an oxidation catalyst, which are over and above the cost of installing an SCR. Please specify the capital recovery factors utilized in each configuration, as they are not readily apparent (but appear to be > 0.11). It should be noted that the current version of the EPA's "OAQPS Control Cost Manual" uses an interest rate of 7% versus 9.64%. Additionally, the manual includes a 3% contingency versus the supplied 20% value. Lastly, two values within the economic analysis of the oxidation catalyst system appear suspect:*
   - *a) The annual catalyst replacement cost of $330,000 does not appear to comport with the $644,000 replacement cost and 3 year life guarantee, and*
   - *b) An annual direct cost of $31,000 is shown as a "lost power generation" cost. Although it is appropriate to calculate the cost of using additional natural gas to compensate for the power consumption resulting from the pressure drop across the catalyst bed, lost revenue should not be included in the cost analysis.*

   All of the above recommendations should be applied and the economic analysis redone.

Operating Mode	***SCR Only***	***Oxidation Catalyst***	***SCR + Oxidation Catalyst***	***Differential Cost (Over SCR) of Oxidation Catalyst***[1]
Total Purchased Equipment Costs	*$1,709,000*	*$1,139,000*	*$2,558,000*	*$849,000*
Direct Installation Costs	*$513,000*	*$342,000*	*$767,000*	*$254,000*
Total Direct Costs Less Catalyst	*$1,601,000*	*$817,000*	*$2,040,000*	*$439,000*
Assumed Catalyst Costs	*$621,000*	*$644,000*	*$1,285,000*	*$664,000*

Operating Mode	*SCR Only*	*Oxidation Catalyst*	*SCR + Oxidation Catalyst*	*Differential Cost (Over SCR) of Oxidation Catalyst*[1]
Total Indirect Capital Costs	*$820,000*	*$547,000*	*$1,229,000*	*$409,000*
Total Capital Costs	*$3,042,000*	*$2,028,000*	*$4,554,000*	*$1,512,000*
Total Direct Annual Costs	*$448,000*	*$365,000*	*$813,000*	*$365,000*
Total Indirect Annual Costs	*$433,000*	*$237,000*	*$384,000*	*??*
Total Annualized Costs	*$881,000*	*$602,000*	*$1,197,00*	*??*
Tons Pollutant Removed (TYP)	*193.3*	*209.3*	*402.6*	*209.3*
Cost-Effectiveness ($/ton)	*$4,600*	*$2,900*	*$3,000*	*??*

[1]Estimated values prior to JEA's recalculations as requested by FDEP.

Response: The FDEP table listed below has been completed per FDEP requirements. The right-hand column in the FDEP table has been filled in per their request. The total indirect annual cost has been recalculated for the SCR and oxidation catalyst alternative. The capital recovery cost in the original BACT was calculated by subtracting the SCR/Oxidation catalyst system cost from the total installed cost and then multiplied by the capital recovery factor. This has been recalculated to only multiply the capital recovery factor by the total installed cost of the SCR/Oxidation catalyst. The total annualized cost and cost effectiveness were then recalculated based on the revised indirect annual cost. The FDEP table listed below has been updated with these changes and completed per FDEP requirements. In addition, the real interest rate of 9.64 percent that was used in the BACT analysis has been changed to 7 percent that is listed in the current version of the OAQPS Control Cost Manual (Fifth edition, 1996). The FDEP table has been updated to reflect the revised annual costs and cost effectiveness for each control alternative. Furthermore, the annualized costs in the BACT have been revised for each control alternative based on a real interest rate of 7 percent and are listed in Tables 3-8, 3-10, and 3-13 at the end of this document.

Operating Mode	SCR Only	Oxidation catalyst	SCR + Oxidation catalyst	Differential Cost (Over SCR) of Oxidation Catalyst [1]
Total Purchased Equipment Costs	$ 1,709,000	$ 1,139,000	$ 2,558,000	$ 849,000
Direct Installation Costs	$ 513,000	$ 342,000	$ 767,000	$ 254,000
Total Direct Costs Less Catalyst	$ 1,601,000	$ 817,000	$ 2,040,000	$ 439,000
Assumed Catalyst Cost	$ 621,000	$ 664,000	$ 1,285,000	$ 664,000
Total Indirect Capital Costs	$ 820,000	$ 547,000	$ 1,229,000	$ 409,000
Total Capital Costs	$ 3,042,000	$ 2,028,000	$ 4,554,000	$ 1,512,000
Total Direct Annual Costs	$ 437,000	$ 349,000	$ 783,000	$ 346,000
Total Indirect Annual Costs	$ 385,000	$ 210,000	$ 516,000	$ 131,000
Total Annualized Costs	$ 822,000	$ 559,000	$ 1,299,000	$ 477,000
Tons Pollutant Removed (TPY)	193.3	209.3	402.6	209.3
Cost-Effectiveness ($/ton)	$ 2,800	$ 2,700	$ 3,200	$ 400

[1]Estimated values prior to JEA's recalculations as requested by FDEP.

The capital recovery factors were stated in Table 3-2 in the BACT analysis (Section 3.0) of the air permit application for a real interest rate of 9.64 percent. The revised capital recovery factor based on a 20-year economic life and real interest rate of 7.0 percent is 0.0944. The revised capital recovery factor of 0.3811 was used to calculate the catalyst replacement cost that was based on a 3-year guaranteed catalyst life and real interest rate of 7.0 percent. Equation 1 shows the calculation for the catalyst replacement cost that was the recommended format in the Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual (Fifth Edition, 1996). Installation cost for the replacement catalyst was added to the equation based on Black & Veatch experience and estimated to be 15 percent. Sales tax and freight for the SCR/oxidation catalyst was estimated to be eight percent. Engelhard Corporation provided the oxidation catalyst replacement module cost of $664,000.

$$\text{Annual Catalyst Replacement Cost} = (\text{Catalyst Cost}) * (1.15) * (1.08) * (\text{CFR}_{\text{Based on 3 year catalyst life}}) \quad [1]$$

Therefore, the annual oxidation catalyst replacement cost was calculated to be about $314,000.

The project economic criteria used in this BACT economic analyses uses a contingency value of 20 percent as listed in the capital cost estimate example shown in the EPA BACT guidance document (March 15, 1990) on the use of the "top-down" approach to BACT determinations. The EPA document was published by the OAQPS, Air Quality Management Division Noncriteria Pollutants Program Source Review Section, March 15, 1990, and is titled, "Top Down" Best Available Control Technology Guidance Document. The example in Appendix B, Page B-5 shows a contingency of 20 percent.

The 3 percent contingency value as a function of the total purchased equipment cost suggested in the latest OAQPS Cost Control Manual (Fifth Edition, 1996) is judged to be inaccurate for SCR and oxidation catalyst systems as compared to actual values typically used in the construction field for this level of estimating. There are many potential items and uncertainties that are not captured by the cost items included in the estimate including ammonia permitting cost, ammonia suppression, changes between cost quotes and contract values, changes in operating conditions, process contingency, etc. For example, the original capital cost estimate for the Cane Island 3 plant was estimated to be $117.6 million and the current estimate to complete is $135.7 million, a 15.4 percent increase. The increase was due to increased equipment cost, scope changes, labor/wage increases, and schedule acceleration.

The OAQPS Control Cost Manual states in regards to the intended users of the manual, "Moreover, the user should be able to exercise "engineering judgment" on those occasions when the procedures may need to be modified or disregarded." The 20 percent contingency for the SCR/oxidation catalyst system is appropriate based the above discussion. Alstom Power (SCONOx system manufacturer) advised Black & Veatch that the cost associated with contingency for a SCONOx system should be approximately equal to the SCR/oxidation catalyst system. Therefore, in order for the magnitude of the cost associated with contingency to be approximately the same, Black & Veatch used 3 percent for SCONOx and 20 percent for the SCR/oxidation catalyst system. Black & Veatch does have concerns that the SCONOx contingency may be greater than 3 percent, since the technology is new and only two systems exist. However, Black & Veatch is willing to accept the "engineering judgement" put forth by Alstom Power and calculate the cost associated with contingency to be approximately the same for a SCONOx system and an SCR/oxidation catalyst system.

In addition, the Electric Power Research Institute published the document titled, NOx Emissions: Best Available Control Technology, A Gas Turbine Permitting Guidebook in November 1991 and list under NOx control cost (Page 5-5) the following text:

> "Based on experience with other cost methodology sources, the contingency factor recommended by the OAQPS Manual (3% of the total equipment cost) is a lower-bound estimate. Standard EPA guidance for pollution control costing is a contingency factor of 10 to 50% of the sum of direct and indirect costs. (10) A contingency

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(10) *U.S. Environmental Protection Agency, A Standard Procedure for Cost Analysis of Pollution Control Operations: Volume I, EPA 600/8-79-018a, June 1979.*

> factor of 20% of the sum of direct and indirect costs was used in the economic analyses conducted by the EPA in support of the NSPS for industrial and small boilers and municipal waste combustors. (11, 12) Based on this range of values, it is recommended that individual utilities use the contingency factor that would normally be used in-house in procurement or rate estimation procedures, and document the validity of the factor for the case in question. The factor recommended by OAQPS should be used as a default value when more appropriate information is not available."

The lost power generation is a function of the lost capacity from the combustion turbine, operating hours and the lost power generation revenue. The lost power generation cost should be included since the owner will incur a lost of revenue that will not be recoverable. The backpressure on the combustion turbine will decrease the total power output that the owner could have sold to generate revenue. The owner will also incur a loss in revenue from the SCONOx system by consumption of steam and natural gas for the regeneration process that could have been used to operate a steam turbine and a combustion turbine. The owner will also incur a loss in revenue when the unit is offline for annual washing of the SCONOx catalyst.

2. *The PM BACT Determination for each of the CT's currently permitted at Brandy Branch was 9lb/hr for gas firing and 17 lb/hr for oil firing. Please reconcile these emissions rates with JEA's currently supplied BACT Determination of 19.8 lb/hr for gas firing and 62.1 lb/hr for oil firing.*

Response: The PM BACT determination for each of the combustion turbines at the Brandy Branch facility currently permitted to operate as a simple cycle facility is 9 lb/hr and 17 lb/hr for gas and fuel oil firing, respectively. The simple cycle BACT determination was based on PM emissions measured as the front-half only.

For the Combined Cycle Project, the PM emission rates presented in the BACT determination conservatively account for both front-half (filterable) and back-half (condensable) particulates. As mentioned in the footnotes for Table 2-1 and Table 2-2 in Section 2 of Appendix 10.7, the total PM emission rates presented in Section 3.4, and Attachment 1 to Appendix 10.7 account for the front-half PM, back-half PM, and the amount of ammonium sulfates formed in the SCR. The

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(11) *U.S. Environmental Protection Agency, Industrial Boiler SO_2 Cost Report, EPA 450/3-85-011, November 1984.*

(12) *U.S. Environmental Protection Agency, Municipal Waste Combustors – Background Information for Proposed Standards: Control of NO_x Emissions, EPA 450/3-89-27d, August 1989.*

ammonium sulfates are formed as a result of the oxidation of SO_2 to SO_3 followed by the reaction of the ammonia in the SCR with SO_3. In order to estimate the amount of PM resulting from the reaction of SO_3 and ammonia, a 10 percent conversion of SO_2 to SO_3 and a 100 percent conversion of SO_3 to ammonium sulfates was assumed for natural gas. Similarly, an 8 percent conversion of SO_2 to SO_3 and a 90 percent conversion of SO_3 to ammonium sulfates was assumed for fuel oil firing. The conversion estimates were based on Black & Veatch experience and conservatively account for any deviations in manufacturer's data. Also, a 5 percent margin of error was added onto the manufacturer's estimates for the PM emissions from the turbines.

3. *Please confirm that the requested CO emission limits of 54.26 lb/hr (natural gas) and 72.43 lb/hr (oil) are equivalent to 12.21 ppmvd at 15% O_2 (natural gas, inclusive for supplementary firing) and 14.17 ppmvd (oil) respectively, as BACT emission limits for CO will be set on a ppmvd basis. The Department wishes to point out that recent test from TECO's Polk Power Station 7FA resulted in CO emissions of less than 1 ppmvd (gas) and less than 2 ppmvd (oil) at full load. Although contracting for CO limits between GE and its customers may not have caught up with field experience, actual results will be considered in the setting of BACT.*

Response: Performance data for each combustion turbine at 100 percent, 75 percent and 50 percent load cases at 95 F, 59 F and 20 F are presented in Attachment 1 to Appendix 10.7. As presented in the performance data spreadsheets, the CO emission limit of 54.26 lb/hr corresponds to 11.90 ppmvd @ 15%O_2 (natural gas, inclusive of supplemental firing, 100 percent load, 20 F ambient temperature). Similarly, the CO emission limit of 72.43 lb/hr corresponds to 14.24 ppmvd @ 15%O_2 (distillate fuel oil firing, 100 percent load, 20 F ambient temperature). The CO BACT analysis was based on emission estimates corresponding to full load operation at an ambient temperature 59 F. Therefore, BACT for CO was determined to be good combustion controls to achieve a CO emission limits of 0.0291 lb/MMBtu (52.6 lb/hr, 12.21 ppmvd@15% O_2) and 0.0350 lb/MMBtu (67.9 lb/hr, 14.17 ppmvd@15% O_2) for natural gas and fuel oil firing, respectively.

4. *Please confirm that the data shown in Attachment 2 "Potential-To-Emit (PTE) and Enveloped Spreadsheet" (Combined Natural Gas and Fuel Oil for two turbines) summarizes the maximum emissions of criteria pollutants considering worst-case operating scenarios and all operating modes.*

Response: The Potential-To-Emit (PTE) table presents ton-per-year emission calculations based on the 59 F (average annual temperature) case, and is used to determine the PTE and PSD applicability of criteria and HAP pollutants from the facility. The data presented in the Enveloped Spreadsheet" (Determination of Representative Emission and Stack Parameters and Potential to Emit Calculator) represent the maximum emissions of criteria pollutants for all operating scenarios and ambient temperatures, and are used in the air dispersion modeling analysis. .

5. *Please indicate the maximum gross MW capability of the combined cycle unit, and under what operating conditions this output is achieved. Please provide the same information for the maximum heat input of the CT's as well as duct burners, and the corresponding values under ISO conditions. Maximum requested heat input rates have been specified at 1910.2 MMBtu/hr (HHV natural gas) while firing duct burners and 2059.4 MMBtu/hr (HHV oil).*

Response: The following items present detailed responses to each of the items in Comment 5.

- Maximum gross plant output is expected to be 570.2 MW and occurs on the cold ambient day (20 °F) with the combustion turbine at 100% load, oil fired, and no heat recovery steam generator (HRSG) duct firing (performance case 16.) The corresponding combustion turbine generator (CTG) gross output is expected to be 190.1 MW per CTG.
- Maximum total combustion turbine heat input (per CTG) is expected to be 2059.4 MMBtu/h (HHV) and occurs on the cold ambient day (20 °F) with the combustion turbine at 100% load, oil fired (performance case 16.) The corresponding plant gross output is expected to be 570.2 MW with a CTG gross output of 190.1 MW per CTG.
- Maximum plant duct burner heat input (per HRSG) is expected to be 170.5 MMBtu/h (HHV) and occurs on the hot ambient day (95 °F) with the combustion turbine at 100% load, gas fired, no evaporative cooler in operation (performance case 1). The corresponding plant gross output is expected to be 489.6 MW with a CTG gross output of 148.5 MW per CTG.
- The maximum CTG heat input on a day with ISO conditions is expected to be 1939.3 MMBtu/h (HHV) with the combustion turbine at 100% load, oil fired (performance case 15.) The corresponding plant gross output is expected to be 546.5 MW with a CTG gross output of 179.6 MW per CTG. This assumes that the evaporative cooler is not in operation at temperatures at or below 59 °F.
- The maximum plant duct burner heat input (two HRSGs) on a day with ambient conditions of 59 °F, 60% relative humidity, is expected to be 45.7 MMBtu/h (HHV) with the combustion turbine at 100% load, gas fired (performance case 6.) The corresponding plant gross output is expected to be 534.8 MW with a CTG gross output of 170.9 MW per CTG. This assumes that the evaporative cooler is not in operation at temperatures at or below 59 °F.
- The maximum requested heat input specified at 1910.2 MMBtu/hr (HHV natural gas) occurs on a 20°F day with the combustion turbines running at 100% load (performance case 7). The maximum requested heat input at 2059.4 MMBtu/hr (HHV oil) occurs on a 20°F day with the combustion turbines running at 100% load (performance case 16). Note that these heat inputs are per HRSG.

6. *Please provide the estimated time frames required and emission levels of NO_X, CO and PM/PM_{10} during hot and cold start-up periods. The Department intends to define these levels in the setting of BACT.*

Response: The time required for a typical cold start up for the 2x1 combined cycle is 228 minutes (3 hours 48 minutes). This allows for both combustion turbines and the steam turbine to operate at base load. During this start up, emissions from each CTG are expected to be 768 lbm NO_x, 2,365 lbm CO, 179 lbm VOC, 34 lbm front half particulates, and 34 lbm back half particulates.

The time required during a typical warm start up for the 2x1 combined cycle is 129 minutes (2 hours 9 minutes). During this start up, emissions from each CTG are not expected to be more than 283 lbm NO_x, 1,360 lbm CO, 110 lbm VOC, 19 lbm front half particulates, and 19 lbm back half particulates.

The time required during a hot start up for the combined cycle is 60 minutes. During the hot start up, emissions from each CTG are expected to be 104 lbm NO_x, 652 lbm CO, 82 lbm VOC, 9 lbm for front half particulates, and 9 lbm for back half particulates.

7. *The Department requires a project specific cost estimate of $SCONO_X$ control system to be supplied by the technology provider (Alstom Power).*

Response: ALSTOM POWER E-MAIL
From: gerald.r.oegema@power.alstom.com
Sent: Thursday, February 01, 2001 2:06 PM
To: Holscherga@bv.com
Cc: ronald.r.bevan@power.alstom.com
Subject: B&V Project 099262

Greg, further to your request of January 26, 2001, please note the following.

We have evaluated the performance and emission data for the cases provided, namely the NOx emission limits of 2.0 ppmvd and 3.5 ppmvd while firing natural gas, and 15 ppmvd while firing fuel oil. The fuel oil firing case is the size controlling case, as the reduction from 42 to 15 ppmvd requires more catalyst than either of the natural gas fired cases. As a result, we are providing cost and performance data for two cases; fuel oil firing and a NOx reduction from 42 to 15 ppmvd, and natural gas firing and a NOx reduction from 9 to 2 ppmvd. Both cases provide a CO emission reduction of 90%.

Included in our scope is the SCONOx reactor including inlet and outlet dampers, all SCOSOx and SCONOx catalyst, inlet and outlet transitions to the reactor including expansion joints, regeneration gas production and distribution piping and valves, regeneration gas condensing and condensate collection system, catalyst installation and removal system, PLC control system and instrumentation, freight, as well as all engineering, design, and project management services to support the execution of the project.

Fuel Oil Firing
Budgetary Capital Cost Estimate - $ 19,800,000
Steam consumption for regen gas production - 20,500 #/hr
Natural gas consumption for regen gas production - 340 #/hr
Pressure drop through the SCONOx system - 5.3 in w.c.
O&M cost estimate, including catalyst washing - $310,000 per year
Catalyst replacement cost estimate - $230,000 per year

Natural Gas Firing
Budgetary Capital Cost Estimate - $ 15,600,000
Steam consumption for regen gas production - 19,700 #/hr
Natural gas consumption for regen gas production - 330 #/hr
Pressure drop through the SCONOx system - 3.8 in w.c.
O&M cost estimate, including catalyst washing - $310,000 per year
Catalyst replacement cost estimate - $230,000 per year

Costs provided are for one SCONOx system for each CCGT.

I trust that this meets with your immediate needs. Please contact me if you have any questions.

Regards,

Rick Oegema

Alstom Power has provided Black & Veatch with a project specific cost estimate for a SCONOx control system for the Brandy Branch Repowering Project. They provided their estimate via e-mail to Black & Veatch on February 1, 2001 and it is listed below for your reference. Mr. Rick Oegema from Alstom Power informed Black & Veatch that the fuel oil fired case would be the worst case design scenario for the project and the cost provided would include any necessary reductions during natural gas firing. Tables 3-5 and 3-6 in the BACT have been revised based on the Alstom Power budgetary quote and are attached in this document for your reference.

The direct and indirect capital costs in Table 3-5 have been revised based on the Alstom Power budgetary quote. The total direct cost excluded the catalyst replacement cost for both the SCONOx and SCR/oxidation catalyst system. The estimated catalyst costs are listed in Table 3-5 under the “Remarks” column. It should be noted that the SCONOx replacement cost is based on a 10-year life for the first layer of catalyst. The SCR/oxidation catalyst indirect costs were determined based on percentages listed in the OAQPS Control Cost Manual. The SCONOx indirect costs were adjusted based on reasonable project estimates, because if OAQPS Cost Manual percentages were applied then the indirect costs would be misrepresented.

The direct and indirect annual costs in Table 3-6 have been revised based on the Alstom Power budgetary quote. The SCR and oxidation catalyst replacement cost was calculated by equation [1] based on a 3-year life, 15 percent for installation, and 8 percent for sales tax and freight. The SCONOx catalyst replacement cost was based on $230,000 per year for catalyst over a 10-year life that corresponds to a capital recovery factor of 0.1424 (7.0 percent real interest rate), 15 percent for installation, and 8 percent for sales taxes and freight. The annual SCONOx replacement catalyst cost was then calculated by using equation [1] shown previously. The SCR/oxidation catalyst indirect annual costs were determined based on percentages listed in the OAQPS Control Cost Manual. The SCONOx indirect annual costs for overhead and administrative charges were adjusted based on reasonable project estimates, because if OAQPS Control Cost Manual percentages were applied then the indirect annual costs would be misrepresented.

Table 3-5 Combined NO_x and CO Control Alternative Capital Cost Per GE 7FA CTG/HRSG Unit.				
	$SCONO_x$ System	**SCR/ Oxidation Catalyst**	**LNB**	**Remarks**
Direct Capital Cost				Cost based on emissions in Tables 3-3 and 3-4 in BACT
SCR & Oxidation Catalyst System	N/A	1,721,000	N/A	Estimated from Engelhard Corporation.
$SCONO_x$ System (Includes catalyst)	19,800,000	N/A	N/A	Estimated from Alstom Power.
Catalyst Reactor Housing	Included	268,000	N/A	Estimated by Alstom Power & scaled from an estimate by Engelhard Corporation.
Control/Instrumentation	Included	180,000	N/A	Estimated; includes controls and monitoring equipment.
Ammonia (Storage & Handling))	N/A	200,000	N/A	Estimated from previous projects.
Purchased Equipment Costs	19,800,000	2,369,000	N/A	
Sales Tax	594,000	71,000	N/A	3% of Purchased Equipment Costs
Freight	Included	118,000	N/A	5% of Purchased Equipment Costs
Total Purchased Equipment Costs (PEC)	20,394,000	2,558,000	N/A	
Direct Installation Costs				
Balance of Plant	Included	767,000	N/A	For SCR: 8% Foundation & Supports, 14% Handling & Erection, 4% Electrical Installation, 2% Piping, 1% Insulation and 1% Painting. SCONOx bid included installation.
Total Direct Cost Less Catalyst	**20,164,000**	**2,040,000**	Base	Catalyst cost is excluded as annual O&M cost. SCR and oxidation catalyst costs are \$897,000 and \$690,000, respectively. SCONOx replacement cost estimate is \$230,000 per year, based on a 10-year life.
Indirect Capital Costs				
Contingency	612,000	512,000	N/A	For SCR: 20% of Total PEC; For SCONOx: 3% of Total PEC
Engineering and Supervision	Included	256,000	N/A	For SCR: 10% of Total PEC
Construction & Field Expense	198,000	128,000	N/A	For SCR: 5% of Total PEC; For SCONOx 2.5% of Total PEC
Construction Fee	396,000	256,000	N/A	For SCR: 10% of Total PEC; For SCONOx 5% of Total PEC
Start-up Assistance	Included	51,000	N/A	For SCR: 2% of Total PEC
Performance Test	40,000	26,000	N/A	For SCR: 1% of Total PEC; For SCONOx 0.5% of Total PEC
Total Indirect Capital Costs	**1,246,000**	**1,229,000**	Base	
Total Installed Cost (TIC)	**21,410,000**	**3,269,000**	Base	Catalyst cost is included in annual cost estimate per OAQPS guidelines.

Table 3-6
Combined NO_x and CO Control Annualized Cost Per GE 7FA CTG/HRSG Unit

	$SCONO_x$ System	SCR/Oxidation Catalyst	LNB	Remarks
Direct Annual Cost				Cost based on emissions in Tables 3-3 & 3-4 in BACT
Catalyst Replacement	41,000	608,000	N/A	Catalyst life of 3 year for SCR/Oxidation catalyst and 10 year life for SCONOx catalyst.
Operation and Maintenance	310,000	39,000	N/A	Estimated from Alstom Power & includes catalyst washing and materials. For SCR/Oxidation catalyst assumed 2 hr/day, 8,472 hr/yr at $38/hr and includes materials.
Reagent Feed	N/A	52,000	N/A	Assumes 1.4 stoichiometric ratio.
Natural Gas Consumption	195,000	N/A	N/A	Based on 340-lb/hr natural gas consumption.
Power Consumption	3,000	4,000	N/A	Includes injection blower and vaporization of ammonia for SCR and damper actuation for $SCONO_x$.
Lost Power Generation				
$SCONO_x$ Washing	544,000	N/A	N/A	Down time due to $SCONO_x$ washing period.
Steam Consumption	671,000	N/A	N/A	Loss based on 20,500 lb/hr of steam required.
Backpressure	137,000	72,000	N/A	Includes backpressure on the combustion turbine.
Annual Distribution Check	N/A	8,000	N/A	Required for SCR, estimated as 0.5% of total direct cost less the catalyst cost.
Total Direct Annual Cost	**1,901,000**	**783,000**	N/A	
Indirect Annual Costs				
Overhead	31,000	19,000	N/A	For SCR 60% of O&M Labor; For SCONOx: 10% of O&M Labor
Administrative Charges	65,000	65,000	N/A	For SCR 2% of Total Installed Cost; For SCONOx: 0.3% of TIC
Property Taxes	589,000	90,000	N/A	For SCR and SCONOx 2.75% of Total Installed Cost
Insurance	214,000	33,000	N/A	For SCR and SCONOx 1% of Total Installed Cost
Capital Recovery	2,021,000	309,000	N/A	Capital Recovery Factor times the Total Installed Cost
Total Indirect Annual Costs	2,920,000	516,000	N/A	
Total Annualized Cost	**4,821,000**	**1,299,000**	N/A	
Annual Emissions, tpy	82.7	139.5	542.0	Emissions taken from Tables 3-3 and 3-4 in BACT
Emissions Reduction, tpy	459.3	402.6	N/A	Emissions calculated from Tables 3-3 and 3-4 in BACT
Total Cost Effectiveness, $/ton	**10,500**	**3,200**	N/A	Total Annualized Cost / Emissions Reduction
Incremental Annualized Cost	**3,522,000**	N/A	N/A	Total annualized SCR/Oxidation catalyst system cost minus the total annualized SCONOx system cost
Incremental Reduction	**62,000**	N/A	N/A	Total Incremental Annualized Cost / Incremental Emissions Reduction

Table 3-8
NO_x Control Annualized Cost Per GE 7FA CTG/HRSG Unit

	SCR	Low NO_x Burners	Remarks
Direct Annual Cost			Cost based on emissions in Tables 3-3 and 3-4
Catalyst Replacement	294,000	N/A	Catalyst life of 3 yr. of equivalent operating hours
Operation and Maintenance	35,000	N/A	See text for background information on this item
Reagent Feed	52,000	N/A	Assumes 1.4 stoichiometric ratio
Power Consumption	4,000	N/A	Includes injection blower and vaporization of ammonia for SCR
Lost Power Generation	41,000		Back Pressure on CT
Annual Distribution Check	8,000	N/A	Required for SCR, estimated as 0.5% of total direct cost less catalyst cost
Total Direct Annual Cost	434,000	N/A	
Indirect Annual Costs			
Overhead	17,000	N/A	60% of O&M Labor
Administrative Charges	48,000	N/A	2% of Total Installed Cost
Property Taxes	67,000	N/A	2.75% of Total Installed Cost
Insurance	24,000	N/A	1% of Total Installed Cost
Capital Recovery	229,000	N/A	Capital Recovery Factor times Total Installed Cost
Total Indirect Annual Costs	385,000	N/A	
Total Annualized Cost	**819,000**	N/A	
Annual Emissions, tpy	116.7	309.5	Emissions taken from Tables 3-3 and 3-4
Emissions Reduction, tpy	193.3	N/A	Emissions calculated from Tables 3-3 and 3-4
Total Cost Effectiveness, $/ton	**4,200**	N/A	Total Annualized Cost/Emissions Reduction

Table 3-10 CO Reduction System Annualized Cost Per GE 7FA CTG/HRSG Unit			
	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Annual Cost			Cost based on emissions in Tables 3-3 and 3-4
Catalyst Replacement	314,000	NA	Catalyst life of 3 yr. of equivalent operating hours
Operation and Maintenance	4,000	NA	See text for background information on this item
Lost Power Generation	31,000	NA	Back Pressure on Combustion Turbine
Total Direct Annual Cost	349,000	NA	
Indirect Annual Costs Indirect Annual Costs			
Overhead	2,000	NA	60% of Operating and Maintenance Labor
Administrative Charges	27,000	NA	2% of Total Installed Cost
Property Taxes	38,000	NA	2.75% of Total Installed Cost
Insurance	14,000	NA	1% of Total Installed Cost
Capital Recovery	129,000	NA	Capital Recovery Factor times Total Installed Cost
Total Indirect Annual Costs	210,000	NA	
Total Annualized Cost	**559,000**	NA	
Annual Emissions, tpy	23.3	232.5	Emissions taken from Tables 3-3 and 3-4
Emissions Reduction, tpy	209.3	NA	Emissions calculated from Tables 3-3 and 3-4
Total Cost Effectiveness, $/ton	**2,700**	NA	Total Annualized Cost/Emissions Reduction

Table 3-13
VOC Reduction System Annualized Cost Per GE 7FA CTG/HRSG Unit

	Oxidation Catalyst	Good Combustion Controls	Remarks
Direct Annual Cost			Cost based on emissions in Table 3-11
Catalyst Replacement	314,000	NA	Catalyst life of 3 yr. of equivalent operating hours
Operation and Maintenance	4,000	NA	See text for background information on this item
Lost Power Generation	31,000	NA	Back pressure on combustion turbine
Total Direct Annual Cost	349,000	NA	
Indirect Annual Costs Indirect Annual Costs			
Overhead	2,000	NA	60% of Operating and Maintenance Labor
Administrative Charges	27,000	NA	2% of Total Installed Cost
Property Taxes	38,000	NA	2.75% of Total Installed Cost
Insurance	14,000	NA	1% of Total Installed Cost
Capital Recovery	129,000	NA	Capital Recovery Factor times Total Installed Cost
Total Indirect Annual Costs	210,000	NA	
Total Annualized Cost	**559,000**	NA	
Annual Emissions, tpy	11.1	15.9	Emissions taken from Table 3-11 (Combined Natural Gas and Fuel Oil)
Emissions Reduction, tpy	4.8	NA	Emissions calculated from Table 3-11
Total Cost Effectiveness, $/ton	**117,000**	NA	Total Annualized Cost/Emissions Reduction

Florida Fish and Wildlife Conservation Commission

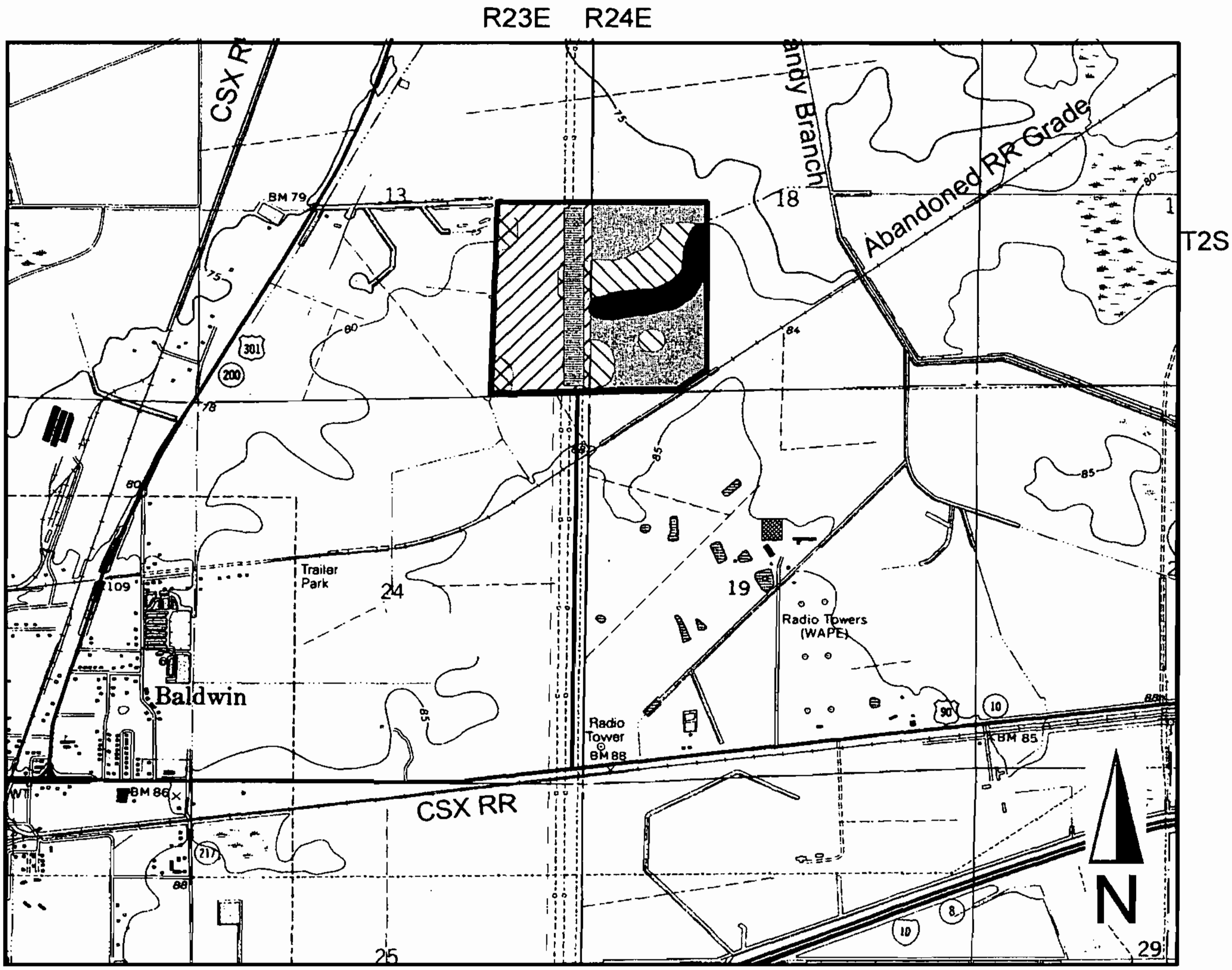
1. *In reviewing the site application, it was difficult to determine what the current conditions of the site are, or how much of the site has already been altered for construction of the first three units. The descriptions of vegetative communities of the site apparently were prepared prior to the current construction activities, and do not describe what will be impacted by this conversion project. The application mentions an additional 2.5 acre area of pine woods to be cleared, but does not provide any detail about this area. The applicant should provide a vegetation map showing current vegetative cover, with the footprints of new facilities needed for the conversion project clearly indicated.*

   Response: Pre-construction land use / vegetative cover for the Brandy Branch Generating Station site is illustrated in Figure 1. Actual land use / vegetative cover for simple cycle construction of the Brandy Branch Generating Station site is illustrated in Figure 2. Figure 3 represents the proposed land use / vegetative cover for combined cycle construction of the Brandy Branch Generating Station site.

   Construction of the simple cycle facility began in November 1999. To date, all areas (42 acres) scheduled for construction have been fully developed. Please note the additional combined cycle construction area in the northeast corner of the power block area for the cooling tower and associated piping. A more detailed view of this locality showing the plant footprint and additional construction area is illustrated in Figure 4. An additional total of 2.96 acres of conversion / cooling tower impact are expected at the location, with 2.5 acres composed of pine flat woods and 0.46 acres composed of coniferous plantation.

   The most recent surveying of the additional construction area took place on February 2, 2000, during tree removal permitting efforts.

   Vegetation in the cooling tower area is composed of pine flat woods that have been heavily influenced by adjacent pine plantation activities. The area is dominated by slash pine (*Pinus elliottii*) with individuals of red maple (*Acer rubrum*), diamond leaf oak (*Quercus laurifolia*), red bay (*Persea borbonia*), and dahoon holly (*Ilex cassine*) scattered throughout the site. The understory is relatively open with occasional thickets that include several shrub species such as saw palmetto (*Serenoa repens*), fetterbush (*Lyonia lucida*), peelbark St. Johnswort (*Hypericum fasciculatum*), and smaller indivuals of red bay and dahoon holly. The herbaceous layer is more or less absent due to heavy pine needle litter but, contains sporadic individuals of greenbriar (*Smilax bona-nox*) and poison ivy (*Toxicodendron radicans*).



