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April 8, 2015

Ms. Corynella L. Price Alabama Department of Environmental Management P.O. Box 301463 Montgomery, Alabama 36130-1463



Re: Anniston Choccolocco Creek Wastewater Treatment Plant Biosolids Improvements Supplemental Information TVA Energy Efficiency SRF Loan/Grant Application Contract No. 16022

Dear Ms. Price:

The purpose of this letter is to provide additional information regarding the energy savings and energy efficiencies that will be achieved by the proposed Biosolids Improvements at the Anniston Choccolocco Creek Wastewater Treatment Plant, as included in the Anniston CWSRF application.

The existing treatment process at the Choccoloccoo Creek Wastewater Treatment Plant is energy inefficient due to (1) age and condition of equipment (i.e. RAS pumps, WAS pumps, Blowers, etc...), (2) ability to control equipment to meet requirements of the treatment process (i.e. VFDs), and (3) insufficient influent loadings to self sustain/support anaerobic digestion resulting in the need to utilize constant speed electrically driven blowers for the aeration basins. The purpose of this project is to provide reliable process and biosolids treatment by the most energy efficient means. The plant improvements proposed will accomplish this purpose by modifications to (1) the aeration basins to reduce oxygen supplied to meet the demand required, (2) the aeration basins to incorporate nutrient removal to further reduce oxygen required, (2) the RAS and WAS pumps, (3) the digestion process to incorporate an Autothermal Thermophilic Aerobic Digestion (ATAD) system, (4) the dewatering facilities, (5) the facility lighting, and (6) the generator/power service upgrades to meet the proposed improvements.

The improvements to the aeration basins will generally consist of creation of an anoxic and an anaerobic zone in the existing aeration basin, installation of a mixer and return pump for these new zones, installation of instrumentation/controls/SCADA connection for control loops (DO control), replacement of the RAS pumps (on VFDs) with more efficient pumps, and replacement of the WAS pumps with more efficient pumps.

The improvements to the digesters for conversion to an ATAD system include installation of a rotary drum thickener, jet aeration, blowers, transfer pumps, and instrumentation/controls/SCADA connection. The ATAD system has a lower power requirement than the aerobic digestion process option, reduces the volume of solids to dewater, reduces the nutrients in the recycle that are treated in the aeration basins (i.e. reduced oxygen demand), and requires the replacement of the antiquated gas engine blowers that are continuously

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supplemented by constant speed electrically driven blowers with more efficient electric blowers with VFDs.

The improvements to the dewatering facilities include installation of a screw press, conveyance system, transfer pumps, building, and instrumentation/controls/SCADA connection. These improvements will replace the contracted dewatering facilities located at the plant that utilize belt press technology.

Other proposed improvements to further reduce the energy requirements of the plant include replacement of the antiquated existing lighting fixtures with LED fixtures, and modifications to the old aerated grit chamber to eliminate the need to aerate to prevent deposition of solids.

A summary of the energy savings broken out per component and a summary of the estimated project costs are attached. We hope this letter provides the additional information needed, and we are happy to discuss or prove more detail at your request. Thank you in advance for consideration of Anniston Water Works & Sewer Board's funding request.

Sincerely yours,

Krebs Engineering, Inc.

Nina D. Williams, P.E. Senior Associate

CC:

Krebs File No. 16022 / Regulatory

## Anniston Water Works & Sewer Board Choccolocco Creek Wastewater Treatment Plant Biosolids Improvements Power Savings/Reduction Due to Improvements

POWER SAVINGS DUE TO NEW RAS PUMPS			
Item	Current	Proposed	% Change
Flow (gpm)1	3,500	3,500	Manager and the
Head (feet)	30	30	
Efficiency	0.65	0.75	-15%
HP	40.8	35.4	-13%
KW	30	26	-13%
Hours/Day	24	24	
Days/Year	365	365	
Annual Power Usage (KW/Year)	266,578	231,034	-13%
Power Cost (\$/kw-hr)	\$0.11	\$0.11	
Annual Power Cost (\$)	\$29,324	\$25,414	-13%
Annual Power Savings (KW)	35,544		
Annual Power Savings (2015\$)	\$3,910		
Present Value of Savings (20 years, 5%)	\$48,725		

POWER SAVINGS DUE TO NEW WAS PUMPS			
Item	Current	Proposed	% Change
Flow (gpm)1	630	200	
Head (feet)	35	50	-
Efficiency	0:6	0.75	-25%
HP .	9.3	3.4	-64%
KW	7	3	-64%
Hours/Day	2	2	
Days/Year	365	365	
Annual Power Usage (KW/Year)	5,054	1,834	-64%
Power Cost (\$/kw-hr)	\$0.11	\$0.11	
Annual Power Cost (\$)	\$556	\$202	-64%
Annual Power Savings (KW)	3,220		
Annual Power Savings (2014\$)	\$354		
Present Value of Savings (20 years, 5%)	\$4,414		

<sup>1</sup> The proposed flow rate is lower due to a lower loading on the plant.

POWER SAVINGS DUE TO AERATION OPTIMIZATION AND	<b>NEW BLOWERS</b>		2 (* Table 2)
Item	Curernt	Proposed	% Change
HP1	125.0	85.0	
<b>KW</b>	93	63	45 · 1
Hours/Day2	40	24	
Days/Year	365	365	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Annual Blower Power Usage (KW/Year)	1,361,450	555,472	-59%
Added Annual Power Required for Anoxic/Anaerobic Zone Mixers, 20 HP (KW/Year)		130,699	
Added Annual Power Required for Recycle Pumping, 20 HP (KW/Year)		130,699	
Total Annual Power Usage for Biological Treatment	1,361,450	816,870	-40%
Power Cost (\$/kw-hr)	\$0.11	\$0.11	•
Annual Power Cost (\$)	\$149,760	\$89,856	-40%
Annual Power Savings (KW)	805,978		
Annual Power Savings (2015\$)	\$59,904		
Present Value of Savings (20 years, 5%)	\$746,534		

<sup>1</sup> Proposed HP is based on oxygen demand after aeration basin optimization including nutrient removal.

<sup>2</sup> Current conditions reflect the current operation of two, 125 HP constant speed blowers to supplement the gas driven blowers.

## Anniston Water Works & Sewer Board Choccolocco Creek Wastewater Treatment Plant Biosolids Improvements Power Savings/Reduction Due to Improvements

POWER SAVINGS DUE TO DEWATERING IMPROVEMENTS			
Item	Current	Proposed	% Change
WAS Produced (dry lbs/day)	5,800	1,600	-72%
Feed Rate (dry lbs/hr)	1,500	400	-73%
HP	9	3	-67%
KW	7	2	-67%
Hours/Day	4	4	• 1
Days/Year	365	365	• 5
Annual Power Usage (KW/Year)	9,476	3,267	-66%
Power Cost (\$/kw-hr)	\$0.11	\$0.11	•
Annual Power Cost (\$)	\$1,042	\$359	-66%
Annual Power Savings (KW)	6,208		
Annual Power Savings (2015\$)	\$683		
Present Value of Savings (20 years, 5%)	\$8,510		

POWER SAVINGS DUE TO NEW LIGHTING			
ltem .	Current	Proposed	% Change
Annual Power Usage (KW/Year)	243,738	57,509	-76%
Power Cost (\$/kw-hr)	\$0.11	\$0.11	
Annual Power Cost (\$)	\$26,811	\$6,326	-76%
Annual Power Savings (KW)	186,229		
Annual Power Savings (2015\$)	\$20,485		
Present Value of Savings (20 years, 5%)	\$255,291		