



Progress Energy

January 22, 2010

Mr. Jeff Koerner, P.E.
DEP/DARM
Permitting Section
Division of Air Resource Management
2600 Blair Stone Road MS 5500
Tallahassee, Florida 32399-2400

RECEIVED

JAN 25 2010

BUREAU OF AIR REGULATION

Re: Request for Additional Information
Crystal River Power Plant – Permit Number 0170004-023-AC

Dear Mr. Koerner:

Progress Energy Florida (PEF) is in receipt of your letter, dated October 27, 2009, concerning requested revisions to the Acid Mist Mitigation (AMM) system. The responses below are provided for each respective comment received in the Department's letter, which is included in Attachment A of this response.

First set of questions:

- a. *Please provide a copy of the contractor estimate for the additional equipment. What was the cost (including installation) of the originally designed AMM system? What was the cost of the entire project to add control equipment? What is the current cost of coal with the following sulfur contents: 3.13% by weight and 0.68% by weight?*

Response:

Due to an oversight, the contractor estimate had been previously prepared, but was not attached to PEF's submittal. The estimate to upgrade the system to eliminate common components is slightly more than \$4 million and is included as Attachment B to this letter. The cost of the originally designed AMM System for both Crystal River Unit Nos. 4 and 5 is \$8,136,748. The cost of the entire clean air project controls, including the Selective Catalytic Reduction (SCR) system and Flue Gas Desulfurization (FGD) system for both units, is \$1.128 billion.

Coal costs, as of January 5, 2010 as reported by ICAP, an independent 3rd party OTC broker, are approximately \$42.95/ton for the 3.13% sulfur coal and \$62.23/ton for 0.68% sulfur coal. These market prices are for the cost of coal only and do not include other variable costs such as (but not limited to) transportation, terminaling, handling, usage, etc. It should be noted that these market prices are subject to change dependent on market dynamics and drivers at the time of pricing.

Second question:

- b. *To minimize sulfuric acid mist emissions caused by the shutdown of the AMM system for maintenance, the Department understands your response as follows:*

A Progress Energy Company

P.O. Box 14042, CN 77 • St. Petersburg • Florida 33733-4042 • (727) 820-5151

- *The plant will perform preventive maintenance on the AMM system to coincide with the scheduled unit outages which occur at 18-month intervals.*
- *Although it is necessary to shutdown the AMM system to perform the preventive maintenance, at least one electric utility steam generating unit will be off line during such periods.*
- *To conduct the necessary preventive maintenance, the plant requests authorization to shutdown the AMM system for up to ten days during any rolling 18-month period.*

Please comment.

Response:

The first two bullet items above are correct. We plan to shut down each of the two units at 18 month intervals for preventative maintenance. The preventative maintenance schedules for each unit will be staggered. Therefore, during any year at least one of the units will be in an outage. We are requesting to shut down the AMM system 10 days each year, for the period of January through December.

Third set of questions:

Question #10, Potential Emissions from Shutdown of the AMM System: *The BACT limit for sulfuric acid mist is 0.009 lb/MMBtu, which is a maximum of 64.8 lb/hour at full load operation as controlled by the AMM system. In your response, it is estimated that the hourly sulfuric acid mist emissions rate will increase from 64.8 to 504 lb/hour when the AMM system is shutdown for preventive maintenance. This is based on firing coal with a maximum sulfur content of 3.13% by weight. For the 10 days requested, this is 52.7 tons of additional sulfuric acid mist emitted. The plant currently fires coal with a maximum sulfur content of 0.68% by weight. Preliminary tests for sulfuric acid mist indicate compliance with the BACT limit of 0.009 lb/MMBtu without control by the AMM system. Please explain how "compliant" coal could be fired during the regularly scheduled preventive maintenance periods. Does the plant currently keep separate coal piles on site to blend coals with varying sulfur contents? What is the expected range of the sulfur content for future coal? Also, identify any other methods the plant will or could use to minimize emissions of sulfuric acid mist.*

Response:

The use of compliance coal becomes increasingly difficult as a long term sustainable solution due to industry and market dynamics that will likely impact the production and supply of compliance coal in the long term. As the use of scrubbers in the utility industry becomes more prevalent, the industry is moving towards the use of higher sulfur coals. As the number of unscrubbed generation sites continues to dwindle, it is expected for the demand and production of low sulfur coal to follow this same trend. In the long term, this will impact our ability to readily acquire this coal material on a relatively short notice. Secondly, and most notably, the cost of compliance coals is currently significantly higher than higher sulfur coals in today's market. Due to the changes noted previously it is anticipated that there would be an inevitable market shift resulting in significant increases in the costs of compliance coal as production/supply decreases. Lastly we are also concerned that the movement towards the procurement of higher sulfur coal could potentially impact the compliance coal quality by increasing the chances of cross-contamination at the terminals PEF utilizes as well as on-site storage. As a result of

these concerns and the uncertainty of the market conditions we face in the future, we do not recommend this as a reliable and sustainable long term solution.

While PEF anticipates firing only high-sulfur coal following the 2010-2011 ramp-up transition, coal with lower sulfur content may be used per the permit depending on market availability and cost effectiveness.

A method the facility could use to minimize emissions during periods when the AMM system is shut down is to utilize lower (relatively lower) sulfur coal from Crystal River Units 1 and 2 (referred to as "A" coal). This coal will be readily available on-site and not subject to spot market cost fluctuations or transportation-related issues. These units are currently burning coal that contains approximately 1% sulfur. Therefore, we expect SAM emissions while burning this coal at Units 4 and 5 to be very close to the permitted limit of 0.009 lb SAM/mmBtu. Attachment C provides the SAM estimating methodology that was used to estimate emissions of approximately 0.010 lb SAM/mmBtu at a sulfur level of 1%. This estimate and methodology reflects the SAM testing that was recently conducted on July 23, 2009 and utilizes the lower SO₂ to SO₃ boiler conversion rate, as described in PEF's letter to the Department, dated August 24, 2009. It is important to note that this lower SO₂ to SO₃ conversion rate, as validated by actual field testing, would result in lower uncontrolled SAM emissions (i.e., when the AMM system is not in operation) than were previously assumed.

During the testing and development of the "SAM Operating Protocol", PEF will evaluate the relationship between sulfur in the coal and emissions of SAM. This will help to refine the SAM emission estimates and the potential impacts of burning the lower sulfur coal from Crystal River Units 1 and 2. This option has significant costs. Utilizing the cost information provided above, we estimate an increase in coal cost of just under \$1 million per year (based on combustion of 70,930 tons coal at \$59.71 per ton estimated from third party broker sheets and is subject to change based on market conditions).

Fourth question:

Additional Question Related to Selective Catalytic Reduction (SCR) System: You indicate that the SCR system will also be inoperable for the limited periods of preventive maintenance since the SCR systems share components with the ammonia supply system. However, the plant believes that each unit will be able to comply with the long-term mass emissions rate limits. Please identify any specific conditions of the original air construction permit that you believe may need clarification on this point.

Response:

With regard to NO_x, PEF must meet a limit of 2,085 tons per year per unit. PEF believes that this limit is achievable, even considering the projected time that the SCR may be out of service for preventative maintenance. In the air construction permit, *Section 1 – General Information, Facility and Project Description* - the first sentence of the second paragraph states:

Due to the Environmental Protection Agency's revised 8-hour ozone standard, the permittee shall install and continuously operate new low-NO_x burners, new selective catalytic reduction systems, new flue gas desulfurization systems, and

new stack configurations for existing Units 4 and 5, except for designed periods of SCR bypass as specified in condition 2.b.

We would appreciate a clarifying sentence after the above sentence stating: "Continuous operation" shall include an allowance for preventative maintenance and malfunction repair.

Fifth question:

Additional Question Related to Deferral of Operation of AMM System: On September 29, 2009, the Department also received additional information dated September 22, 2009 that is related to operation of the AMM system and the permit deadline for conducting initial performance tests to determine the sulfuric acid mist emissions and performance of the AMM system. This information included a test protocol that had previously been submitted to the Department's Emissions Monitoring Section. Please identify any specific conditions of the original air construction permit that may need clarification as to the startup of the AMM system and conducting the required initial performance tests.

Response:

As indicated in our August 24, 2009 letter, testing has shown that we can meet the SAM limit of 0.009 lb/mmBtu while burning our current sulfur coal. PEF requests language in the construction permit – Section 3, Item number 16 – stating that preliminary SAM performance tests will be completed within 60 days after increasing the sulfur content by 0.5% (currently scheduled for March of 2010 for Unit 5 and July of 2010 for Unit 4).

We would appreciate the first sentence of item number 16 in section 3 modified as follows:

Preliminary SAM Performance Tests: Within 60 days after completing construction on the pollution control systems of Unit 5 and increasing the sulfur content of the coal by more than 0.5% above 0.68% Sulfur coal (based upon a one week average), the permittee shall conduct a series of preliminary performance tests on Unit 5 to determine the SAM emissions rate under a variety of operating scenarios.

Note: with the current construction schedule outlined above, the above-referenced series of SAM performance tests will be completed on Unit 5.

We would also appreciate item number 16.e in section 3 be clarified as follows:

Change "Within 45 days following the submittal of the emissions test report" to "Within 45 days following the submittal of the performance test report."

Finally, we request that item number 16.g be added to the permit as follows:

"Data obtained during the preliminary SAM performance tests may be used to demonstrate compliance with the permitted SAM limits in lieu of performing the SAM compliance tests required by Section 3.A.19a of this permit, provided that the data obtained during the SAM performance tests is acquired under the identical and applicable unit and control device operating conditions (e.g., alkali

injection rate) and scenarios that would be implemented during a given SAM compliance test program.”

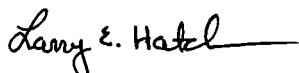
An item which is not in the Department's RAI letter which we would request be clarified is the requirement to apply for a Title V operating permit. *Item number 6 of Section 2* describes this requirement as follows:

Title V Permit: This permit authorizes construction of the permitted emissions units and initial operation to determine compliance with Department rules. A Title V operation permit is required for regular operation of the permitted emissions unit. The permittee shall apply for a Title V operation permit at least 90 days prior to expiration of this permit, but no later than 180 days after commencing operation. To apply for a Title V operation permit, the applicant shall submit the appropriate application form, compliance test results, and such additional information as the Department may by law require. [Rules 62-4.030, 62-4.050, 62-4.220 and Chapter 62-213.420, F.A.C.]