Base Map: USGS 7.5' Topographic
Baldwin Quadrangle, Revised 1992

Preconstruction Land Use and Land Cover
Brandy Branch Generating Station

Florida Land Use, Cover, and Forms Classification System

212
411
441
621
644
832

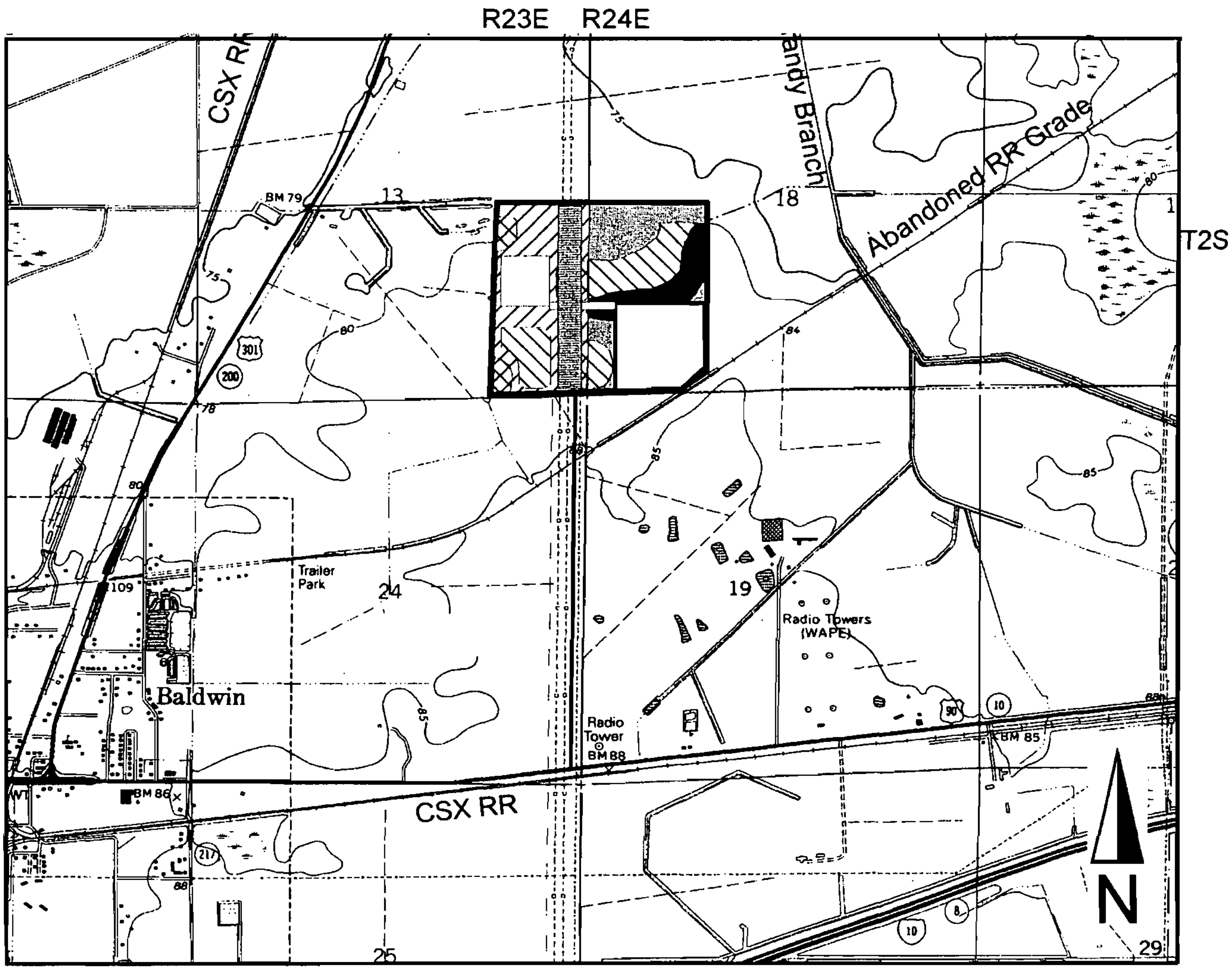
Mile
0 0.5 1

Preconstruction Land Use and Cover
Brandy Branch Generating Station

FLUCFCS* Code	Description	Acres	Percent of Project Area
212	Unimproved Pastures	75	49
411	Pine Flatwoods	46	30
441	Coniferous Plantations	5	3
621	Cypress	22	14
644	Emergent Vegetation	6	4
832	Electrical Power Transmission Lines	12	8

jeaandy4a.tif
image = jeatotal2.tif

Figure 1



Base Map: USGS 7.5' Topographic
Baldwin Quadrangle, Revised 1992

Proposed Land Use and Land Cover - Simple Cycle
Brandy Branch Generating Station

Florida Land Use, Cover, and
Forms Classification System

212 621 832

411 644

441 831

Mile

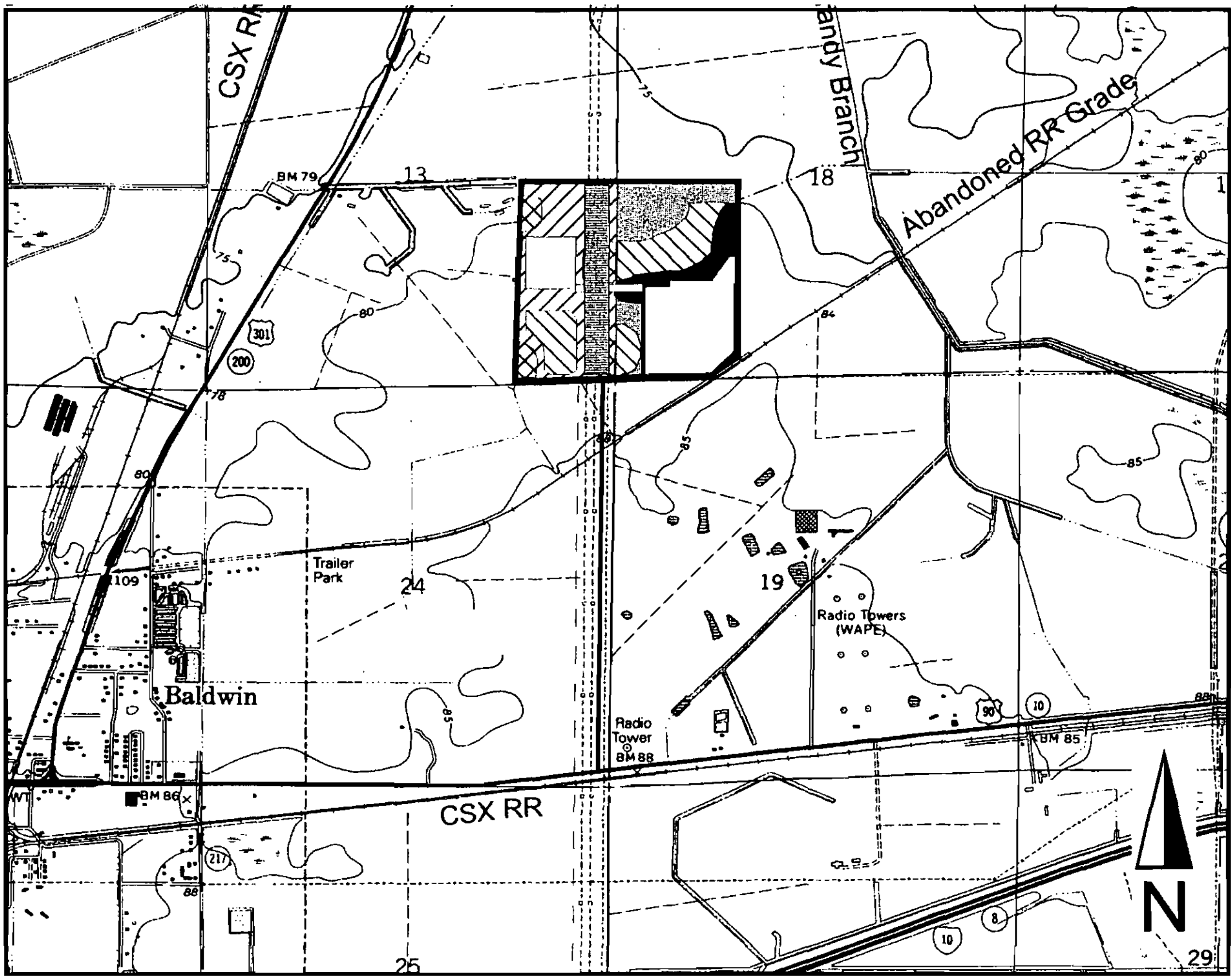
0 0.5 1

Proposed Land Use and Cover - Simple Cycle
Brandy Branch Generating Station

FLUCFCS* Code	Description	Acres	Percent of Project Area
212	Unimproved Pastures	65	42
411	Pine Flatwoods	16	10
441	Coniferous Plantations	4	3
621	Cypress	20	14
644	Emergent Vegetation	6	4
831	Electrical Power Facilities	42	27
832	Electrical Power Transmission Lines	12	8

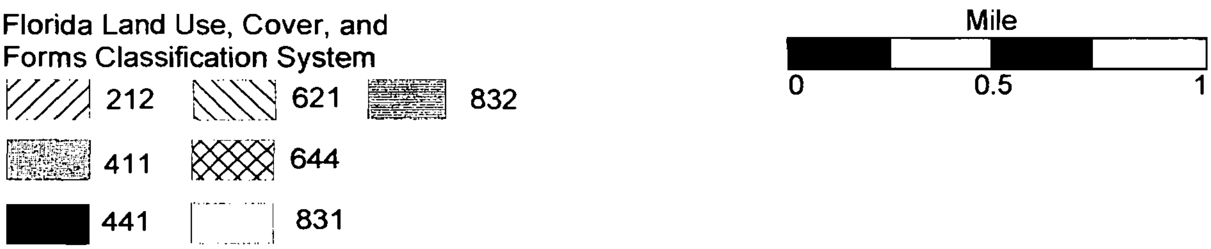
jeaandy4b.tif

Figure 2



Base Map: USGS 7.5' Topographic
Baldwin Quadrangle, Revised 1992

Proposed Land Use and Land Cover - Combined Cycle
Brandy Branch Generating Station

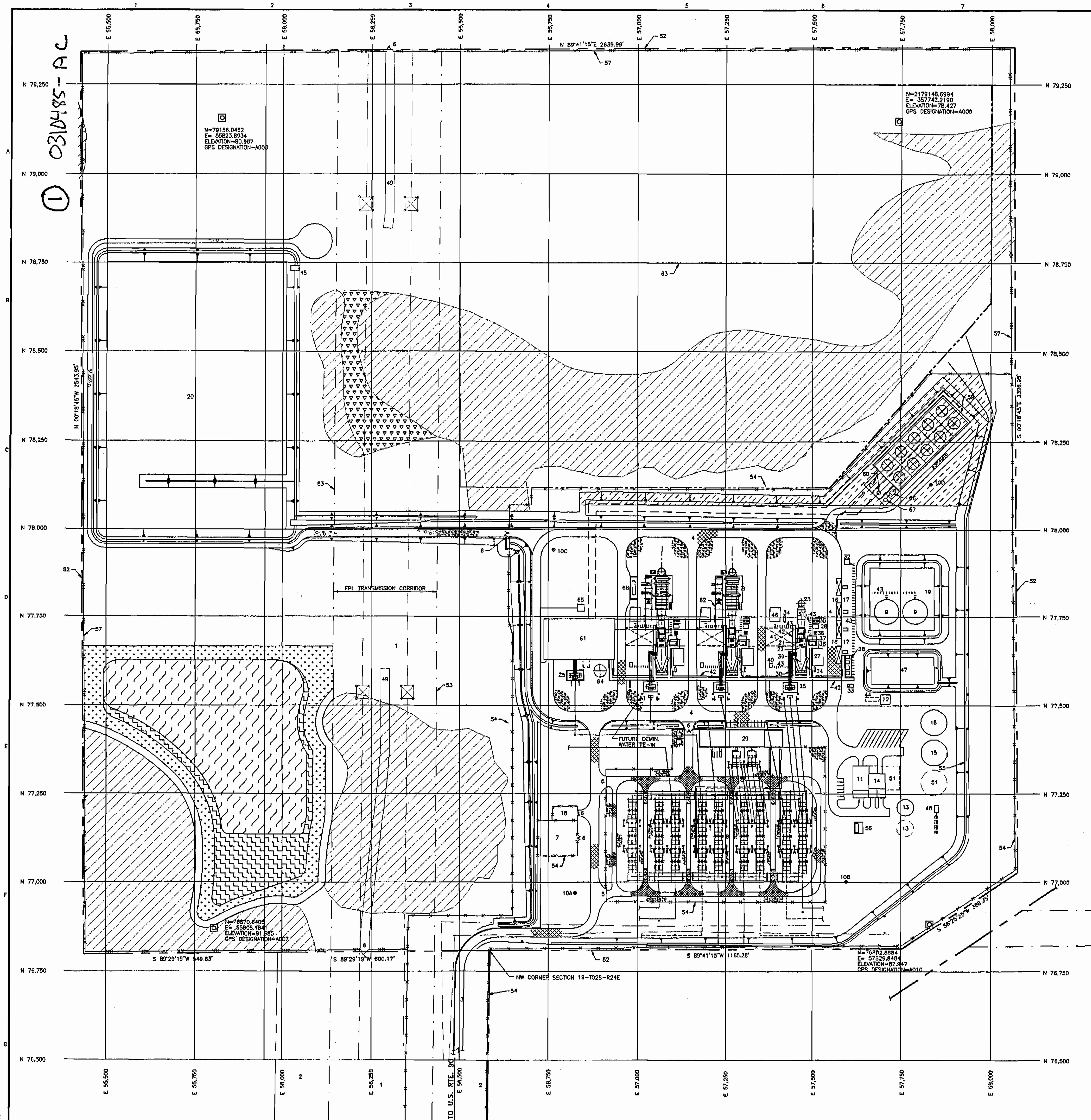


Proposed Land Use and Cover - Combined Cycle Brandy Branch Generating Station

FLUCFCS* Code	Description	Acres	Percent of Project Area
212	Unimproved Pastures	65	42
411	Pine Flatwoods	16	10
441	Coniferous Plantations	4	3
621	Cypress	20	14
644	Emergent Vegetation	6	4
831	Electrical Power Facilities	42	27
832	Electrical Power Transmission Lines	12	8

jeaandy4c.tif

Figure 3



FACILITIES LEGEND

	ITEM NO	DESCRIPTION	LOCATION COORDINATES NORTH	LOCATION COORDINATES EAST	REFERENCE LOCATION
	1	F.P.&L. RIGHT-OF-WAY	N/A	N/A	
	2	JEA TRANSMISSION CORRIDOR	N/A	N/A	
	3	ACCESS ROAD	N/A	N/A	
**	4	LOOP ROAD	N/A	N/A	
	5	SLIDE GATE	N/A	N/A	
	6	SWING GATE	N/A	N/A	
	7	FUEL GAS METERING STATION	N/A	N/A	
	8	SUBSTATION AREA	N/A	N/A	
	9	FUEL OIL STORAGE TANK (1,000,000 GALLONS)	N/A	N/A	
	10A	WATER SUPPLY WELL	76970.00	56825.00	CL WELL
	10B	WATER SUPPLY WELL	77001.92	57597.00	CL WELL
**	10C	WATER SUPPLY WELL	77943.00	567645.00	CL WELL
**	10D	WATER SUPPLY WELL	78129.00	57834.00	CL WELL
	11	SHOP/STORAGE BUILDING	N/A	N/A	
	12	WASTEWATER PUMPING STATION	N/A	N/A	
	13	RAW WATER/FIRE WATER STORAGE TANK	N/A	N/A	
	14	MECHANICAL EQUIPMENT BUILDING	N/A	N/A	
	15	DEMINERALIZED WATER STORAGE TANK	N/A	N/A	
	16	FUEL OIL UNLOADING AREA	N/A	N/A	
	17	FUEL OIL UNLOADING PUMP AREA	N/A	N/A	
	18	HYDROGEN STORAGE GAS AREA	N/A	N/A	
**	19	FUEL OIL STORAGE TANK SECONDARY CONTAINMENT	N/A	N/A	
	20	STORM WATER DETENTION POND	N/A	N/A	
	21	COMBUSTION TURBINE (CT)	N/A	N/A	
	22	CT GENERATOR	N/A	N/A	
	23	CT EXHAUST STACK (UNIT 1)	77788.26	57469.00	CL STACK
	23	NOT USED	N/A	N/A	
	23	NOT USED	N/A	N/A	
	24	CT AIR INLET FILTER	N/A	N/A	
	25	GENERATOR STEP-UP TRANSFORMER	N/A	N/A	
	26	CT WATER INJECTION SKID	N/A	N/A	
	27	CONTROL/ELECTRICAL BUILDING	N/A	N/A	
	28	FUEL FORWARDING SKIDS	N/A	N/A	
	29	CONTROL/SHARED SERVICES BUILDING	N/A	N/A	
	30	UNIT AUXILIARY TRANSFORMER	N/A	N/A	
	31	EXHAUST DUCT SILENCER	N/A	N/A	
	32	FIRE PROTECTION FOAM HOUSE	N/A	N/A	
	33	WASH WATER SKID	N/A	N/A	
	34	MISCELLANEOUS DRAIN TANK	N/A	N/A	
	35	CT CO2 FIRE PROTECTION SKID	N/A	N/A	
	36	FALSE START DRAIN TANK	N/A	N/A	
	37	LIQUID FUEL/ATOMIZING AIR MODULE	N/A	N/A	
	38	CT ACCESSORY MODULE	N/A	N/A	
	39	GENERATOR COMPARTMENT	N/A	N/A	
	40	FIRE WATER DELUGE HOUSE	N/A	N/A	
	41	MAINTENANCE AREA	N/A	N/A	
	42	PIPE TRENCH	N/A	N/A	
	43	SLEEPER PIPE RACK	N/A	N/A	
	44	OIL WATER SEPARATOR	N/A	N/A	
	45	STORM WATER DETENTION POND DISCHARGE STRUCTURE	N/A	N/A	
	46	COOLER	N/A	N/A	
	47	PERCOLATION POND	N/A	N/A	
	48	SEPTIC TANK AND DRAINFIELD DETAIL	N/A	N/A	
	49	EXISTING ROAD	N/A	N/A	
	50	NOT USED			
	51	FUTURE WATER TREATMENT EQUIPMENT EXPANSION	N/A	N/A	
	52	PROPERTY BOUNDARY	N/A	N/A	
	53	EASEMENT BOUNDARY	N/A	N/A	
**	54	CHAIN LINK SECURITY FENCE	N/A	N/A	
**	55	PERIMETER DITCH	N/A	N/A	
	56	LUBE OIL STORAGE AREA	N/A	N/A	
	57	BARBED WIRE SITE PERIMETER FENCE	N/A	N/A	
**	58	HEAT RECOVERY STEAM GENERATOR	N/A	N/A	
**	59	COOLING TOWER	N/A	N/A	
**	60	CIRCULATING WATER PUMPS	N/A	N/A	
**	61	STEAM TURBINE GENERATOR BUILDING	N/A	N/A	
**	62	ABOVE GROUND PIPE RACK	N/A	N/A	
	63	CONSERVATION EASEMENT	N/A	N/A	
**	64	CONDENSATE STORAGE TANK	N/A	N/A	
**	65	WASTEWATER SUMP	N/A	N/A	
**	66	CIRCULATING WATER ACID TANK	N/A	N/A	
**	67	CIRCULATING WATER HYPOCHLORITE TANK	N/A	N/A	
**	68	AMMONIA STORAGE TANK	N/A	N/A	

GENERAL LEGEND

- BENCHMARK
- FUTURE FACILITY
- WETLANDS
- CYPRESS (ZONE 2) AREA
- ASPHALT
- CRUSHED ROCK SURFACING
- HERBACEOUS (ZONE 1) AREA
- UPLAND SEEDING AREA
- RESTORATION MITIGATION AREA
- GEOWEB
- ADDITIONAL COMBINED CYCLE CONSTRUCTION AREA
- ** INDICATES NEW AND MODIFIED FACILITIES

NOT TO BE USED
FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
A	03-04-2001	ISSUED FOR SCA PERMIT	WG	JMS		MJS	

100' 50' 0 100' 200'
SCALE: 1"=100'

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF FLORIDA.
SIGNED ______
DATE ______ REG NO. ______

BLACK & VEATCH — JEA Building Community

ENGINEER JMS — DRAWN WG — CHECKED — DATE

JEA
BRANDY BRANCH COMBINED CYCLE PROJECT
SITE ARRANGEMENT

PROJECT / DRAWING NUMBER: 97990-DS-S1001 — REV: A
CODE — AREA
FIG 4

2. *On page 2-49 of the application, reference is made to Table 2, which provides information about wildlife species observed on the site during inspections made in December 1998 and March 1999; however, no Table 2 was provided. Please provide Table 2. In addition, more recent wildlife survey information needs to be provided, which describes current wildlife utilization of the site, including use by listed species. The dates of these surveys, along with methodologies used and survey transect locations, also need to be provided.*

Response: Table 2 is included with this response as requested.

Additional wildlife surveys at Brandy Branch have been postponed until after construction at the site ceases. Surveys performed during March of 1999 represent pre-construction conditions. Initiation of plant construction during November of 1999 has temporarily influenced the wildlife utilization of the site. Any surveys performed during this construction period would inaccurately represent the expected long-term post-development wildlife utilization of the site. Once onsite construction is complete, wildlife surveys can again be initiated to document wildlife utilization. These surveys should give a more accurate account of the site's wildlife and their utilization of the remaining natural areas with the exception of wood storks, which are occasionally observed in the adjacent wetland areas; listed species have not been observed in the area prior to or during construction. Suitable habitat for use by listed species has not been impacted by the construction of this plant. Included are previous agency correspondence and sensitive species information for the Brandy Branch Simple Cycle Project.

TABLE 2
WILDLIFE OBSERVED
AT
BRANDY BRANCH

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS
Green tree frog	**Hyla cinereus**		
Black rat snake	*Elaphe obsoleta*		
Cotton mouth	*Agkistrodon piscivorus*		
Spring peeper	*Pseudacris crucifer*		
Green anole	*Anolis carolinensis*		
Brown anole	*Anolis sagrei*		
Eastern box turtle	*Terrapene carolina*		
Sharp-skinned hawk	*Accipiter striatus*		
American crow	*Corvus brachyrhynchos*		
Black vulture	*Coragyps atratus*		
American robin	*Turdus migratorius*		
Northern cardinal	*Cardinalis cardinalis*		
Carolina chickadee	*Parus carolinensis*		
Red-eyed vireo	*Vireo olivaceus*		
Prairie warbler	*Dendroica discolor*		
Hairy woodpecker	*Picoides villosus*		
Tufted titmouse	*Parus bicolor*		

TABLE 2
WILDLIFE OBSERVED
AT
BRANDY BRANCH

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS
White-tailed deer	*Odocoileus virginianus*		
Gray squirrel	*Sciurus carolinensis*		
Wood stork	*Mycteria americana*	E[1]	E[1]
Cattle egret	*Bubulcus ibis*		
Great blue heron	*Ardea herodias*		

[1]E = Federally Endangered

FLORIDA GAME AND FRESH WATER FISH COMMISSION

THOMAS B. KIBLER, Lakeland | JAMES L. "JAMIE" ADAMS Jr., Bushnell | JULIE K. MORRIS, Sarasota | QUINTON L. HEDGEPETH, DDS, Miami | EDWIN P. ROBERTS, D.C., Pensacola

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

OFF ICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, FL 32399-1600
(850) 488-6661
SUNCOM 278-6661
FAX (850) 922-5679
TDD (850) 488-9542

May 10, 1999

Andy Burr
Black and Veatch
8400 Ward Parkway
P.O. Box No. 8405
Kansas City, MO 64114

Dear Mr. Burr:

This letter is in response to your request for information on listed species occurrences on Brandy Branch Power Project site in Duval county. Our potential species habitat maps showed potential habitat for Florida black bear, fox squirrel, and indigo snake. The black bear habitat was mostly in the northeast corner of the site. Our land cover map showed this area to be a wetland area.

Both the fox squirrel and indigo snake habitat maps showed potential habitat scattered throughout the large parcel (not the corridor). Fox squirrels use areas with mature hardwoods or pines that are fairly open with herbaceous ground cover. The site should be evaluated for this type of pine or hardwood area to determine suitability for fox squirrels.

I hope this information is helpful in evaluating this site. If you have any further questions, feel free to contact me at (850) 488-6661.

Sincerely,

Beth Stys

Beth Stys

BS
ENV 8-7/8

RECEIVED
MAY 14 1999
EAS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive South
Suite 310
Jacksonville, Florida 32216-0912

60903.32.0402
cc: A. Burr
S. Wood/
M. Serafin

IN REPLY REFER TO:
FWS/R4/ES-JAFL

AUG 19 1999

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 3
To Mike Soltys	From Steve Moser
Co. B+V	Co. JEA
Dept.	Phone #
Fax # (913) 458-2934	Fax # 904 665 7376

Ms. Debbie Solis
Regulatory Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

FWS Log No: 99-702
Application No: 199902840 (LP-DAS)
Dated: July 12, 1999
Applicant: Jacksonville Electric Authority
County: Duval

Dear Ms. Solis:

The U.S. Fish and Wildlife Service has reviewed the project plans for the above referenced permit application. The applicant proposes to construct an access road (Phase I) and new power generation facility (Phase II). The planned road, located within an existing transmission line right-of-way, will impact approximately 1.4 acres of disturbed herbaceous wetlands. Wetland impacts from power plant construction would be limited to a 2.2-acre, isolated cypress dome. Proposed mitigation includes on-site creation of a 1.4-acre herbaceous wetland and 4.4-acre cypress forest. The proposed location is one mile east of the city of Baldwin and one mile north of US 90/SR 10, Baldwin, in S13 and18, T25S, R23E.

The following comments are submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act)(16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

ENDANGERED SPECIES ACT

The Corps did not evaluate the project with respect to federally listed species. The site is within the historic range of the threatened flatwoods salamander (*Ambystoma cingulatum*). The optimum habitat for this species is open, mesic, longleaf pine/slash pine (*Pinus palustris/P. elliottii*) flatwoods maintained by frequent fire. Breeding sites are small (mean size of 3.68 acres), isolated, marsh-like depressions having mean depths less than 15.4 inches and emergent herbaceous vegetation along the edges. A relatively open canopy of trees and shrubs such as pond cypress (*Taxodium ascendens*), blackgum (*Nyssa sylvatica* var biflora), and slash pine grow both in and around the depressions. The sites dry completely on a cyclical basis. The 2.2-acre cypress dome within the project site has a variable canopy, and all depressional areas were dry when visited on July 20, 1999. The surrounding flatwood had been clearcut. A smaller, mixed pine/ cypress wetland community occurs approximately 400 feet southwest of the other wetland, and is contiguous with a herbaceous marsh within the transmission line right-of-way. Silvicultural practices causing extensive soil disturbance and producing significant changes in hydrology, ground cover, and canopy coverage, are implicated in the decline of the flatwoods salamander.

Because of the extensive silvicultural and pasture operations within and adjacent to the project site, we believe the probability of flatwoods salamanders occurring on this site is very low; therefore, proposed work is not likely to adversely affect the flatwoods salamander. Although this does not represent a biological opinion as described in section 7 of the Act, it does fulfill the requirements of the Act and no further action is required. If modifications are made in the project or additional information becomes available on listed species, reinitiation of consultation may be required.

FISH AND WILDLIFE COORDINATION ACT

A Service biologist visited the site on July 20, 1999. Plants observed within the 1.4-acre herbaceous wetland community proposed for impact by the access road include both native species and invasive exotics. The major exotics include Indian shot (*Canna indica*) and dewflowers (*Murdannia nudiflora*). Examples of native species are Southern swamp-lily (*Crinum americanum*), soft rush (*Juncus effusus*), flat sedges (*Cyperus* spp.), redroot (*Lachnanthes caroliana*), and hooded pitcher plant (*Sarracenia minor*). This area is bordered on the east by a fenced agricultural field, and on the west by a shallow ditch and little-used, unimproved road between the transmission lines. In addition to pond cypress (*Taxodium ascendens*), other canopy species within the 2.2-acre cypress dome include slash pine, red maple (*Acer rubrum*), swamp tupelo (*Nyssa sylvatica* var. biflora), and swamp laurel oak (*Quercus laurifolia*). Signs of soil subsidence and the presence of some wax myrtle (*Myrica cerifera*) suggest changes in wetland hydrology resulting from a lowered water table. The site is apparently accessible to cattle from the adjacent pasture. Because of these impacts, we consider this wetland to be of fair quality. The remaining wetlands within the project area consist of herbaceous marsh dominated by soft rush, a small mixed pine/cypress wetland, and a larger mixed forested wetland. The herbaceous marsh occurs primarily within and west of the transmission line right-of-way. An unimproved roadway beneath the ROW and non-culverted ditches on both sides of this road split the marsh physically and hydrologically. The small mixed pine/cypress wetland east of the ROW is split by a berm, fence, and some drainage ditches. The ditches showed signs of use by cattle. The large mixed forested wetland at the north central and northeast portion of the site appears to be of very good quality. Its size has buffered it somewhat from adjacent silvicultural activities.

The applicant's siting of the project reduced wetland impacts to a total of 3.6 acres. The proposed wetland mitigation plan for these impacts (see attachment) includes two phases. Phase I involves fencing the main site and access road corridor north of the hiking/biking trail to prohibit further cattle grazing and enhance existing wetlands. Phase II involves creation of

1.4 acres of herbaceous marsh (1:1 ratio) and 4.4 acres of cypress swamp (2:1 ratio) for a total of 5.8 acres of created wetlands. The plan includes wetland siting, construction, tree planting, and monitoring.

Isolated forested and herbaceous wetlands in general provide high value habitat to a large variety of fish and wildlife, including many species of migratory birds, which are a Federal trust resource. The Service therefore considers the wetlands in the project area to be, as a whole, of high wildlife value, and to represent a habitat type that is becoming rare in the ecoregion. In accordance with the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, January 23, 1981) our mitigation goal for these wetlands is to ensure no net loss of in-kind habitat value. In effect, it is our view that any unavoidable adverse impacts to trust and other natural resources that may be authorized by the requested permit must be offset through the restoration and/or enhancement of forested wetland functions and values. The current mitigation proposal does provide reasonable assurances that such in-kind, on-site compensation would occur.

Based on the preceding review and analysis, we find the proposed mitigation plan consistent with our mitigation policy. However, because of the temporal lag factor for created systems, we recommend that the following additional measures be taken to further protect and enhance the wetland resources on-site.

- Place all created and remaining wetlands within the perimeter fence enclosing the main site into a single permanent conservation easement.

- Remove all extraneous berms, ditches, and similar man-made land alterations within the non-impacted wetlands to improve their hydrology, thereby enhancing their function and value.

- Install culverts beneath ROW unimproved roadway to connect existing herbaceous marsh with the proposed created wetland.

Provided the preceding recommendations are added as additional conditions to the permit, we do not object to its issuance. This response represents the views of the Department of the Interior. If you have any questions regarding this response, please contact Mr. John Milio of my staff at (904)-232-2580, ext. 112.

Sincerely,

for David L. Hankla
Field Supervisor

cc: DEP, Tallahassee
SJWMD, Palatka
EPA, Atlanta

Protected Species Report
Brandy Branch Generating Station

Introduction

JEA has applied for an Environmental Resource Permit (ERP) for wetlands impacts and construction of a storm water management system associated with development of the Brandy Branch Generating Station (Station). The station is a 500 megawatt simple cycle combustion turbine facility located on 153 acres, 1 mile northeast of Baldwin, in Duval County. Project construction will required the clearing and filling of 1.4 acres of herbaceous wetlands in the site access road corridor (an existing, maintained transmission line right-of-way) and 2.2 acres of an isolated, good quality, pond cypress (*Taxodium ascendens*) dome on the main site. This report addresses protected species issues associated with Clean Water Act Section 404 and Florida Environmental Resource Permitting.

Federal and state agencies were contacted for information regarding the potential for the occurrence of protected species at the project site. Copies of pertinent correspondence are attached. Published information regarding the threatened and endangered species for Duval County, Florida, and surrounding counties was reviewed and habitat preferences for listed species with the potential to occur in the project area were researched. A list of the federal and state listed species for Florida is attached. Pedestrian surveys were conducted onsite December 3, 1998 and March 29 through April 2, 1999 to search specifically for protected species and potential habitat. The pedestrian surveys consisted of walking through all habitat types on the site and recording the wildlife that was observed and that have left signs (e.g. tracks, scat, nests) of their presence.

Site Description

The Brandy Branch site is divided approximately in half by forested and non-forested habitat, the eastern portion being forested and the western half open. Within the forested and open portions are upland and wetland areas that for the most part have relatively well defined boundaries due to subtle changes in elevation. The eastern half of the site is isolated from the remainder of the site by a north-south fence. Cattle roam the western half of the site where the vegetation has been heavily grazed and is composed of numerous weedy and introduced plant species. The following sections briefly describe the vegetation at the project site as observed in early December 1998. A list of the plant species observed is provided in Table 1. The species were identified on the basis of Wunderlin (1986) and Goddfrey and Wooten (1981).

Forested Areas

Slash pine woodlands (*Pinus elliottii*) and cypress dome/strands (*Taxodium ascendens*) occupy the forested areas of the project site. The quality of these with regard to species composition varies depending on whether or not they are grazed. At the time these areas were observed the ground was saturated but there was very little standing water. However, judging from the distribution of ground cover and water lines on the trees, water must at times be as much as 12-20 inches deep.

Slash pine dominates the dry forested uplands. Where grazing occurs, the understory and ground cover is for practical purposes non-existant. In the ungrazed areas the understory is composed of dense thickets red bay (*Persea borbonia*), saw palmetto (*Serenoa repens*), and fetterbush (*Lyonia lucida*). Vines are common and include poison ivy (*Toxicodendron radicans*) and greenbrair (*Smilax bona-nox*). Ground cover is not especially prevalent, although there are small, shallow, scattered and open depressions where it is not uncommon to find white-top-sedges (*Dichromena colorata* and *D. latifolia*) or pitcherplant (*Sarracenia sp.*). One strip of land running east-west in the central portion of the forested section has been planted to slash pine. Here such depressions are common in the turned ground.

Two isolated cypress domes are located in the western half of the project site. Both are dominated by pond cypress with slash pine and red maple occurring toward the fringes. The understory and groundcover have been largely removed due to grazing, although a few ferns remain including netted chainfern (*Woodwardia areolata*) and *Thelypteris* sp. Similar areas are found on the west side of the fence in the central and southcentral portion of the project site.

In the forested half of the project site is a narrow cypress strand that essentially divides this area into a north and south half. In addition, there are two small cypress domes, one located in the southwest corner of the forested area and the other is located in the west central portion of the forested area. The ungrazed portions of these have a canopy similar to that described above and in addition have a greater abundance of fern thickets and understory shrubs, such as dahoon holly (*Ilex cassine*).

Open Areas

Open areas at the project site are mostly upland pasture with a small area of wetland dominated by herbaceous plants which is located in the south-central portion of the project site and in a few areas along the proposed access road corridor.

The fenced grasslands of the project site are dominated by Bermudagrass (*Cynodon dactlyon*), broomsedge (*Andropogon virginicus*), and southern crabgrass (*Digitaria ciliaris*), that have been grazed close to the ground. Scattered about the pastures are a wide variety of herbaceous species, such as slender fragrant goldenrod (*Euthamia minor*), small dog-fennnel thoroughwort (*Eupatorium capillifolium*), green carpetweed (*Mollugo verticillata*), and black medic (*Medicago lupulina*). Based on the condition of the site as observed, this area is considered to be of low quality with regard to species composition or potential for providing habitat to wildlife or unusual plant species.

The access road corridor is not grazed but possess a similar species composition to that found in the grazed pasture, although a few scattered shrubs are present. The taller and dense vegetation does provide some habitat for small mammals, birds, and reptiles.

The open wetland areas on the project site appear to be created by the clearing of the edge of a small cypress dome in the past. The open areas are nearly a monoculture of soft rush (*Juncus effusus*), except in areas of standing water where the surface is choked with duckweed (*Lemna* sp.), giant duckweed (*Spirodela polyrhiza*), and watermeal (*Wolffia brasiliensis*).

A few open wetland areas are present along the access road corridor. These areas are subtle drainageways between pastures and are dominated by dense stands of swamp smartweed (*Polygonum hydropiperoides*) or in some areas shrub thickets of eastern false-willow (*Baccharis halimifolia*) or St. John's-wort (*Hypericum* sp.).

Federal Listed Species

In a letter dated December 29, 1998, the US Fish and Wildlife Service indicated that this project is not likely to adversely affect resources protected by the Endangered Act of 1973, as amended (16 U.S.C. 1531 et seq.).

During the onsite surveys conducted December 3, 1998, wood storks were observed resting in the herbaceous wetlands in the southwest portion of the site. The wood stork is an endangered species that is locally common in the swamps, marshes, and ponds of Florida and the south. No nests were observed onsite. Current project plans do not include impacts to wetlands in the southwest portion of the project site, thus the project is not expected to affect these areas.

No federal listed plant species were observed or are expected onsite since no appropriate habitat is present.

State Listed Species

In a letter dated May 10, 1999, the Florida Game and Fresh Water Fish Commission (FGFWFC) indicated that potential habitat for Florida black bear (*Ursus americanus floridanus*), fox squirrel (*Sciurus niger shermani*), and indigo snake (*Drymarchon corais couperi*) may be present onsite or in the project area. The FGFWFC indicated that the black bear habitat was mostly in the northeast corner of the site and the fox squirrel and indigo snake habitat was scattered throughout the large parcel.

During the site visits in December 1998 and March 1999 a total of 20 wildlife species or their signs were observed onsite (Table 2). No state listed species were observed. The potential habitat for the black bear in the northeast corner of the site will remain undisturbed. The forested areas are too dense to be considered good fox squirrel habitat. Therefore this project is not expected to impact any state listed species.

State listed plant species are not expected at the site since habitat appropriate to support the growth of these unique species is not present.

St. Johns River Water Management District

1. *The application indicates that there are herbaceous and forested wetlands as well as other surface waters on and surrounding the proposed site. The ground water modeling, however, analyzes the drawdown impacts to the Floridan aquifer only. Please provide an analysis of the steady-state impact of the proposed Floridan aquifer withdrawals on the surficial water table at the maximum proposed pump rate of 2.744 million gallons per day (mgd) and at increased rate of 3.722 mgd for 288 hours, transient conditions. The drawdown contours should be overlain on a map of wetlands and surface waters and displayed at one-half foot intervals and also delineate outward from the well(s) to the 0.2 foot drawdown contour. [Section 10.2(e)(f)(g)(l)(p), 10.3(d), Applicant's Handbook Consumptive Uses of Water (February 8, 1999) (A.H.)]*

Response: Exhibit 1 shows a hydro-stratigraphic cross section at the site with the completion details of the new production wells. The data collected during the pumping tests of the "east" well in May and June of 2000 was reviewed. During the test, a transducer was set in the shallow aquifer "rock" zone temporary water supply well at the site. The shallow rock zone well was located several hundred feet west of the pumping well and was completed into the carbonate rock at the base of the shallow aquifer approximately 100 feet in depth. Exhibit 2 shows the depth to water in this well during the constant rate test of the "east" Floridan aquifer water supply well. No obvious correlation in water level change is apparent. Although there is a general downward trend of about 0.05 feet during the 48-hour test, the trend continues through the recovery phase of the pumping test. If the water level drop were related to pumping the underlying Floridan aquifer, the water levels in the shallow rock well would have recovered when the pump was shut off. The trends noted on Exhibit 2 were likely caused by variations in barometric pressure and changes in local domestic demand. This shallow rock aquifer is used in this area for domestic supply purposes.

Exhibit 3 shows the response of the same shallow well during the step-drawdown test of the "east" well performed about a week prior to the constant rate test. There is an obvious inverse correlation between the water level in the shallow well and the water level in the "west" (Floridan aquifer observation) well. When the water level was pumped lower in the Floridan aquifer, the shallow rock well water level rose. If the pumping of the Floridan were impacting the shallow aquifer, the opposite reaction would be expected. The supervisor of the pumping test reports that the pump discharge during the test was located several hundred feet from the shallow well and the resulting change in the surface water level may have influenced the water table near the well.

The drawdown in the "west" well measured during the 48-hour constant rate test of the "east" well 770 feet away was examined more closely in order to determine if the aquifer was beginning to show evidence of steady-state drawdown conditions. As expected, the aquifer does deviate from strictly confined conditions. Exhibit 4 shows a revised late-time data match to Hantush & Jacob's (1955) solution for a leaky confined aquifer with an r/B.

Hydro-stratigraphic Cross Section at JEA Brandy Branch Site

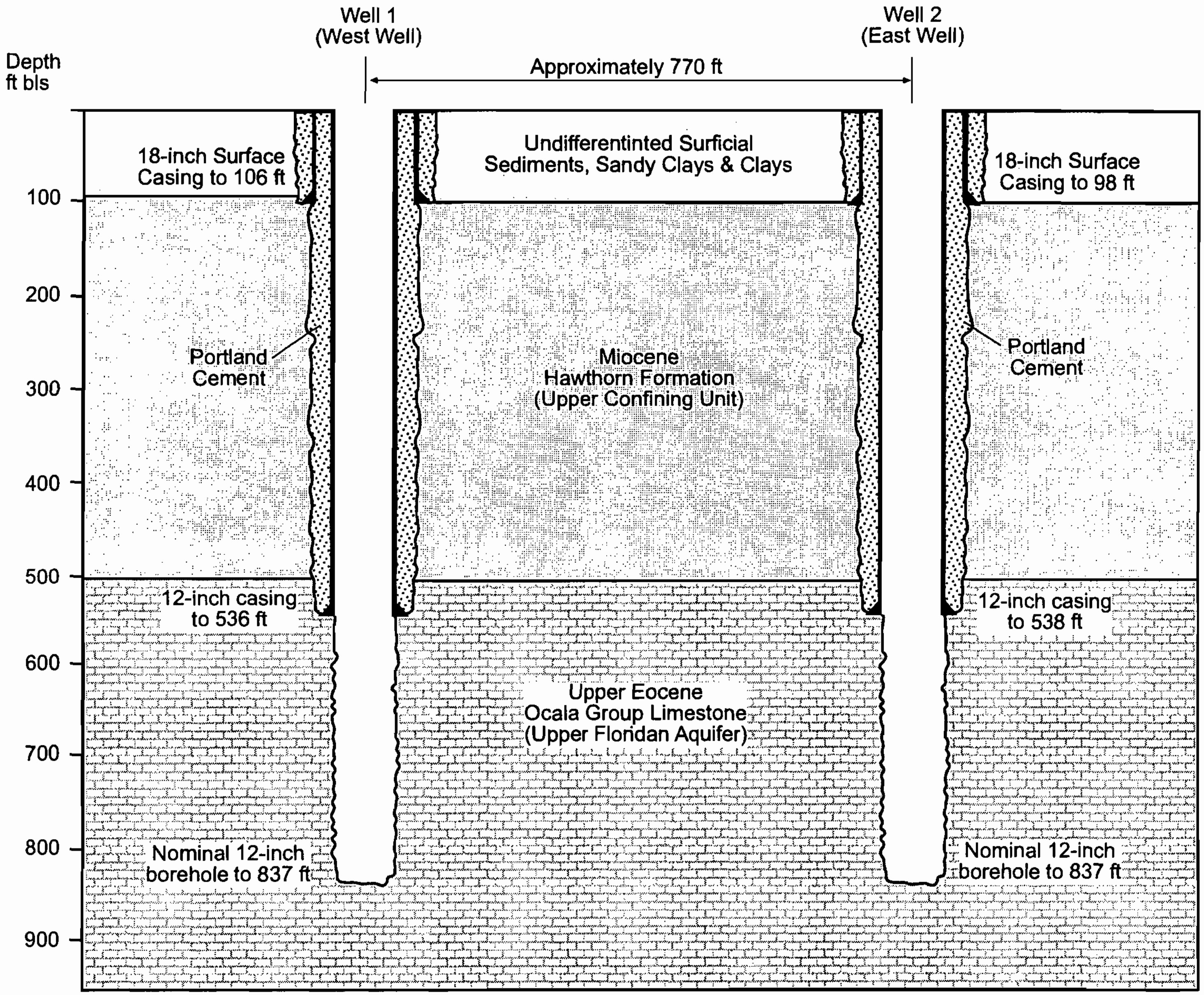


Exhibit 1

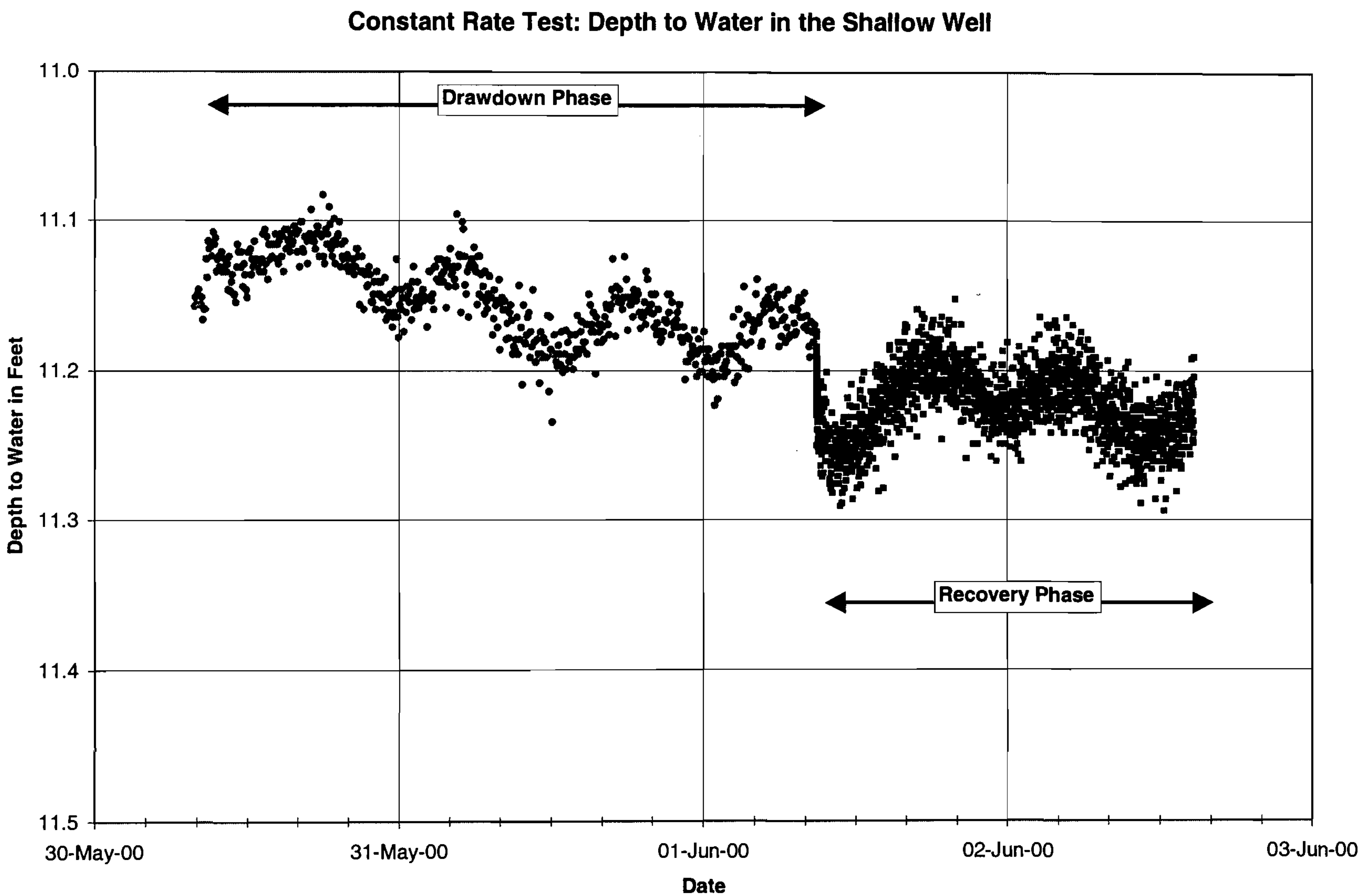

Constant Rate Test: Depth to Water in the Shallow Well
Drawdown Phase
Recovery Phase
Depth to Water in Feet
11.0
11.1
11.2
11.3
11.4
11.5
30-May-00
31-May-00
01-Jun-00
02-Jun-00
03-Jun-00
Date

Exhibit 2

Step Test: Depth to Water in Shallow well and "West" (Floridan Aquifer) Well

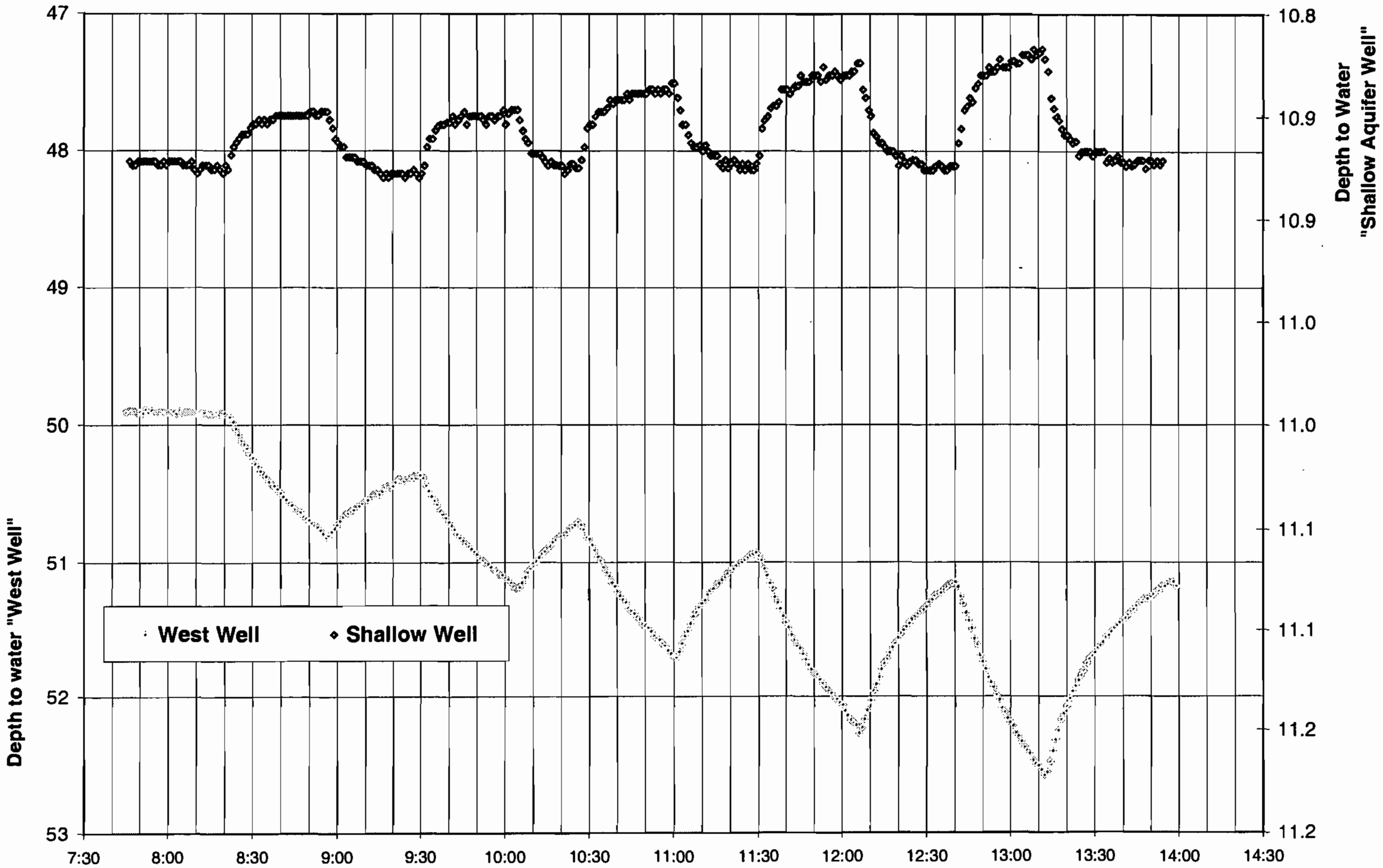


Exhibit 3

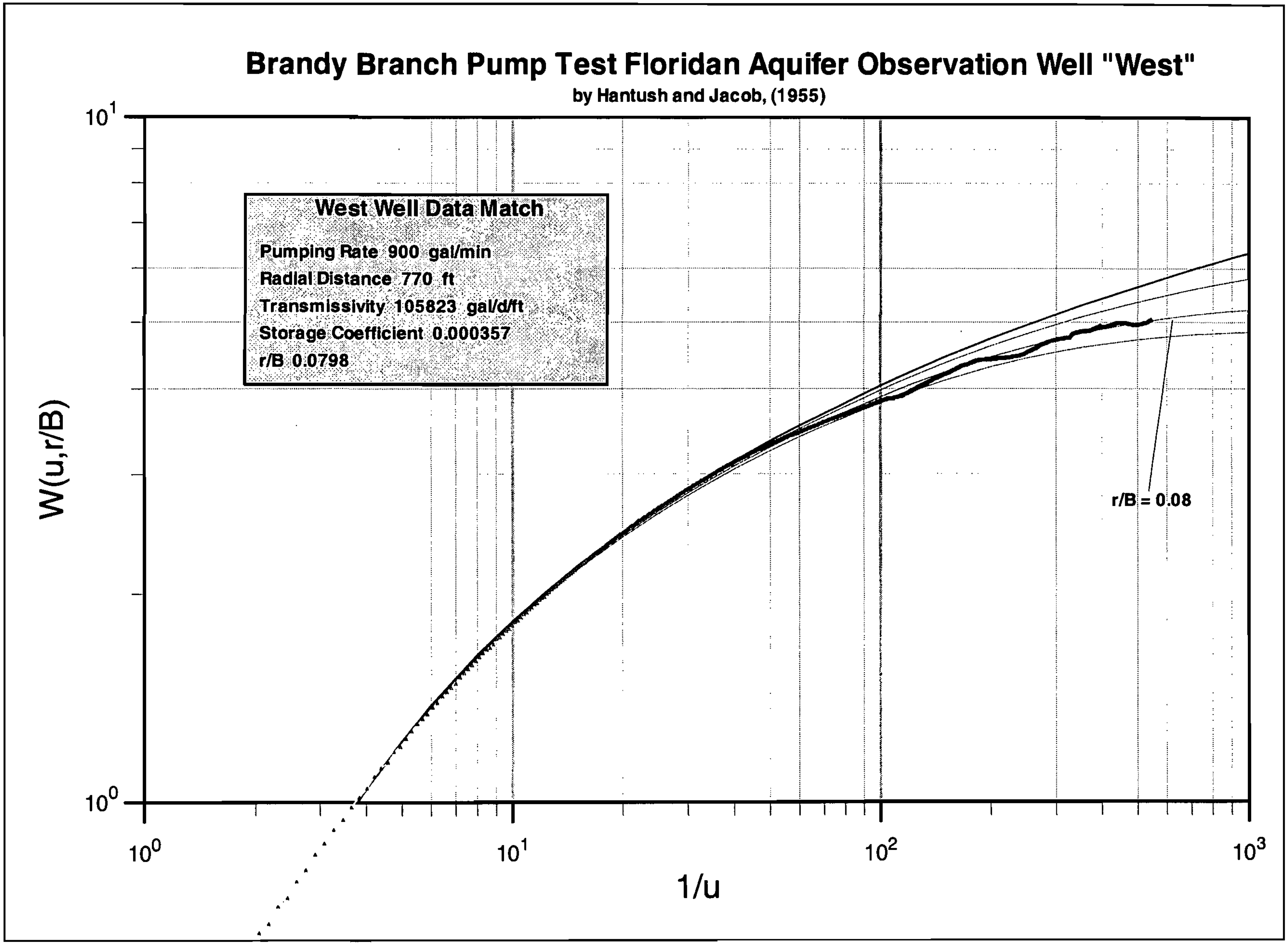

Brandy Branch Pump Test Floridan Aquifer Observation Well "West"
by Hantush and Jacob, (1955)
West Well Data Match
Pumping Rate 900 gal/min
Radial Distance 770 ft
Transmissivity 105823 gal/d/ft
Storage Coefficient 0.000357
r/B 0.0798
r/B = 0.08
W(u,r/B)
1/u
10^1
10^0
10^0
10^1
10^2
10^3

Exhibit 4

value of approximately 0.08. Values for transmissivity and the storage coefficient are similar to the values originally reported in the permit application. An analytical element model, Aquifer^{Win32} version 2.33 (2001 by Environmental Simulations, Inc.) was used to predict drawdown in the Upper Floridan Aquifer due to the future operation of the wellfield. The analytical model uses the exact solution of Hantush & Jacob (1955) to calculate drawdown in the aquifer at any desired point. Analytical element models have a number of advantages over a finite difference model such as MODFLOW for simple drawdown calculations. Analytical element models use exact solutions for drawdown, in this case, the same solutions used to develop the type curves used in the analysis of the pump test. Analytical models are unconstrained by boundary conditions, the assumption that the aquifer is infinite in area extent is inherent in the solution. Finite difference models require assumptions about aquifer properties to be made, and then tested (calibrated) to confirm proper duplication of some known condition or event, such as a pump test. Finite difference models can be sensitive to the placement of boundary conditions. This is of particular significance if the accurate location at which very small amounts of drawdown (such as the 0.2 ft contour) are required.

Pumping rates of 2.75 MGD and 3.72 MGD were simulated using the analytical element model. The flowrates were divided equally among the two existing wells "east" and "west" and the two proposed wells; "NW proposed" and "NE proposed". In both cases, a steady state of drawdown was achieved in 7 days or less at the center of the wellfield and in 16 days or less at a distance of 9 miles from the center of the wellfield. Exhibit's 5-A through 5-E show the simulated drawdown in the Floridan aquifer at the center of the wellfield, 1/3-mile, 1 mile, 3 miles, and 9 miles from the wellfield, with a steady pumping rate of 2.75 MGD, followed by a 288 hour (12 day) increase to 3.72 MGD.

The simulated areal extent of the steady state drawdown cone with the wellfield pumping at a rate of 2.75 MGD is shown on Exhibit 6. Exhibit 7 shows the simulated areal extent of the drawdown cone after the wellfield pumping rate had been increased to a rate of 3.72 MGD for a period of 288 hours (12 days). However, since the model predicts that virtually the entire aquifer within a 9 mile radius (refer to Exhibit 5-E) reaches a steady state of drawdown by this time, the drawdown contours shown in Exhibit 7 are virtually identical to the 3.72 MGD steady state drawdown cone.

To estimate the affect that these Floridan aquifer drawdowns have on the shallow aquifer, it is important to note that the vertical gradient is naturally downward, unlike areas in eastern Duval county. At this site, the static potentiometric elevation of the Floridan Aquifer is about 32 feet msl, while the water table is about 80 feet msl. The Hawthorn formation is approximately 400 feet thick at this site, so the gradient between the two aquifers is about 0.12 ft/ft downward.

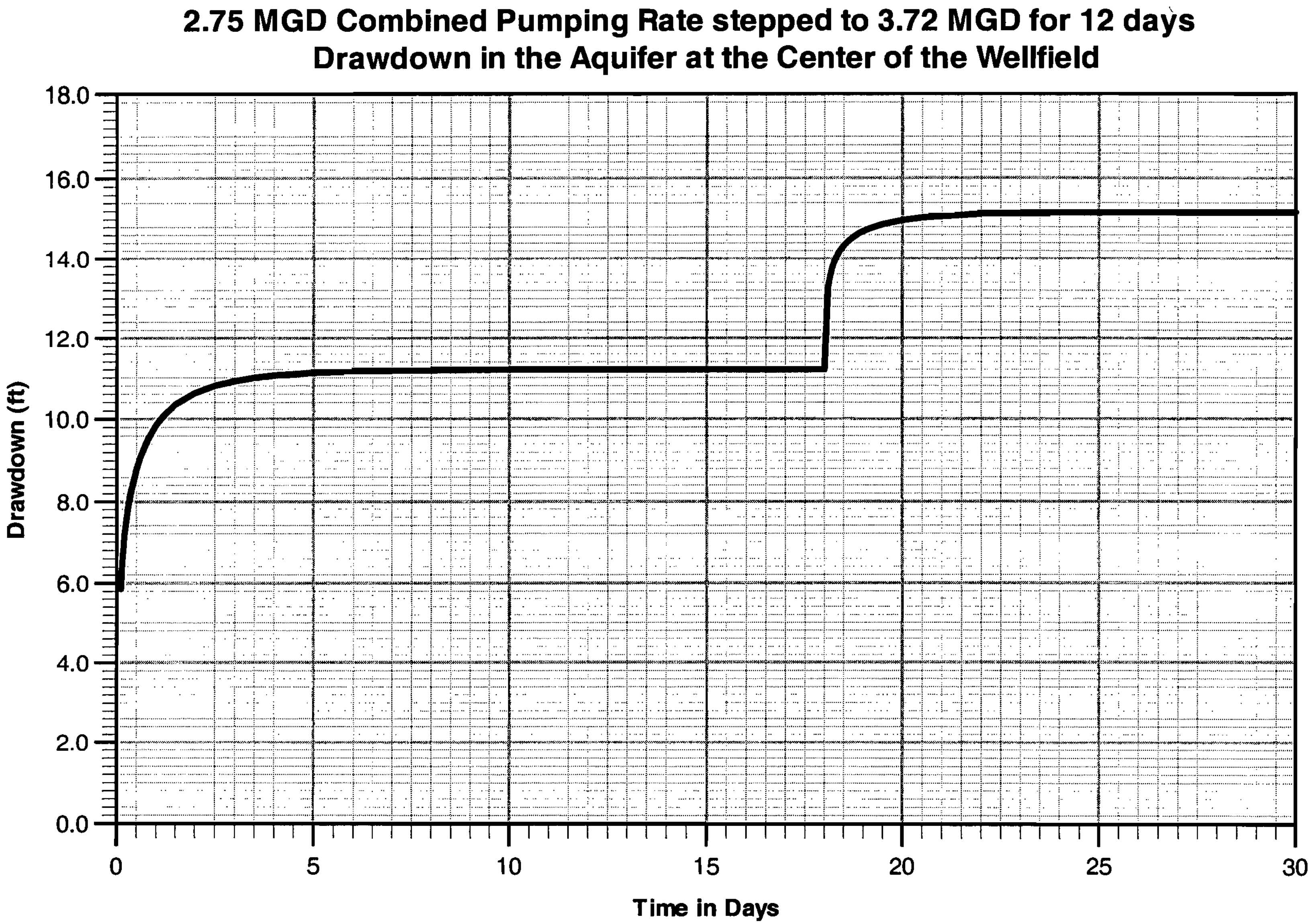
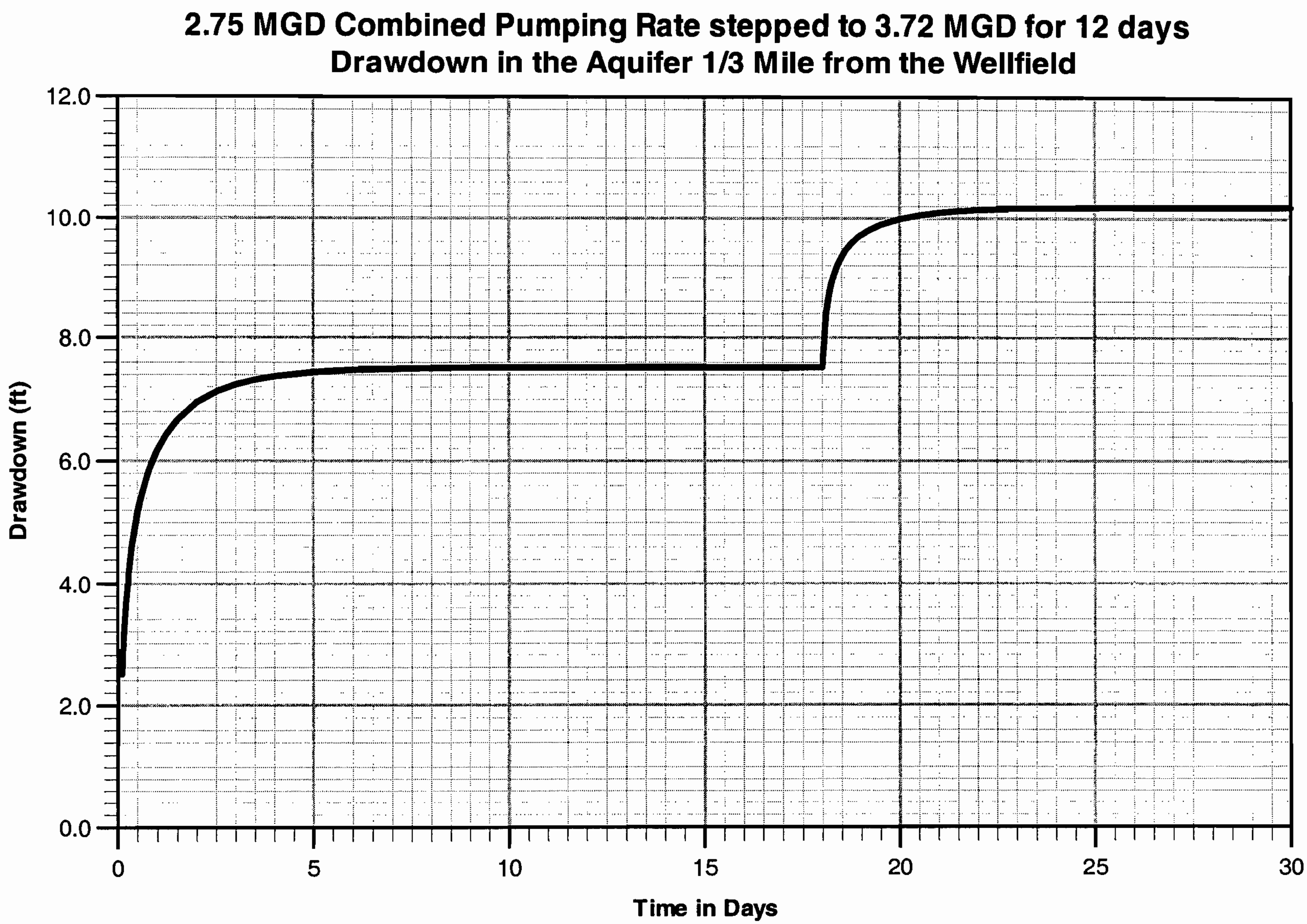
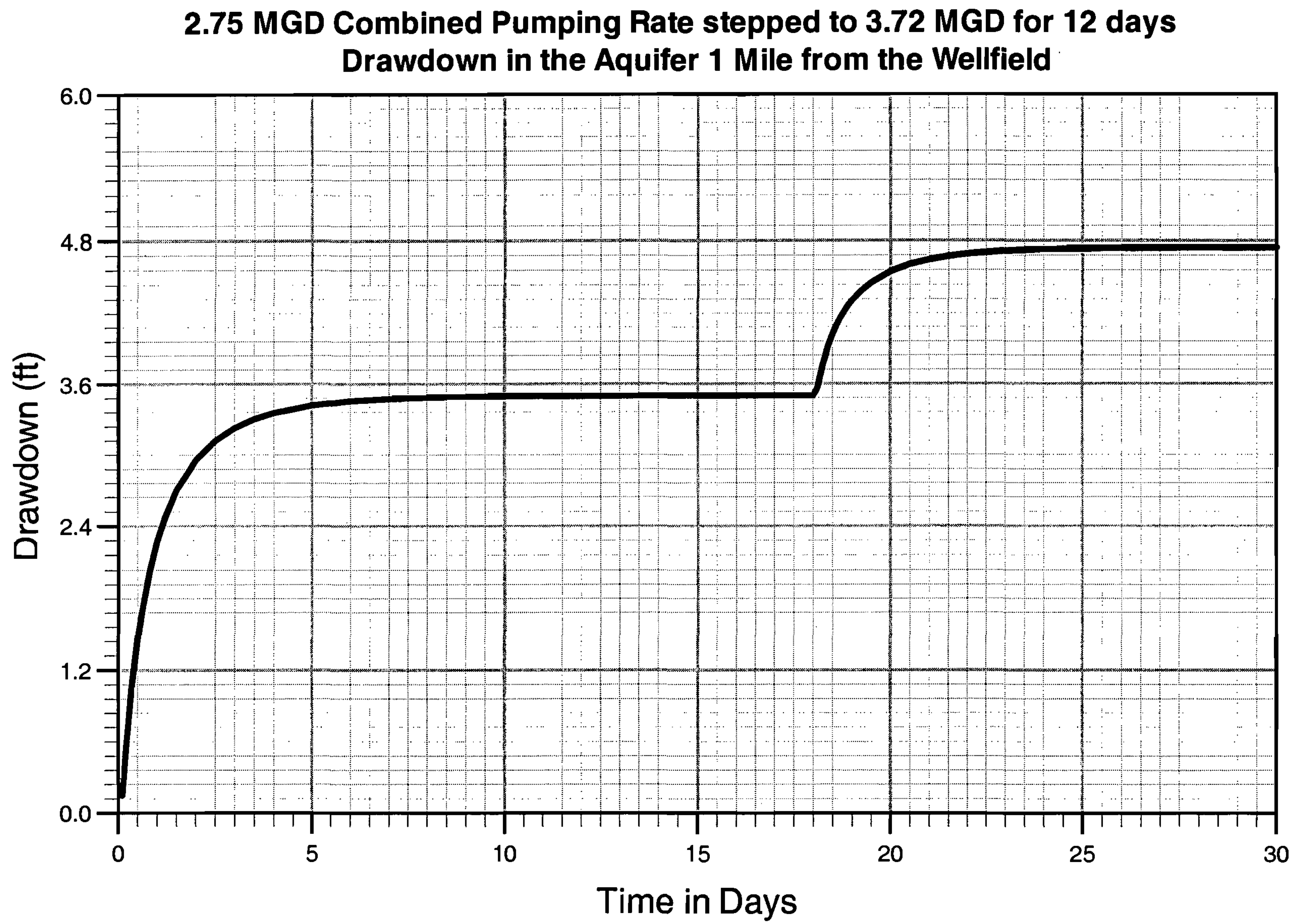

2.75 MGD Combined Pumping Rate stepped to 3.72 MGD for 12 days
Drawdown in the Aquifer at the Center of the Wellfield
Drawdown (ft)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
5
10
15
20
25
30
Time in Days

Exhibit 5A



2.75 MGD Combined Pumping Rate stepped to 3.72 MGD for 12 days
Drawdown in the Aquifer 1/3 Mile from the Wellfield
Drawdown (ft)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
5
10
15
20
25
30
Time in Days

Exhibit 5B



2.75 MGD Combined Pumping Rate stepped to 3.72 MGD for 12 days
Drawdown in the Aquifer 1 Mile from the Wellfield
Drawdown (ft)
6.0
4.8
3.6
2.4
1.2
0.0
0
5
10
15
20
25
30
Time in Days

Exhibit 5C

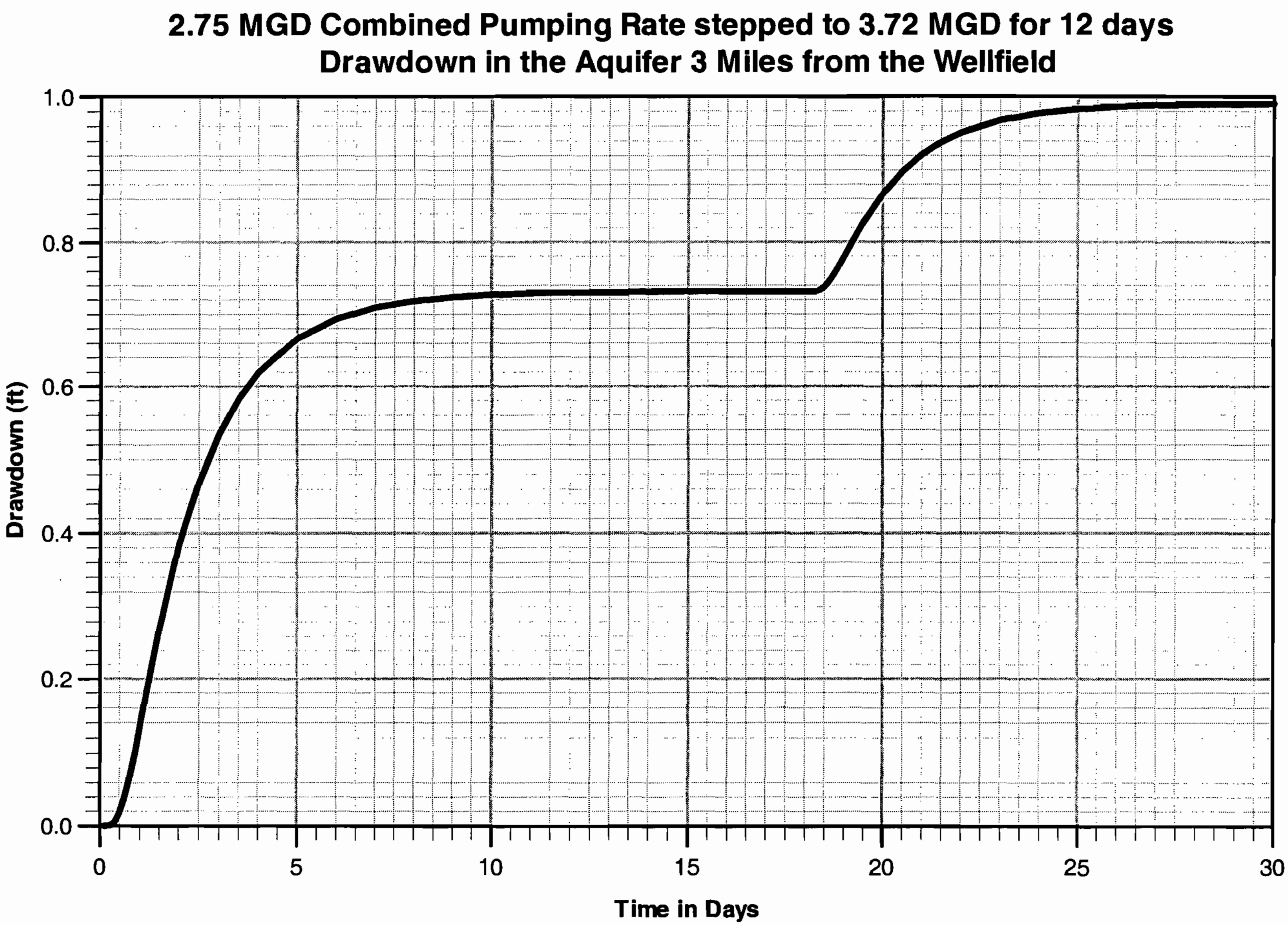

2.75 MGD Combined Pumping Rate stepped to 3.72 MGD for 12 days
Drawdown in the Aquifer 3 Miles from the Wellfield
Drawdown (ft)
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
30
Time in Days