The above requires a Title V application within 180 days of “commencing operation.” We interpret the “commencing operation” date to be the date that the second unit (Unit 4) begins operation with the FGD tied in. This date is currently estimated to be May 15, 2010. We would appreciate your concurrence on the definition of “commencing operation”.

PEF appreciates the Department's consideration of this additional information. If you have any questions, please contact Dave Meyer at (727) 820-5295.

Sincerely,



Larry E. Hatcher
Manager, Crystal River Fossil Plant & Fuel Operations

cc: Bill Schroeder, DEP SW District
Dave Meyer, P. E., PEF
Scott Osbourn, P.E. Golder Associates

Attachments

Bxc: Cyndy Wilkinson (Plant Files)
Scott Osbourn P.E., Golder
Dave Meyer, (ESS Files)
Darrell Okain

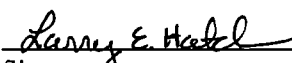
Scott Osbourn, P.E.
Golder Associates
5100 West Lemon St. Suite 114
Tampa Fl. 33609

FDEP Regional Office
Mr. Bill Schroeder
FDEP Air Resource Management
Southwest District Office
13051 N. Telecom Parkway
Temple Terrace, Florida 33637-0926

APPLICATION INFORMATION

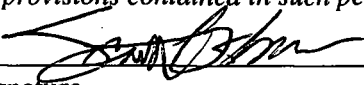
Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

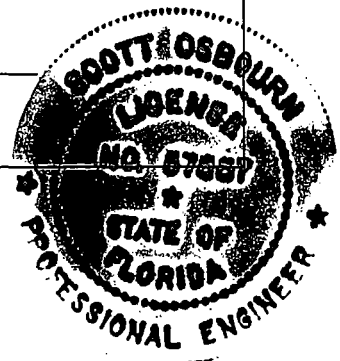
1. Owner/Authorized Representative Name : Larry Hatcher, Plant Manager
2. Owner/Authorized Representative Mailing Address... Organization/Firm: Progress Energy Florida Street Address: 299 First Ave., North, Mail Code CN77 City: St. Petersburg State: FL Zip Code: 33701
3. Owner/Authorized Representative Telephone Numbers... Telephone: (352) 563-4484 ext. Fax: (352) 563-4496
4. Owner/Authorized Representative E-mail Address: <u>larry.hatcher@pgnmail.com</u>
5. Owner/Authorized Representative Statement: <i>I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.</i> <div style="display: flex; justify-content: space-between;"><div style="text-align: center;"> _____ Signature</div><div style="text-align: center;"><u>1/22/10</u> _____ Date</div></div>

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: Scott H. Osbourn, Senior Consultant Registration Number: 57557
2. Professional Engineer Mailing Address... Organization/Firm: Golder Associates, Inc. Street Address: 5100 West Lemon Street, Suite 114 City: Tampa State: FL Zip Code: 33609
3. Professional Engineer Telephone Numbers... Telephone: (813) 287-1717 ext. Fax: (813) 287-1716
4. Professional Engineer E-mail Address: sosbourn@golder.com
5. Professional Engineer Statement: <i>I, the undersigned, hereby certify, except as particularly noted herein*, that:</i> (1) <i>To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and</i> (2) <i>To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.</i> (3) <i>If the purpose of this application is to obtain a Title V air operation permit (check here <input type="checkbox"/>, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.</i> (4) <i>If the purpose of this application is to obtain an air construction permit (check here <input checked="" type="checkbox"/>, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here <input type="checkbox"/>, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.</i> (5) <i>If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here <input type="checkbox"/>, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.</i> Signature  (seal) Date <u>1/22/18</u>

* Attach any exception to certification statement.



Attachment A

FDEP's October 27, 2009 Correspondence



Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor

Jeff Kotkamp
Deputy Governor

Michael W. Sole
Secretary

October 27, 2009

Sent by Electronic Mail with Received Receipt Requested

Mr. Larry E. Hatcher, Manager
Crystal River Steam Plant
Progress Energy Florida, Inc.
15760 West Powerline Street, CN77
Crystal River, Florida 34428

Re: Request for Additional Information
Project No. 0170004-023-AC (PSD-FL-383C)
Progress Energy Florida, Inc., Crystal River Steam Plant
Requested Revisions for Acid Mist Mitigation (AMM) System

Dear Mr. Hatcher:

On September 30, 2009, the Department received your additional information dated September 28, 2009. The application remains incomplete. Please note the new project number above. In order to continue processing your application, please provide the additional information requested below. Should your response to any of the requested items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

Question 9, Common Components of the AMM System: Your response to this question indicates that the following additional equipment would be needed to provide independent AMM systems for Units 4 and 5: urea auxiliary steam supply-line; condensate return supply line to the plant; urea steam saturator; urea condensate recovery tank; AMM urea solution day tank; AMM hydrolyzer blow-down tank; and manual valves. You estimated the total installed cost of this additional equipment as \$4,669,000. This estimate appears high given the scope of the equipment identified. Your response indicates that a copy of the contractor estimate was attached, but the Department did not receive this document.

- a. Please provide a copy of the contractor estimate for the additional equipment. What was the cost (including installation) of the originally designed AMM system? What was the cost of the entire project to add control equipment? What is the current cost of coal with the following sulfur contents: 3.13% by weight and 0.68% by weight?
- b. To minimize sulfuric acid mist emissions caused by the shutdown of the AMM system for maintenance, the Department understands your response as follows:
 - The plant will perform preventive maintenance on the AMM system to coincide with the scheduled unit outages which occur at 18-month intervals.
 - Although it is necessary to shutdown the AMM system to perform the preventive maintenance, at least one electric utility steam generating unit will be off line during such periods.

Request for Additional Information

- To conduct the necessary preventive maintenance, the plant requests authorization to shutdown the AMM system for up to ten hours during any rolling 18-month period.

Please comment.

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Additional Question Related to Selective Catalytic Reduction (SCR) System: You indicate that the SCR system will also be inoperable for the limited periods of preventive maintenance since the SCR systems share components with the ammonia supply system. However, the plant believes that each unit will be able to comply with the long-term mass emissions rate limits. Please identify any specific conditions of the original air construction permit that you believe may need clarification on this point.

Additional Question Related to Deferral of Operation of AMM System: On September 29, 2009, the Department also received additional information dated September 22, 2009 that is related to operation of the AMM system and the permit deadline for conducting initial performance tests to determine the sulfuric acid mist emissions and performance of the AMM system. This information included a test protocol that had previously been submitted to the Department's Emissions Monitoring Section. Please identify any specific conditions of the original air construction permit that may need clarification as to the startup of the AMM system and conducting the required initial performance tests.

The above information is requested pursuant to the following F.A.C. regulations: Rule 62-4.050 (Procedures to Obtain Permits and Other Authorizations; Applications); 62-4.055 (Permit Processing); 62-4.070 (Standards for Issuing or Denying Permits; Issuance; Denial); 62-4.120 (Construction Permits); 62-204.800 (Federal Regulations Adopted by Reference); 62-212.300 (Permits Required); 62-210.370 (Emissions Computations and Reporting); 62-210.900 (Forms and Instructions); 62-212.300 (General Preconstruction Review); and 62-212.400 (Prevention of Significant Deterioration). All applications for a Department permit must be certified by a professional engineer registered in the State of Florida pursuant to Rule 62-4.050(3), F.A.C. This requirement also applies to responses to Department requests for additional information of an engineering nature. For any material changes to the application, please include a new certification statement by the authorized representative or responsible official.

We will resume processing your application after receipt of the requested information. You are reminded that Rule 62-4.055(1), F.A.C. requires applicants to respond to requests for information within 90 days or to provide a written request for an additional period of time to submit the information. If you have any questions regarding this matter, please contact the project engineer, Jeff Koerner, at 850/921-9536.

Sincerely,



Jeffery F. Koerner, Program Administrator
New Source Review Section

Request for Additional Information

This letter was sent to the following people by electronic mail with received receipt requested.

Mr. Larry Hatcher, Progress Energy, Inc. (larry.hatcher@pgnmail.com)
Mr. Dave Meyer, Progress Energy, Inc. (dave.meyer@pgnmail.com)
Mr. Benjamin Borsch, Progress Energy, Inc. (benjamin.borsch@pgnmail.com)
Mr. Scott Osbourn, Golder Associates (sosbourn@golder.com)
Mr. Mike Halpin, DEP Siting (mike.halpin@dep.state.fl.us)
Ms. Cindy Zhang-Torres, DEP SWD (cindy.zhang-torres@dep.state.fl.us)
Ms. Katy Forney, EPA Region 4 (forney.kathleen@epa.gov)
Ms. Heather Abrams, EPA Region 4 (abrams.heather@epamail.epa.gov)
Mr. Dee Morse, NPS (dee_morse@nps.gov)
Ms. Vickie Gibson, DEP BAR Reading File (victoria.gibson@dep.state.fl.us)

Attachment B

AMM System Cost Estimate



9400 Ward Parkway
Kansas City, MO 64114
Tel: (816) 823-7096
Fax: (816) 333-3690

1515 Arapahoe Street
Tower I, Suite 700
Denver, CO 80202
Ph: (303) 928-4400
Fax: (303) 928-4367

527 Logwood
San Antonio, TX 78221
Ph: (210) 475-8903
Fax: (210) 475-8572

August 25, 2009

Rich Donatelli
Engineering Manager
Progress Energy Florida, Inc.
15760 W. Powerline Street
Mail Drop EPCR-01
Crystal River, FL 34428-6708

Crystal River SCR&FGD Units 4&5
EPC Contract #341343
EPCR-KC Project #44000
Letter No.: EPCR (KC)-PE-2009-172

Dear Rich,

EPCR has completed the order of magnitude cost estimate for the redundant U2A equipment per your request and as identified in change request number 209. The cost estimate is not a proposal from EPCR to complete the work.