Exhibit 5D

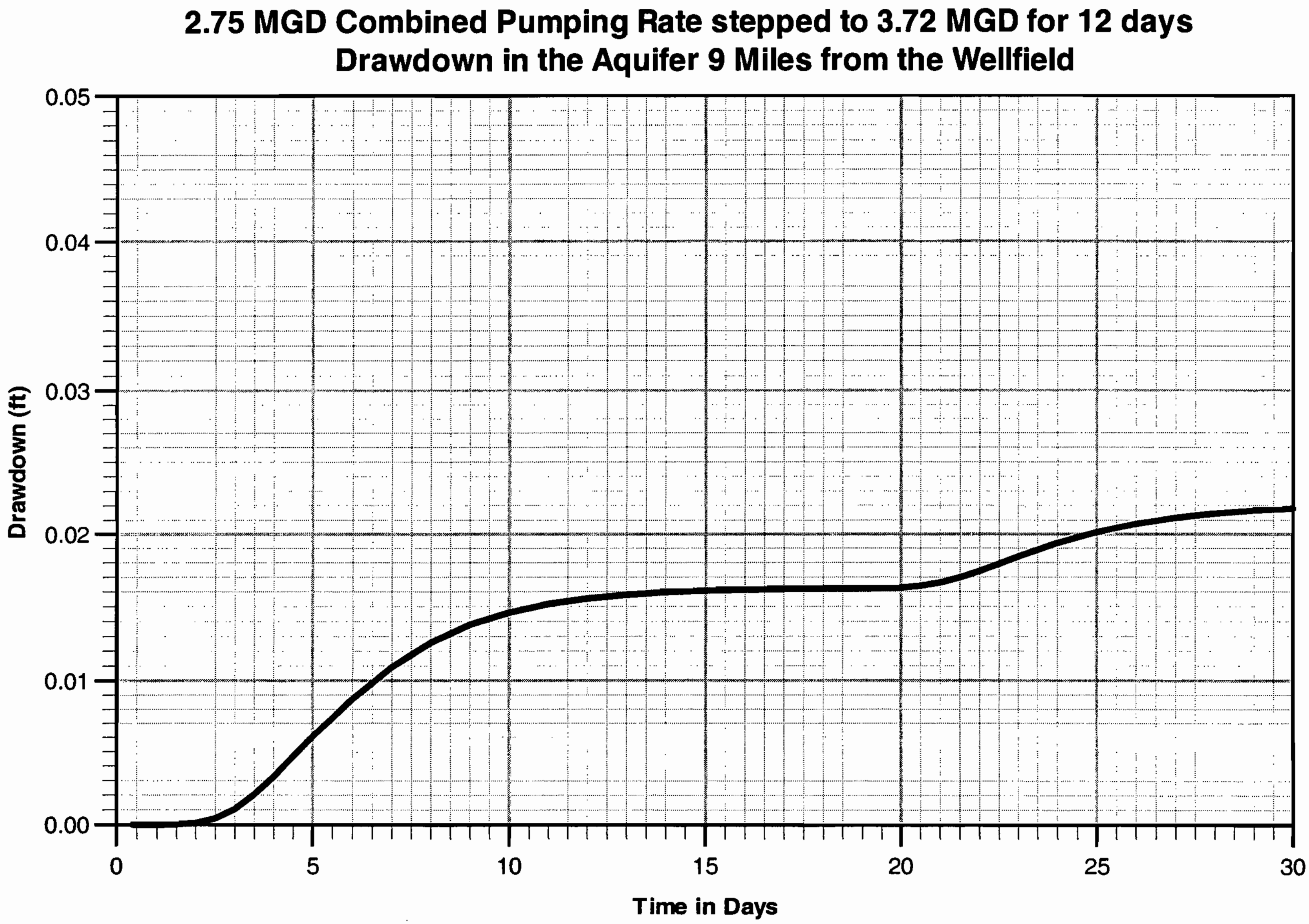

2.75 MGD Combined Pumping Rate stepped to 3.72 MGD for 12 days
Drawdown in the Aquifer 9 Miles from the Wellfield
Drawdown (ft)
0.05
0.04
0.03
0.02
0.01
0.00
0
5
10
15
20
25
30
Time in Days

Exhibit 5E

0310485-PC

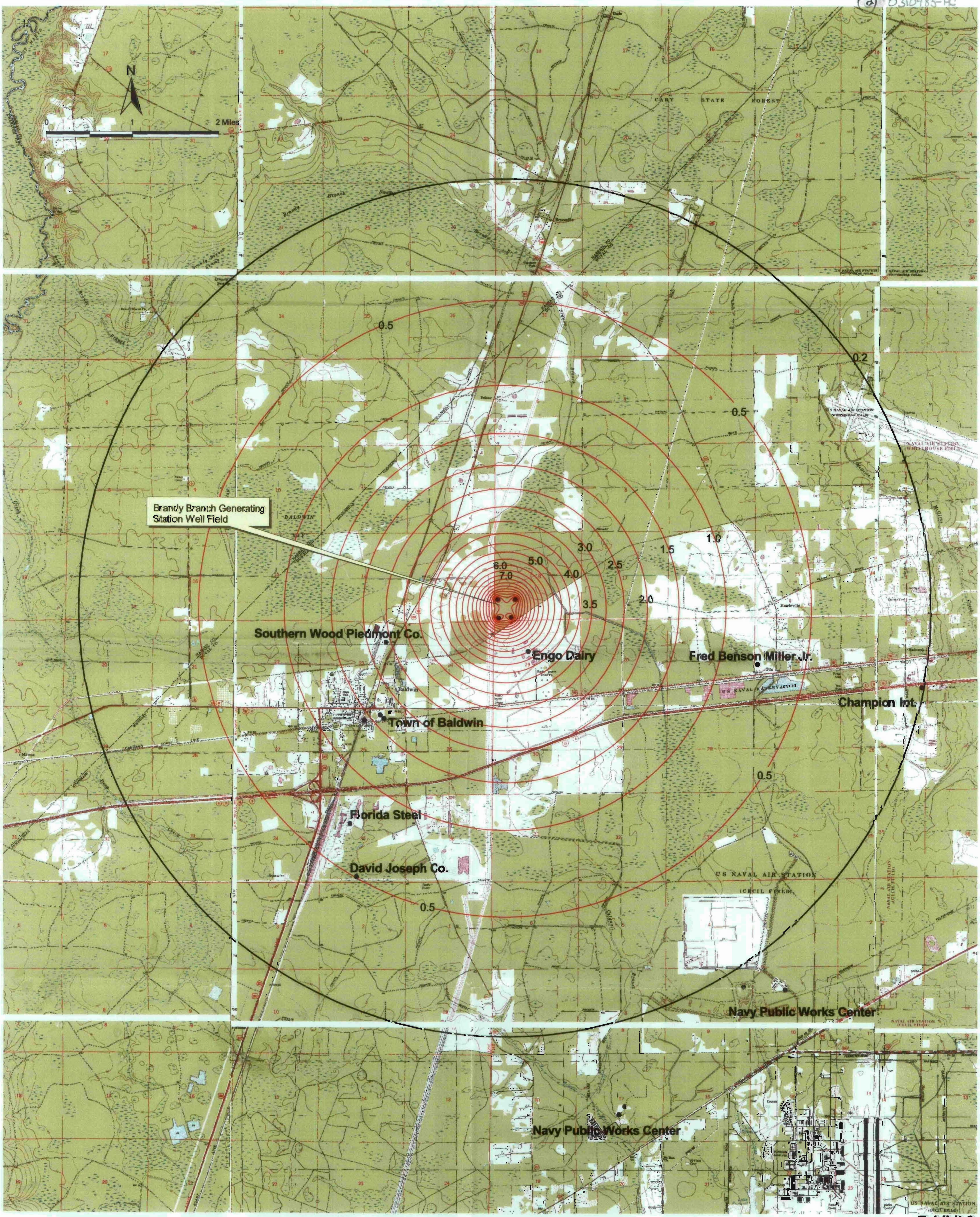


Exhibit 6
JEA Brandy Branch Generating Station
Upper Floridan Aquifer Steady State Drawdown
Resulting From Pumping at 2.75 mgd

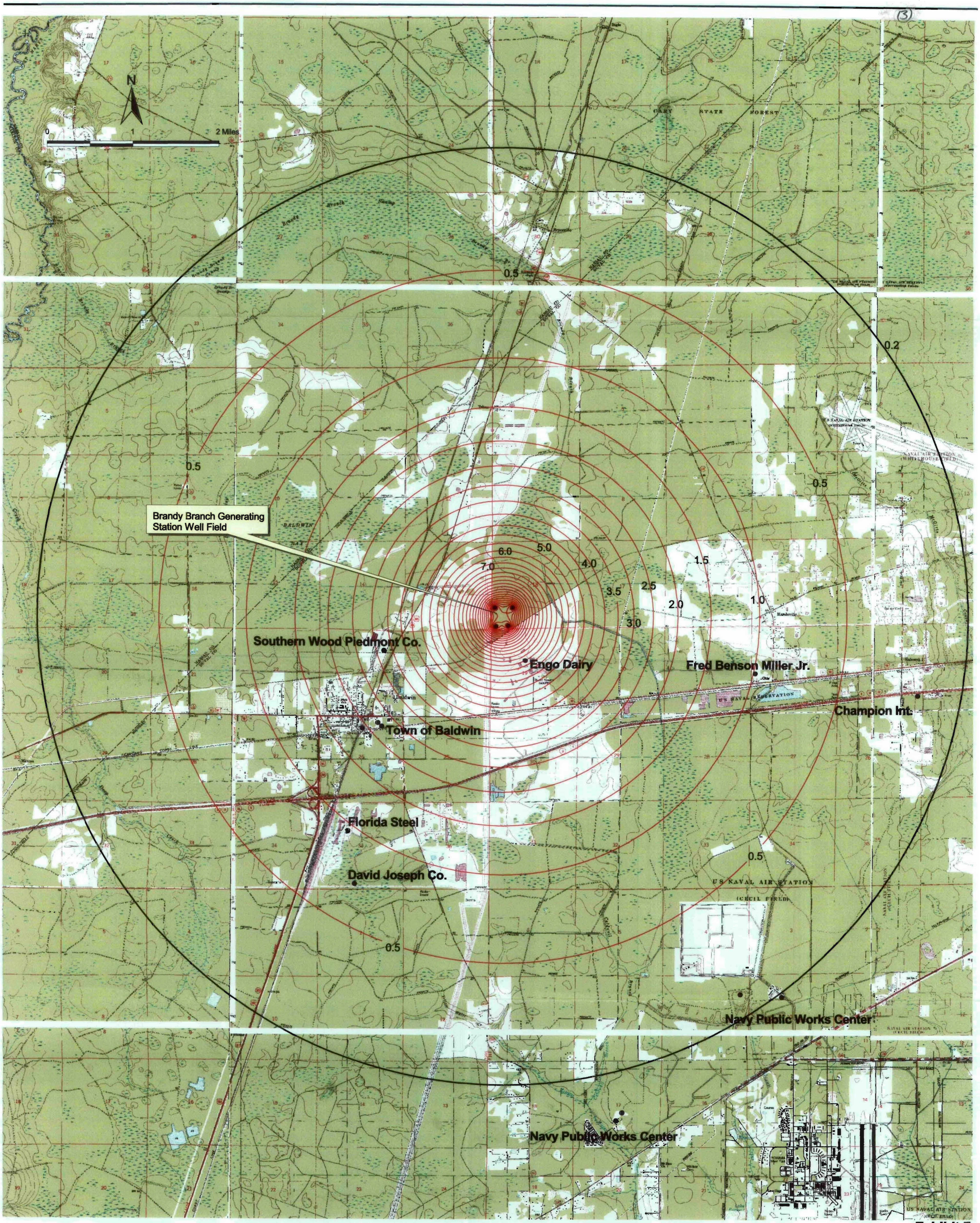


Exhibit 7
JEA Brandy Branch Generating Station
Upper Floridan Aquifer Steady State Drawdown
Resulting From Pumping at 3.72 mgd

Based on the results of the pump test, specifically the r/B match with Hantush & Jacob (Exhibit 4), additional water enters the aquifer as it is pumped, tempering the drawdown which would be expected under strictly confined conditions. If it were assumed that all of this additional water entering the aquifer comes from the Hawthorn formation, then the calculated recharge rate to the upper Floridan aquifer is about 32 inches per year. However, 32 inches of recharge to the Upper Floridan aquifer is far higher than published recharge rates and that which would be expected from the known permeability of the Hawthorn Formation (Aucott 1988). The actual value is believed to be less than 1 inch/year. The SJRWMD regional model, (Durden 1997), as well as pump test results from wellfields throughout Duval county indicate that much of the leakance observed when pumping the Upper Floridan is due to leakage from deeper portions of the Floridan aquifer system, rather than from the confining units of the Hawthorn formation.

If the Floridan aquifer recharge rate is assumed to be 1-inch per year then this implies a 1-inch per year loss from the shallow aquifer. If the specific yield of the shallow aquifer is approximately equal to the porosity, and this value is approximately 0.2, then the yearly drop in water table elevation due only to the elevation difference between the two aquifers equals 5-inches per year. This simple calculation obviously neglects gains due to precipitation, and losses due to transpiration and evaporation.

To calculate the additional drop in the water table due to the increased difference in water levels between the two aquifers caused by pumping, a simple MODFLOW model was constructed. Three scenario's were developed. The first simulates the affect of a constant head equal to 32 ft msl underlying the shallow aquifer with an initial water table elevation of 80 ft msl. Leakance between the two aquifers was set at 4.76×10^{-6} per day (Leakance equals 1-inch per year divided by 48 feet of head difference). This model simulates the simple calculation from the paragraph above.

The remaining simulations were made in a similar manner, except that the 2.75 MGD and 3.72 MGD steady state potentiometric surfaces calculated using the analytical model (see Exhibits 6 and 7) were placed as constant head surfaces below the shallow aquifer rather than the flat 32 ft msl surface. Again, no recharge, evaporation, or transpiration functions were included in any of the three models. Note that steady state simulations are not possible for this model. Under all three simulations, a steady state cannot be achieved until the water table falls to the same elevation as the underlying constant head surface.

Exhibits 8-A through 8-H show time series graphs for a 180 day period at the center of the wellfield, and at distances of 1,000 ft, 2,000, ft, 3,000ft, 4,000, ft, 5,000 ft, 7,500 ft, and 10,000 ft from the center of the wellfield. The baseline scenario with no wellfield pumping is identical regardless of the distance from the wellfield. This baseline drop in water table elevation amounts to 0.21 feet over the 180 day period or 5.1 inches per year, comparing well with the simple calculation of the previous paragraph. At the center of the wellfield the 2.75 MGD scenario added an additional 0.04 ft (0.48-inch) to the baseline scenario after 180 days and the 3.72 MGD added an additional 0.05 ft (0.60-inch) to the baseline scenario after 180 days. Using a 90 day period, the two pumping scenarios added an additional 0.02 ft (0.24 -in) and 0.025-ft

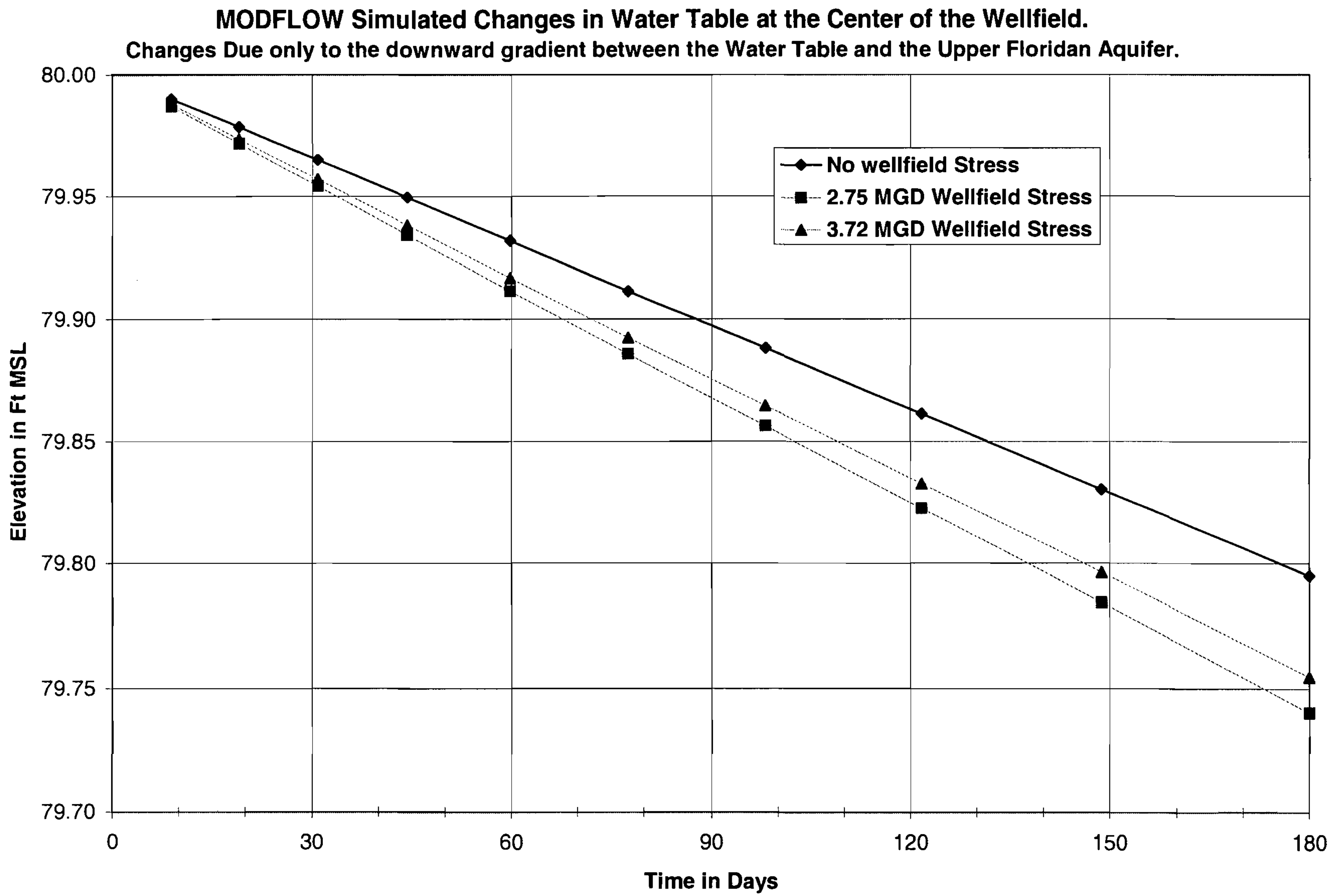
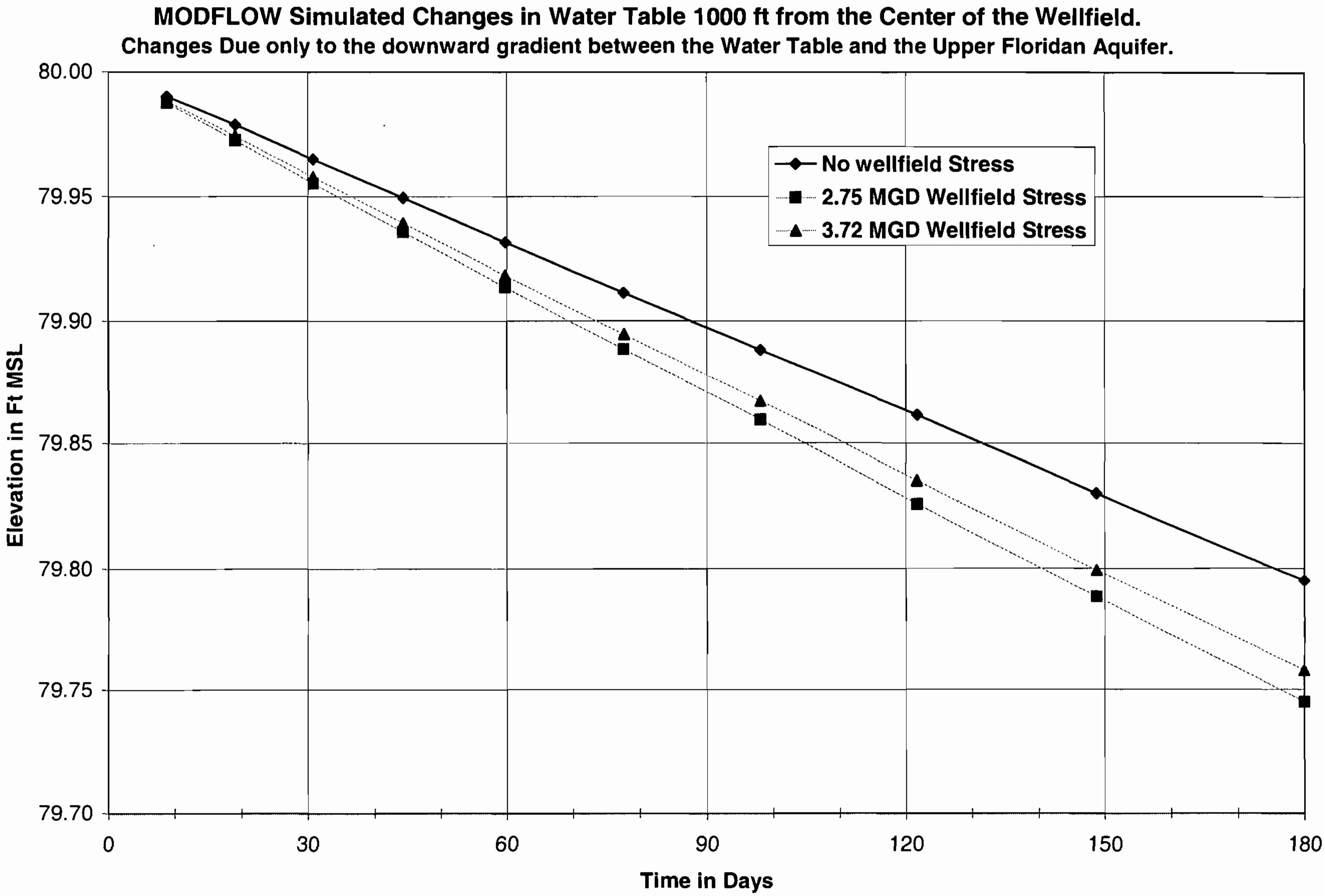
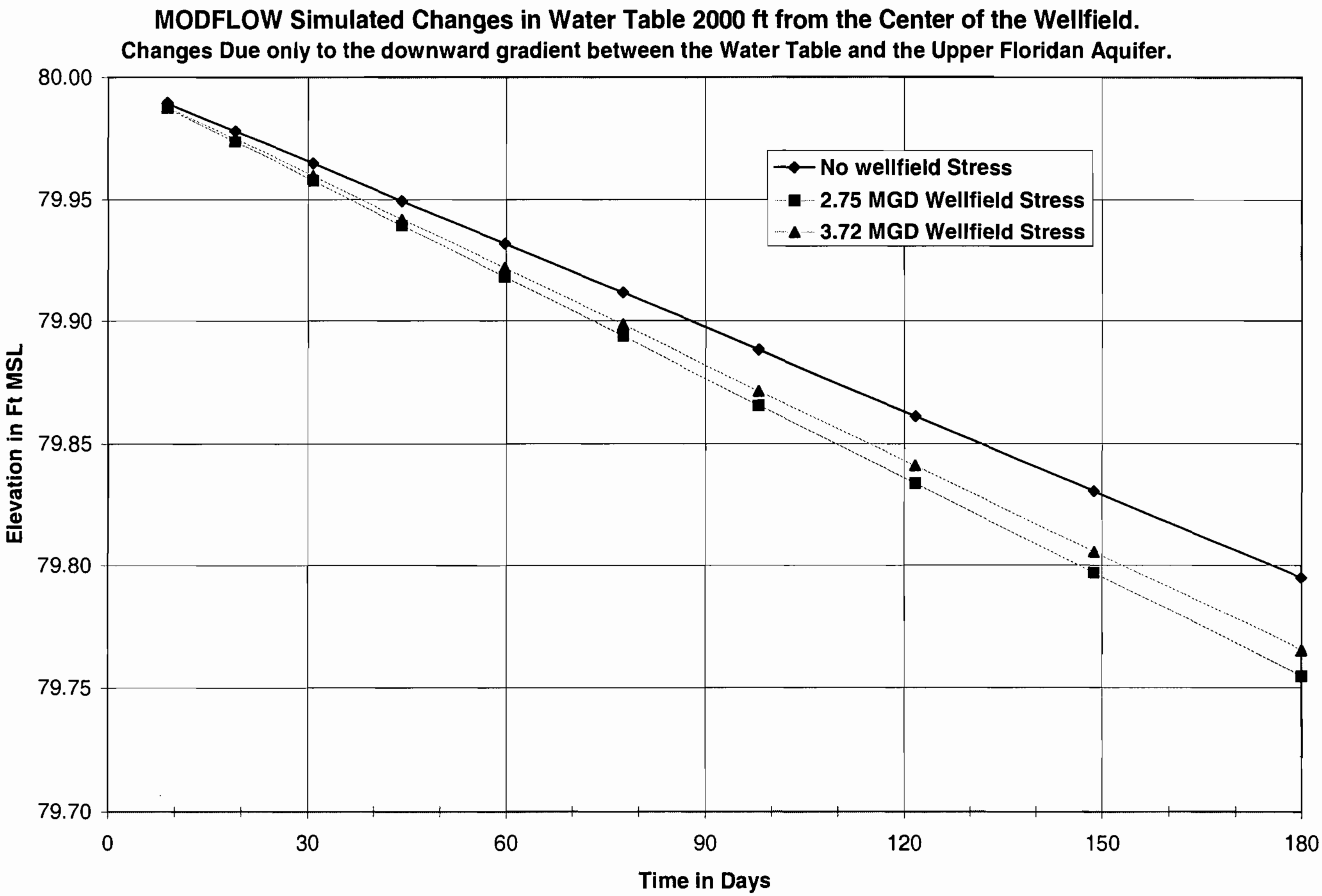

MODFLOW Simulated Changes in Water Table at the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress
Elevation in Ft MSL
80.00
79.95
79.90
79.85
79.80
79.75
79.70
0
30
60
90
120
150
180
Time in Days

Exhibit 8A



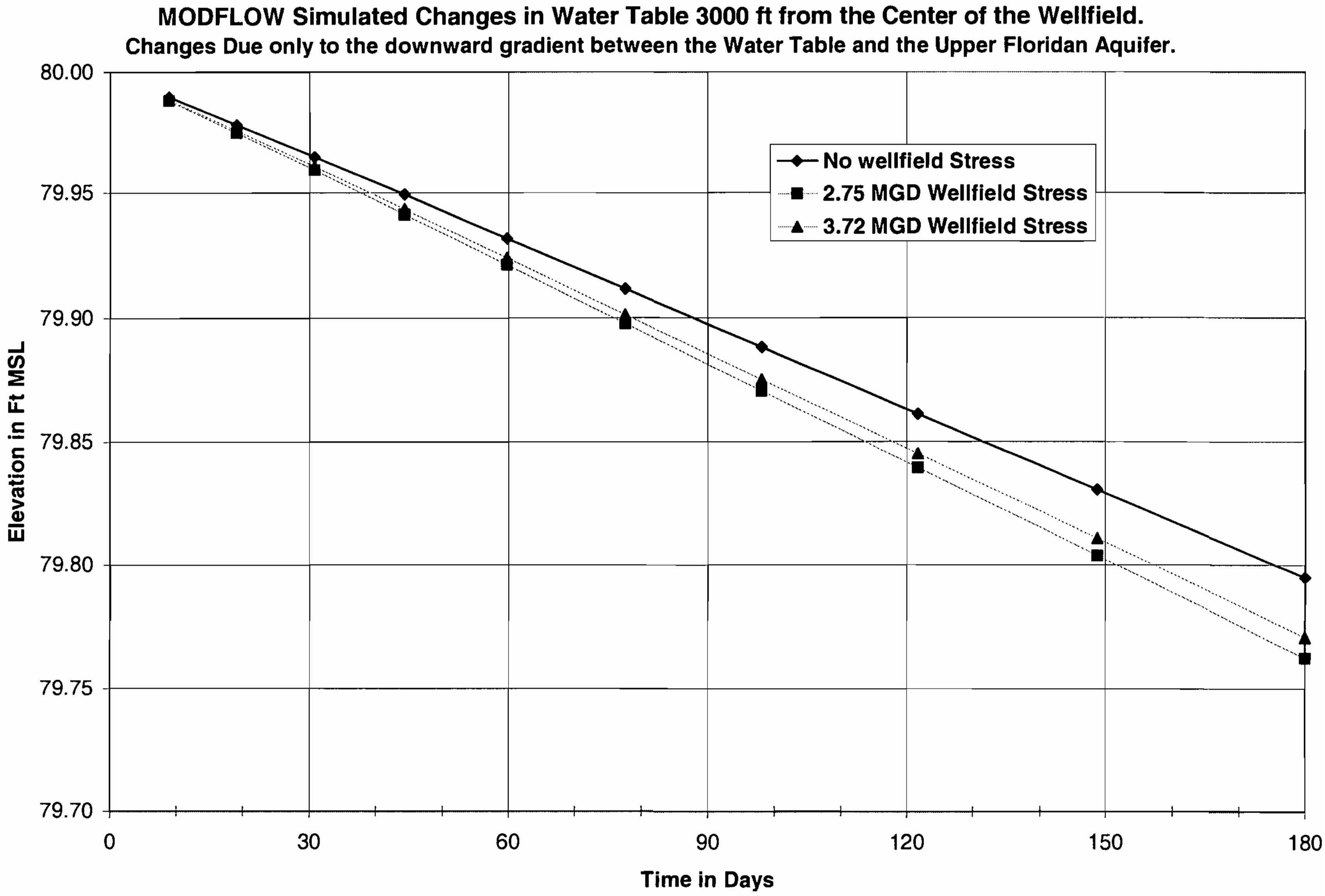
MODFLOW Simulated Changes in Water Table 1000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
80.00
79.95
79.90
79.85
79.80
79.75
79.70
Elevation in Ft MSL
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress
0
30
60
90
120
150
180
Time in Days

Exhibit 8B



MODFLOW Simulated Changes in Water Table 2000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
Elevation in Ft MSL
80.00
79.95
79.90
79.85
79.80
79.75
79.70
0
30
60
90
120
150
180
Time in Days
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress

Exhibit 8C



MODFLOW Simulated Changes in Water Table 3000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
80.00
79.95
79.90
79.85
79.80
79.75
79.70
Elevation in Ft MSL
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress
0
30
60
90
120
150
180
Time in Days

Exhibit 8D

MODFLOW Simulated Changes in Water Table 4000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.

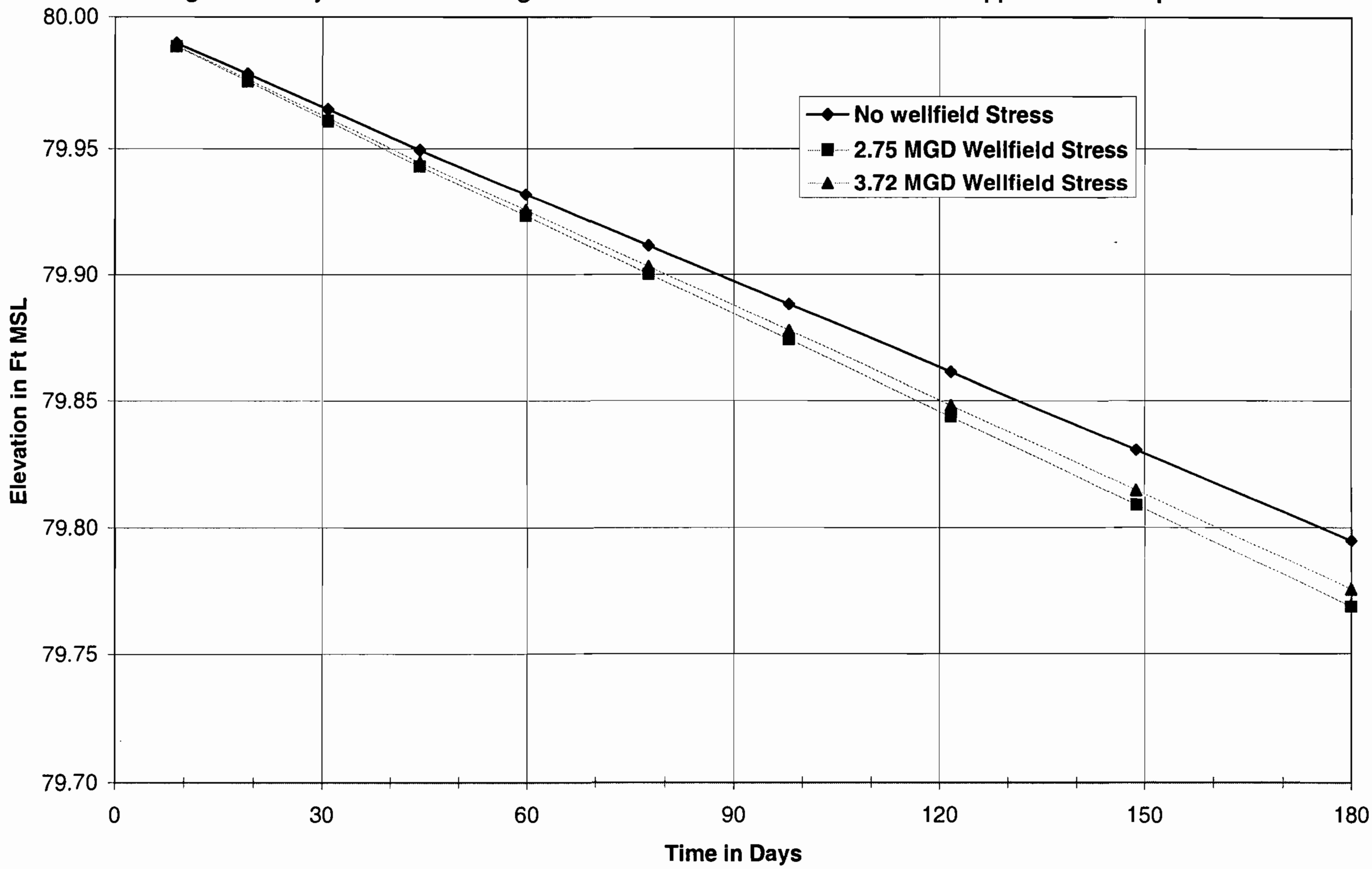


Exhibit 8E

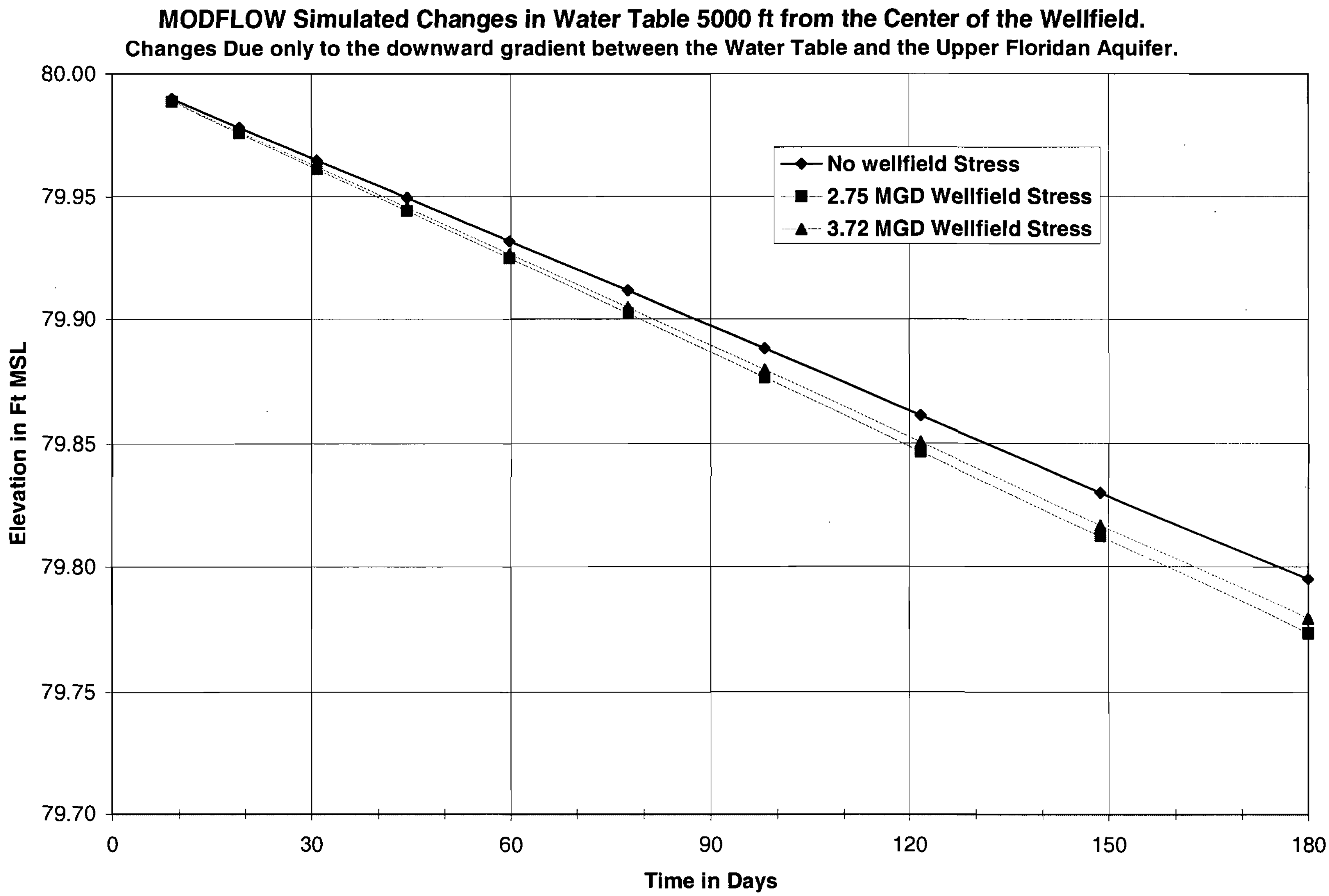

MODFLOW Simulated Changes in Water Table 5000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
Elevation in Ft MSL
80.00
79.95
79.90
79.85
79.80
79.75
79.70
0
30
60
90
120
150
180
Time in Days
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress

Exhibit 8F

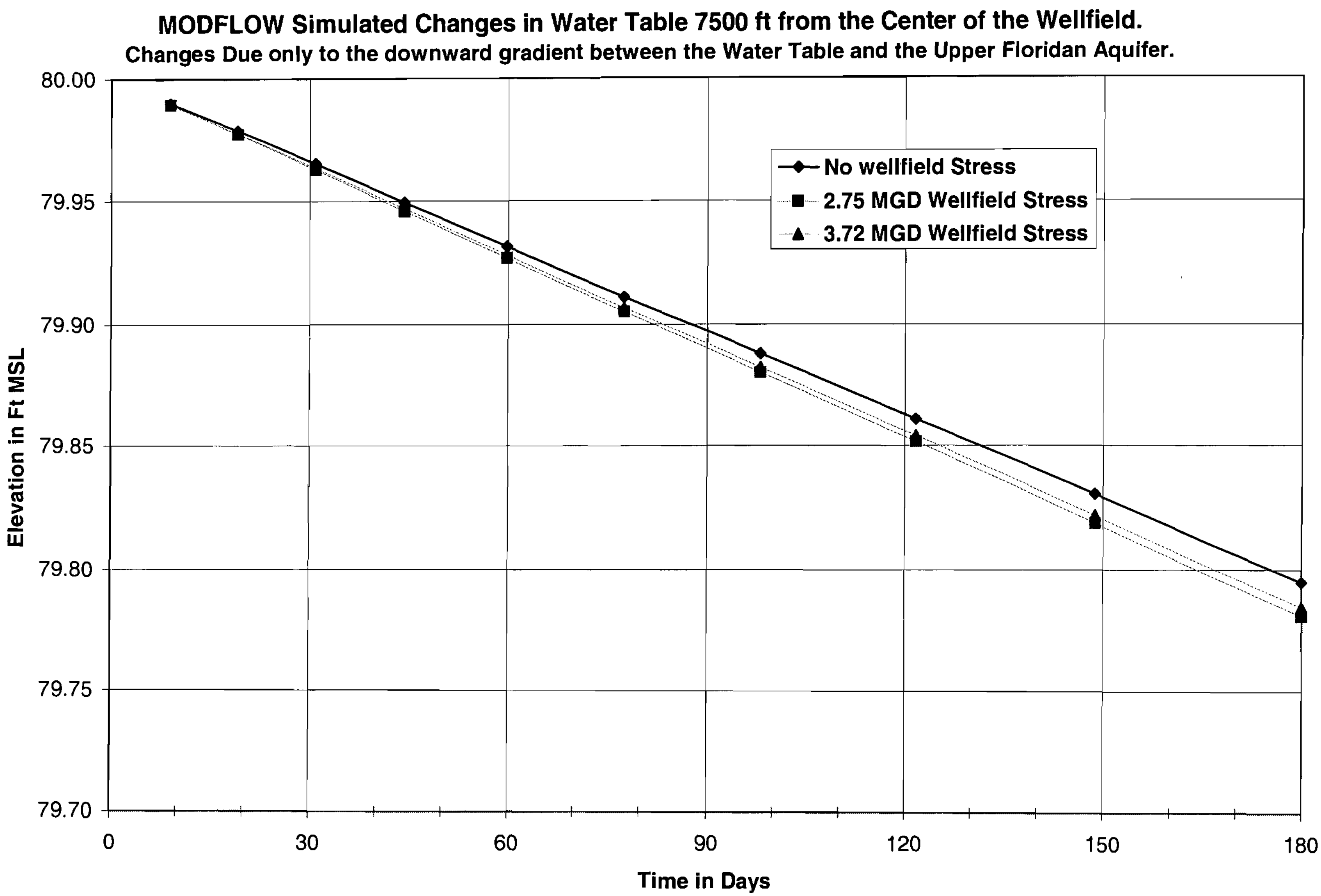

MODFLOW Simulated Changes in Water Table 7500 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
80.00
79.95
79.90
79.85
79.80
79.75
79.70
Elevation in Ft MSL
0
30
60
90
120
150
180
Time in Days
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress

Exhibit 8G

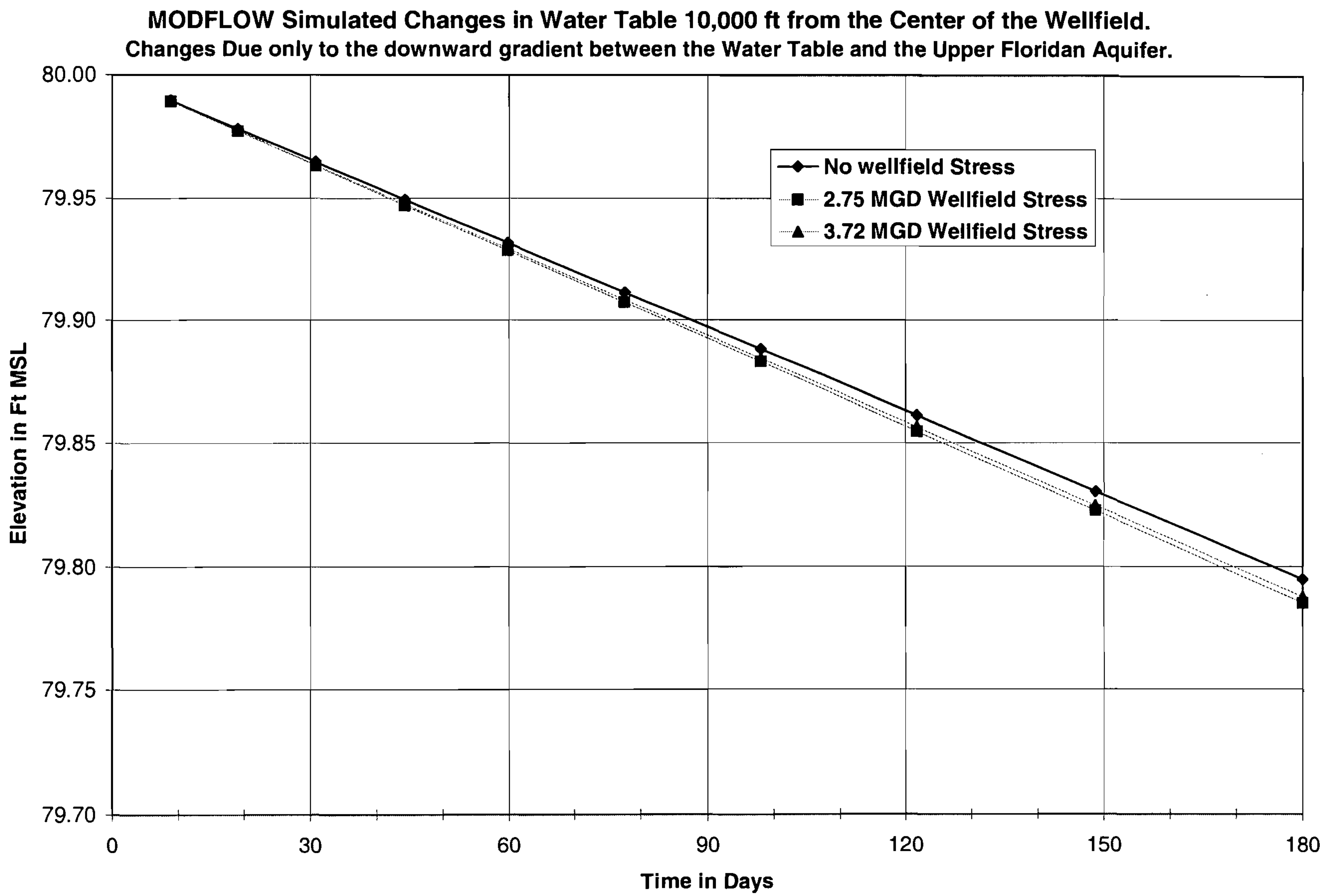

MODFLOW Simulated Changes in Water Table 10,000 ft from the Center of the Wellfield.
Changes Due only to the downward gradient between the Water Table and the Upper Floridan Aquifer.
No wellfield Stress
2.75 MGD Wellfield Stress
3.72 MGD Wellfield Stress
Elevation in Ft MSL
80.00
79.95
79.90
79.85
79.80
79.75
79.70
0
30
60
90
120
150
180
Time in Days

Exhibit 8H

(0.30-in), respectively. These differences from the baseline scenario become smaller in magnitude as the distance increases away from the wellfield.

These simulations do not address the dominant factors that impact the shallow water table levels and surrounding wetlands. Those factors include precipitation, transpiration, evaporation, vegetative cover and runoff. The minor impact from pumping the Floridan will be overwhelmed by these other factors. <u>Therefore, the conclusion is that the shallow aquifer and the wetlands will not be impacted by pumping the Floridan aquifer at the site.</u>

Aucott, Walter R., *Areal Variation in Recharge to the Discharge form the Floridan Aquifer System in Florida,* USGS WRI Report 88-4057, 1988.

Durden, Douglas W., *Finite-Difference Simulation of the Floridan Aquifer System in Northeast Florida and Camden County, Georgia.* Technical Publication 97-2997, SJRWMD, 1997.

2. *Please provide reasonable assurance that impacts to wetlands and surface waters from the proposed drawdown will be reduced to an acceptable level. This would entail a field evaluation of the wetlands that may potentially be impacted. Please contact Robert Epting at (904) 329-4163 for a further discussion of the evaluation process. [Sections 9.4.1(b), 9.4.3(a), 10.2(e)(f)(l)(p), 10.3(d); A.H.]*

Response: No impacts to the shallow aquifer or the wetlands are expected to be caused by drawdowns in the Floridan aquifer. Please refer to the complete discussion provided in response to Comment No. 1.

Robert Epting, SJRWMD, was contacted to discuss theses issues. His primary concern regarding potential impacts to the wetlands by drawdowns in the shallow aquifer resulting from pumping the Floridan aquifer. Based on the calculations presented in response to Comment No. 1, there is no discernable impact to the water level in the shallow aquifer. Therefore, no contour map of the water table can be prepared. It was agreed that if a "no impact" determination was supported, Mr. Epting's concerns would be deemed satisfied.

3. *Figure 2.3-5 on page 2-30, reflects well "PW-1" on the east side of the site and well "PW-2" on the west side of the site. All subsequent references reflect "Well #1" on the west of the site and "Well #2" on the east side of the site. For future references and to maintain consistency, please clarify which well ID will be used for the well west of the site and which ID will be used for the well east of the site. [Sections 4.2, A.H.]*

Response: "Well #1" will be used to identify the well located on the west side of the JEA Brandy Branch site. "Well #2" will be used to identify the well located on the east side of the site.

4. *District water use rules require that all potential sources of water be evaluated for reuse feasibility for the requested use(s) prior to permit issuance. Please provide a reuse feasibility study, including supporting documentation, that evaluates the economic, environmental and technical feasibility of using reclaimed water to supply the water needs of this facility. The study must comprehensively address the following:*

- *A description of all possible sources of reclaimed water, including the Baldwin Waste Water Treatment Plant (WWTP) as a source of water for cooling tower makeup;*
- *Details and costs of transmission from and source to the facility;*
- *Factors constraining the use of reclaimed water in the facility;*
- *Wastewater disposal issues; and*
- *Environmental limitations and concerns.*

The study must contain a conclusion as to the feasibility and, if determined to be feasible, a detailed discussion of implementation. The discussion of implementation shall address:

- *The amount of reclaimed water to be used versus total facility demand for each year until reclaimed water supplies 100 percent;*
- *Secondary sources if reclaimed water cannot be utilized to supply 100 percent of the need;*
- *Other issues related to implementation.*

[Section 10.3(c)(d)(f)(g), A.H.]

Response: A Reuse Feasibility Study has been prepared by JEA, as required in Item No. 4 above, and is presented in the following. This study also addresses the feasibility of treating the cooling tower blowdown for reuse at the Generating Station as required in Item No. 8.

Reuse Feasibility Study

Introduction

JEA has prepared this Reuse Feasibility Study in response to the SJRWMD Request for Additional Information on the Brandy Branch Combined Cycle Conversion Site Certification Application No. PA00-43. This Study evaluates the environmental, technical and economic feasibility of using reclaimed water to supply the water needs of the power generating station. The Study conforms to the requirements of the *Guidelines for Preparation of Reuse Feasibility Studies for Consumptive Use Permit Applications* prepared by the Reuse Coordinating Committee (June 4, 1996).

In the Site Certification Application, it was established that the use of reclaimed water in the proposed cooling towers, demineralized water system and fire water system was potentially feasible.

The majority (93 percent) of the water demand will be for cooling tower makeup water. The estimated cooling tower makeup water demands are as follows:

- 2.75 million gallons per day (mgd) on an annual average day basis
- 3.72 mgd on a peak demand basis (approximate duration of 288 hours per year)

The Brandy Branch Generating Station will normally operate to meet peak electrical demands. The Station's source of cooling water must be highly reliable, as loss of supply would require shut down of the generating turbines. Because of the importance of a reliable water supply, the supply system must have a backup, or contingency, source in the event of loss of the primary water source. Currently, there are two 1.3 mgd capacity wells at the Brandy Branch Generating Station which provide service water for the simple cycle project.

The cooling water will be cycled through the towers approximately eight times prior to disposal (blowdown). Dissolved solids in the blowdown will be concentrated approximately eight-fold over the concentration of the makeup water. Blowdown will be discharged off site to JEA's sanitary sewer system. The estimated blowdown flow rate is 0.322 mgd on an annual average day basis.

The Brandy Branch Generating Station will replace two JEA steam facilities: the Kennedy Generating Station and the Southside Generating Station. Combined, the decommissioning of these facilities will reduce groundwater withdrawals by enabling the retirement of two Consumptive Use Permits totaling 0.49 mgd.

Water Supply Alternatives for Power Production

There are three potential water sources for power production at the Brandy Branch Generating Station:

1. Reclaimed water from the City of Baldwin Wastewater Treatment Plant
2. Reclaimed water from JEA's Southwest Wastewater Treatment Plant
3. Groundwater

Surface water supply has been determined to be infeasible as discussed in the response to SJRWMD RAI Item No. 9.

Feasibility Evaluation of Alternatives

In the following, each of the alternatives is evaluated for environmental, technical and economic feasibility.

ALTERNATIVE 1 - RECLAIMED WATER FROM THE CITY OF BALDWIN WASTEWATER TREATMENT PLANT (WWTP)

In this alternative, secondary effluent from the City of Baldwin WWTP would receive additional treatment and be pumped to the Brandy Branch Generating Station.

Environmental Feasibility
Reuse of Reclaimed Water Regulations - Reuse of reclaimed water as a source for cooling water is regulated by the rules set forth under Chapter 62-610 F.A.C. Part VII, Industrial Uses of Reclaimed Water. These rules require the application of high-level disinfection treatment at the Brandy Branch site because the proposed location of the cooling towers are within 300 feet of the site property line (Chapter 62-610.662, Setbacks). High-level disinfection consisting of filtration [(Chapter 62-610.460(3)} and disinfection [(Chapter 62-600.440(5)] plus continuous monitoring are required as described in Rules 62-600.440(5), 62-610.430(3) and 62-610.463(2). Reclaimed wastewater must not exceed 5 milligrams per liter (mg/L) for Total Suspended Solids (TSS). Anytime the effluent does not meet high-level disinfection standards, it must be diverted away from the reuse system to an approved effluent storage or disposal system.

Environmental Impacts –There would be short term environmental impacts associated with the construction activities, especially for the fabrication and installation of the reclaimed water force main. During the fabrication, significant resources would be consumed to manufacture and transport the pipe and fittings. During installation, there would be emissions from construction equipment, traffic disturbances and increased noise and dust levels within the City of Baldwin and along the Rails To Trails bicycle path. These environmental impacts would cease when the construction activities were completed.

The effluent from Baldwin's WWTP follows a circuitous path, eventually reaching the St. Mary's River. In principal, reuse of the effluent would result in reduced direct nutrient loading to surface water although it is not believed that the current discharge has any adverse impacts.

Technical Feasibility

Water Characteristics – The Baldwin WWTP produces effluent meeting secondary treatment and basic disinfection requirements. The WWTP Permit allows TSS levels to be 20 milligrams per liter (mg/L) on an annual average basis. The WWTP currently treats approximately 200,000 gallons per day (gpd). The plant capacity has a rated capacity of 400,000 gpd; however the City does not have future growth or flow projections to estimate when the plant may treat more than the current 200,000 gpd.

Process – Secondary effluent from the Baldwin WWTP must receive high-level disinfection treatment for use in the cooling towers. This would require effluent filtration, disinfection, pumping, and conveyance processes. Even if regulations did not require high-level disinfection, the process requirements at the Generating Station would require that the effluent be filtered. The Baldwin WWTP processes would be designed for a capacity of 400,000 gpd to match the WWTP capacity. Because the rated capacity of the Baldwin WWTP is less than the power plant water demand, groundwater would be required to supplement the effluent flow. Therefore, groundwater withdrawal, pumping and conveyance processes would also be required. In addition, a backup cooling water source would be required whenever the Baldwin WWTP effluent does not meet high-level disinfection standards. It is recommended that groundwater be used for the backup source. Therefore, total groundwater withdrawal capacity should be 3.722 mgd minimum. Blowdown water would be disposed in a sanitary sewer system. Pumping and conveyance processes for disposal of the blowdown water would be required.

Facility Requirements - The following facility improvements would be required under Alternative No.1:

- ***Filter System*** – A filter system would be required at the Baldwin WWTP capable of producing effluent with 5 mg/L or less TSS. For this analysis, a disc-type filter system, similar to the system that JEA has installed at their Arlington East WWTP, has been assumed.

- ***Disinfection System*** – A system that would provide high-level disinfection requirements would be required. This alternative assumes ultra-violet (UV) disinfection combined with liquid sodium hypochlorite dosing for chlorine residual maintenance in the force main. This configuration the same as that employed at JEA's Mandarin Reuse System.

- ***Reclaimed Water Pump Station*** – A pump station with two vertical turbine pumps would be required at the Baldwin WWTP site.

- ***Reclaimed Water Force Main*** – An 8-inch diameter reclaimed water force main extending approximately 3.5 miles from the Baldwin WWTP to the Brandy Branch Generating Station would be required. A conceptual route for the force main is shown on Exhibit 1.

- ***Water Supply Wells***– Two new 1.3 mgd (900 gpm) wells would be required at the Generating Station in addition to the two existing 1.3 mgd wells. One of the four wells would serve in a standby mode. The capacity of the remaining three wells would be 3.9 mgd, slightly greater than the 3.722 mgd peak demand.

- ***Well Pump Requirements*** – Submersible well pumps, each with a capacity of 1.3 mgd, would be required at each of the two new wells.

- ***Raw Water Header*** – A raw water header would be required from the new wells to the cooling towers. Each header is assumed to consist of 1,000 feet of 12-inch diameter PVC pipe.

- ***Blowdown Water Disposal*** – Blowdown would be pumped to a JEA sanitary sewer connection at the West Beaver Street Lift Station. The estimated blowdown flow rate is 0.32 mgd. Required facilities would include a blowdown pump station and approximately 5-miles of 6-inch PVC sewer force main.

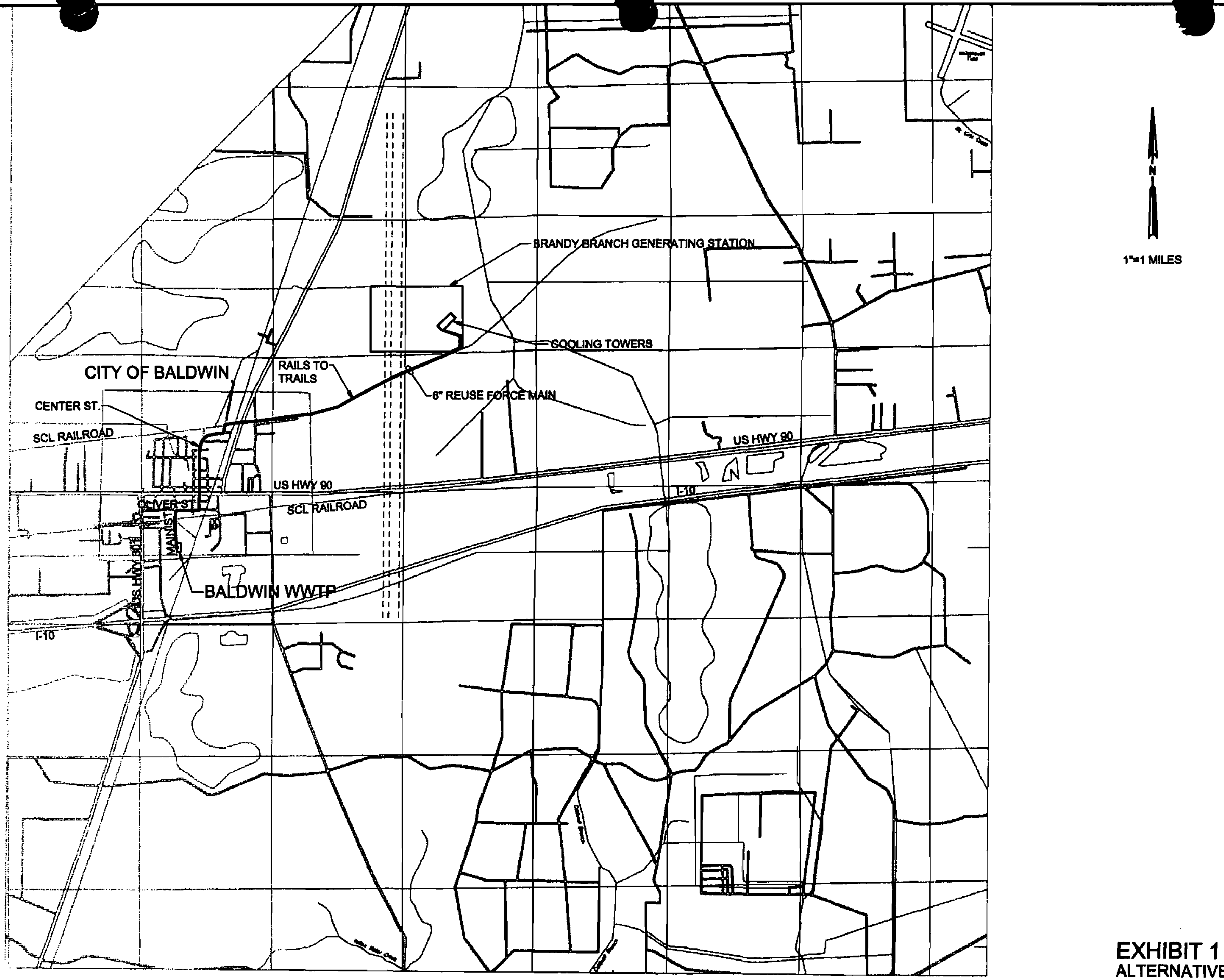


EXHIBIT 1
ALTERNATIVE NO. 1
CITY OF BALDWIN
REUSE FORCE MAIN

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Cost Estimate
The estimated capital and annual costs for Alternative 1 are presented in the following Exhibit 2.

EXHIBIT 2
Alternative 1 – Baldwin Reuse (400,000 gpd reuse capacity)
Cost Estimate

Equipment	Capital Cost
Filter System	$303,000
UV High Level Disinfection System	$220,000
Sodium Hypochlorite Residual System	$89,000
Reuse Pump Station	$131,000
Reuse Force Main (18,480 LF/8-inch)	$998,000
Wells & Pumps complete (quantity – 2)	$675,000
Raw Water Header (2,000 LF/12-inch)	$162,000
Blowdown Sewer Line (26,400 LF/6-inch)	$1,000,000
Total Capital Cost	$3,578,000
Operation & Maintenance Cost/Year	
Maintenance	$57,400
Chemicals	$1,000
Power	$10,500
Labor	$5,200
Total Annual O & M Cost	$74,100

Assumptions: Cost includes construction, engineering and contingency

The above cost estimate is an order of magnitude estimate. The capital costs were developed from general estimating information, cost information from major equipment suppliers, experience on previous projects of similar scope, and quantity takeoffs from conceptual layouts using unit costs. The costs are order of magnitude, planning level estimates and were prepared without detailed engineering data. An order of magnitude estimate generally has a level of accuracy of +50 to -30 percent.

Actual costs will depend on the final project scope and implementation schedule, labor and material costs, competitive market conditions at the time of construction, and other variable factors. Inflation during the 20-year planning period was not included in the present value analysis as required by the Reuse Coordinating Committee Guidelines Manual.

Annual costs for Alternative No. 1 are based on the assumptions that maintenance costs will be 1 percent of the capital cost of pipelines and 2 percent of the capital cost for treatment and pumping facilities. Chemical costs are based on sodium hypochlorite usage at a dose of 5 mg/L at a cost of $0.23/gallon. Power costs are based on $0.055/kw-hour. Labor costs are based on 2 hours per week of an operator's time.

ALTERNATIVE 2 - RECLAIMED WATER FROM JEA'S SOUTHWEST WASTEWATER TREATMENT PLANT

In this alternative, secondary effluent from JEA's Southwest WWTP would receive additional treatment and be pumped to the Generating Station for reuse in the cooling towers.

Environmental Feasibility

Reuse of Reclaimed Water Regulations – Reuse regulations are identical to those described in Alternative No. 1.

Environmental Impacts – There would be short term environmental impacts associated with the construction activities, especially for the fabrication and installation of the reclaimed water force main. During the fabrication of over 126,000 linear feet of 18-inch pipe, significant resources would be consumed to manufacture and transport the pipe and fittings. During installation, there would be disturbances to wetlands, emissions from construction equipment, traffic disturbances and increased noise and dust levels. These environmental impacts would cease when the construction activities were completed.

The effluent from JEA's Southwest WWTP is currently permitted to discharge to the St. Johns River. Reuse of the effluent would result in reduced direct nutrient loading to the River.

Technical Feasibility

Water Characteristics – The JEA Southwest WWTP produces effluent meeting secondary treatment and basic disinfection requirements. The WWTP Permit allows TSS levels up to 20 milligrams per liter (mg/L) on an annual average basis. The WWTP currently treats approximately 7 million gallons per day (mgd) and has a permitted capacity of 10 mgd.

Process – Secondary effluent from the Southwest WWTP must receive high-level disinfection treatment for use in the cooling towers. This would require effluent filtration, disinfection, pumping and conveyance processes. The processes would be designed to meet an annual average daily demand of 2.744 mgd. Peak demand of

3.722 mgd could be met by using reuse water from the WWTP and groundwater from one existing 900 gpm well at the Brandy Branch Generating Station. A backup to the cooling tower water would be required in the event that the Southwest WWTP effluent does not meet high-level disinfection standards. Backup could be provided by either onsite storage of reuse water or the installation of two additional wells to meet annual average daily demands for a 24-hour period. Since the cost for these options is approximately the same, it will be assumed that new wells will provide the backup capacity. Blowdown water will be disposed to JEA's sanitary sewer system. Pumping and conveyance processes would be required for its disposal.

Facility Requirements - The following facility improvements would be required for Alternative No. 2.

- ***Filter System*** – A filter system installed at the JEA Southwest WWTP capable of producing effluent with 5 mg/L or less TSS. For this analysis, a disc type filter system, similar to the system that JEA has installed at their Arlington East WWTP, has been assumed. The system would be constructed with a capacity of 2.744 mgd, matching the annual average day flow demand for cooling water.

- ***Disinfection System*** – A system that would provide high level disinfection would be required. This alternative assumes ultra-violet (UV) disinfection combined with liquid sodium hypochlorite dosing for chlorine residual maintenance in the force main. This configuration is the same as that employed at JEA's Mandarin Reuse System.

- ***Reclaimed Water Pump Station*** – A pump station with two vertical turbine pumps would be required at the Southwest WWTP.

- ***Reclaimed Water Force Main*** – An 18-inch diameter reclaimed water force main, extending approximately 24 miles from the Southwest WWTP to the Brandy Branch Generating Station would be required. A conceptual route for the force main is shown on Exhibit 3.

- ***Water Supply Wells*** - Two new 1.3 mgd (900 gpm) wells would be installed at the Generating Station, to serve as a backup to the reuse system. In addition to the two existing 1.3 mgd wells, one of the four wells would serve in a standby mode. The capacity of the remaining three wells would be 3.9 mgd, slightly greater than the 3.744 mgd peak demand. The water supply wells would provide the supplemental flow for the peak demand which has been estimated not to exceed 288 hours per year.

- ***Well Pump Requirements*** – Submersible well pumps, each with a capacity of 1.3 mgd, would be installed on each of the two new wells.

- ***Raw Water Header*** – A raw water header would be installed from the new wells to the cooling towers. Each header is assumed to consist of 1,000 feet of 12-inch diameter PVC pipe.

- ***Blowdown Water Disposal*** – Blowdown water would be pumped to the JEA sanitary sewer connection at the West Beaver Street Lift Station. The blowdown flow rate will be 0.32 mgd. Facilities would include a blowdown pump station and approximately 5-miles of 6-inch PVC sewer force main.

Cost Estimate - The estimated capital and annual costs for Alternative 2 are presented in the following Exhibit 4.

EXHIBIT 4
Alternative 2 – JEA Southwest WWTP Reuse (2.74 mgd capacity – AADF)
Cost Estimate

Equipment	Capital Cost
Filter System	$985,500
UV High Level Disinfection System	$1,458,000
Sodium Hypochlorite Residual System	$164,000
Reuse Pump Station	$274,000
Reuse Force Main (126,720-LF/18-inch)	$15,400,000
Wells & Pumps, complete (quantity – 2)	$675,000
Raw Water Header (2,000-LF/12-inch)	$162,000
Blowdown Sewer Line (26,400 LF/6-inch)	$1,000,000
Total Capital Cost	$20,118,500
O&M Cost/Year	
Maintenance	$248,000
Chemicals	$17,300
Power	$16,500
Labor	$5,200
Total Annual O&M Cost	$287,000

Assumptions: Costs include Construction, engineering, and contingency

Annual costs for Alternative No. 2 are based on the assumptions that maintenance costs will be 1 percent of the capital cost of pipelines and 2 percent of the capital cost for treatment and pumping facilities. Chemical costs are based on sodium hypochlorite usage at a dose of 5 mg/L at a cost of $0.23/gallon. Power costs are based on $0.055/kw-hour. Labor costs are based on 2 hours per week of an operator's time.

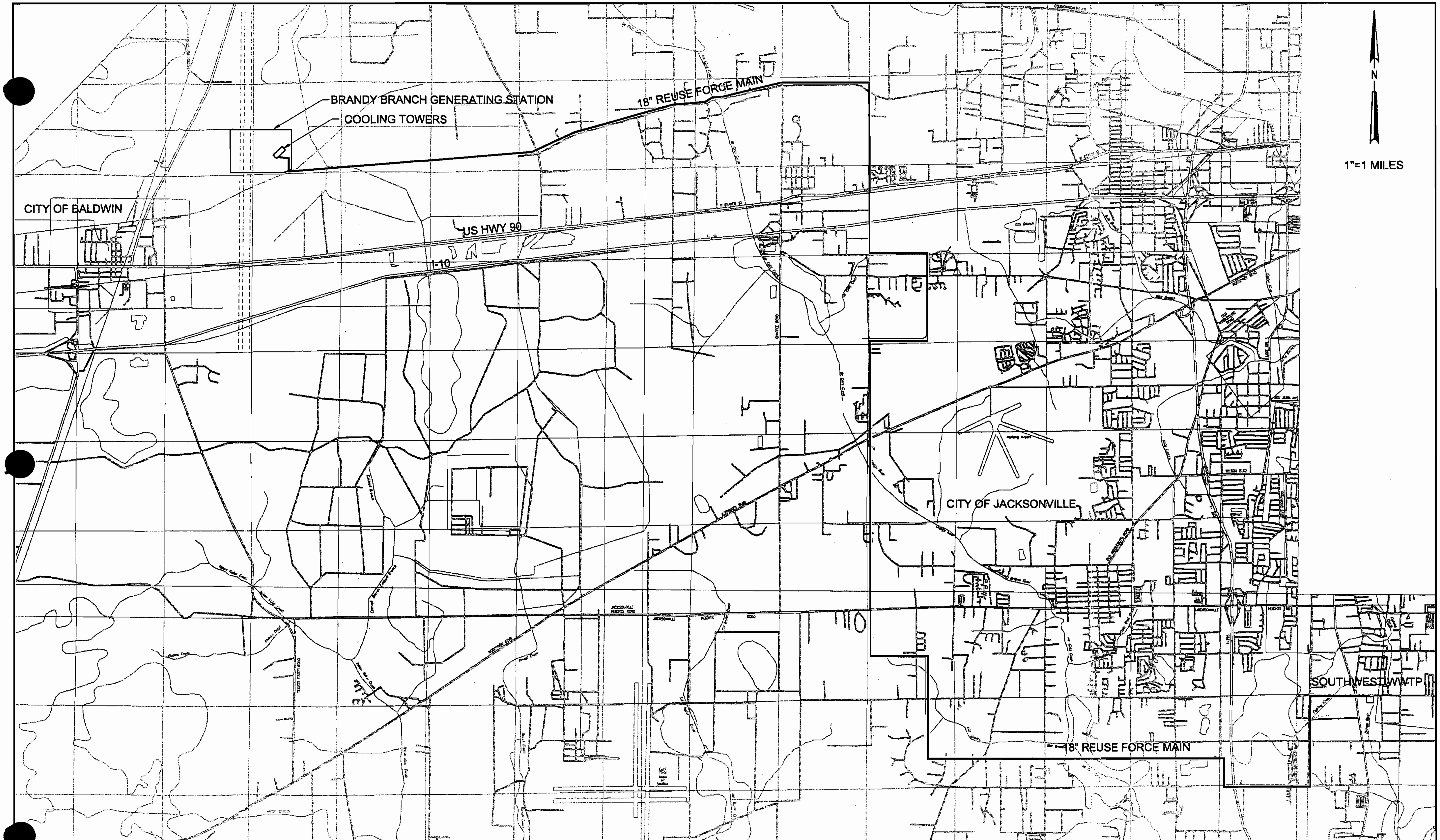

EXHIBIT 3
ALTERNATIVE NO. 2
JEA SOUTHWEST WWTP
REUSE FORCE MAIN

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ALTERNATIVE 3 – GROUNDWATER

Alternative No. 3 is the use of groundwater for cooling tower makeup supply.