The cost estimate is based on the following scope:

1. Design, supply, install, and commission of the following additional U2A equipment,
 - a. Urea Auxiliary Steam Supply Line
 - b. Condensate Return Line to Plant
 - c. Urea Steam Saturator
 - d. Urea Condensate Recovery Tank
 - e. AMM Urea Solution Day Tank
 - f. AMM Hydrolyzer Blowdown Tank
 - g. Manual valves at each of the above equipment to change flow from one equipment to its redundant equipment.
2. The scope is based on the attached general arrangement and P&ID's and includes the following:
 - a. Foundations.
 - b. Piping including insulation, heat tracing, and pipe supports.
 - c. Electrical raceways and cabling.
 - d. Instrumentation.
 - e. Additional DCS programming and I/O for the additional instrumentation.

The following process was used by EPCR to develop the cost estimate:



9400 Ward Parkway
Kansas City, MO 64114
Tel: (816) 823-7096
Fax: (816) 333-3690

1515 Arapahoe Street
Tower I, Suite 700
Denver, CO 80202
Ph: (303) 928-4400
Fax: (303) 928-4367

527 Logwood
San Antonio, TX 78221
Ph: (210) 475-8903
Fax: (210) 475-8572

1. EPCR developed the conceptual design documents.
2. PE reviewed and approved the conceptual design documents.
3. EPCR completed quantity takeoffs and pricing for the construction materials.
4. EPCR worked with Wahlco to provide equipment pricing.
5. EPCR estimated the detailed engineering.

The order of magnitude cost estimate for the above scope of work is \$4,059,661. Please note that the cost estimate includes 25% contingency. The contingency amount is based on the conceptual nature of the design. The cost estimate does not include internal PE costs for labor, permits, interfacing with FDEP, etc.

EPCR originally agreed to provide the cost estimate by 9/4/2009. In the August monthly meeting, PE requested an accelerated date of 8/25/2009 for the estimate. EPCR is still working on the associated schedule and will provide the schedule by 9/4/2009.

If you have any questions please call me at your convenience.

Sincerely,

Bill Steenson
Engineering Assistant PM
EPCR

Attachments

SK-CRN-209-01: U2A Redundancy Preliminary General Arrangement (Red Marked)
CRCA-0-DW-442-302-001: P&ID – Existing – Aux Steam Supply (Red Marked)
CRCA-0-DW-442-302-002: P&ID – Urea Steam Supply (Red Marked)
2206-3510-317-023: P&ID – Urea Steam Saturator Skid (Red Marked)
2206-3510-317-023R: P&ID – Redundant Urea Steam Saturator Skid (Red Marked)
2206-3510-317-022: P&ID – Condensate Recovery Skid (Red Marked)
2206-3510-317-022R: P&ID – Redundant Condensate Recovery Skid (Red Marked)
CRCA-0-DW-514-302-001: P&ID – Urea Condensate Return (Red Marked)
CRCA-0-DW-542-302-003: P&ID – Ammonia Vaporization (Red Marked)
2206-3510-317-008R: P&ID – Redundant AMM Urea Solution Day Tank (Red Marked)
2206-3510-317-015R: P&ID – Redundant AMM Hydrolyzer Blowdown Day Tank (Red Marked)

Progress Energy - Crystal River U4 U5 Clean Air Project
Contract No.: 341343
EPCR Change Order Request - Summary Pricing Information

Change Request # N/A
ORDER OF MAGNITUDE
ESTIMATE - U2A Redundant
Description Equipment

Revision Date 8/25/2009

Description	Cost
Engineering - Office	\$446,443
Engineering - Field Support	\$19,290
Engineering - Startup	\$50,480
Procurement / Subcontract	\$1,508,950
Construction - Labor	\$550,807
Construction - Material	\$282,947
Subtotal	\$2,858,916
Contractor Markup 13.6%	\$388,813
Subtotal	\$3,247,729
Contingency 25.0%	\$811,932
Total (Order Of Magnitude)	\$4,059,661

EPCR Change Order Request - Backup Engineering Pricing Information

[illegible]

Progress Energy - Crystal River U4 U5 Clean Air Project
Contract No. - 341343
EPCR Change Order Request - Backup Pricing Information