Environmental Feasibility

Groundwater Regulations – There are no water quality regulations for the use of groundwater in cooling tower applications.

Environmental Impacts - A modeling analysis of the existing and proposed well field was conducted and there are no anticipated impacts to wetlands or surface waters. The findings of this analysis are presented in the response for RAI items No. 1, 2, 6 and 7 of this document.

Technical Feasibility

Water Characteristics –Two existing groundwater wells, each with a capacity of 1.3 mgd, provide water to the service water system. Two additional wells would be required to provide the additional water demand when the plant is converted from a simple cycle to a combined cycle generation station. The two new wells would each have a capacity of 1.3 mgd. Modeling completed as part of the RAI response predicts that the aquifer can safely yield the quantity of water required without adverse impact to adjacent users or wetlands. Findings of the analysis are presented in the response to RAI item No. 5 of this document.

Process – The quality of water from the Floridan aquifer is adequate for use in the cooling towers without further treatment. However, two additional groundwater wells would be required to supplement the two existing wells. Each new well would have a capacity of 1.3 mgd. The total groundwater withdrawal capacity with three wells on line and one standby would be 3.9 mgd. Groundwater withdrawal, pumping and conveyance for the two new wells would be required. Blowdown water would be disposed to JEA's sanitary sewer system. Pumping and conveyance processes would be required for its disposal.

Facility Requirements - The following facility improvements would be required for Alternative No. 3:

- ***Water Supply Wells***– Two new 1.3 mgd (900 gpm) wells would be installed at the Generating Station. One of the four wells would serve in a standby mode. The capacity of the remaining three wells would be 3.9 mgd, slightly greater than the 3.722 mgd peak demand.

- ***Well Pump Requirements*** – Submersible well pumps, each with a capacity of 1.3 mgd, would be installed in each of the two new wells.

- ***Raw Water Header*** – A raw water header would be installed from the new wells to the cooling towers. The header is assumed to consist of 1,000 feet of 12-inch diameter PVC pipe.

- ***Blowdown Water Disposal*** – Blowdown would be pumped to the JEA sanitary sewer system at the West Beaver Street Lift Station. Facilities would include a blowdown pump station and approximately 5-miles of 6-inch PVC sewer force main.

Cost Estimate
The estimated capital and annual costs for Alternative 3 are presented in the Exhibit 5.

EXHIBIT 5
Alternative 3 – Groundwater Wells
Cost Estimate

Equipment	**Capital Cost**
Wells & Pumps, complete (quantity – 2)	$675,000
Raw Water Header (2,000-LF/ 12-inch)	$162,000
Blowdown Sewer Line (26,400 LF/6-inch)	$1,000,000
Total Capital Cost	$1,837,000
O&M Cost/Year	
Maintenance	$37,000
Chemicals	$0
Power	$7,700
Labor	$2,600
Total	$47,300

Assumptions: Costs include Construction, Engineering and Contingency

Annual costs for Alternative No. 3 are based on the assumptions that maintenance costs will be 1 percent of the capital cost of pipelines and 2 percent of the capital cost for treatment and pumping facilities. Power costs are based on $0.055/kw-hour. Labor costs are based on 1 hour per week of an operator's time.

A variation on Alternative No. 3 is the reuse of the blowdown water in the cooling tower system. This alternative would require membrane treatment, such as nanofiltration, to treat the blowdown water for reuse in the cooling towers. This alternative would reduce groundwater withdrawals from 2.744 mgd to 2.489 mgd on an annual average day basis. This is based on reusing 80 percent of the total blowdown flow of 0.322 mgd, with the remaining 20 percent consisting of concentrate. The estimated cost for the blowdown water reuse alternative is shown in Exhibit 6.

EXHIBIT 6
Groundwater Wells with Reuse of Blowdown
Cost Estimate

Equipment	**Capital Cost**
Wells & Pumps, complete (quantity – 2)	$675,000
Raw Water Header (2,000-LF/ 12-inch)	$162,000
Blowdown Sewer Line (26,400 LF/6-inch)	$1,000,000
Membrane System	$1,350,000
Total Capital Cost	$3,187,000
O&M Cost/Year	
Maintenance	$52,100
Chemicals	$1,000
Power	$17,700
Labor	$5,200
Total	$76,000

Assumptions: Costs include Construction, Engineering and Contingency

As shown above, the additional cost to reduce groundwater withdrawals by 0.254 mgd with reuse of blowdown water is $1.35 million. This additional cost is for the membrane treatment system.

Present Value Cost Analysis

In accordance with the Reuse Coordinating Committee Guidelines, a present value analysis was conducted for each alternative to compare the total costs on an equivalent basis. All costs anticipated during the planning period were converted to an equivalent present value in 2001 dollars. Key parameters used to conduct the present value analysis are summarized in Exhibit 7.

To perform the present value analysis, estimates of all of the costs were needed for each alternative. Pertinent costs include the capital and annual costs associated with implementation of the alternatives and include applicable markups and allowances for contingency, engineering, legal and administrative costs. In addition, replacement costs and salvage values for facilities were included in the analysis. It was assumed that there would not be any revenue associated with any of the alternatives. In fact, it is possible that JEA might have to pay for the reclaimed water from the City of Baldwin. However, for this analysis, it was assumed that Baldwin would not charge JEA for the reclaimed water. This assumption benefits the present value cost for this alternative.

EXHIBIT 7
Parameters for the Present Value Analysis

Parameter	Value
Period of Analysis	20 years
	2001-2021
Design Year	2001
Discount Rate[a]	6.375%
Percentages Used for Indirect Costs:	
Contingency	15%
Mobilization/Bond/Insurance	5%
Contractor's Overhead and Profit	15%
Engineering/Legal/Administration	30%
Useful Life for Salvage Value and Replacement:[b]	
Piping	50 years
Structures and Concrete/Steel Tankage	30 years
Process Equipment & Pumps	15 years
Auxiliary Equipment	10 years
Land	Permanent
Depreciation Method	Straight Line

[a]Based on USBR discount rate for fiscal year 2000.[b]From SJRWMD Guidelines for Preparation of Reuse Feasibility Studies for Consumptive Use Applicants (SJRWMD, June 1996).

MOB = Mobilization

OH = Overhead

USBR = U.S. Bureau of Reclamation

SALVAGE VALUE

In accordance with the Guidelines, salvage value for facilities is included in the present value analysis based on the type of equipment and the useful lives defined in Exhibit 7. It should be noted that salvage value for items such as piping represents a significant amount on paper. However, in reality, it is unlikely that a utility would actually receive any salvage value for piping, which has been in place for 20 years. Consequently, the present value of those alternatives, which involve substantial pipeline facilities, would appear more favorable than those options, which do not involve extensive pipeline systems.

ANNUAL COSTS

An estimate of capital and O&M costs and present value for each alternative was prepared and is summarized in Exhibit 8. Capital costs included construction cost, engineering fees and a contingency. Annual O&M estimates included maintenance, chemical, power and labor costs. A detailed presentation of the present value analyses is presented in Attachment A.

The findings of the 20-year present value analysis show that the groundwater alternative, No. 3, offers the lowest capital, annual, and present value cost.

EXHIBIT 8
Estimated Present Value

Alternative	Capital $	Cost Annual $/Year	O&M Estimated Present Value $
Alternative 1 – Baldwin WWTP Reuse	3,578,000	74,400	4,058,000
Alternative 2 – JEA Southwest WWTP Reuse	20,118,500	287,000	20,505,000
Alternative 3A – Groundwater Wells	1,837,000	47,300	2,176,000
Alternative 3B – Groundwater Wells and Blowdown Water Reuse	3,187,000	76,000	4,014,000

See Attachment A for Present Value calculations.

Conclusions

All of the alternatives would have short-term environmental impacts associated with construction activities. These would include wetlands disturbances, traffic disturbances, increased noise and dust levels and pipe fabrication and transportation impacts. The environmental impacts would cease when construction activities were completed.

The two reuse alternatives would provide the following positive impacts:

- A decrease in the net withdrawal of water from the Floridan aquifer.
- A reduction of wastewater effluent disposal via surface water discharge to the St. Johns River.

All of these processes are feasible from an engineering and technical standpoint. The processes and equipment needed are commonly employed in the water and wastewater industry and do not present any unusual technical difficulty.

The two reuse alternatives have high costs even by reuse standards. For example, the cost per unit of installed capacity for the two reuse alternatives are much higher than JEA's Mandarin Reuse System, as shown in the following Exhibit 9.

EXHIBIT 9

Cost per Gallon of Installed Reuse Capacity

Reuse System	Installed Capacity (mgd)	Total Reuse Construction Cost ($million)	Cost per MGD of Installed Capacity ($million)
JEA Mandarin	5.0	13.00	$2.60
Baldwin WWTP Reuse at Brandy Branch Generating Station	0.4	1.74	$4.40
JEA Southwest WWTP Reuse at Brandy Branch Generating Station	2.74	18.28	$6.70

The total reuse construction cost is the cost of filters, disinfection and residual equipment, and a reuse force main.

The groundwater supply alternative with reuse of the blowdown water is environmentally and technically feasible but not economically feasible. JEA would incur costs of $1.35 million to treat the blowdown water using a membrane system.

Groundwater withdrawals would only be reduced by 0.254 mgd which represents less than a 10 percent reduction in withdrawals over the non-reuse alternative.

The Baldwin Reuse alternative cost analysis is based on installing 0.4 mgd of reuse treatment capacity even though the facility will only be able to provide 0.2 mgd for the foreseeable future. If JEA were to install reuse treatment facilities to match the current WWTP flows, the supply shortfall would have to be met with groundwater and the cost per mgd of installed capacity, shown in Exhibit 9, would increase from $4.40 to approximately $6.00.

Only one alternative, No. 3 - Groundwater Supply, is environmentally, technically, and economically feasible. This alternative can be implemented for a significantly lower cost than any of the other alternatives, thereby minimizing impacts to JEA's rate payers. Based on a modeling analysis, there are not anticipated to be any adverse impacts on the environment or other users.

Based on the high cost of reuse implementation, JEA would like to obtain the Site Certification as applied for with no conditions requiring reuse. JEA desires to implement Alternative No. 3 and expand the existing groundwater supply system at the Brandy Branch Generating Station for power generation water supply.

JEA's Reuse Initiatives

Although water reuse is not feasible at the Brandy Branch Generating Station, JEA currently has a number of reuse projects underway. Combined, these projects represent 8.5 mgd of reuse capacity with plans to expand to 19.4 mgd. Upon full utilization of these facilities, their reclaimed water production will far exceed the Brandy Branch consumptive use. Although JEA has limited resources, a significant commitment and monetary investment has been made on these water reuse projects. A summary of JEA's reuse projects is presented in the following:

District 1 - Buckman WRF

JEA is currently constructing a reuse pump station at the Buckman Water Reclamation Facility (WRF) to provide reclaimed water for the sludge incinerator scrubbers, plant-wide wash down water, new grit processing facilities and sewer cleaning truck unloading facilities. The total pumping capacity of the new pump station will be approximately 5,300 gpm. This reuse facility will enable a reduction in groundwater withdrawals from an existing, on-site well. JEA is currently using reclaimed water for washdown water at the Buckman WRF as it is at all of its regional wastewater treatment plants.

District 2 - District II WRF

Current reuse activities at the District II WRF include two components: Implementation of a pilot-scale hardwood tree demonstration project on JEA-owned property adjacent to the WRF site and development of a restricted public access reuse system to provide reclaimed water for JEA's Northside Generating Station and other potential industrial users. The permitted capacity of the pilot-scale hardwood tree demonstration project is 0.12 mgd.

JEA is also implementing a full-scale restricted public access reuse system at the District II WRF to provide reclaimed water for JEA's Northside Generating Station and other potential industrial users including Stone Container, Cedar Bay Co-Generation Facility, the St. Johns River Power Park and Anheuser-Busch. Initially, approximately 1 mgd will be provided to the Northside Generating Station. It is estimated that potential reuse demands could reach a total of 6 mgd (including the tree demonstration project).

DISTRICT 4 - ARLINGTON EAST WRF

JEA has constructed 2 mgd of reuse capacity at the Arlington East WRF through construction of a package filter and high-level disinfection system and a reclaimed water pump station and transmission pipeline from the plant along Mill Coe Road to Monument Road. However, start up of the reuse system has been impacted by the schedule for completion of the reclaimed water pipeline which is being constructed in conjunction with the Monument Road roadway improvement project.

Once the pipeline is completed, these improvements will effectively provide the ability to deliver public access quality reclaimed water to potential customers along Monument Road. Current efforts are focused on discussions with the two golf courses which are located closest to the Arlington East WRF (Mill Cove and Hidden Hills). Letters of Intent have been received from Mill Cove and Hidden Hills golf courses however, no user agreements have been executed at this time. In addition to the two golf courses mentioned above, there is potential for utilizing reclaimed water for irrigation at the City Council District 2 Park (formerly The Dunes Golf Course), within the Monument Road Right of Way, and within the grounds of the Arlington East WRF.

DISTRICT 5 - MANDARIN WRF

The Mandarin WRF Reuse System, is being implemented in two phases. Phase 1 of the program will provide 2.5 mgd of reclaimed water on an average daily flow (ADF) basis to large irrigation customers (primarily golf courses) located within the Mandarin WRF Reclaimed Water Service Area.

Based on available historical irrigation records, the estimated annual average daily reuse rate will be approximately 1.5 mgd. JEA estimates that an additional reclaimed water demand of approximately 1.0 mgd will be identified from other customers in the near future. Therefore, the Phase 1 facilities will be sized to provide 2.5 mgd ADF.

It is anticipated that future reclaimed water demands within the service area will increase to 5.0 mgd ADF. Therefore, Phase 2 of the Mandarin WRF Reuse System will provide for expansion of the system to deliver 5.0 mgd ADF.

The potential customers originally identified for Phase 1 include the following:

- Deercreek Country Club
- Deerwood Country Club
- Baymeadows Golf Course

- Jacksonville Golf & Country Club
- University of North Florida (UNF)
- Glen Kernan Country Club
- Windsor Parke Golf and Country Club
- Skinner Nurseries

Letters of Intent have been executed and returned by most of the above parties. Negotiations for reclaimed water use agreements are ongoing; however, none have been executed.

JULINGTON CREEK WRF

In 1999, JEA acquired and took over operation of the Julington Creek Plantation Wastewater Treatment Facility. This facility currently has a permitted treatment capacity of 1.00 mgd on an annual average day basis and a reuse/disposal capacity of 1.298 mgd. Current reuse activities include a public access reuse system serving the Julington Creek Champions Club Golf Course (0.627 mgd), Racetrack Road areas (0.534 mgd), and Davis Pond Boulevard (0.089 mgd). In addition, there is a permitted Part IV, Rapid Rate Land Application System, on-site percolation pond system with a capacity of 0.048 mgd.

A summary of JEA's current and planned reuse capacity is presented in Exhibit 9.

EXHIBIT 9
JEA
Current and Planned Reuse Capacity

Facility	Current Reuse Capacity MGD	Planned Reuse Capacity mgd
Buckman WRF	5.2 *	7.6*
District 2 WRF	0	6 **
Southwest WRF	0	0
Arlington East WRF	2	2
Mandarin WRF	0	2.5
Julington Creek WRF	1.3	1.3
System-Wide Total	**8.5**	**19.4**

*Indicates firm pumping capacity of plant reuse pump station for existing and new processes at the Buckman WRF site (restricted access reuse - no offsite reuse)

**Includes 0.12 mgd capacity for the Tree Reuse Demonstration Project

Attachment A
Present Value Calculations for Alternatives

Present Value Calculations

The calculations for the present value of the three alternatives are shown in Exhibits A-1, A-2, A-3 and A-4. The analysis conforms to the document entitled *Guidelines for Preparation of Reuse Feasibility Studies for Consumptive Use Permit Applications (June 4,1996)* and is based on a twenty year period of analysis.

Exhibit A-1

JEA - Brandy Branch Generation Station Reuse Feasibility Study
Alternative 1 - Baldwin WWTP Reuse

YR.	CAPITAL COST	O&M COST $	DIS.RATE 6.38%	PRESENT WORTH
0	**$3,578,000**		1.0000	$3,578,000
1		$74,100	0.9401	$69,659
2		$74,100	0.8837	$65,485
3		$74,100	0.8308	$61,560
4		$74,100	0.7810	$57,871
5		$74,100	0.7342	$54,403
6		$74,100	0.6902	$51,142
7		$74,100	0.6488	$48,077
8		$74,100	0.6099	$45,196
9		$74,100	0.5734	$42,488
10		$74,100	0.5390	$39,941
11		$74,100	0.5067	$37,548
12		$74,100	0.4763	$35,297
13		$74,100	0.4478	$33,182
14		$74,100	0.4210	$31,194
15	**$567,000**	$74,100	0.3957	$253,707
16		$74,100	0.3720	$27,567
17		$74,100	0.3497	$25,915
18		$74,100	0.3288	$24,362
19		$74,100	0.3091	$22,902
20	**($1,958,000)**	$74,100	0.2905	($547,352)
TOTAL PRESENT VALUE				**$4,058,000**

Note: Year 15 cost is for replacement of equipment; is based on 40 % of the non-pipeline capital cost.
Salvage value is shown in Year 20.

Exhibit A-2

PRESENT VALUE

JEA - Brandy Branch Generation Station Reuse Feasibility Study
Alternative 2 - JEA Southwest WWTP Reuse

YR.	CAPITAL COST	O&M COST $	DIS.RATE 6.38%	PRESENT WORTH
0	**$20,118,500**		1.0000	$20,118,500
1		$287,000	0.9401	$269,800
2		$287,000	0.8837	$253,631
3		$287,000	0.8308	$238,431
4		$287,000	0.7810	$224,142
5		$287,000	0.7342	$210,709
6		$287,000	0.6902	$198,082
7		$287,000	0.6488	$186,211
8		$287,000	0.6099	$175,051
9		$287,000	0.5734	$164,561
10		$287,000	0.5390	$154,699
11		$287,000	0.5067	$145,428
12		$287,000	0.4763	$136,712
13		$287,000	0.4478	$128,519
14		$287,000	0.4210	$120,817
15	**$1,423,000**	$287,000	0.3957	$676,710
16		$287,000	0.3720	$106,770
17		$287,000	0.3497	$100,371
18		$287,000	0.3288	$94,356
19		$287,000	0.3091	$88,701
20	**($11,600,000)**	$287,000	0.2905	($3,286,899)
TOTAL PRESENT VALUE				**$20,505,000**

Note: Year 15 cost is for replacement of equipment; is based on 40 % of the non-pipeline capital cost.
Salvage value is shown in Year 20.

Exhibit A-3

PRESENT VALUE				
JEA - Brandy Branch Generating Station Reuse Feasibility Study Alternative 3A - Groundwater				
YR.	CAPITAL COST	O&M COST $	DIS.RATE 6.38%	PRESENT WORTH
0	$1,837,000		1.0000	$1,837,000
1		$47,300	0.9401	$44,465
2		$47,300	0.8837	$41,801
3		$47,300	0.8308	$39,295
4		$47,300	0.7810	$36,941
5		$47,300	0.7342	$34,727
6		$47,300	0.6902	$32,646
7		$47,300	0.6488	$30,689
8		$47,300	0.6099	$28,850
9		$47,300	0.5734	$27,121
10		$47,300	0.5390	$25,496
11		$47,300	0.5067	$23,968
12		$47,300	0.4763	$22,531
13		$47,300	0.4478	$21,181
14		$47,300	0.4210	$19,912
15	$270,000	$47,300	0.3957	$125,567
16		$47,300	0.3720	$17,597
17		$47,300	0.3497	$16,542
18		$47,300	0.3288	$15,551
19		$47,300	0.3091	$14,619
20	($1,012,000)	$47,300	0.2905	($280,286)
TOTAL PRESENT VALUE				**$2,176,000**

Note: Year 15 cost is for replacement of equipment; is based on 40 % of the non-pipeline capital cost.
Salvage value is shown in Year 20.

Exhibit A-4

PRESENT VALUE				
JEA - Brandy Branch Generating Station Reuse Feasibility Study Alternative 3B - Groundwater with Blowdown Reuse				
YR.	CAPITAL COST	O&M COST $	DIS.RATE 6.38%	PRESENT WORTH
0	**$3,187,000**		1.0000	$3,187,000
1		$76,000	0.9401	$71,445
2		$76,000	0.8837	$67,164
3		$76,000	0.8308	$63,139
4		$76,000	0.7810	$59,355
5		$76,000	0.7342	$55,798
6	**$20,000**	$76,000	0.6902	$66,257
7	**$20,000**	$76,000	0.6488	$62,287
8	**$20,000**	$76,000	0.6099	$58,554
9		$76,000	0.5734	$43,577
10		$76,000	0.5390	$40,965
11	**$20,000**	$76,000	0.5067	$48,645
12	**$20,000**	$76,000	0.4763	$45,729
13	**$20,000**	$76,000	0.4478	$42,989
14		$76,000	0.4210	$31,993
15	**$670,000**	$76,000	0.3957	$295,220
16	**$20,000**	$76,000	0.3720	$35,714
17	**$20,000**	$76,000	0.3497	$33,574
18	**$20,000**	$76,000	0.3288	$31,562
19		$76,000	0.3091	$23,489
20	**($1,282,000)**	$76,000	0.2905	($350,393)
TOTAL PRESENT VALUE				**$4,014,000**

Note: Year 15 cost is for replacement of equipment; is based on 40 % of the non-pipeline capital cost. One third of the treatment membranes are replaced every 6,7 and 8 years per mfr. recommendations. Salvage value is shown in Year 20.

5. *In order to determine cumulative drawdown impacts to the area, please provide a cumulative impact analysis that incorporates the proposed withdrawals and any other existing Floridan aquifer users in the region. All adjacent and regional Consumptive Use Permit ("CUP") permittees' withdrawals should be used in the drawdown model at withdrawal rates that reflect those experienced in May, June, and July of 2000. The Brandy Branch withdrawal rates should be set at 2.744 million gallons per day at steady state and 3.722 million gallons per day for a transient period of 288 hours for the Brandy Branch site. All model results must be presented as overlays to USGS quadrangles of the area and drawdown contours should be delineated to define the .2 foot contour. [Sections 9.4.1(b), 9.4.4, 10.3(c),(d), A.H.]*

Response: Exhibits 6 and 7 show the locations of known Floridan aquifer wells within the 0.2 foot contour around the site. From a practical standpoint, a 0.2 ft change in the Floridan aquifer potentiometric surface will be impossible to resolve from other sources of drawdown in the aquifer. Even a one foot change would be hard to discern in other wells and the 1.0 ft contour extends only about 2 miles radially around the site. Since there are only two CUP permitted well owners and one known Floridan well without a CUP located within that radius, the overall interference affect between Floridan wells will be nominal.

The requested regional model would require a large amount of effort to develop and calibrate. The existing SJRWMD regional model does not cover this area and is currently being modified by the District staff to extend far enough west to include the Brandy Branch site. District staff report that it could take until next year before the model is completed. There are no plans by the SJRWMD to perform modeling on this area prior to completion of the regional model.

Given the large amount of effort required to develop a regional model and the limited impact predicted on the Floridan aquifer and other users in the area, no further modeling is necessary or proposed.

6. *In order to evaluate the potential for interference to existing legal uses that may result from the proposed withdrawals, please conduct a Florida aquifer impact analysis of the proposed Brandy Branch withdrawals. All models should be run using the transmissivity and storativity data that was obtained in the aquifer performance pump test that was conducted on-site in 1999. Withdrawal rates should be set at 2.744 million gallons per day at steady state and 3.722 million gallons per day for a transient period of 288 hours for the Brandy Branch site. The transient conditions simulations should be run using the steady state results as a base condition. Both model results must be presented as overlays to USGS quadrangles of the area and define to the .2 foot contour. [Sections 9.4.1(b), 9.4.4, 10.3(c)(d), A.H.]*

Response: The response to Comment No 1 describes an analytical element model developed to address this comment. Exhibit 6 shows the simulated steady state drawdown cone with the wellfield pumping at a rate of 2.75 MGD. Exhibit 7 shows the simulated drawdown cone after the wellfield pumping rate had been increased to a rate of 3.72 MGD for a period of 288 hours (12 days). However, since the model predicts that virtually the entire aquifer within a 9 mile radius has reached a steady state of drawdown by this time, the drawdown contours shown in Exhibit 7 are virtually identical to the 3.72 MGD steady state drawdown cone.

The response to Comment No. 7 describes the other well users in the area and addresses the potential impact on those users from pumping at Brandy Branch.

7. *In order to identify any potentially affected legal users of the Floridan aquifer, please provide a more complete listing of all Floridan aquifer well owners who withdraw water from the Floridan aquifer for any type of use. The area of interest is that area within the .2 foot contour based on modeling results at maximum daily usage. It appears SJRWMD consumptive use permit files were used as the only information source. SJRWMD consumptive use permit files are limited to wells 6" in diameter or larger or actual use in excess of 100,000 gpd. Please supply this information in a graphical format as an overlay to the USGS quadrangle of the area. [Sections 9.4.1(b), 9.4.4, 10.3(d), A.H.]*

Response: The SJRWMD CUP files were used to identify CUP permits within the 0.2 ft drawdown contour. Those permits are listed in the Site Certification document. The locations of the CUP permitted wells are shown on Exhibits 6 and Exhibits 7. [The large, folded figures are Exhibit 6: 2.75 mgd and Exhibit 7: 3.72 mgd] Only five permitted users are located within the 0.2 ft drawdown contour. Those include the Town of Baldwin, Southern Wood Piedmont Company, David Joseph Company, Fred Benson Miller Jr., and Champion International. Based on the predicted drawdowns resulting from pumping the Brandy Branch wells, the impacts on these Floridan aquifer wells are expected to be minimal. Since the Floridan aquifer potentiometric head is typically over 30 ft below land surface, any existing wells which utilize the Floridan in this area will have a submersible, vertical turbine, or jet pump installed. The nominal change in water level in these wells should not have a significant impact to the functionality of these pumps or reduce the capacity of the wells.

The nearest permitted Floridan wells to the Brandy Branch site are the Town of Baldwin's wells and the Southern Wood Piedmont well. The drawdown predicted at those wells resulting from pumping at Brandy Branch will range from about 1.5 to 2.5 ft. (based on 2.75 mgd or 3.72 mgd pumping rates). Other Floridan wells are located on the Engo Dairy property directly south of the site. This well will have up to 6 feet of additional drawdown resulting from pumping at Brandy Branch. Floridan wells are also reported to be used at the Florida Steel facility located south of I-10 and east of US 301. Those wells may have an additional 0.5 to 1.0 feet of drawdown resulting from pumping at Brandy Branch.

The Town of Baldwin serves its customers from three wells completed into the upper Floridan aquifer. Outside of Baldwin's water service area, a typical residence has a shallow aquifer rock well for water supply. Typical well construction practices were determined through an interview with a local well drilling contractor, W. Earl Floyd & Son, Inc. The typical residential well in the area is reported to be completed into the base of the shallow aquifer, at the top of the Hawthorn formation with about 80 feet of casing and a total depth of 90 to 100 feet. These wells are locally known as "rock wells" because the target production interval is a thin limestone unit at the base of the shallow aquifer. The production interval is recharged by local rainfall and typically has a static water level of 4 to 8 feet below land surface. Common casing sizes are 2 to 4-inches with jet pumps in the 2-inch wells and submersible pump in the 4-inch wells.

Typical yields of these "rock wells" range from 10 to 15 gpm and are limited by pump capacity rather than aquifer capacity. For example, a rock well was used for make-up water during construction of the Floridan aquifer wells at Brandy Branch. The well was pumped at 100 gpm demonstrating the abundant capacity of the shallow aquifer. Using the USGS quadrangle maps, the visual survey observations, and assuming each residence has a well, there are about 500 private shallow aquifer wells within the 0.2 foot drawdown contour in the Floridan aquifer. About 60 residential shallow aquifer wells are estimated to be within the 1.0 ft contour in the Floridan aquifer. As discussed in the response to comments No. 1 and No. 2, typical residential wells completed into the shallow aquifer are not expected to have an impact caused by production from the Brandy Branch Floridan wells.

It is possible that some of the residences have Floridan aquifer wells but it was not feasible to determine if that is the case since it would require a door-to-door survey to interview the owners. If the Floridan aquifer is for residential supply, the predicted drawdown impact resulting from pumping at Brandy Brach would be minimal.

8. *Please evaluate the technical and economic feasibility for providing pretreatment to the cooling tower blowdown water (.322 mgd), which is currently proposed for discharge to a JEA WWTP, for reuse in the cooling towers or other power generation processes. [Section 10.3(d)(e)(g)(i), A.H.]*

Response: The response to this item is contained in the response to SJRWMD Request No. 4.

9. *Section 2.3.3 on page 3-38 states that there are no natural lakes or reservoirs within 5 miles of the site to evaluate as lower quality sources. Please identify and evaluate the potential for using surface water from all rivers, streams, creeks, and artificially constructed impoundments (ponds, lakes, stormwater systems) located within 3 miles of the property boundary. [Section 10.3(d)(g), A.H.]*

Response: The Site Certification Application reported in Section 2.3.4.2 the predominant surface hydrologic features in the vicinity of the Brandy Branch site. Those include unnamed emergent and cypress wetland areas, the Baldwin Bay wetlands about 2 miles from the site, Brandy Branch Creek about 2,000 feet to the east, McGirts Creek about 4 miles to the northeast, and the Yellow Water and Caldwell Branch Creeks about 4 miles south of the site. The St. Marys River is located about 6.5 miles northwest of the site. Brandy Branch Creek discharges to the St. Marys River. Periods of zero flow have been reported at the stream gauging stations within the St. Marys River drainage basin. This indicates that periods of zero flow can be expected during drought conditions within Brandy Branch Creek, as well as other local creeks.

None of these wetlands and streams are predicted to have adequate capacity to reliably supply the needs of the Generating station and the St. Marys River is outside of the 3 mile range around the site.

Developing a surface water impoundment would be difficult since the ground surface relief in the area is very flat. Elevations vary between 85 and 75 feet msl in the area around the site making construction of a surface reservoir difficult. A reservoir sized to provide reliable water supply would cover a very large area and would be subject to a high percentage of evaporative losses. It would also be impossible to prevent impacts to wetlands since those areas occur in the only elevation relief likely to be flooded by a reservoir.

Regulatory & Environmental Services Department

A. Aquifer/Groundwater

1. *Page 2-31, Figure 2.3-6 indicates the top of the Floridan Aquifer is located at 520-525 feet below ground surface (BGS). But page 2-32, Section 2.3.2.2, paragraph 1 indicates it's at 380 feet BGS. An explanation is needed.*

   Response: The depth to the top of the Floridan Aquifer, as interpreted from the logs of wells installed at the site, is 520 to 525 feet below ground surface (bgs). Figure 2.3-6 in the SCA shows the correct depth to the top of the Floridan Aquifer at the site. Paragraph 1 in Section 2.3.2.2, page 2-32 of the SCA, where it is indicated that the depth to the top of the Floridan Aquifer is 380 feet bgs, is incorrect. (The 380 feet depth was originally indicated in the Hydrogeologic Report presented by Black & Veatch in June 2000. However, upon further review of the two well logs available for the site, it was concluded that the greater depth is more appropriate for the top of the Floridan aquifer.)

2. *Page 2-35, third paragraph provides information about the freshwater-saline water interface based on a 1994 St. Johns River Water Management District (SJRWMD) report. Additional work was done by the SJRWMD in 2000, and continues this year, to examine water quality at the bottom of the Floridan. According to information provided by Bill Osburn Hydro IV, a deep outpost monitoring well was recently drilled in Nassau County, adjacent to the St. Mary's River approximately north of this project's site. It found chlorides in excess of 1,800 mg/l at the bottom of the Floridan. Another similar well, drilled recently in Callahan between the JEA Brandy Branch site and St. Mary's well site, has not found this problem, chlorides at 1,516 feet deep on 10/5/2000 were 25 mg/l. But, at this same depth, it found sulfate levels at 179.4 mg/l. These findings provide a new uncertainty about the water quality that might exist at this site now or in the future. It should be noted that currently there are no monitoring wells into the lower Floridan Aquifer with Duval County west of the St. John's River.*

   The most direct approach to address this uncertainty is to drill a deep outpost monitoring well at or near this site. If JEA is unwilling or unable to take this action on their own, then it is recommended that they meet with Floridan Aquifer monitoring network experts from the SJRWMD, U.S. Geological Survey, and this office. The purpose of this meeting would be to explore a possible multi-party cooperative agreement to address this issue. Another appropriate action is for JEA to drill a monitoring well into the Avon Park to a depth of approximately 1,000 feet to monitor any water quality changes that might occur as a result of the proposed withdrawal.

   Response: The referenced deep monitoring wells recently constructed by the District are located in Nassau County north and northeast of the site. The referenced Callahan well is over 20 miles to the north-northeast of the Brandy Branch site. The well near the St. Mary's river is near US-1 and Boulogne and is identified by the District as the Ralph Simmons WMA well. It is over 31 miles north of the site. The nearest well, near Callahan, was test drilled to a depth of 2,114 feet and a down hole sample taken from 2,112 feet had a chloride concentration of 19 mg/L. This indicates that the Fernandina zone contains fresh water in the area. The well was backplugged up to 1,500 feet and the chloride concentration at that depth was about 25 mg/L. The sulfate concentration (179 mg/L) is not noted in the draft monitoring well report obtained from the SJRWMD. Sulfate concentrations in this range are typical of many of the operating Upper and Lower Floridan aquifer production wells in the area and is not necessarily an indicator of saltwater intrusion. It is typically a result of dissolution of gypsum contained in the matrix of the limestone resulting in elevated sulfate and calcium hardness. Since the chloride concentration is 25 mg/L, this indicates that the lower Floridan intervals contain freshwater in the area.

The noted well near Boulogne has a reported chloride concentration of 1,800 mg/L at the bottom of the Floridan. The draft monitoring well report obtained from the SJRWMD reports that the well was drilled to 1,956 feet into the Fernandina zone and casing is set at 1,760 feet. The water quality in the open hole during drilling indicated that freshwater extends to below 1,835 feet. A reverse-air sample from 1,835 feet had chlorides of 55 mg/L. Below that depth, the chloride concentration increased and a sample taken at 1,912 ft had 1,927 mg/L chlorides. Since the well is over 30 miles north of the Brandy Branch site and freshwater extends as deep as 1,835 feet into the Fernandina zone, this data does not cause much concern that saltwater may be present in the Fernandina zone at the Brandy Branch site.

Fernandina monitoring wells studied by Spechler in the 1994 USGS Report 92-4174 found that well D-425 located on the east side of the river near San Marco, had specific conductance of less than 700 µS/cm, equivalent to freshwater. This well demonstrates that the Fernandina zone has been effectively flushed by recharge to the Floridan aquifer from the west side of the St. Johns river. The report also notes that geophysical logs of a Fernandina well located in western Duval County indicated that the water from the Fernandina zone was fresh. The location of this well is not noted in the report however, Brandy Branch is located in western Duval County.

The SJRWMD Technical Publication 97-2, *Finite-Difference Simulation of the Floridan Aquifer System in Northeast Florida and Camden County, Georgia,* 1997, the hydraulic gradient of the Fernandina zone (layer 4 in the model) is from west and southwest throughout the area. The source of recharge to the Floridan aquifer is the potentiometric high centered on the Keystone Heights area. Therefore, it is not likely that saltwater will migrate upgradient toward the Brandy Branch site.

Under the terms and conditions of a separate water supply wellfield CUP, the JEA has agreed to construct a number of Lower Floridan monitoring wells at 10 wellfields in their water supply system. The wells will be constructed at two wellfields located west and north of the St. Johns River and at the 8 wellfields located east and south of the St. Johns River. These wells will be located within the cone of depression of each wellfield and will be cased to about 1,100 feet and open to 1,200 feet. All of the wells east and south of the river will be operational by mid-year 2002. The two wells west and north of the river will be operational by mid-year 2003 at the Highlands WTP and one year prior to startup of the new wellfield tentatively located near NAS JAX. The JEA is also offering to the SJRWMD a number of existing supply wells that will be taken out of service for conversion to monitoring wells.

This is a significant commitment of resources by JEA toward the regional Floridan aquifer monitoring network. These wells were located where the SJRWMD has concerns over potential upconing of poor quality water from the Lower Floridan and Fernandina zone. The main concern was east and south of the river where evidence suggests that poor quality water exists in the deeper intervals of the Floridan aquifer. The two wells west and north of the river are located at wellfields located within about one mile of the river. The SJRWMD did not have evidence of poor quality water being present beneath other wellfields located further west of the river.