Change Request #
Description
Revision Date

N/A
ORDER OF MAGNITUDE ESTIMATE - U2A Redundant Equipment
8/25/09

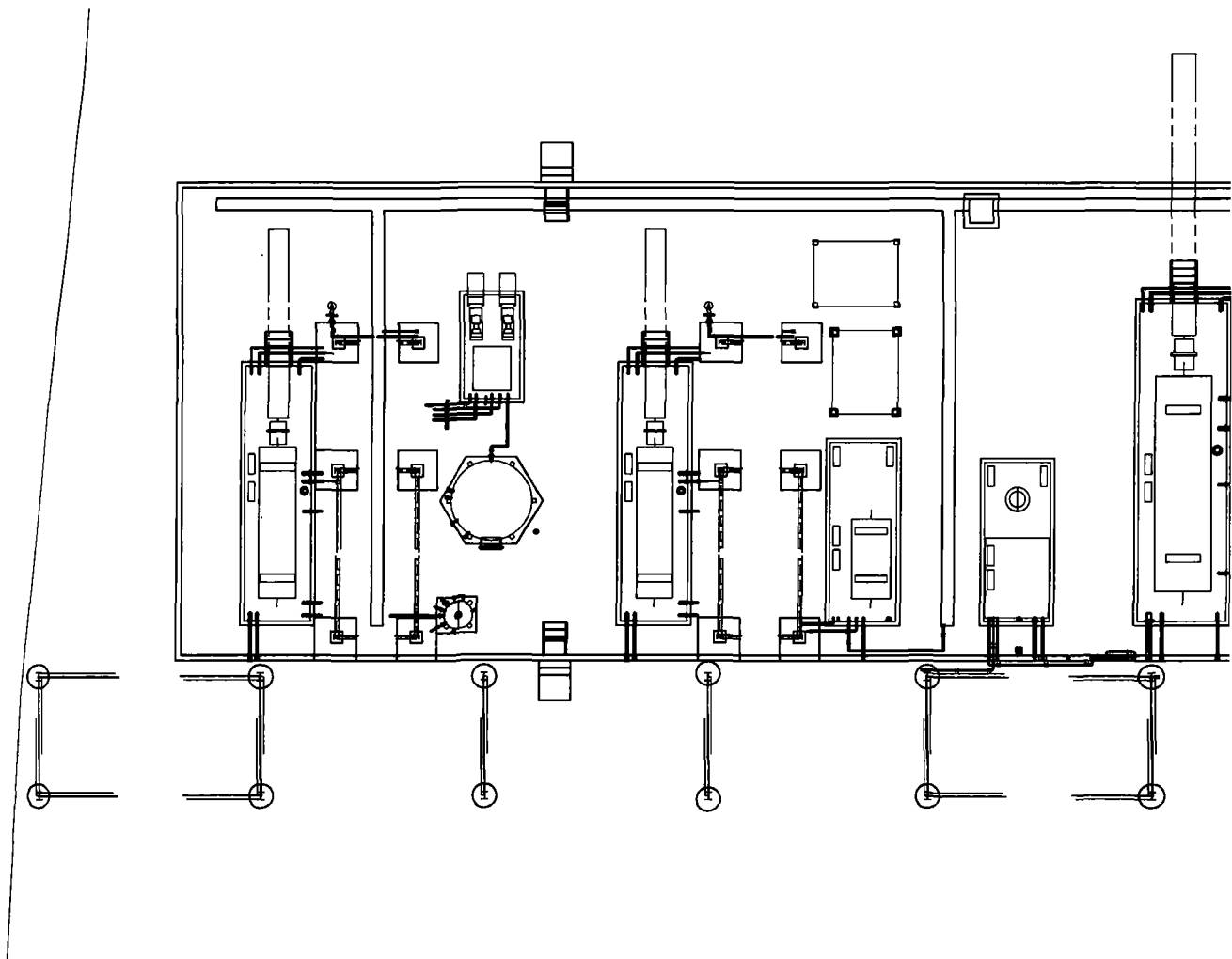
Description	Quantity	Unit	Labor Cost			Material/Equip Cost		Procurement / Subcontract		Total	Notes
			Unit MH's	Hours	Rate	Unit Cost	Subtotal	Unit Cost	Subtotal		
Civil - Site Work											
		0 LF			0.00 \$ 59.25	\$ -	\$ -	\$ -	\$ -	\$ -	
		0 LF			0.00 \$ 59.25	\$ -	\$ -	\$ -	\$ -	\$ -	
Civil - Concrete											
Concrete (including form work and rebar)	75	CY	9.20	690.00	\$ 59.25	\$ 40,882.50	\$ 300.00	\$ 22,500.00	\$ -	\$ 63,382.50	includes PFC and materials
		0 ea			0.00 \$ 59.25	\$ -	\$ -	\$ -	\$ -	\$ -	
Steel											
Structural Steel & Pipe Supports	15	Tons	25.00	375.00	\$ 59.25	\$ 22,218.75	\$ 3,300.00	\$ 49,500.00	\$ 1.00	\$ 71,733.75	
		0 ea			0.00 \$ 59.25	\$ -	\$ -	\$ -	\$ -	\$ -	
Mechanical											
Condensate Recovery Tank (14' L x 5' diam, 5000 lbs.)	1	ea	250.00	250.00	\$ 59.25	\$ 14,812.50	\$ 2,500.00	\$ 2,500.00	\$ 300,000.00	\$ 317,312.50	Equipment Price from Wahloo
Urea Steam Saturator (7' H x 3.5' diam, 3100 lbs.)	1	ea	250.00	250.00	\$ 59.25	\$ 14,812.50	\$ 2,500.00	\$ 2,500.00	\$ 327,000.00	\$ 344,312.50	Equipment Price from Wahloo
AMM Hydrolyzer Blowdown Tank (7' H x 3.5' diam, 3000 lbs.)	1	ea	250.00	250.00	\$ 59.25	\$ 14,812.50	\$ 2,500.00	\$ 2,500.00	\$ 80,000.00	\$ 97,312.50	Equipment Price from Wahloo
AMM Urea Solution Day Tank (20' H x 10' D, 13000 lbs.)	1	ea	250.00	250.00	\$ 59.25	\$ 14,812.50	\$ 2,500.00	\$ 2,500.00	\$ 320,000.00	\$ 337,312.50	Equipment Price from Wahloo
Wahloo Engineering & Design	1	LS		0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ 330,000.00	\$ 330,000.00	
Wahloo Field Service	1	LS		0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ 39,000.00	\$ 39,000.00	
Piping											
Valve - 6" Gate, CL150, BE, ASTM A351 GRADE CF8M, VST 110	4	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 968.00	\$ -	\$ 968.00	labor included in the pipe rate
Valve - 4" Gate, CL300, BE, S-STD BORE, ASTM A216-WCB, VST 110	9	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 2,178.00	\$ -	\$ 2,178.00	labor included in the pipe rate
Valve - 4" Gate, CL150, BE, S-STD BORE, ASTM A216-WCB, VST 110	3	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 726.00	\$ -	\$ 726.00	labor included in the pipe rate
Valve - 4" Butterfly, Cast or Ductile Iron, Lugged, VST 210	1	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 242.00	\$ -	\$ 242.00	labor included in the pipe rate
Valve - 3/4" Gate, CL300, SWE, ASTM A105, VST 110	2	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 484.00	\$ -	\$ 484.00	labor included in the pipe rate
Valve - 3" Gate, CL150, BE, S-STD BORE, ASTM A216-WCB, VST 110	1	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 242.00	\$ -	\$ 242.00	labor included in the pipe rate
Valve - 3" Gate, CL150, BE, ASTM A351 CF8M, VST 110	3	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 726.00	\$ -	\$ 726.00	labor included in the pipe rate
Valve - 2" Gate, CL150, BE, S-STD BORE, ASTM A216-WCB, VST 110	1	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 242.00	\$ -	\$ 242.00	labor included in the pipe rate
Valve - 2" Gate, CL300, SWE, FULL PORT, ASTM A105, VST 110	4	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 968.00	\$ -	\$ 968.00	labor included in the pipe rate
Valve - 2" Ball, CL150, SWE/CFTE, ASTM A182-F316, VST 410	7	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 1,694.00	\$ -	\$ 1,694.00	labor included in the pipe rate
Valve - 1.5" Ball, CL150, SWE/CFTE, ASTM A182-F316, VST 410	2	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 484.00	\$ -	\$ 484.00	labor included in the pipe rate
Valve - 1" Gate, CL300, SWE, ASTM A105, VST 110	2	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 484.00	\$ -	\$ 484.00	labor included in the pipe rate
Valve - 1" Ball, CL150, SWE/CFTE, ASTM A182-F316, VST 410	1	ea		0.00	\$ 59.25	\$ -	\$ 242.00	\$ 242.00	\$ -	\$ 242.00	labor included in the pipe rate
Pipe - 6" SS, Schedule 10S, ERW, ASTM A312/312M Gr. Tp304	220	ft	2.52	554.40	\$ 59.25	\$ 32,848.20	\$ 25.00	\$ 5,500.00	\$ -	\$ 38,348.20	
Pipe - 4" CS, Std. weight, Seamless, ASTM A106-Gr. B	760	ft	2.73	2,074.80	\$ 59.25	\$ 122,931.90	\$ 25.00	\$ 19,000.00	\$ -	\$ 141,931.90	
Pipe - 4" HPF, DR of 17	160	ft	0.90	144.00	\$ 59.25	\$ 8,532.00	\$ 25.00	\$ 4,000.00	\$ -	\$ 12,532.00	
Pipe - 3" SS, Schedule 10S, ERW, ASTM A312/312M Gr. Tp304	165	ft	1.12	194.80	\$ 59.25	\$ 10,949.40	\$ 25.00	\$ 4,125.00	\$ -	\$ 15,074.40	
Pipe - 3" CS, Std. weight, Seamless, ASTM A106-Gr. B	15	ft	2.53	37.95	\$ 59.25	\$ 2,448.54	\$ 25.00	\$ 375.00	\$ -	\$ 2,823.54	
Pipe - 2" SS, Schedule 40S, Seamless, ASTM A312/312M Gr. Tp304	415	ft	1.79	742.85	\$ 59.25	\$ 44,013.86	\$ 25.00	\$ 10,375.00	\$ -	\$ 54,388.86	
Pipe - 2" CS, Sch. 40, Seamless, ASTM A106-Gr. B	385	ft	2.53	974.05	\$ 59.25	\$ 57,712.46	\$ 25.00	\$ 9,625.00	\$ -	\$ 67,337.46	
Pipe - 1.5" CS, Sch. 40, Seamless, ASTM A106-Gr. B	50	ft	1.94	97.00	\$ 59.25	\$ 5,747.25	\$ 25.00	\$ 1,250.00	\$ -	\$ 6,997.25	
Pipe - 1.5" SS, Schedule 40S, Seamless, ASTM A312/312M Gr. Tp304	50	ft	1.79	89.50	\$ 59.25	\$ 5,302.68	\$ 25.00	\$ 1,250.00	\$ -	\$ 6,552.68	
Pipe - 1" CS, Sch. 40, Seamless, ASTM A106-Gr. B	50	ft	1.94	97.00	\$ 59.25	\$ 5,747.25	\$ 25.00	\$ 1,250.00	\$ -	\$ 6,997.25	
Insulation - 2" HC (4" pipe)	695	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 13,205.00	\$ 24.00	\$ 16,680.00	\$ 29,885.00
Insulation - 1.5" PP (3" pipe)	10	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 190.00	\$ 24.00	\$ 240.00	\$ 430.00
Insulation - 1.5" PP (4" pipe)	65	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 1,235.00	\$ 24.00	\$ 1,560.00	\$ 2,795.00
Insulation - 1.5" PP (3" pipe)	15	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 285.00	\$ 24.00	\$ 360.00	\$ 645.00
Insulation - 1.5" PP (2" pipe)	245	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 4,655.00	\$ 24.00	\$ 5,880.00	\$ 10,535.00
Insulation - 1.5" PP (1.5" pipe)	100	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 1,900.00	\$ 24.00	\$ 2,400.00	\$ 4,300.00
Insulation - 1.5" PP (1" pipe)	50	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 950.00	\$ 24.00	\$ 1,200.00	\$ 2,150.00
Insulation - 1.5" HC (6" pipe)	190	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 3,610.00	\$ 24.00	\$ 4,560.00	\$ 8,170.00
Insulation - 1.5" HC (3" pipe)	155	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 2,945.00	\$ 24.00	\$ 3,720.00	\$ 6,665.00
Insulation - 1.5" HC (2" pipe)	415	ft		0.00	\$ 59.25	\$ -	\$ 19.00	\$ 7,885.00	\$ 24.00	\$ 9,960.00	\$ 17,845.00
Heat Trace - (3" pipe)	155	ft	0.35	54.25	\$ 59.25	\$ 3,214.31	\$ 8.00	\$ 1,240.00	\$ -	\$ 4,454.31	
Heat Trace - (2" pipe)	660	ft	0.35	231.00	\$ 59.25	\$ 13,686.75	\$ 8.00	\$ 5,280.00	\$ -	\$ 18,966.75	
Heat Trace - (1.5" pipe)	100	ft	0.35	35.00	\$ 59.25	\$ 2,073.75	\$ 8.00	\$ 800.00	\$ -	\$ 2,873.75	
Heat Trace - (1" pipe)	50	ft	0.35	17.50	\$ 59.25	\$ 1,036.88	\$ 8.00	\$ 400.00	\$ -	\$ 1,436.88	
Pipe Support - 6" S-02	1	ea	3.61	3.61	\$ 59.25	\$ 213.89	\$ 106.00	\$ 106.00	\$ -	\$ 319.89	
Pipe Support - 6" G-01 Type A	1	ea	3.61	3.61	\$ 59.25	\$ 213.89	\$ 106.00	\$ 106.00	\$ -	\$ 319.89	
Pipe Support - 4" H-02A	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ 639.79	
Pipe Support - 4" G-02	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ 639.79	
Pipe Support - 3" S-02	1	ea	3.61	3.61	\$ 59.25	\$ 213.89	\$ 106.00	\$ 106.00	\$ -	\$ 319.89	
Pipe Support - 3" G-01A	10	ea	3.61	36.10	\$ 59.25	\$ 2,138.93	\$ 106.00	\$ 1,060.00	\$ -	\$ 3,198.93	
Pipe Support - 3" B-01B	10	ea	3.61	36.10	\$ 59.25	\$ 2,138.93	\$ 106.00	\$ 1,060.00	\$ -	\$ 3,198.93	
Pipe Support - 2" B-01	1	ea	3.61	3.61	\$ 59.25	\$ 213.89	\$ 106.00	\$ 106.00	\$ -	\$ 319.89	
Pipe Support - 2" H-02A	8	ea	3.61	28.88	\$ 59.25	\$ 1,711.14	\$ 106.00	\$ 848.00	\$ -	\$ 2,559.14	
Pipe Support - 2" G-02	11	ea	3.61	39.71	\$ 59.25	\$ 2,352.82	\$ 106.00	\$ 1,166.00	\$ -	\$ 3,518.82	
Pipe Support - 2" G-01A	20	ea	3.61	72.20	\$ 59.25	\$ 4,277.85	\$ 106.00	\$ 2,120.00	\$ -	\$ 6,397.85	
Pipe Support - 2" G-01	3	ea	3.61	10.83	\$ 59.25	\$ 641.68	\$ 106.00	\$ 318.00	\$ -	\$ 959.68	
Pipe Support - 2" B-01B	22	ea	3.61	79.42	\$ 59.25	\$ 4,705.64	\$ 106.00	\$ 2,332.00	\$ -	\$ 7,037.64	

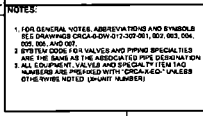
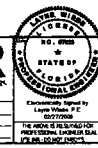
Progress Energy - Crystal River U4 U5 Clean Air Project
Contract No.: 341343
EPCR Change Order Request - Backup Pricing Information

Change Request #
Description
Revision Date

N/A
ORDER OF MAGNITUDE ESTIMATE - U2A Redundant Equipment
8/25/09

Description	Quantity	Unit	Labor Cost			Material/Equip Cost		Procurement / Subcontract		Total	Notes
			Unit MH's	Hours	Rate	Subtotal	Unit Cost	Subtotal	Unit Cost		
Pipe Support - 2" B-01	9	ea	3.61	32.49	\$ 59.25	\$ 1,925.03	\$ 106.00	\$ 954.00	\$ -	\$ -	\$ 2,879.03
Pipe Support - 2" A-01	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ -	\$ 639.79
Pipe Support - 1.5" TS-03C	3	ea	3.61	10.83	\$ 59.25	\$ 641.68	\$ 106.00	\$ 318.00	\$ -	\$ -	\$ 959.68
Pipe Support - 1.5" G-01A	3	ea	3.61	10.83	\$ 59.25	\$ 641.68	\$ 106.00	\$ 318.00	\$ -	\$ -	\$ 959.68
Pipe Support - 1.5" B-01B	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ -	\$ 639.79
Pipe Support - 1" G-01A	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ -	\$ 639.79
Pipe Support - 1" B-01B	2	ea	3.61	7.22	\$ 59.25	\$ 427.79	\$ 106.00	\$ 212.00	\$ -	\$ -	\$ 639.79
Engineered Pipe Supports (Lisega)				0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ -	\$ 11,500.00	\$ 11,500.00
Supplemental Steel for engineered pipe supports	0.75	Tons		0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ 2,500.00	\$ 1,875.00	\$ 1,875.00
Electrical											
4" Conduit	20	LF	0.47	9.40	\$ 59.25	\$ 556.95	\$ 13.00	\$ 260.00	\$ -	\$ -	\$ 816.95
2" Conduit	400	LF	0.47	188.00	\$ 59.25	\$ 11,139.00	\$ 13.00	\$ 5,200.00	\$ -	\$ -	\$ 16,339.00
1" Conduit	800	LF	0.47	376.00	\$ 59.25	\$ 22,278.00	\$ 13.00	\$ 10,400.00	\$ -	\$ -	\$ 32,678.00
1/3c #2 AWG w/gnd 600V Cable	600	LF	0.03	18.00	\$ 59.25	\$ 1,065.50	\$ 2.00	\$ 1,200.00	\$ -	\$ -	\$ 2,265.50
1/3c #8 AWG w/gnd 600V Cable	1000	LF	0.03	30.00	\$ 59.25	\$ 1,777.50	\$ 2.00	\$ 2,000.00	\$ -	\$ -	\$ 3,777.50
1/3c #10 AWG w/gnd 600V Cable	2000	LF	0.03	60.00	\$ 59.25	\$ 3,555.00	\$ 2.00	\$ 4,000.00	\$ -	\$ -	\$ 7,555.00
1/3c #4/0 AWG w/gnd 600V Cable	60	LF	0.03	1.80	\$ 59.25	\$ 106.65	\$ 2.00	\$ 120.00	\$ -	\$ -	\$ 226.65
Foundation Fieldbus Cable	1500	LF	0.02	30.00	\$ 59.25	\$ 1,777.50	\$ 2.00	\$ 3,000.00	\$ -	\$ -	\$ 4,777.50
1/2c #16 AWG Twisted Pair Instrument Cable	200	LF	0.02	4.00	\$ 59.25	\$ 237.00	\$ 2.00	\$ 400.00	\$ -	\$ -	\$ 637.00
1/3c #16 AWG Twisted RTD Cable	400	LF	0.02	8.00	\$ 59.25	\$ 474.00	\$ 2.00	\$ 800.00	\$ -	\$ -	\$ 1,274.00
1/2c #16 AWG Type E TC Cable	300	LF	0.02	6.00	\$ 59.25	\$ 355.50	\$ 2.00	\$ 600.00	\$ -	\$ -	\$ 955.50
4/0 bare copper ground cable	250	LF	0.13	32.50	\$ 59.25	\$ 1,925.63	\$ 6.00	\$ 1,500.00	\$ -	\$ -	\$ 3,425.63
Terminations - Power	350	ea	0.38	133.00	\$ 59.25	\$ 7,880.25	\$ 3.00	\$ 1,050.00	\$ -	\$ -	\$ 8,930.25
Terminations - Instrumentation	60	ea	0.26	15.60	\$ 59.25	\$ 924.30	\$ 1.00	\$ 60.00	\$ -	\$ -	\$ 984.30
Terminations - Grounding	20	ea	0.25	5.00	\$ 59.25	\$ 296.25	\$ 1.00	\$ 20.00	\$ -	\$ -	\$ 316.25
Terminations - Compression couplers 4/0	10	ea	0.38	3.80	\$ 59.25	\$ 225.15	\$ 3.00	\$ 30.00	\$ -	\$ -	\$ 255.15
Transformer - 75KVA 480/120/208	1	ea	27.73	27.73	\$ 59.25	\$ 1,643.00	\$ 1,500.00	\$ 1,500.00	\$ -	\$ -	\$ 3,143.00
Heat Trace Panel - 28 pole, 225A panel	1	ea	15.00	15.00	\$ 59.25	\$ 888.75	\$ 27,700.00	\$ 27,700.00	\$ -	\$ -	\$ 28,588.75
Breaker - 100A Main	1	ea	3.00	3.00	\$ 59.25	\$ 177.75	\$ 250.00	\$ 250.00	\$ -	\$ -	\$ 427.75
Breaker - 20A	20	ea	1.00	20.00	\$ 59.25	\$ 1,185.00	\$ 30.00	\$ 600.00	\$ -	\$ -	\$ 1,785.00
Breaker - 30A	10	ea	1.00	10.00	\$ 59.25	\$ 592.50	\$ 40.00	\$ 400.00	\$ -	\$ -	\$ 992.50
MCC Breaker - 100A w/bucket	1	ea	25.00	25.00	\$ 59.25	\$ 1,481.25	\$ 1,600.00	\$ 1,600.00	\$ -	\$ -	\$ 3,081.25
Power Panel - 120 Volt, 400A main	1	ea	15.00	15.00	\$ 59.25	\$ 888.75	\$ 1,500.00	\$ 1,500.00	\$ -	\$ -	\$ 2,388.75
Breaker - 120 Volt, 100A	5	ea	3.00	15.00	\$ 59.25	\$ 888.75	\$ 250.00	\$ 1,250.00	\$ -	\$ -	\$ 2,138.75
Lighting - Holophane 175MH 27kw4g	4	ea	12.00	48.00	\$ 59.25	\$ 2,844.00	\$ 386.00	\$ 1,544.00	\$ -	\$ -	\$ 4,388.00
Lighting Protection - Air terminals	8	ea	12.56	100.48	\$ 59.25	\$ 5,953.44	\$ 45.92	\$ 367.36	\$ -	\$ -	\$ 6,320.80
Lighting Protection - #4/0 downcomers 8 total	200	LF	0.13	26.00	\$ 59.25	\$ 1,540.50	\$ 2.40	\$ 480.00	\$ -	\$ -	\$ 2,020.50
Lighting Protection - Terminations-ground and air terms	16	ea	0.36	5.76	\$ 59.25	\$ 341.28	\$ 5.00	\$ 80.00	\$ -	\$ -	\$ 421.28
Instrumentation											
Emerson Field Service to implement the Programming	120	hrs		0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ 250.00	\$ 30,000.00	\$ 30,000.00
I/O Points	13	ea		0.00	\$ 59.25	\$ -	\$ -	\$ -	\$ 1,000.00	\$ 13,000.00	\$ 13,000.00
Construction Equipment / Support											
75 Ton Picker	50			0.00	\$ 59.25	\$ -	\$ 57.99	\$ 2,899.50	\$ -	\$ -	\$ 2,899.50
Forklift	50			0.00	\$ 59.25	\$ -	\$ 14.20	\$ 710.00	\$ -	\$ -	\$ 710.00
Scaffolding	1	LS		0.00	\$ 59.25	\$ -	\$ 500.00	\$ 500.00	\$ 10,000.00	\$ 10,000.00	\$ 10,500.00
Operator (75 Ton Picker)	50	Hours	1.00	50.00	\$ 59.25	\$ 2,962.50	\$ 61.84	\$ 3,092.00	\$ -	\$ -	\$ 6,054.50
Operator (Forklift)	50	Hours	1.00	50.00	\$ 59.25	\$ 2,962.50	\$ 52.68	\$ 2,634.00	\$ -	\$ -	\$ 5,596.50
General Field Support (QA, Safety, etc.)	150	Hours	1.00	150.00	\$ 59.25	\$ 8,887.50	\$ -	\$ -	\$ -	\$ -	\$ 8,887.50
				0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
				0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
				0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Contingency	1	LS		0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total											
				9,296.32		\$ 550,806.96		\$282,946.86		\$ 1,508,950.00	\$ 2,342,703.82