In Summary, the water quality results from the Callahan and Boulogne deep monitoring wells, published data, and the SJRWMD regional flow model assumptions all suggest that the Fernandina zone contains freshwater in Duval and Nassau Counties west of a line running north-south along the St. Johns River. When this data is considered in context with previous agreements made with the SJRWMD, there is no compelling reason to construct a Lower Floridan or Fernandina zone monitoring well at the Brandy Branch site that relates to the proposed withdrawals.

Durden, Douglas W., Technical Publication 97-2, *Finite-Difference Simulation of the Floridan Aquifer System in Northeast Florida and Camden County, Georgia,* 1997, SJRWMD.

SJRWMD, *Preliminary Data Callahan Fair Grounds, Aquifer System Monitor Wells, Program No. 31-58200,* November 30, 2000.

SJRWMD, *Preliminary Data Ralph Summons WMA, Aquifer System Monitor Wells, Program No. 31-58200,* August, 2000.

Spechler, Rick M. *Saltwater Intrusion and Quality of Water in the Floridan Aquifer System, Northeastern Florida,* USGS WRI Report 92-4174, 1994.

3. *Page 4-3, Section 4.3.1. The applicant needs to supply the analysis used to conclude the construction dewatering effort will not adversely impact the wetlands adjacent to the cooling tower and heat recovery steam generator site.*

Response: Finish grade elevation for the proposed heat recovery steam generators, steam turbine and cooling tower areas at the JEA Brandy Branch site is Elevation 88 feet, the same as that for the simple cycle facility currently under construction. Design groundwater elevation at the site is Elevation 78 feet, as indicated by the monitoring of the piezometers installed by Black & Veatch during the site investigation for the simple cycle facility (Figures 2.3-7 and 2.3-8 of the SCA). Based on these elevations, dewatering of excavations will need to be performed only for the circulating water lines north of the main power block area, the cooling tower pump pits, and a wastewater sump located just south of the proposed steam turbine building. The location of these facilities is shown in Figure 2.1-3, Site Arrangement, in the SCA.

The following assumptions were made for estimating construction dewatering impacts from these excavations:

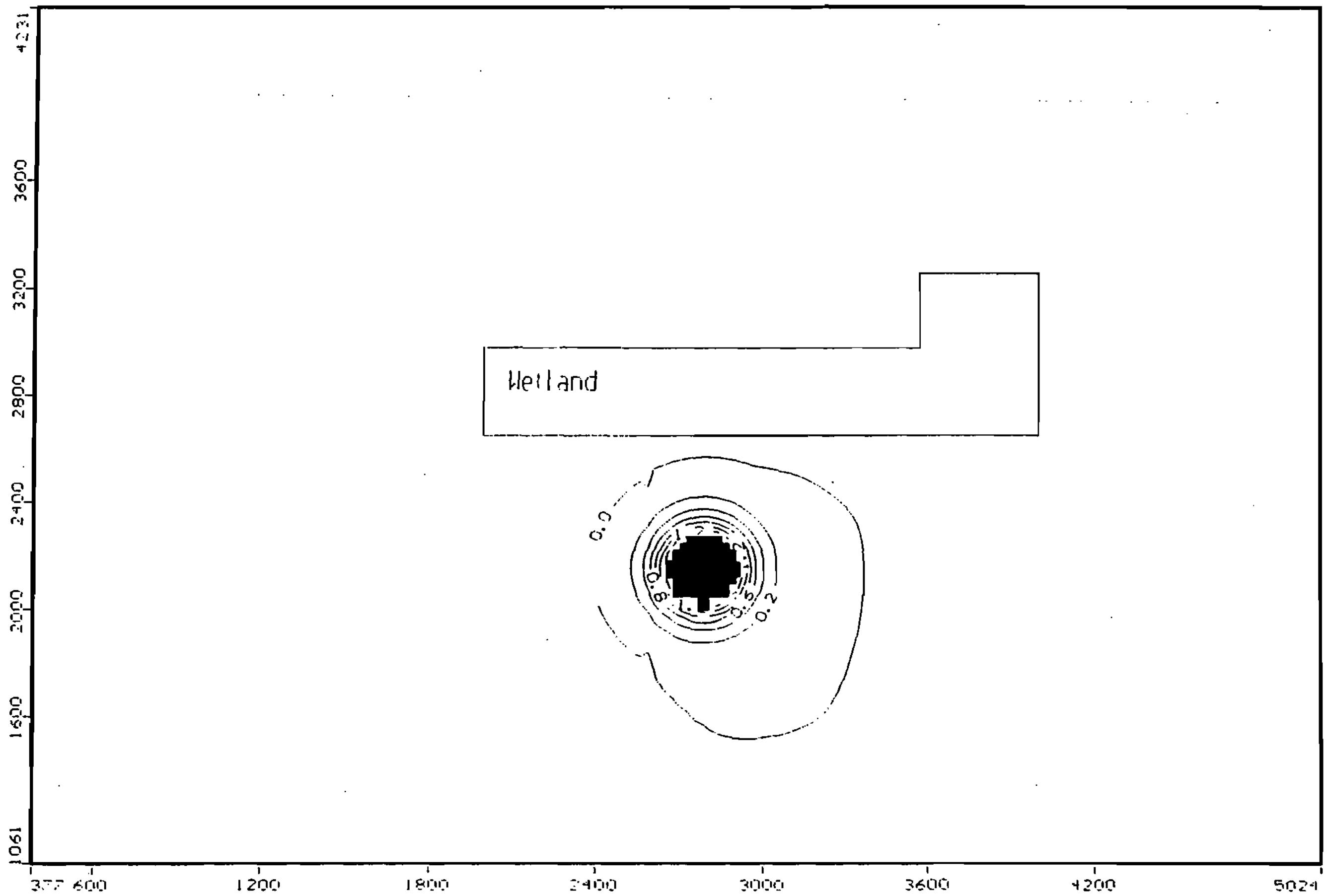
- Dewatering will be performed only at one location at a given time.
- Groundwater will be lowered to 2 feet below the bottom of the proposed excavations.
- Two lines of wellpoints will be used for dewatering, per excavation (one line along each long side). Excavations will be open cut, with 1.5H:1V slopes.
- To minimize the width of the excavation, it is assumed that excavation will proceed from a level 2 feet above groundwater surface.
- Installation of the circulating water pipes will be performed in 100-foot sections, with each section open for about 2 weeks (14 days). The total duration of pumping along the circulating water lines is estimated at about seven and a half months. Bottom of excavation was assumed at Elevation 77 feet.
- The excavation for the wastewater sump will be open for 5 days. Bottom of excavation was assumed at Elevation 63 feet.
- The excavation for the cooling tower pump pits will be open for about one month (30 days). Bottom of excavation was assumed at Elevation 68 feet.
- The design hydraulic conductivity for the shallow aquifer is 15 feet/day (Black & Veatch Geotechnical Report, September 1999).
- As indicated in the SCA, the average annual recharge rate in the region is 52 inches per year, and the annual average evapotranspiration rate in the region is 36 to 38 inches per year. A recharge rate of 52 in/year and an evapotranspiration rate of 38 in/year was applied to the top layer in the model, except where the power block is located, where zero recharge and evapotranspiration was assumed.

Estimation of the amount of flow and the drawdown with distance from the wellpoints was performed using the groundwater computer program Visual MODFLOW v. 2.8, to develop a groundwater model for the unconfined aquifer at the site. A two-layer model was developed to represent the unconfined aquifer and the wetland. The upper layer of the model is 1.5 feet thick, which is the estimated depth of the wetland. The second layer extends from 1.5 to 90 feet, which is the base of the unconfined aquifer. The wetland was modeled by establishing a specific yield of 0.9 and a hydraulic conductivity of 100,000 feet per day for the upper layer over an area similar in shape and plan area to the existing wetland. A specific yield of 0.9 indicates the layer is predominantly water. The high permeability for the wetland cells allows the model to transmit the water within and between cells at a high rate, as will occur in a water body.

The results of the analysis performed indicate the following:

- The only wetland that will be impacted by dewatering is immediately north of the plant site.
- Dewatering for the wastewater sump excavation will have no impact on the wetlands (see attached Figure 1).
- Dewatering for the circulating water line and the cooling tower pump pits will result in water being withdrawn from the wetland located north of the power block. It is predicted that the water level in the wetland will drop about 0.4 feet (4.8 inches) due to construction dewatering for the cooling tower pump pits (see attached Figure 2). The water level in the wetland will drop about 0.2 feet (2.4 inches) due to construction dewatering for the circulating water pipe line (see attached Figure 3). The reason there is minimal to no impact, is that the size of the wetland is large compared to the area impacted by dewatering; therefore, the recharge to the wetland is sufficient to offset the water removed during dewatering.

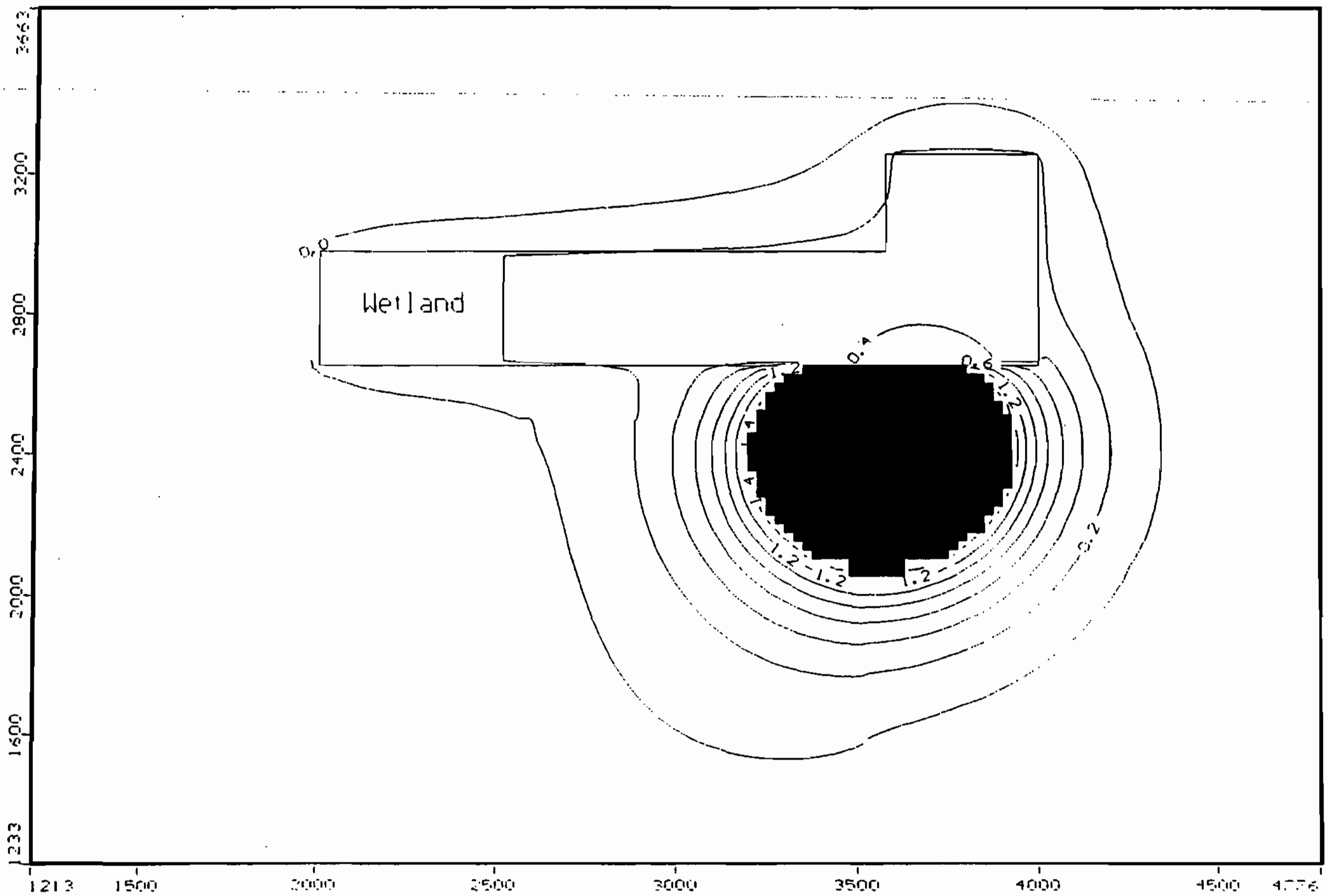
The cases considered represent worst case conditions, assuming maximum anticipated groundwater elevation, maximum depths for the equipment to be installed, sloped excavations instead of shored excavations, and maximum length of time the excavation may be open. Once pumping for construction dewatering is stopped, it is anticipated that the unconfined aquifer will recover relatively quickly, i.e., groundwater levels will return to those present before the start of construction dewatering. No permanent impacts on the wetlands are anticipated due to construction dewatering for the Combined Cycle Conversion of the JEA Brandy Branch site.



Black & Veatch
Project: JEA Brandy Branch
Description: Wastewater Sump Dewaterin
Modeller: G. Zelada
23 Mar 01

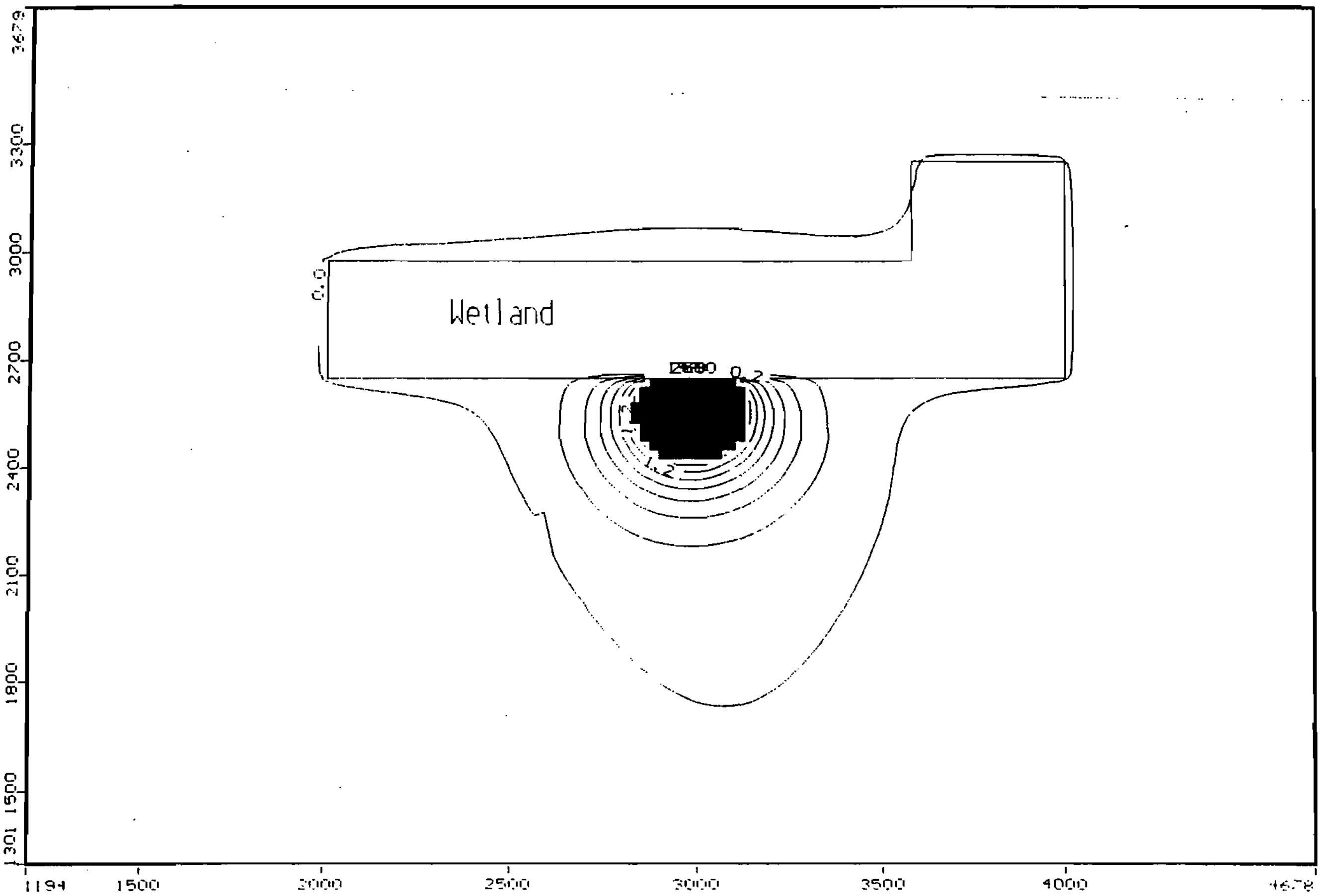
Visual MODFLOW v.2.8.2, (C) 1995-1999
Waterloo Hydrogeologic, Inc.
NC: 180 NR: 195 NL: 2
Current Layer: 1

Figure 1: Wastewater Sump Dewatering



Black & Veatch Project: JEA Brandy Branch Description: Cooling tower pump pits Modeller: G. Zelada 23 Mar 01	Visual MODFLOW v.2.8.2, (C) 1995–1999 Waterloo Hydrogeologic, Inc. NC: 218 NR: 214 NL: 2 Current Layer: 1

Figure 2: Cooling Tower Pump Pits Dewatering



Black & Veatch Project: JEA Brandy Branch Description: Cooling water circ pipes Modeller: G. Zelada 23 Mar 01	Visual MODFLOW v.2.8.2, (C) 1995-1999 Waterloo Hydrogeologic, Inc. NC: 265 NR: 166 NL: 2 Current Layer: 1

Figure 3: Cooling Water Circulating Pipeline Dewatering

4. *Page 5-29, paragraphs 4-6. Additional monitoring efforts, like those mentioned in comment 2, are needed before confidence can be placed in the conclusion that the proposed use "will not cause any saltwater intrusion."*

Response: All of the evidence provided in the response to Comment No. 2 suggests that the Fernandina zone contains freshwater in Duval and Nassau Counties west of a line running north-south along the St. Johns River. There is no compelling reason to construct a Lower Floridan or Fernandina zone monitoring well at the Brandy Branch site to provide reasonable assurance that the withdrawals at the Brandy Branch site will not cause saltwater intrusion.

5. *Page 5-31, Section 5.3.3, paragraph 1. The conclusion that "there will be no harm to any existing legal users or to the resource by any of the activities associated with the Generating Station" may be somewhat premature because:*

a) No evidence has been provided to support the conclusion that construction dewatering will not affect the adjacent wetlands.
b) It appears, from the AWQD well inventory, that there could be private well owners that have not been identified in this report that could see impacts from this facility. Depending on the private owner well pumping configuration, it is possible that the additional water level declines caused by this facility could force the private well owners to have to make changes to their systems.
c) The most recent data obtained by the SJRWMD raises some questions about current situation and future stability of the water quality situation in the Floridan Aquifer in the western part of Duval County.

Response:

5-a. As described in Response 3 above, groundwater modeling indicates a wetland drawdown between 2.4 and 4.8 inches depending on the area being dewatered. The aquifer is also expected to recover quickly. Such impacts are not considered adverse due to the short-term duration of the work and minimal drawdown.

5-b. The SJRWMD CUP files were used to identify CUP permits within the 0.2 ft drawdown contour. Those permits are listed in the Site Certification document. The locations of the CUP permitted wells are shown on Exhibits 6 and 7 of the response to the SJRWMD Request No. 1. Only 5 permitted wells are located within the 0.2 ft drawdown contour. Those include the Town of Baldwin, Southern Wood Piedmont Company, David Joseph Company, Fred Benson Miller Jr., and Champion International. Based on the predicted drawdowns resulting from pumping the Brandy Branch wells, the impacts on these Floridan aquifer wells are expected to be minimal as shown in Exhibits 6 and 7. Since the Floridan aquifer potentiometric head is typically over 30 ft below land surface, any well that utilizes the Floridan in this area will require a submersible, vertical turbine or jet pump. The nominal change in water level in these wells should not reduce the capacity of the wells.

The nearest permitted Floridan wells to the Brandy Branch site are the Town of Baldwin's wells and the Southern Wood Piedmont well. The drawdown predicted at those wells resulting from pumping at Brandy Branch will be about 1.5 to 2.5 ft. Other Floridan wells are located on the Engo Dairy property directly south of the site. This well will have up to 6 feet of additional drawdown resulting from pumping at Brandy Branch. Floridan wells are also reported to be used at the Florida Steel facility located south of I-10 and east of US 301. Those wells may have an additional 0.5 to 1.0 feet of drawdown resulting from pumping at Brandy Branch.

Other potential residential water well locations within the 0.2 ft drawdown contour were estimated from the USGS quadrangle maps and from a visual tour of the area. Typical well construction practices were determined through an interview with a local well drilling contractor, W. Earl Floyd & Son, Inc. The typical residential well in the area is reported to be completed into the base of the shallow aquifer with about 80 feet of casing and a total of 90 feet depth. These wells are locally known as "rock wells" because the target production interval is a thin limestone unit at the base of the shallow aquifer. The production interval is recharged by local rainfall and typically has a static water level of 4 to 8 feet below land surface. Common casing sizes are 2 to 4-inches with jet pumps in the 2-inch wells and submersible pump in the 4-inch wells.

Typical well yields range from 10 to 15 gpm and are limited by pump capacity. For example, a rock well was used for make-up water during construction of the Floridan aquifer wells at Brandy Branch. The well was pumped at 100 gpm demonstrating the abundant capacity of the shallow aquifer. The base of the shallow aquifer occurs at a depth of about 100 feet below land surface at the top of the Hawthorn Formation.

The Town of Baldwin serves its customers from 3 wells completed into the upper Floridan aquifer. Outside of Baldwin's water service area, a typical residence has a shallow aquifer rock well for water supply. Using the USGS quadrangle maps, the visual survey observations and assuming each residence has a well, there are about 500 private shallow aquifer wells within the 0.2 foot drawdown contour in the Floridan aquifer. About 60 residential shallow aquifer wells are estimated to be within the 1.0 ft contour in the Floridan aquifer. Since the typical residential well is completed into the shallow aquifer, the Brandy Branch Floridan wells are not expected to have an impact on any of these wells.

It is possible that some of the residences have Floridan aquifer wells but it was not feasible to determine if that is the case since it would require a door-to-door survey to interview the owners. If the Floridan aquifer is for residential supply, the predicted drawdown impact resulting from pumping at Brandy Brach will be minimal.

5-c. All of the evidence provided in the response to Comment No. 2 suggests that the Fernandina zone contains freshwater in Duval and Nassau Counties west of a line running north-south along the St. Johns River. There is no compelling reason to construct a Lower Floridan or Fernandina zone monitoring well at the Brandy Branch site to provide reasonable assurance that the withdrawals at the Brandy Branch site will not cause saltwater intrusion.

6. *Page 5-31, Section 5.3.5, paragraph 1. Has JEA developed a contingency plan to mitigate any adverse impacts that occur on the wetlands during construction?*

Response: The following plan has been developed to mitigate wetland impacts associated with the construction of the Brandy Branch Generating Station. The discharge of dewatering effluent back to the aquifer will be the main component of the plan.

Water removed during de-watering activities will be tested in accordance with FDEP requirements and either returned to the wetland or routed through the existing storm water drainage system to the site storm water detention pond. Water from the storm water detention pond will be allowed to discharge back to the existing wetland via the pond's discharge weir if water levels are of sufficient volume.

7. *Page 5-31, Section 5.3.5, paragraph 2. As mentioned in item 2, it is recommended a 1,000-foot deep monitoring well be placed into the Floridan Aquifer and sampled regularly in order to obtain a warning of any changes in water quality before the production wells are impacted.*

Response: All of this evidence provided in the response to Comment No. 2 suggests that the Fernandina zone contains freshwater in Duval and Nassau Counties west of a line running north-south along the St. Johns River. There is no compelling reason to construct a Lower Floridan or Fernandina zone monitoring well at the Brandy Branch site to provide reasonable assurance that the withdrawals at the Brandy Branch site will not cause saltwater intrusion.

8. *Section 10.4.2 Consumptive Use Permit Application, Page C1-1, Item I.2 Requested Water Use: Why does the proposed average and maximum daily use rate differ by 0.01 mgd and 0.51 mgd from the data in Figures 3.5-1 and 3.5-2?*

Response: Attached is a revised Page CI-1 of the Consumptive Use Permit Application.

COMMERCIAL/INDUSTRIAL TYPE USES

(Submit 2 copies of application, supplemental information drawings, calculations, etc.)

I. PROJECT DESCRIPTION

1. Type of business and/or operation, please describe:
   Electric power generation - combined cycle combustion turbine power plant

2 Requested Water Use:

	Existing (mgd)	Proposed (mgd) 5 years	Proposed (mgd) 10 years	Proposed (mgd) 15 years
Average Daily Use (mt'l gd)	0	2.75	2.75	2.75
Maximum Daily Use (oil)	0	3.72	3.72	3.72
Average Off-Site Discharge	0	0.32	0.32	0.32

*mgd - million gallons per day

3. Provide a graph (month vs mgd) or table summarizing monthly water use for the previous 3 years. N/A - new facility

4. Provide a flow chart (schematic diagram) depicting the flow of all sources of water, use and eventual discharge. Water Mass balance Attached

5. Please provide a table projecting expected growth over the next 15 years. What is the reason for the expected growth?
   Expected generation to be relatively constan

II. WASTEWATER DISPOSAL

Describe in detail the flow of wastewater from the plant to its ultimate disposal. Also, provide the applicable Florida Department of Environmental Protection, Environmental Protection Agency permit numbers (EPA, FDEP) issued for discharge to surface waters. Attach daily flow amounts for effluent discharged to surface waters for the last 12 months. Include this information in the above requested schematic diagram.

1. There are no exisitng or proposed discharges to surface waters.
2. Sanitary wastewaters treated and disposed on-site by septic tank/tile drainfrield.
3. Process wastewater routed to an on-site oil/water separator. Oil/Water separator effluent routed to an on-site dry pretreatment/percolation pond for additional treatment and groundwater discharge. Filter backwash from water pretreatment system (non-process wastewater) also routed to percolation pond.
4. Cooling tower blow-down from combined cycle process to be pumped to off-site JEA owned region wastewater colltion/treatment and disposal system.

9. *Engineering Certification Statement. This statement appears to be incomplete since there is no mention of the rules of St. John's River Water Management District.*

Response: A new certification has been provided to indicate that project will comply with the Water Management District's rules. A copy of the statement is included herein, the original signature statement has been provided to the FDEP.

10. *Pages 9 and 10. Please identify which shallow well was used to provide the water level information shown on Figures 3-1 and 3-2.*

Response: The shallow well used to provide water level information during the pump tests performed at the site was Piezometer B-1, installed during the site investigation performed by Black & Veatch in June 1999. The location of this well is presented in Appendix A of the Geotechnical Design Report prepared by Black & Veatch for the JEA Brandy Branch Generating Station, September 1999 (Appendix 10.8 of the SCA).

11. *Page 19, Section 5.2 indicates "the proposed withdrawal will have negligible impacts on the adjacent users. See AWQD comments under 5b and c.*

Response: See response to 5-b.

B. Environmental Features/Impacts

1. *The applicant in numerous sections of the application has failed to identify the Jacksonville-Baldwin Rails to Trails recreational area adjacent to the project.*

Response: JEA acknowledges that the Jacksonville-Baldwin Rails to Trails recreational area was overlooked in some areas of the Site Certification Application (SCA). However, JEA worked with the FDEP during the permitting of the simple cycle project to accommodate simultaneously the plant access road and trail use. Furthermore, the below response addresses the expected impact to the Jacksonville-Baldwin Rails to Trails recreational area.

2. *The applicant by omitting the Jacksonville-Baldwin Rails to Trails has not addressed Noise, Air Pollution, Aesthetics, Plume Impact, Chemical Impact, and other impacts upon the recreational area.*

Response:

Noise

Noise Pollution issues pertaining to the Jacksonville-Baldwin Rails to Trails recreational area are addressed in C1 below.

Air Pollution

SITE CERTIFICATION APPLICATION
ENGINEERING CERTIFICATION STATEMENT
BRANDY BRANCH GENERATING STATION

I, the undersigned, hereby certify that:

The engineering features of the responses to the Requests for Additional Information (RAIs) from the St. Johns River Water Management District (Items 1, 4, 5, 6, 7, 8, and 9) and the City of Jacksonville Regulatory and Environmental Services Department (Items 2, 4, 5b, 5c, 7, and 11) for the Brandy Branch Generation Station combined cycle conversion project described in this application have been prepared or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles; and,

To the best of my knowledge, the information submitted in support of the RAI responses is true, accurate, and complete and is based upon reasonable techniques, estimates, materials, and information gathered and evaluated by qualified personnel; and ,

To the best of my knowledge, there is reasonable assurance that the RAI responses contained in the application, are based on all applicable pollution control standards found in Florida Statutes and rules of the Department of Environmental Protection and the St. John's River Water Management District.

Stephen H. Riley 3/27/01

Stephen H. Riley Date
Florida No. 33726
CH2M HILL
9428 Baymeadows Road, Suite 200
Jacksonville, Florida 32256

Mar-27-01 02:51pm From-JEA ENVIRONMENTAL GROUP 9046657376 T-476 P.02/02 F-448

As presented in Section 4.0 of Appendix 10.7, air dispersion modeling was performed for pollutants that exceed the PSD significant emission thresholds. Modeling receptors were placed in a rectangular grid that extended 10 kilometers from the facility in all directions. Thus, the modeling receptor grid included the Jacksonville-Baldwin Rails to Trails recreational area. The maximum modeled impacts for each of the regulated pollutants occurred at the receptors placed on the north-northeast fence line of the proposed facility. It is important to note that the maximum modeled impacts are well below the National Ambient Air Quality Standards (NAAQS).

As presented in the analyses, the predicted maximum impacts from the facility did not exceed either the primary or the secondary NAAQS. According to the EPA, primary standards are designed to protect human health from adverse pollutant impacts, and the secondary standards, which are less stringent than the primary standards, are designed to protect the environment, including vegetation. Therefore, since the modeled impacts from the facility do not exceed even the more stringent primary standards, it is not expected to adversely impact the trail. The modeling methodology and results are presented in Section 4.0 of Appendix 10.7.

Aesthetics

Two worst case line-of-sight views of the Brandy Branch Combined Cycle Conversion from the recreational trail are included in the following line of sight drawings. A visitor to the trail may be able to view the facility at various locations along the trail; however, most views from the trail will be either partially or fully blocked by the trees along the trail or by landscaping buffer surrounding the facility.

Plume Impact

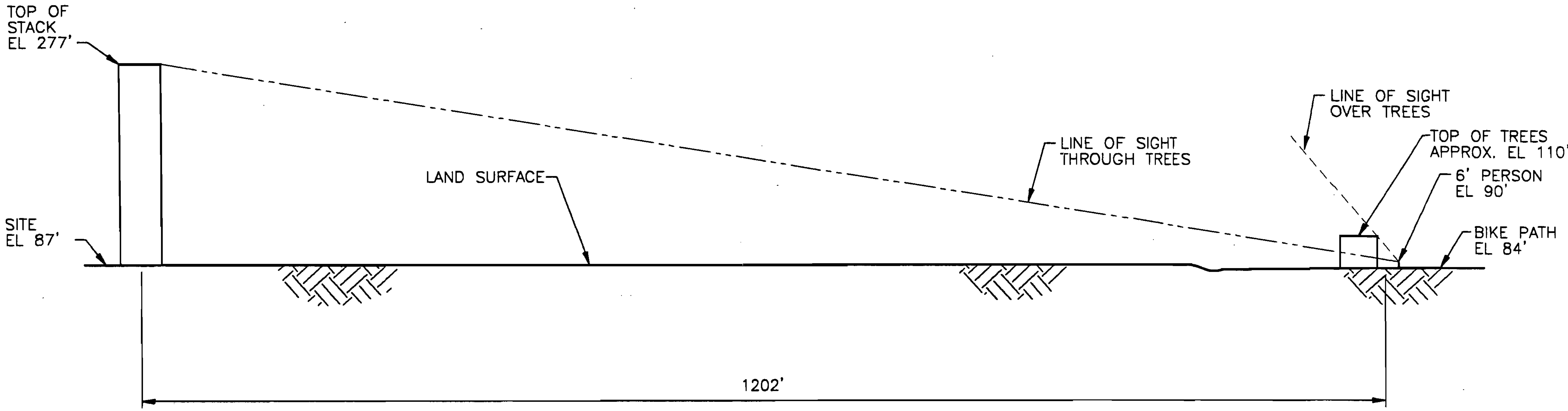
As presented in Section 5.0 of the SCA, a plume impact analysis was performed for the water vapor plume from the cooling tower. As presented in the analysis, the area surrounding the project, which included the Jacksonville-Baldwin Rails to Trails recreational area, was analyzed to estimate impacts of the cooling tower plume. The results of the analysis show that the cooling tower plume is not expected to adversely impact the area surrounding the facility.

Based on model results, water deposition will be greatest at the northwest portion of the site (0.01 mm/month) and will be approximately half that amount (0.005 mm/month) in the southeast corner of the site where the trail is located. Water deposition from the cooling tower is not expected to adversely impact the area surrounding the facility. Additionally, Figures 5.1-1 through 5.1-4 of the SCA address fogging, water disposition, salt disposition and plume visibility.

Chemical Impact

The facility will store and use all chemicals on-site within the regulatory guidelines established by the Clean Air Act and 40 CFR Part 68. Appropriate accidental release analyses will be prepared and submitted to the regulatory agencies when more information as to the type and quantity of the chemicals stored on site becomes available. At such time, the accidental release analysis will include the potential impacts of such chemicals on the area surrounding the facility. The response plan developed for accidental releases from the facility will take into consideration the potential impacts to the Jacksonville-Baldwin Rails to Trails recreational area and its users.

Additionally, the existing Integrated Contingency Plan for the facility provides the necessary steps to prevent spills and, if necessary, initiate, conduct and terminate any response actions. These steps include recognizing situations that can be cleaned up by on-site personnel and those that require contacting outside help and implementing other appropriate actions. The steps identify actions necessary to protect on-site personnel and adjacent properties.