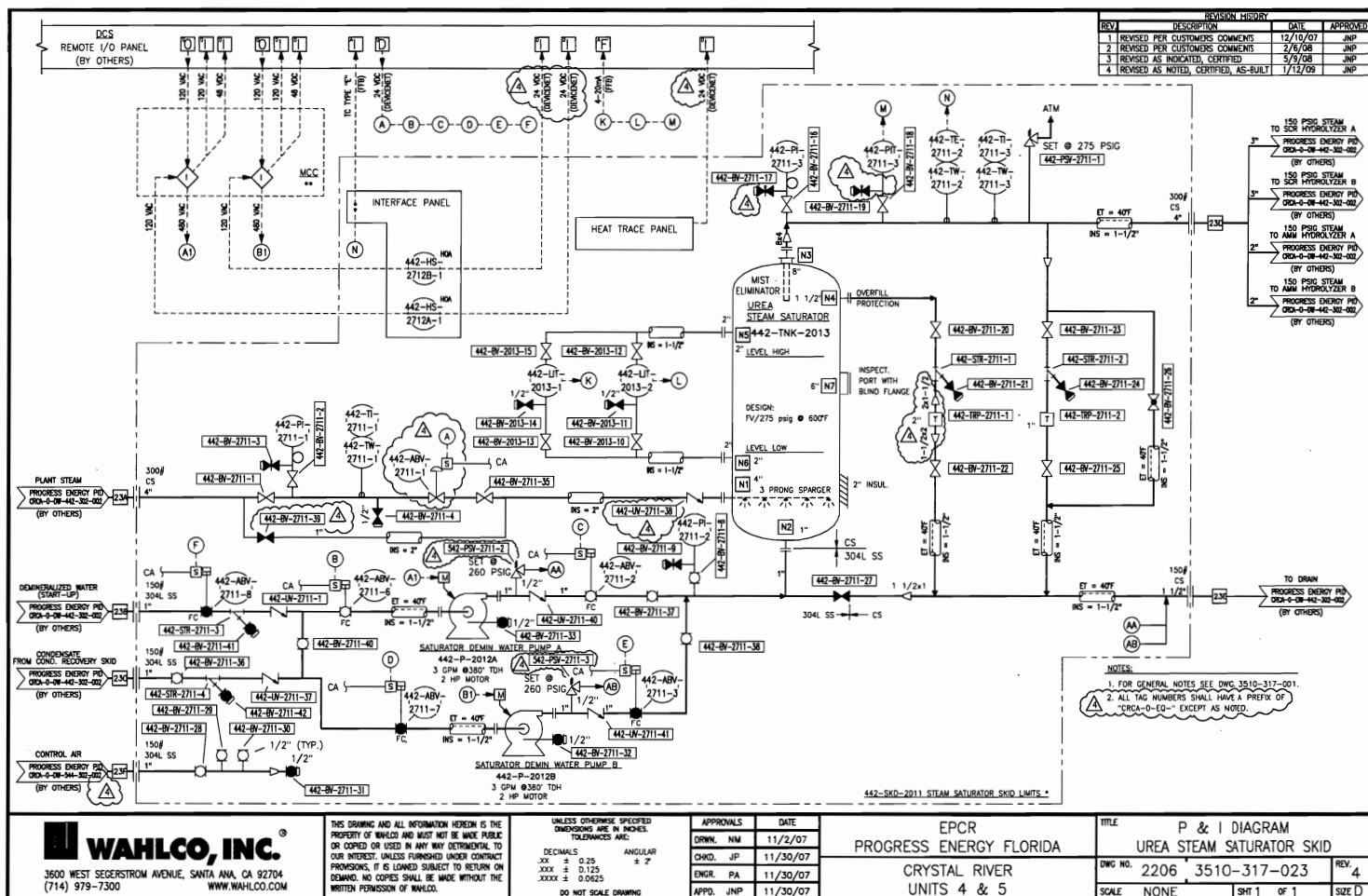
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PROGRESS ENERGY FLORIDA, INC. POWER OPERATIONS GROUP			
PROJECT CRCA	UNIT D	SYSTEM #110	
PROJECT NO. 10-10	UNIT NO. 10-10	SYSTEM NO. 10-10	
PROJECT NAME ANSHO	UNIT NAME NONE	SYSTEM NAME NONE	

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UREA STEAM SUPPLY		
REV	CRCA-0-DW-442-302-002	1

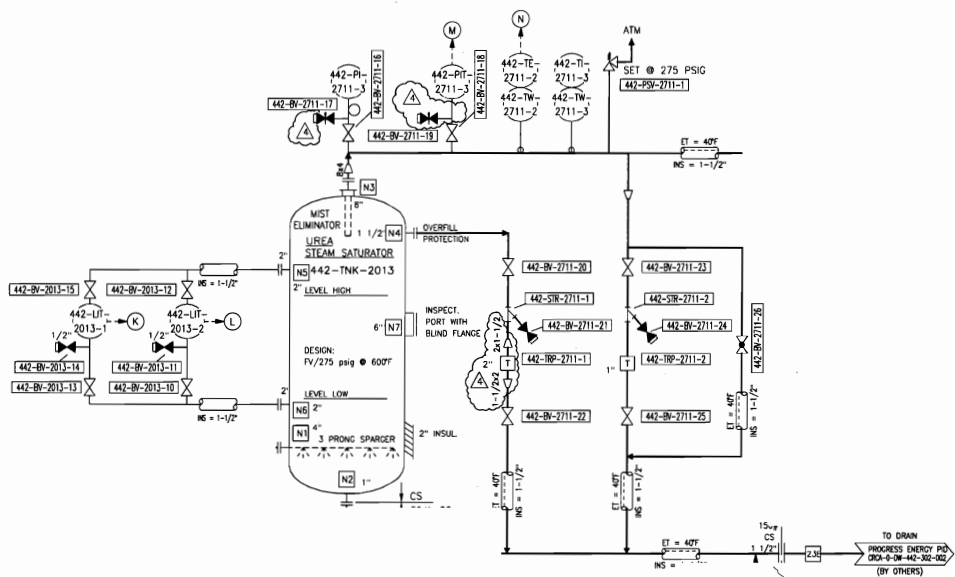


WAHLCO, INC.
 3600 WEST SEGERSTROM AVENUE, SANTA ANA, CA 92704
 (714) 979-7300
 WWW.WAHLCO.COM

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UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 DECIMALS .015
 ANGULAR .5°
 .XXX ± 0.125
 .XXXX ± 0.0625
 DO NOT SCALE DRAWING

K:\MACRO\JANUARY2008\CRYSTAL_RIVER\UNIT5\3510-317-023-001.dwg



WAHLCO, INC.
3600 WEST SEGERSTROM AVENUE, SANTA ANA, CA 92704
(714) 979-7300 WWW.WAHLCO.COM

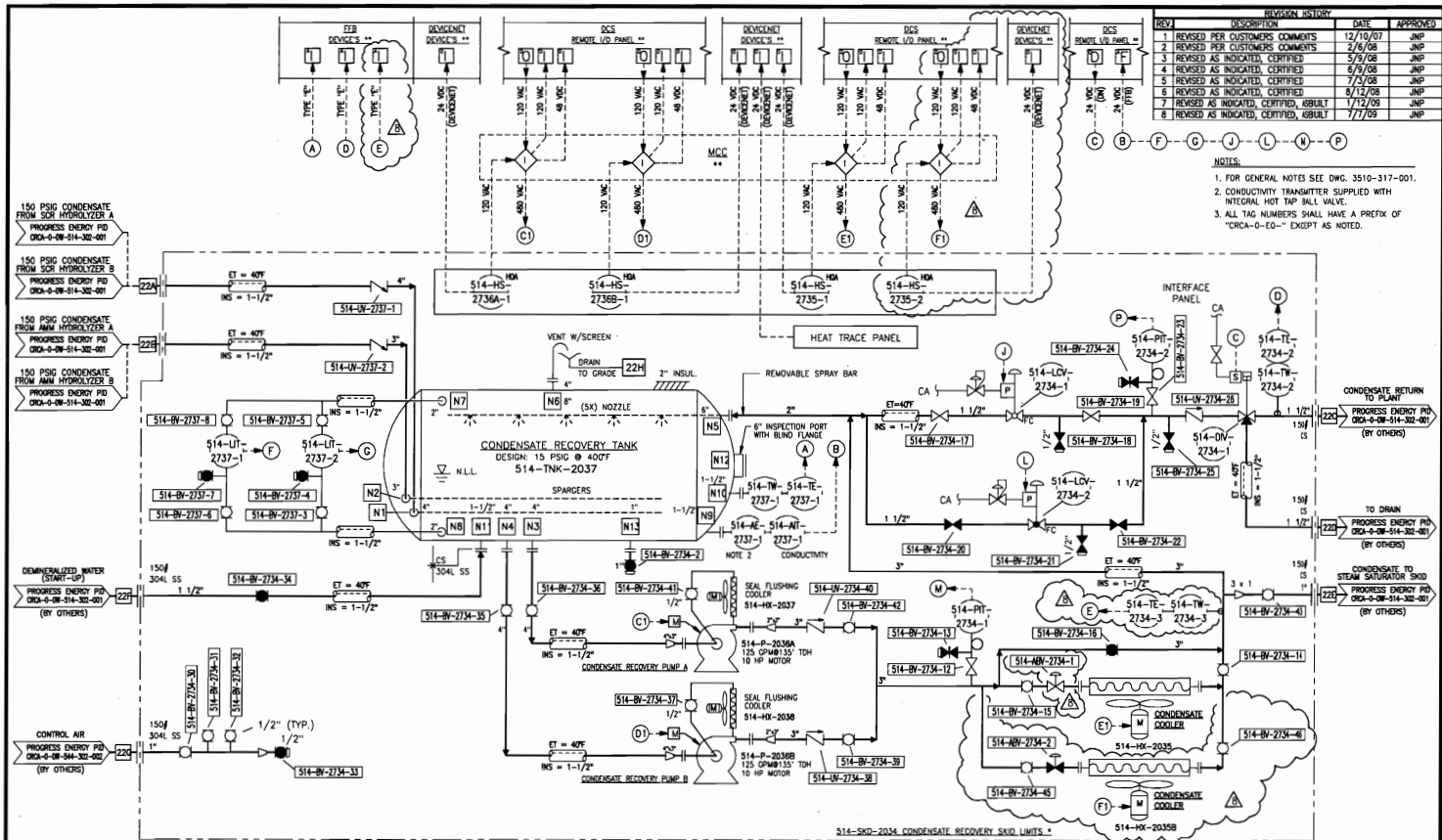
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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
DECIMALS ANGULAR
XX ± 0.25 ± 2°
XXX ± 0.125
XXXX ± 0.0625
DO NOT SCALE DRAWING

EPC
PROGRESS ENERGY FLORIDA
CRYSTAL RIVER
UNITS 4 & 5

TITLE		P & I DIAGRAM	
UREA STEAM SATURATOR SKID			
DWG NO.	2206	3510-317-023	REV
SCALE	NONE	SHT 1 OF 1	SIZE D

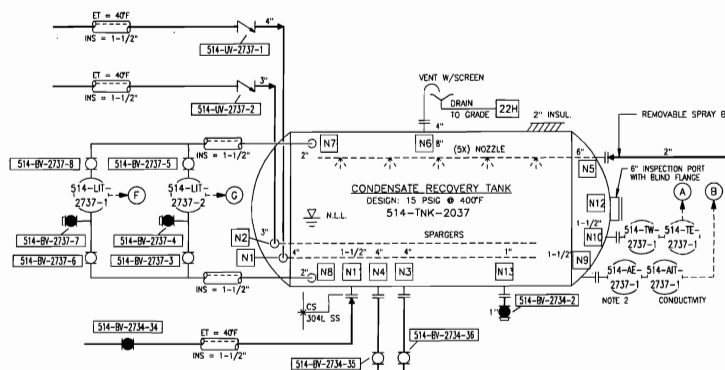
K:\ANALOG\DRAWING\2008 CRITIAL INSTRUMENT\2206-3510-317-023-SHT-04



REV	DESCRIPTION	DATE	APPROVED
1	REVISED PER CUSTOMER COMMENTS	12/15/07	JNP
2	REVISED PER CUSTOMER COMMENTS	2/6/08	JNP
3	REVISED AS INDICATED, CERTIFIED	5/9/08	JNP
4	REVISED AS INDICATED, CERTIFIED	6/9/08	JNP
5	REVISED AS INDICATED, CERTIFIED	7/2/08	JNP
6	REVISED AS INDICATED, CERTIFIED	8/12/08	JNP
7	REVISED AS INDICATED, CERTIFIED, ASBUILT	1/12/09	JNP
8	REVISED AS INDICATED, CERTIFIED, ASBUILT	7/7/09	JNP

NOTES:
 1. FOR GENERAL NOTES SEE DWG. 3510-317-001.
 2. CONDUCTIVITY TRANSMITTER SUPPLIED WITH INTEGRAL HOT TAP BALL VALVE.
 3. ALL TAG NUMBERS SHALL HAVE A PREFIX OF "CRCA-D-EQ-" EXCEPT AS NOTED.

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					SCALE NONE	SHT 1 OF 1	SIZE D	



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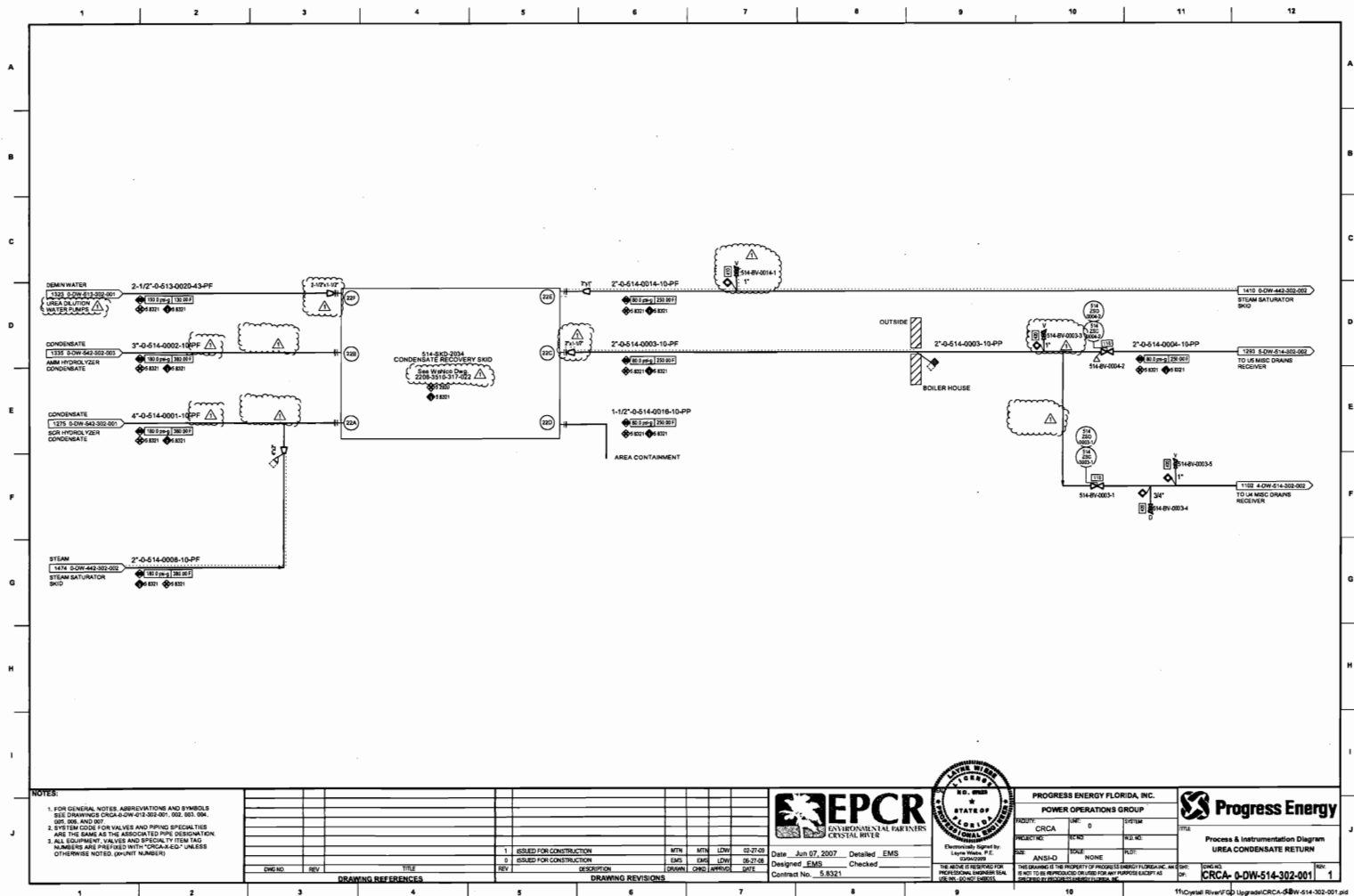
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
DECIMALS ANGULAR
.XX ± 0.25 ± 2°
.XXX ± 0.125
XXXX ± 0.0625
DO NOT SCALE DRAWING