100' 50' 0 100' 200'

1"=100'

(BOTH HORIZONTAL AND VERTICAL)

NOT TO BE USED FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
0			AER	JMS			

BLACK & VEATCH

ENGINEER JMS	DRAWN AER
CHECKED	DATE

JEA
BRANDY BRANCH GENERATING STATION

JACKSONVILLE–BALDWIN RAILS TO TRAILS
LINE OF SIGHT 1A FROM NEAREST POINT

PROJECT	DRAWING NUMBER	REV
	099262–DS–0002	0

CODE

AREA

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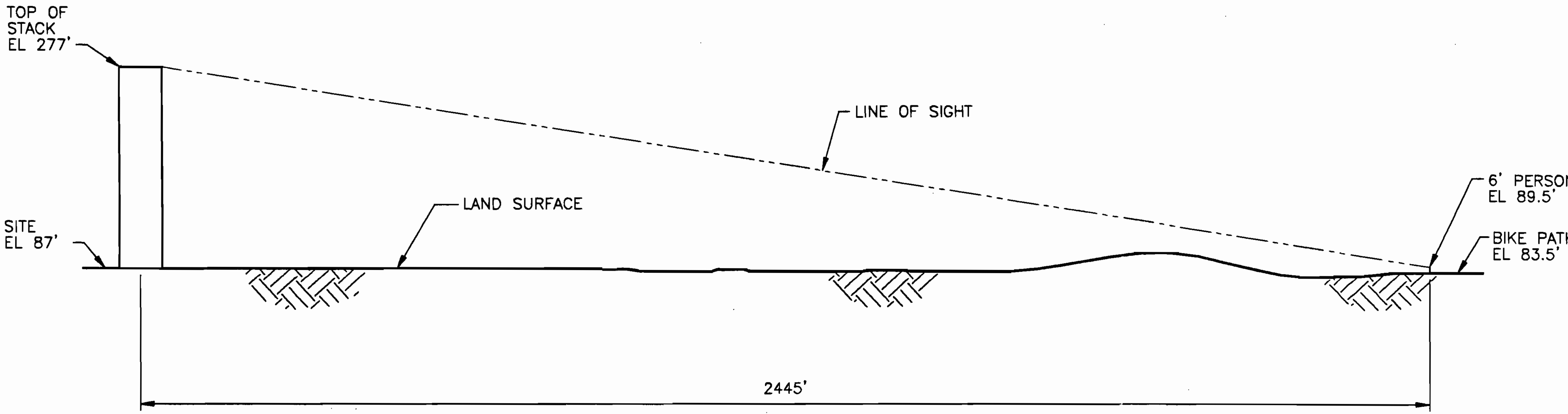

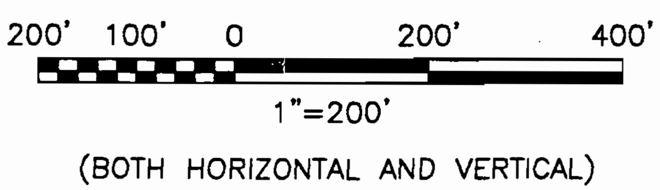

NOT TO BE USED
FOR CONSTRUCTION

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BLACK & VEATCH

ENGINEER JMS	DRAWN AER	JEA BRANDY BRANCH GENERATING STATION	PROJECT 099262-DS-0003 (DRAWING NUMBER) — REV 0
CHECKED	DATE	JACKSONVILLE-BALDWIN RAILS TO TRAILS LINE OF SIGHT 1B	CODE / AREA

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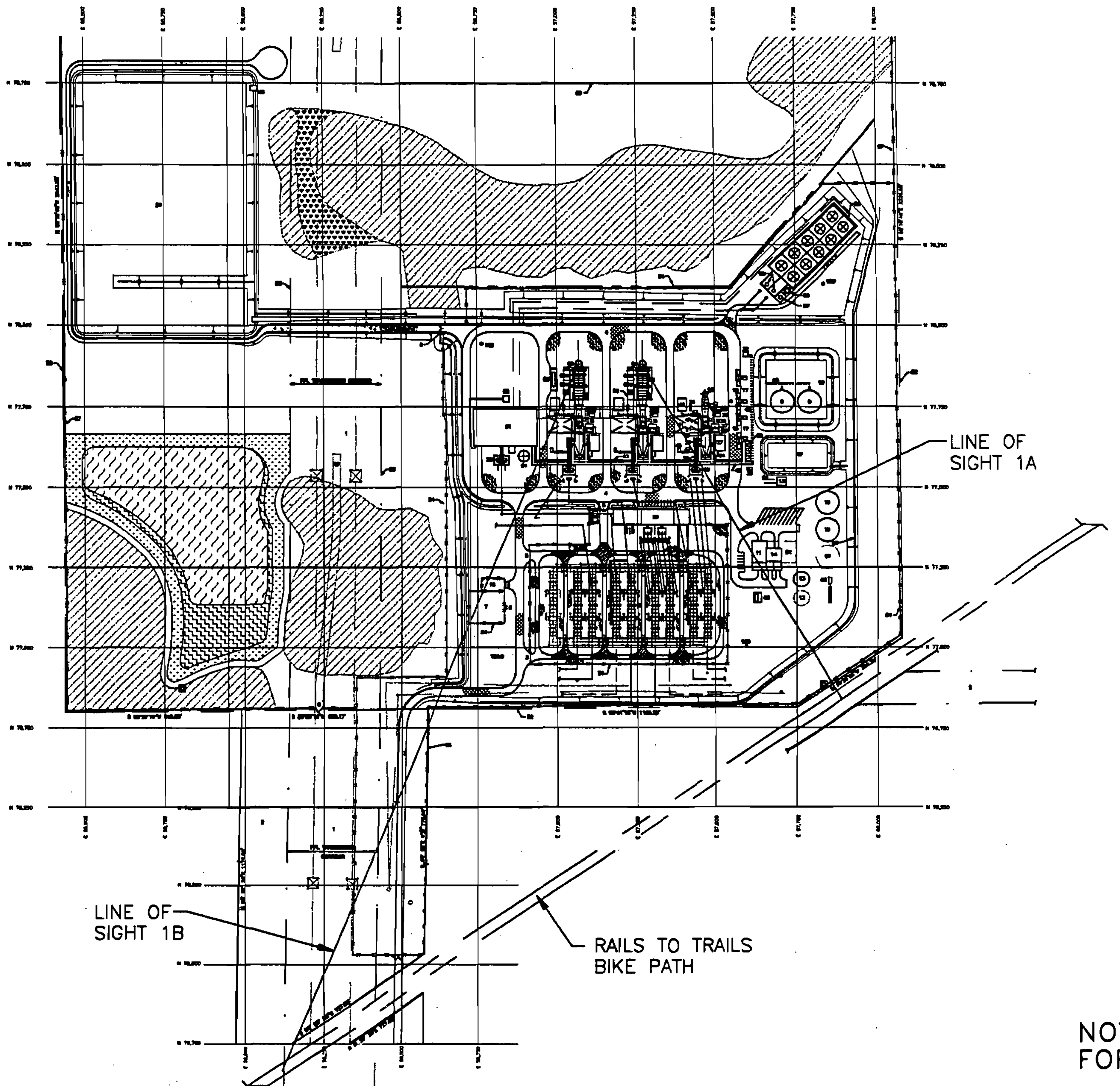
ACAD 15.05



NOT TO BE USED FOR CONSTRUCTION

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
0			AER	JMS			

BLACK & VEATCH

JEA
BRANDY BRANCH GENERATING STATION

ENGINEER JMS
DRAWN AER
CHECKED
DATE

JACKSONVILLE–BALDWIN RAILS TO TRAILS
LINE OF SIGHT–PLAN

PROJECT
DRAWING NUMBER 099262–DS–0004
REV 0
CODE
AREA

ACAD 15.05
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A1ASL012 09:48:32
03/12/01

C. Noise Pollution

1. *The applicant states in Section 5.7 Noise Impacts that the noise levels will comply with the City of Jacksonville's Noise Pollution Standards. However, the Jacksonville-Baldwin Rails to Trails (a recreational area) runs almost adjacent to the proposed JEA Brandy Branch.*

The Jacksonville-Baldwin Rails to Trails represents a Class "B" land usage, while the JEA proposed project is a class "D" land usage. Per EPB Rule 4, the maximum allowable noise levels from the JEA proposed project to the adjacent recreational area would be: 65 dBA daytime and 60 dBA nighttime.

Based upon the noise levels projected by JEA in Section 5.7, and Figure 5.7-1, JEA could exceed the daytime noise levels and would exceed the nighttime levels.

Hence, based upon JEA's data, a violation would exist. In fact, based upon JEA's noise projections, approximately 2,000 feet of the recreational area would be adversely impacted by the noise levels.

Response: The JEA Brandy Branch Facility noise emissions at the boundary of the Jacksonville-Baldwin Rails to Trails right-of-way had not been specifically discussed in the SCA. Noise emissions at this trail are anticipated to be below 65 dBA during both simple cycle and combined cycle operation. The facility noise emissions after conversion to combined cycle are anticipated to be of a very similar level to the simple cycle configuration noise emissions.

The trail has been identified by the city staff to be a recreational area and therefore a Class "B" land usage in accordance with the EPB Rule 4, Noise Pollution Control. In accordance with Rule 4, the maximum allowable noise level at the adjoining boundary with the trail is 65 dBA daytime and 60 dBA nighttime. Nighttime hours are defined as 10 p.m. to 7 a.m.

Reduced nighttime noise restrictions typically apply in areas where people are located during the nighttime periods and the protected location supports sleep activities. The trail is assumed to experience little traffic during nighttime periods, prior to 7 a.m. or after 10 p.m. Therefore, a reduced nighttime noise requirement would not provide any benefit to the users of this recreational trail.

Also, individuals using the trail will be traveling along its path and individuals will not be exposed to the noise for any significant period.

The facility will be fully compliant with the daytime noise requirement of 65 dBA. The facility is anticipated to exceed the 60 dBA nighttime noise requirement. Compliance with the 60 dBA criteria would require increased capital expenditure for noise mitigation with no significant benefit to the community.

2. *JEA references a computer model for projecting the noise levels from the proposed project. However, JEA has not listed the inputs or modeling assumptions necessary to assess the value of the noise level outputs. JEA should provide this data in order to allow evaluation of the outputs.*

Response: The facility noise modeling is based on the equipment noise emissions detailed in the Table below. The listed noise sources, the corresponding equipment noise emission level and equipment location (based on plant arrangement drawings) were input to the model. The noise contours contained in Figure 5.7-1 are based on these equipment noise emissions.

Assumed Equipment Sound Levels

Equipment	Noise Source Components	Sound Level Specification
Combined Cycle Combustion Turbine Generator Package	Turbine compartment, generator compartment, ventilation fans, exhaust ductwork and all other auxiliary equipment (excluding stack exhaust).	63 dBA at 400 ft [1]
Simple Cycle Combustion Turbine Generator Package	Turbine compartment, generator compartment, ventilation fans, exhaust ductwork and all other auxiliary equipment, and stack exhaust.	65 dBA at 400 ft [1]
Combustion Turbine Inlet	CT air inlet.	42 dBA @ 400 ft [1]
HRSG Package	Transition ductwork, boiler, stack, stack exit and all other auxiliary equipment included in the scope-of-supply.	65 dBA @ 400 ft [1]
Steam Turbine Generator Package	Compartments, ventilation fans, piping and all other auxiliary equipment included in the STG scope-of-supply.	Indoor
Generator Step-up Transformer	Transformer with fans at max cooling.	85 dBA @ 3 ft [2]
Cooling Tower (10-cell)	Fans, motors, gear boxes, water splash and all associated equipment.	65 dBA @ 400 ft [1]
Boiler Feed Pumps	Pump and motor assembly.	90 dBA @ 3 ft [2]
Steam Turbine Building	Insulated metal panel system. (22 gauge outer liner, 4-inch insulation, 20 gauge inner liner)	STC-40 (minimum)

NOTES

1. *The maximum sound pressure level in any direction from the equipment envelope at the distance specified. The equipment envelope is defined as the contour that completely encompasses all equipment components at a distance of 3 feet from the equipment face or enclosure.*
2. *Average sound pressure level along the equipment envelope.*

D. Air Quality

1. *Appendix 10.7, Construction Permit Application, Page 15: The applicant has requested specific wording to address "Start-up" and "Shut-down." The*

applicant has suggested wording that is unacceptable. The suggested wording fails to comply with the EPA policy on such, see attachment (September 20, 1999 memo from Steven A. Herman, US EPA). Hence, the applicant should conform to standard Start-up/Shut-down provisions rather than developing their own language.

Response: The permit language was not developed by JEA, rather standard permit language for combustion turbine startups and shutdowns was extracted from the Calpine - Osprey Energy Center PSD Permit issued by the FDEP (Permit No. PSD-FL-287 Osprey Energy Center, Facility No. 1050334). Similar conditions have been placed in other combustion turbine air permits in Florida. Additionally, the referenced EPA policy on excess emissions (September 20, 1999 memo from Steven A. Herman, US EPA) clarifies that the states have the discretion to provide an affirmative defense for excess emissions that arise during certain malfunction, startup and shutdown episodes.

2. *Appendix 10.7, Construction Permit Application Section G, Emission Unit Pollutant Detail Information, Page 22-30. The regulated emissions noted in these sections of the Construction Application should be less than or equal to the BACT limits as expressed in Section 3.0 BACT, Pages 3-1 or 3-2.*

   Response: In accordance with form application instructions, the emission rate information presented in Appendix 10.7, Construction Permit Application, Section G, Emission Unit Pollutant Detail Information, pages 22-30, represent the worst-case for all loads (100, 75 and 50 percent) and temperatures (95, 59 and 20° F). The worst-case emission rates used in the Construction Permit Application are based on emissions data presented in Attachments 1 and 2 to Appendix 10.7 of the application. As indicated in the introductory comments to Section 3.0 of Appendix 10.7, the emission rates presented as BACT represent the emissions for each CTG operating at full load at an ambient temperature of 59° F. The basis for this is supported by guidance found in EPA's New Source Review Workshop Manual under calculating BACT baseline omissions. The guidance suggests that BACT baseline emission rates should represent a realistic scenario of upper-bound uncontrolled emissions, considering the inherent physical or operational constraints of the source. Consequently, estimating realistic upper-bound emissions for the BACT analysis does not mean, or should assume, the emissions represent the potential to emit as presented in Section G – Emission Unit Pollutant Detail Information pages of the application.

3. *Appendix 10.7, Construction Permit Application, Section G, Emission Unit Pollutant Detail Information, Pages 27-28. The projected SO_2 emissions for the combined units exceed the PSD significant emission rate of 40 TPY, hence, requiring a PSD review. Note the numbers supplied in this section do not agree with the "Potential to Emit" emission in other sections.*

   Response: Emission rate information presented in Appendix 10.7, Construction Permit Application, Section G, Emission Unit Pollutant Detail Information, pages 27-28, represent the worst-case for all loads (100, 75 and 50 percent) and ambient temperatures (95, 59 and 20° F). The worst-case emission rates are presented in Attachment 2 to Appendix 10.7. The potential to emit emissions used to determine PSD applicability for SO_2 were estimated based on a full load operation at an annual average temperature of 59° F. The estimate of SO_2 emissions at the annual average temperature do not exceed 40 tpy.

4. *A secondary question arises relative to SO_2 emissions. The applicant has based the SO_2 "potential to emit" on the natural gas containing only 0.2 grains SO_2/100SCF. However, Florida Gas Transmission Company will only commit to the natural gas not having more than 10 grains SO_2/100SCF. This issue needs to be resolved/clarified by the applicant.*

Response: The proposed combined cycle conversion of two of the Brandy Branch's simple cycle combustion turbines will fire natural gas as the primary fuel, with the capability of firing a limited amount of low sulfur distillate fuel oil. It is intended that the combined cycle conversion will result in an SO_2 emission increase of not more than 40 tpy, and therefor not subject to PSD review for SO_2. Using the aforementioned 40 tpy SO_2 limit for the proposed modification, the estimated number of hours of natural gas and distillate fuel oil firing were calculated for each combined cycle combustion turbine based on 0.2 gr./100 scf and 0.05 percent sulfur for natural gas and distillate fuel oil, respectively. Results of this calculation indicate that the combined cycle combustion turbines could operate the entire year on natural gas, or up to 288 hours per year each on low sulfur distillate fuel oil (with the remaining hours of the year on natural gas) and not exceed 40 tpy of SO_2 emissions. While it is understood that the natural gas vendor does not guarantee sulfur content at 0.2 gr./100 scf; nevertheless, actual levels of sulfur detected in the natural gas are of that order of magnitude. Additionally, the USEPA's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources* suggests natural gas typically contains 0.2 gr./100 scf. However, regardless of the actual value of the sulfur content of natural gas, the proposed modification project to convert two of the three simple cycle combustion turbines to combined cycle at Brandy Branch will limit the SO_2 emission increase to less than 40 tpy.

Sufficiency Letter

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

February 13, 2001

Mr. N. Bert Gianazza, P.E.
JEA
21 West Church Street
Jacksonville, Florida 32202-3139

Re: Brandy Branch PA 00-43 - Sufficiency

Dear Mr. Gianazza:

The Florida Department of Environmental Protection finds that the application for power plant certification for the Brandy Branch Combined Cycle Conversion to be insufficient. Please provide the information requested in the following:

1. Please review and complete the chart (below) in order to clarify the Department's understanding of JEA's proposed BACT analysis for NO_X and CO. The right-hand column is intended to provide the Department with information necessary to analyze only those costs associated with the installation of an oxidation catalyst, which are over and above the cost of installing an SCR. Please specify the capital recovery factors utilized in each configuration, as they are not readily apparent (but appear to be > 0.11). It should be noted that the current version of the EPA's *OAQPS Control Cost Manual* uses an interest rate of 7% versus 9.64%. Additionally, the manual includes a 3% contingency versus the supplied 20% value. Lastly, two values within the economic analysis of the oxidation catalyst system appear suspect:
   a) The annual catalyst replacement cost of $330,000 does not appear to comport with the $664,000 replacement cost and 3 year life guarantee, and
   b) An annual direct cost of $31,000 is shown as a "lost power generation" cost. Although it is appropriate to calculate the cost of using additional natural gas to compensate for the power consumption resulting from the pressure drop across the catalyst bed, lost revenue should not be included in the cost analysis.

   All of the above recommendations should be applied and the economic analysis redone.

Operating Mode	SCR Only	Oxidation catalyst	SCR + Oxidation catalyst	*Differential Cost (over SCR) of Oxidation catalyst* [1]
Total Purchased Equipment Costs	$ 1,709,000	$ 1,139,000	$ 2,558,000	$ 849,000
Direct Installation Costs	$ 513,000	$ 342,000	$ 767,000	$ 254,000

Total Direct Costs Less Catalyst	$ 1,601,000	$ 817,000	$ 2,040,000	$ 439,000
Assumed Catalyst Cost	$ 621,000	$ 664,000	$ 1,285,000	$ 664,000
Total Indirect Capital Costs	$ 820,000	$ 547,000	$ 1,229,000	$ 409,000
Total Capital Costs	$ 3,042,000	$ 2;028,000	$ 4,554,000	$ 1,512,000
Total Direct Annual Costs	$ 448,000	$ 365,000	$ 813,000	$ 365,000
Total Indirect Annual Costs	$ 433,000	$ 237,000	$ 384,000	??
Total Annualized Costs	$ 881,000	$ 602,000	$ 1,197,000	??
Tons Pollutant Removed (TPY)	193.3	209.3	402.6	209.3
Cost Effectiveness ($/ton)	$ 4,600	$ 2,900	$ 3,000	??

[1] *Estimated values prior to JEA's recalculations as requested by FDEP.*

2. The PM BACT Determination for each of the CT's currently permitted at Brandy Branch was 9 lb/hr for gas firing and 17 lb/hr for oil firing. Please reconcile these emission rates with JEA's currently supplied BACT Determination of 19.8 lb/hr for gas firing and 62.1 lb/hr for oil firing.

3. Please confirm that the requested CO emission limits of 54.26 lb/hr (natural gas) and 72.43 lb/hr (oil) are equivalent to 12.21 ppmvd @ 15%O_2 (natural gas, inclusive of supplementary firing) and 14.17 ppmvd (oil) respectively, as BACT emission limits for CO will be set on a ppmvd basis. The Department wishes to point out that recent tests from TECO's Polk Power Station 7FA resulted in CO emissions of less than 1 ppmvd (gas) and less than 2 ppmvd (oil) at full load. Although contracting for CO limits between GE and its customers may not have caught up with field experience, actual results will be considered in the setting of BACT.

4. Please confirm that the data shown in Attachment 2 "Potential-To-Emit (PTE) and Enveloped Spreadsheet" (Combined Natural Gas and Fuel Oil for two turbines) summarizes the maximum emissions of criteria pollutants considering worst-case operating scenarios and all operating modes.

5. Please indicate the maximum gross MW capability of the combined cycle unit, and under what operating conditions this output is achieved. Please provide the same information for the maximum heat input of the CT's as well as duct burners, and the corresponding values under ISO conditions. Maximum requested heat input rates have been specified at1910.2 MMBtu/hr (HHV natural gas) while firing duct burners and 2059.4 MMBtu/hr (HHV oil).

6. Please provide the estimated time frames required and emission levels of NO_X, CO and PM/PM_{10} during hot and cold start-up periods. The Department intends to define these levels in the setting of BACT.

8. The Department requires a project specific cost estimate of a $SCONO_X$ control system, to be supplied by the technology provider (Alstom Power).

You may contact Mike Halpin at 850/921-9519 or Cleve Holladay at 850/921-8986 regarding the above questions.

Please address the attached request for additional information from the Florida Fish and Wildlife Conservation Commission and the St. Johns River Water Management District.

Sincerely,

Hamilton S. Oven

Hamilton S. Oven, P.E.
Administrator, Siting
Coordination Office

Attach:

cc: All Parties

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSIOI

BARBARA C. BARSH
Jacksonville

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Miami

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Deltona

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St. Petersburg

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VICTOR J. HELLER, Assistant Executive Director

OFFICE OF ENVIRONMENTAL SERVI
BRADLEY J. HARTMAN, DIREC
(850)488-6661 TDD (850)488-9
FAX (850)922-5

January 30, 2001

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

FEB 08 2001

SITING COORDINATION

Mr. Hamilton S. Oven, Jr., P.E.
Siting Coordination Office
Department of Environmental Protection
2600 Blair Stone Road, MS 48
Tallahassee, FL 32399-2400

RE: DEP File No. PA 00-43, JEA Brandy Branch Combined Cycle Conversion, Siting Certification Application

Dear Mr Oven:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission has reviewed the referenced application for sufficiency pursuant to section 403.5067, F.S., and offers the following comments.

The JEA Brandy Branch Generating Station is currently under construction, and includes three simple cycle electric generating units. Under this application, JEA proposes to convert two of the three units into a combined cycle unit by adding a steam turbine, electric generator, two heat recovery steam generators with new exhaust stacks, cooling tower, condenser, and associated plant equipment.

In reviewing the siting application, it was difficult to determine what the current conditions of the site are, or how much of the site has already been altered for construction of the first three units. The descriptions of vegetative communities of the site apparently were prepared prior to the current construction activities, and do not describe what will be impacted by this conversion project. The application mentions an additional 2.5-acre area of pine woods to be cleared, but does not provide any detail about this area. The applicant should provide a vegetation map showing current vegetative cover, with the footprints of new facilities needed for the conversion project clearly indicated.

On page 2-49 of the application, reference is made to Table 2, which provides information about wildlife species observed on the site during inspections made in December 1998 and March 1999; however, no Table 2 was provided. Please provide Table 2. In addition, more recent wildlife survey information needs to be provided, which describes current wildlife

620 South Meridian Street · Tallahassee · FL · 32399-1600
www.state.fl.us/fwc/

utilization of the site, including use by listed species. The dates of these surveys, along with methodologies used and survey transect locations, also need to be provided.

We appreciate the opportunity to comment on this siting application. Please contact us if we may provide any additional assistance.

Sincerely,

Bradley J. Hartman, Director
Office of Environmental Services

BJH/DBB
ENV 2-11-2/3
f:\ocs\traci\jeabrandy.suf
cc: Mr. Jim Antista

Best Available Copy

St. Johns River Water Management District

Henry Dean, Executive Director • John R. Wehle, Assistant Executive Director

Post Office Box 1429 • Palatka, FL 32178-1429 • (904) 329-4500

DEPARTMENT OF ENVIRONMENTAL PROTECTION

FEB 08 2001

SITING COORDINATION

February 1, 2001

Hamilton S. Oven, Administrator
DEP Siting Coordination Office
Twin Towers Office Building
2600 Blair Stone Road, MS 48
Tallahassee, FL 32399-2400

Via - Facsimile Transmission (850) 921-7250

RE: JEA Brandy Branch Combined Cycle Conversion Site Certification Application No. PA00-43; DOAH Case No. 005120EPP; DEP Case No. 00-2072 and FOR #2000-66

Dear Mr. Oven:

Pursuant to Section 403.5067, Florida Statutes, and Subsection 62-17.081(2)(a)1., Florida Administrative Code, the St. Johns River Water Management District transmits to you its request for additional information. The requested information must be provided to render this application sufficient and enable the District to carry out its statutory review responsibilities. The requests below reflect the information the District's technical staff believes is needed to complete the District's review and to thereafter prepare a report for submittal to the Department:

1) The application indicates that there are herbaceous and forested wetlands as well as other surface waters on and surrounding the proposed site. The ground water modeling, however, analyzes the drawdown impacts to the Floridan aquifer only. Please provide an analysis of the steady-state impact of the proposed Floridan aquifer withdrawals on the surficial water table at the maximum proposed pump rate of 2.744 million gallons per day (mgd) and at increased rate of 3.722 mgd for 288 hours, transient conditions. The drawdown contours should be overlain on a map of wetlands and surface waters and displayed at one-half foot intervals and also delineate outward from the well(s) to the 0.2 foot

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drawdown contour. [Section 10.2(e)(f)(g)(l)(p), 10.3(d), Applicant's Handbook Consumptive Uses of Water (February 8, 1999) (A.H)]

2) Please provide reasonable assurance that impacts to wetlands and surface waters from the proposed drawdown will be reduced to an acceptable level. This would entail a field evaluation of the wetlands that may potentially be impacted. Please contact Robert Epting at (904) 329-4163 for a further discussion of the evaluation process. [Sections 9.4.1(b), 9.4.3(a), 10.2(e)(f)(g)(l)(p), 10.3(d), A.H.]

3) Figure 2.3-5 on page 2-30, reflects well "PW-1" on the east side of the site and well "PW-2" on the west side of the site. All subsequent references reflect "Well #1" on the west side of the site and "Well #2" on the east side of the site. For future references and to maintain consistency, please clarify which well I.D. will be used for the well west of the site and which I.D. will be used for the well east of the site. [Section 4.2, A.H.]

4) District water use rules require that all potential sources of water be evaluated for reuse feasibility for the requested use(s) prior to permit issuance. Please provide a reuse feasibility study, including supporting documentation, that evaluates the economic, environmental and technical feasibility of using reclaimed water to supply the water needs of this facility. The study must comprehensively address the following:
   - a description of all possible sources of reclaimed water, including the Baldwin Waste Water Treatment Plant (WWTP) as a source of water for cooling tower makeup;
   - details and costs of transmission from and source to the facility;
   - factors constraining the use of reclaimed water in the facility;
   - waste water disposal issues; and
   - environmental limitations and concerns

The study must contain a conclusion as to the feasibility and, if determined to be feasible, a detailed discussion of implementation. The discussion of implementation shall address:

- the amount of reclaimed water to be used versus total facility demand for each year until reclaimed water supplies 100 percent;
- secondary sources if reclaimed water cannot be utilized to supply 100 percent of the need;
- other issues related to implementation.

[Section 10.3(c)(d)(f)(g), A.H]

5) In order to determine cumulative drawdown impacts to the area, please provide a cumulative impact analysis that incorporates the proposed withdrawals and any other existing Floridan aquifer users in the region. All adjacent and regional Consumptive Use Permit ("CUP") permittees' withdrawals should be used in the drawdown model at withdrawal rates that reflect those experienced in May, June,

and July of 2000. The Brandy Branch withdrawal rates should be set at 2.744 million gallons per day at steady state and 3.722 million gallons per day for a transient period of 288 hours for the Brandy Branch site. All model results must be presented as overlays to USGS quadrangles of the area and drawdown contours should be delineated to define to the .2 foot contour. [Sections 9.4.1(b), 9.4.4, 10.3(c)(d), A.H]

6) In order to evaluate the potential for interference to existing legal uses that may result from the proposed withdrawals, please conduct a Floridan aquifer impact analysis of the proposed Brandy Branch withdrawals. All models should be run using the transmissivity and storativity data that was obtained in the aquifer performance pump test that was conducted on-site in 1999. Withdrawal rates should be set at 2.744 million gallons per day at steady state and 3.722 million gallons per day for a transient period of 288 hours for the Brandy Branch site. The transient conditions simulations should be run using the steady state results as a base condition. Both model results must be presented as overlays to USGS quadrangles of the area and define to the .2 foot contour. [Sections 9.4.1(b), 9.4.4, 10.3(c)(d), A.H]

7) In order to identify any potentially affected legal users of the Floridan aquifer, please provide a more complete listing of all Floridan aquifer well owners who withdraw water from the Floridan aquifer for any type of use. The area of interest is that area within the .2 foot contour based on modeling results at maximum daily usage. It appears SJRWMD consumptive use permit files were used as the only information source. SJRWMD consumptive use permit files are limited to wells 6" in diameter or larger or actual use in excess of 100,000 gpd. Please supply this information in a graphical format as an overlay to the USGS quadrangle of the area. [Sections 9.4.1(b), 9.4.4, 10.3(d), A.H]

8) Please evaluate the technical and economic feasibility for providing pretreatment to the cooling tower blowdown water (.322 mgd), which is currently proposed for discharge to a JEA WWTP, for reuse in the cooling towers or other power generation processes. [Section 10.3(d)(e)(g)(j), A.H]

9) Section 2.3.3 on page 3-38 states that there are no natural lakes or reservoirs within 5 miles of the site to evaluate as lower quality sources. Please identify and evaluate the potential for using surface water from all rivers, streams, creeks, and artificially constructed impoundments (ponds, lakes, stormwater systems) located within 3 miles of the property boundary. [Section 10.3(d)(g), A.H]

The District appreciates the Department's assistance in obtaining the above-requested information. If further clarification is needed regarding the District's requests, please call me at (904) 329-4488. Thank you in advance for your cooperation.

Sincerely,

Veronika Thiebach

Veronika Thiebach
Assistant General Counsel

Enclosures
VT/kfb

cc: Caroline Silvers
Jay Lawrence
Robert Epting
Dwight Jenkins

Best Available Copy

REGULATORY & ENVIRONMENTAL SERVICES DEPARTMENT

Air and Water Quality Division

February 15, 2001

Mr. Hamilton S. Oven, P.E.
Power Plant Siting
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RE: JEA Brandy Branch Generating Station
Power Plant Siting Application

Dear Mr. Oven:

Having reviewed the referenced application, the Regulatory and Environmental Services Department submits the attached preliminary statements of issues pursuant to Section 403.507(1), Florida Statutes. For further discussion, please call Steve Pace, P.E., at 630-1212 ext. 3133.

The City's Planning and Development Department is also reviewing the application and will submit its preliminary statement of issues by separate correspondence.

Very truly yours,

James L. Manning, P.E.
Chief

JLM/vgw

Enclosure

c: Robert S. Pace, P.E., AWQD
Gary Weise, P.E., AWQD
Cynthia Irvin, AWQD
Richard Robinson, P.E.. AWQD
N. Bert Gianazza, P.E., JEA
Douglas Roberts, Esq., Hopping Green
Gregory K. Radlinski. Esq., City OGC

117 West Duval Street, Suite 225
Jacksonville, Florida 32202
Fax (904) 630-3638

Air Quality 630-3484
Water Quality [illegible]
Ground Water 630-4900
Hazardous Materials 630-3404

Equal Opportunity/Affirmative Action Employer

REGULATORY & ENVIRONMENTAL SERVICES DEPARTMENT

Air and Water Quality Division

February 15, 2001

MEMORANDUM

TO: Hamilton S. Oven, P.E.
FDEP

FROM: James L. Manning, P.E.
Chief

RE: **Concerns-**
JEA Brandy Branch
Power Plant Siting Application

A. **Aquifer/Groundwater**

See Attached memo of January 24, 2001 from Gary Weise, P.E., to Steve Pace, P.E.

B. **Environmental Features/Impacts**

1. The applicant in numerous sections of the application has failed to identify the Jacksonville-Baldwin Rails to Trails recreational area adjacent to the project.

2. The applicant by omitting the Jacksonville-Baldwin Rails to Trails, has not addressed Noise, Air Pollution, Aesthetics, Plume Impact, Chemical Impact and other impacts upon the recreational area.

C. **Noise Pollution**

1. The applicant states in Section 5.7, Noise Impacts that the noise levels will comply with the City of Jacksonville's Noise Pollution Standards. However, the Jacksonville-Baldwin Rails to Trails (a recreational area) runs almost adjacent to the proposed JEA Brandy Branch.

   The Jacksonville-Baldwin Rails to Trails represents a Class "B" land usage, while the JEA proposed project is a class "D" land usage. Per EPB Rule 4, the maximum allowable noise levels from the JEA proposed project to the adjacent recreational area would be: 65 dBA daytime and 60 dBA nighttime.

   Based upon the noise levels projected by JEA in Section 5.7, and figure 5.7-1, JEA could exceed the daytime noise levels and would exceed the nighttime levels.

   Hence, based upon JEA's data a violation would exist. In fact, based upon JEA's noise projections, approximately 2000 feet of the recreational area would be adversely impacted by the noise levels.

2. JEA references a computer model for projecting the noise levels from the proposed project. However, JEA has not listed the inputs or modeling assumptions necessary to assess the value of the noise level outputs. JEA should provide this data in order to allow evaluation of the outputs.

D. <u>**Air Quality**</u>

1. Appendix 10.7, Construction Permit Application, page 15: The applicant has requested specific wording to address "Start-up" and "Shut-down". The applicant has suggested wording that is unacceptable. The suggested wording fails to comply with the EPA policy on such, see attachment (September 20, 1999 memo from Steven A. Herman, US EPA). Hence the applicant should conform to standard Start-up/ Shut-down provisions, rather than developing their own language.

2. Appendix 10.7, Construction Permit Application Section G, Emission Unit Pollutant Detail Information, page 22-30. The regulated emissions noted in these sections of the Construction Application should be less than or equal to the BACT limits as expressed in Section 3.0 BACT pages 3-1 or 3-2.

3. Appendix 10.7, Construction Permit Application, Section G, Emission Unit Pollutant Detail Information pages 27-28. The projected SO_2 emissions for the combined units exceeds the PSD significant emission rate of 40 TPY, hence requiring a PSD review. Note the numbers supplied in this section do not agree with the "Potential to Emit" emission in other sections.

4. A secondary question arises relative to SO_2 emissions. The applicant has based the SO_2 "potential to emit" on the natural gas containing only 0.2 grains SO_2/100SCF. However, Florida Gas Transmission Company will only commit to the natural gas not having more than 10 grains SO_2/100SCF. This issue needs to be resolved/clarified by the applicant.

Your assistance in this project is appreciated. If you have any questions regarding these comments, please contact Steve Pace, P.E. at 904-630-1212 ext. 3133.

JLM/vgw

Attachment

c: Steve Pace, P.E., AWQD
Richard Robinson, P.E., AWQD
Gary Weise, P.E., AWQD
Cynthia Irvin, AWQD

January 25, 2001

MEMORANDUM

TO: Steve Pace, P.E., Environmental Engineering Manager, Senior

FROM: Gary Weise, P.E., Environmental Programs Manager

SUBJ: **JEA Brandy Branch Combined Cycle Conversion**

Review of the subject facility reports dated December 2000, received 1/3/01, has prompted the following observations and comments:

Site Certification Application

1. Page 2-31 Figure 2.3-6 indicates the top of the Floridan Aquifer is located at 520-525 feet below ground surface (BGS). But page 2-32 Section 2.3.2.2 paragraph 1 indicates it's at 380 feet BGS. An explanation is needed.

2. Page 2-35 third paragraph provides information about the freshwater-saline water interface based on a 1994 St. Johns River Water Management District (SJRWMD) report. Additional work was done by the SJRWMD in 2000, and continues this year, to examine water quality at the bottom of the Floridan. According to information provided by Bill Osburn Hydro IV, a deep outpost monitoring well was recently drilled in Nassau County, adjacent to the St. Mary's River approximately north of this project's site. It found chlorides in excess of 1,800 mg./l at the bottom of the Floridan. Another similar well, drilled recently in Callahan between the JEA Brandy Branch site and St. Mary's well site, has not found this problem, chlorides at 1516 feet deep on 10/5/2000 were 25 mg/l. But, at this same depth it found sulfate levels at 179.4 mg/l. These findings provide a new uncertainty about the water quality that might exist at this site now or in the future. It should be noted that currently there are no monitoring wells into the lower Floridan Aquifer within Duval County west of the St. Johns River.

The most direct approach to address this uncertainty is to drill a deep outpost monitoring well at or near this site. If JEA is unwilling or unable to take this action on their own, then it is recommended that they meet with Floridan Aquifer monitoring network experts from the SJRWMD, U. S. Geological Survey, and this office. The purpose of this meeting would be to explore a possible multi-party cooperative agreement to address this issue. Another appropriate action is for JEA to drill a monitoring well into the Avon Park to a depth of approximately 1000 feet to monitor any water quality changes that might occur as a result of the proposed withdrawal.

3. Page 4-3 Section 4.3.1. The applicant needs to supply the analysis used to conclude the construction de-watering effort will not adversely impact the wetlands adjacent to the cooling tower and heat recovery steam generator site.

4. Page 5-29 paragraphs 4-6. Additional monitoring efforts, like those mentioned in comment 2, are needed before confidence can be placed in the conclusion that the proposed use "will not cause any saltwater intrusion".

5. Page 5-31 Section 5.3.3 paragraph 1. The conclusion that "there will be no harm to any existing legal users or to the resource by any of the activities associated with the Generating Station" may be somewhat premature because:
a. No evidence has been provided to support the conclusion that construction dewatering will not affect the adjacent wetlands.
b. It appears, from the AWQD well inventory, that there could be private well owners that have not been identified in this report that could see impacts from this facility. Depending on the private owner well pumping configuration it is possible that the additional water level declines caused by this facility could force the private well owners to have to make changes to their systems.
c. The most recent data obtained by the SJRWMD raises some questions about current situation and future stability of the water quality situation in the Floridan Aquifer in the western part of Duval County.

6. Page 5-31 Section 5.3.5 paragraph 1. Has JEA developed a contingency plan to mitigate any adverse impacts that occur on the wetlands during construction?

7. Page 5-31 Section 5.3.5 paragraph 2. As mentioned in item 2 it is recommended a 1000-foot deep monitoring well be placed into the Floridan Aquifer and sampled regularly, in order to obtain a warning of any changes in water quality before the production wells are impacted.

Appendix 10.4 State Permit Applications

8. Section 10.4.2 Consumptive Use Permit Application, Page Cl-1, Item I.2. Requested Water Use: Why does the proposed average and maximum daily use rate differ by 0.01 MGD and 0.51 MGD from the data in figures 3.5-1 and 2?

Appendix 10.9 Hydrogeologic Report

9. Engineering Certification Statement- This statement appears to be incomplete, since there is no mention of the rules of the St. Johns River Water Management District.

10. Pages 9 & 10. Please identify which shallow well was used to provide the water level information shown on Figures 3-1 & 3-2.

11. Page 19 Section 5.2 indicates "the proposed withdrawal will have negligible impacts on the adjacent users. See AWQD comments under 5b and c.