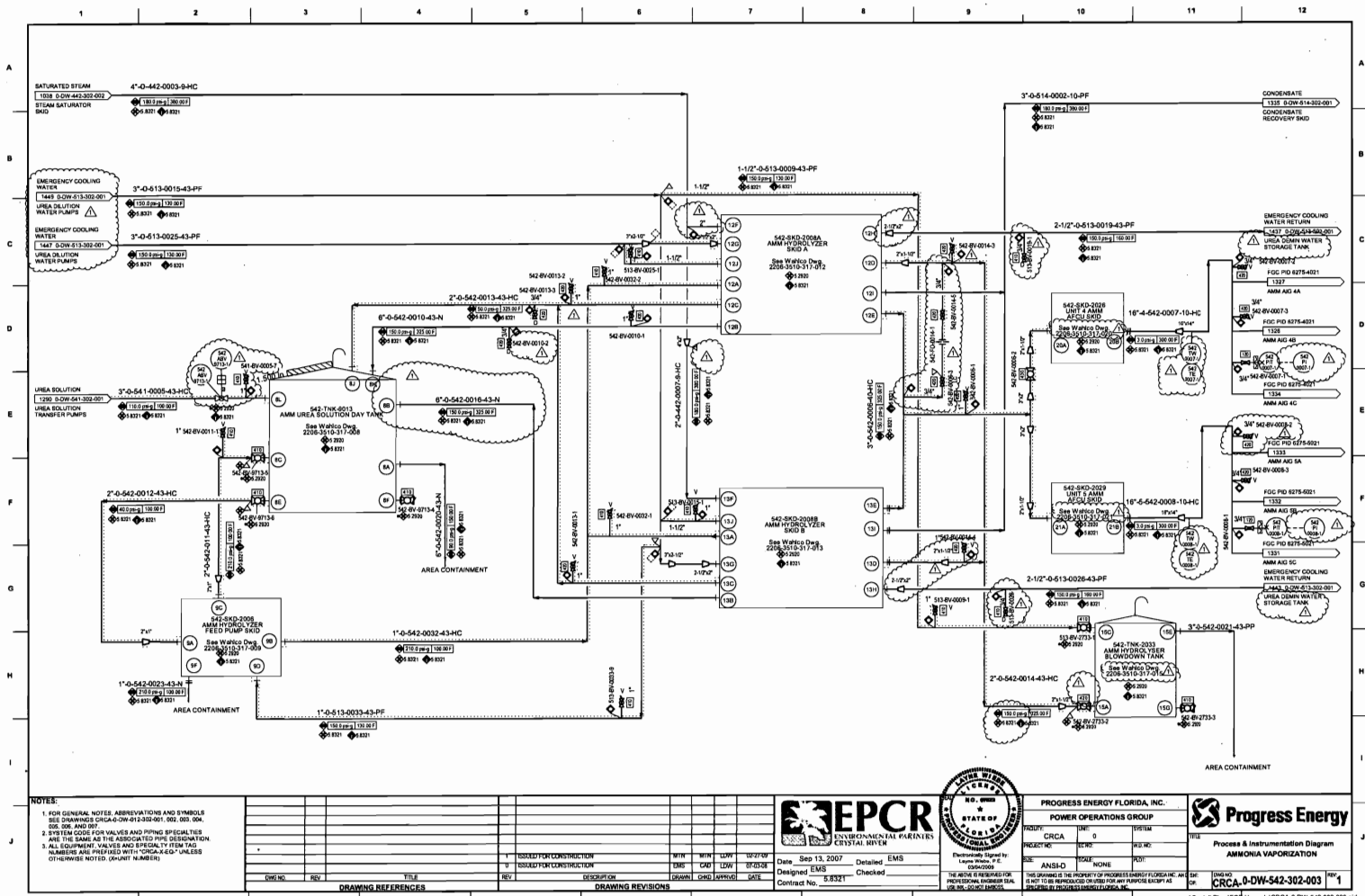
APPROVALS	DATE

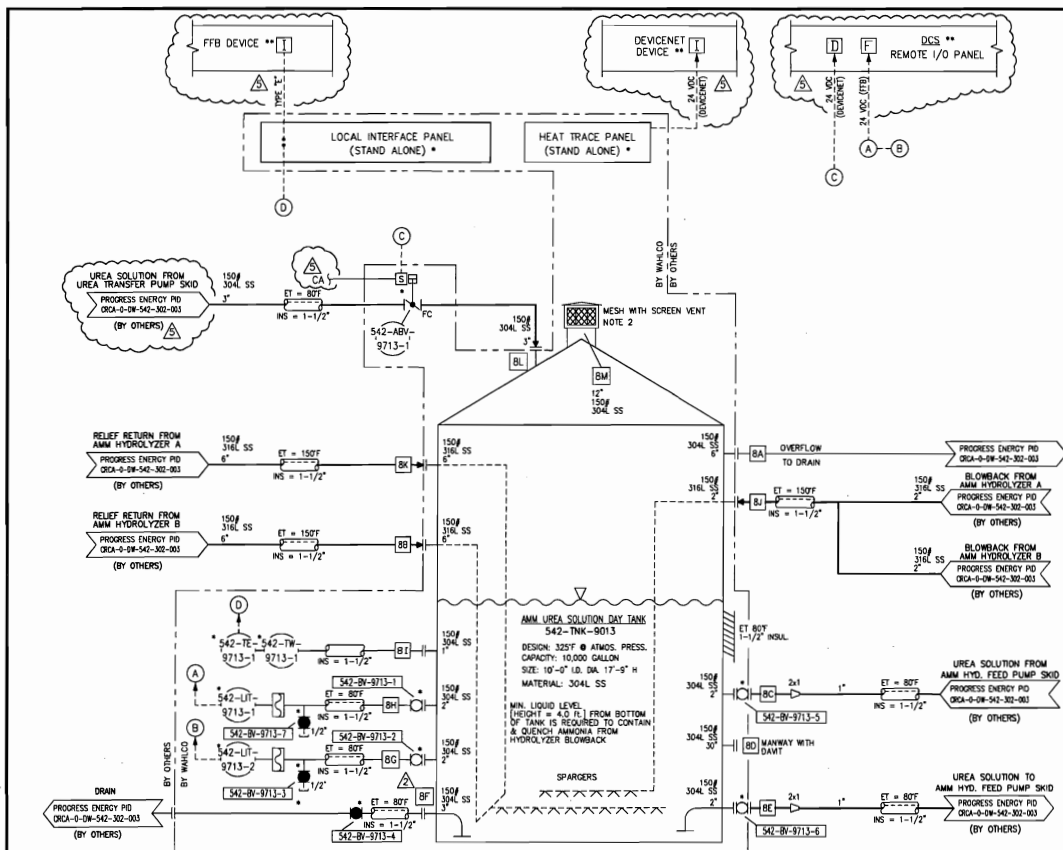
EPCR
PROGRESS ENERGY FLORIDA
CRYSTAL RIVER
UNITS 4 & 5

TITLE		P & I DIAGRAM CONDENSATE RECOVERY SKID	
DWG NO.	2206	3510-317-022	REV
SCALE	NONE	SHT 1 OF 1	SIZE D

WAHLCO/ISSUES/2206 CRYSTAL RIVER/UNIT3/2004-05/317-022-SHT1-08
 07-07-08 10:34







REVISION HISTORY			
REV.	DESCRIPTION	DATE	APPROVED
1	REVISED PER CUSTOMER COMMENTS	12/10/07	JNP
2	REVISED PER CUSTOMER COMMENTS	2/4/08	JNP
3	REVISED AS NOTED, CERTIFIED	5/9/08	JNP
4	REVISED AS NOTED, CERTIFIED, ASBUILT	1/12/09	JNP
5	REVISED AS NOTED, CERTIFIED, ASBUILT	7/7/09	JNP

- NOTES:
1. FOR GENERAL NOTES SEE DWG. 3510-317-001.
 2. VENT SCREEN SHALL BE SUITABLE FOR MARINE ENVIRONMENT.
 3. ALL TAG NUMBERS SHALL HAVE A PREFIX OF "CRCA-0-EQ-" EXCEPT AS NOTED.

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UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES.
 TOLERANCES ARE:
 DECIMALS .XX ± 0.25
 .XXX ± 0.125
 .XXXX ± 0.0625
 ANGULAR ± 2°
 DO NOT SCALE DRAWING

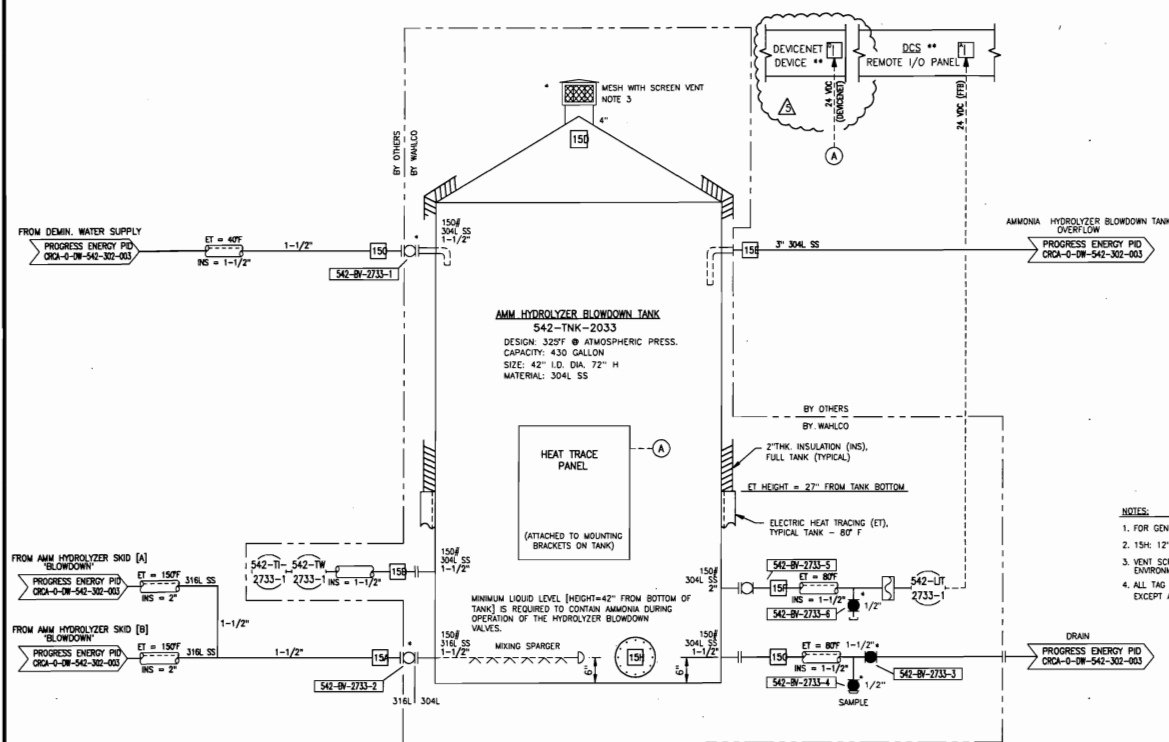
APPROVALS		DATE
DRWN.	NM	10/23/07
CHKD.	JP	11/30/07
ENGR.	PC	11/30/07
APPD.	JNP	11/30/07

EPCR
 PROGRESS ENERGY FLORIDA
 CRYSTAL RIVER
 UNITS 4 & 5

TITLE			
P & I DIAGRAM			
AMM UREA SOLUTION DAY TANK			
DWG NO.	2206	3510-317-008	REV. 5
SCALE	NONE	SHT 1 OF 1	SIZE D

K:\MATERIALS\DRAWINGS\2206 CRYSTAL RIVER\AMM\3510-317-008-SHT-01.dwg
 01-12-09 10:00 AM

REVISION HISTORY		
REV	DESCRIPTION	DATE
1	REVISED PER CUSTOMER COMMENTS	12/10/07
2	REVISED PER CUSTOMER COMMENTS	2/5/08
3	REVISED AS NOTED, CERTIFIED	5/15/08
4	REVISED AS NOTED, CERTIFIED, ASBUILT	7/12/08
5	REVISED AS NOTED, CERTIFIED, ASBUILT	7/7/09



NOTES:

1. FOR GENERAL NOTES SEE DWG. 3510-317-001.
2. 15H: 12" INSPECTION PORT, 90° TO SPARGE FLANGE.
3. VENT SCREEN TO BE SUITABLE FOR MARINE ENVIRONMENT.
4. ALL TAG NUMBERS SHALL HAVE A PREFIX OF "CRCA-D-EQ-" EXCEPT AS NOTED.

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TOLERANCES ARE:
DECIMALS .XX ± 0.25
.XXX ± 0.125
.XXXX ± 0.0625
ANGULAR ± 2°
DO NOT SCALE DRAWING

APPROVALS	DATE
DRWN. NM	10/31/07
CHD. JP	12/3/07
ENGR. PC	12/3/07
APPD. JNP	12/3/07

EPCR
PROGRESS ENERGY FLORIDA
CRYSTAL RIVER
UNITS 4 & 5

TITLE		P & I DIAGRAM	
AMM HYDROLYZER BLOWDOWN TANK			
DWG NO.	2206	3510-317-015	REV. 5
SCALE	NONE	SHT 1	OF 1
SIZE	D		

Wahlco, Inc. 3510-317-015-001-001 10/11/08

Attachment C

Estimated SAM Emissions with "A" Coal

Estimated SAM Emissions with "A" Coal

Operation	Units	AMM Off w/"A" coal
Maximum coal sulfur content	%	1
Coal Heat Content	btu/lb	12,181
Uncontrolled SO2 emissions	lb/mmbtu	1.642
Combustion factor		0.003
Sam from combustion	lb/mmbtu	0.008
SCR factor		0.005
SAM produced by SCR	lb/mmbtu	0.013
SAM and leaving SCR	lb/mmbtu	0.020
Air heater factor		0.9
SAM leaving air heater	lb/mmbtu	0.018
ESP w/AMM system		0.77
SAM leaving ESP	lb/mmbtu	0.014
FGD system factor		0.75
SAM leaving FGD	lb/mmbtu	0.010
Heat input	mmbtu/hr	7200
SAM emission rate (lb/hr)	lb/hr	75.268
Potential emissions for 10 days per year	tons	9.032