CITY OF COFFEYVILLE
BOARD OF COMMISSIONERS AGENDA ITEM

MEETING DATE	June 10, 2014	
RESOLUTION OR ORDINANCE NUMBER	R-14-45	
AGENDA TITLE	**Boiler #5 – Engineering and Field Control Services Burner Management & Combustion Controls Repair**	
REQUESTING DEPARTMENT	Electric Generation	
PRESENTER	Michael Shook	
FISCAL INFORMATION	Cost as recommended:	$46,750.00
	Budget Line Item:	810-5-030-620
	Balance Available	
	New Appropriation Required:	[ ] Yes [X] No
PURPOSE	Facilitate repairs to Boiler #5 Burner Management System and Combustion Control Systems, per State of Kansas Fire Marshall's Office and Chubb Insurance.	
BACKGROUND	Boiler #5 experienced an internal firebox explosion on June 24th, 2013. Structural repairs have since been completed to Boiler #5. Additional changes/ repairs are required to both the Burner Management System and the Combustion Control System to meet National Fire Protection Association Code (NFPA Code 85; Boiler and Combustion Systems Hazards). Modifications will serve to enhance the overall safety of unit operation.	
SPECIAL NOTES	This unit is currently unavailable, resulting in the monthly loss of capacity payment in the amount $85,240.00.	

ANALYSIS	Staff has reviewed engineering and repair proposals, as received from selected engineering firms (2), based on knowledge of systems, schedule, and cost.
PUBLIC INFORMATION PROCESS	
BOARD OR COMMISSION RECOMMENDATION	
STAFF RECOMMENDATION	Staff recommends the Mayor be authorized to execute a Professional Services Agreement with Sega Inc. for engineering services in the amount not to exceed $46,750.00 to Sega Inc. for engineering and field control services for Boiler #5.
REFERENCE DOCUMENTS ATTACHED	Engineering Proposals: • CPL Systems Inc. • Sega Inc.

RESOLUTION NO. R-14-45

A RESOLUTION TO ENTER INTO A PROFESSIONAL SERVICES AGREEMENT WITH SEGA INC. IN THE AMOUNT NOT TO EXCEED $46,750.00 FOR ENGINEERING AND FIELD CONTROL SERVICES FOR THE CITY OF COFFEYVILLE ELECTRIC UTILITY.

BE IT RESOLVED by the Board of Commissioners of the City of Coffeyville, Kansas that the Mayor be and is hereby authorized to enter into a service agreement with Sega Inc. in the amount not to exceed $46,750.00 for engineering and field control services for the City of Coffeyville Electric Utility.

ADOPTED THIS 10th DAY OF June, 2014.

_____
James Falkner, Mayor

ATTEST:

_____
Cindy Price, City Clerk

APPROVED AS TO FORM AND LEGALITY:

_____
Paul Kritz, City Attorney

May 27, 2014

City of Coffeyville, Kansas
Coffeyville Municipal Light and Power
605 Santa Fe Street
P.O. Box 1629
Coffeyville, KS 67337

Attention: Mr. Mike Shook

Re: City of Coffeyville, Kansas
Coffeyville Municipal Light and Power
Boiler 5 Controls Restart Support
Proposal 40Q-14157, Rev. 1

SUBJECT: ESTIMATE FOR ENGINEERING AND FIELD CONTROL SERVICES

Dear Mike:

Sega Inc. (Sega) is pleased to submit this estimate for engineering and field control services to support the burner management (BMS) and combustion control (CCS) systems for the boiler 5 controls restart. The Scope of Services below is based on modifications to the BMS and CCS ("Modifications") that were recommended by others. Sega does not believe the Modifications to the CCS are necessary, and without further investigation or testing, does not know whether the proposed Modifications to the BMS are necessary. Sega has agreed to provide this estimate and perform the Scope of Services as an accommodation to the City of Coffeyville (City), and the City agrees that Sega will have no responsibility for the Modifications recommended by others. With that understanding and agreement, Sega submits the following for your review and acceptance.

PROJECT DESCRIPTION

Boiler 5 has been repaired and is mechanically ready for operation. The City plans to restart and operate the boiler as soon as the BMS and CCS systems are made ready for service. Sega will assist the City with startup, testing, and tuning of boiler 5, and will also assist the City in implementing the Modifications to the BMS and CCS as recommended by others.

Sega Inc.
16041 FOSTER

P.O. BOX 1000
OVERLAND PARK, KANSAS 66085-1000
www.segainc.com

PHONE 913-681-2881
FAX 913-681-8475

SCOPE OF SERVICES

Sega will provide the following:

1. Review CPL's BMS and CCS test summaries with the City to determine the hardware additions and logic enhancement to be made.

2. Mark up copies of the current wiring drawings for any wiring/hardware additions or modifications to be made.

3. Mark up hard copies of the BMS and CCS programs for any logic enhancements to be made.

4. Work closely with the plant I&C personnel to implement hardware and wiring additions and logic enhancements.

5. Assist the City with BMS and CCS wiring, I/O, and logic checkout and testing after changes are implemented.

6. Assist the City with a functional BMS checkout.

7. Take new combustion test data during burner and boiler testing for the fuel, air, and O2 trim characterization and set point curves.

8. Enter the new curve data into the CCS controllers.

9. Test/verify the new curves during boiler operation.

10. Tune the fuel, air, and O2 trim control loops for proper response.

11. Tune the feedwater, steam temperature, and DA level control loops if needed.

12. Monitor and tune boiler response during turbine/generator operation and load changes.

13. Provide informal operator and technician training during checkout and startup.

14. Provide as-left wiring drawings, combustion test data, BMS and CCS program documentation, work summary, and recommendations.

15. One (1) day of field service to check combustion on boiler 4 and tune controls for proper response.

SCHEDULE

Our projected timeline for the work proposed is as follows:

1. Week 1: Upon Notice to Proceed, have electronic copies of both the existing BMS and CCS logic sent to Sega's office to begin the review process. Hold a conference call with the City to determine what hardware additions and logic enhancements are to be made. The City will order any new hardware agreed to.

2. Week 2: Mark up the BMS and CCS wiring and forward to the City so wiring additions/modifications can begin. Begin markup of existing BMS and CCS logic.

3. Week 3: Finish markup of the BMS and CCS logic documents. Work with plant I&C technicians to begin implementing logic changes while wiring is being completed.

4. Week 4: Work with plant I&C technicians to complete logic changes and check out new wiring.

5. Week 5: Assist the City with checkout, testing, and startup of the BMS, CCS, boiler, and burner.

STAFFING

Sega will assign Mr. Kevin Kraatz as the Project Manager for this work. Mr. Joe Fehr, P.E., will be assigned as the Lead Controls Engineer. Additional Sega staff will be assigned as needed.

CLARIFICATIONS

1. Any new field control devices, equipment, hardware, or I/O required will be purchased and installed and/or wired by the City.

2. City I&C personnel will implement any required software or logic changes to both the BMS and CCS using the City's programming software and laptop computer.

3. The City will be responsible for calibration of all field control devices.

4. If needed, any burner adjustments, other than control-related, required for proper combustion and emissions will be done by others.

5. As the extent of drawing changes will not be known until additions and/or modifications are determined, we have not included any drafting time in our estimate to update drawings. This can better be assessed at a later date.

6. The City agrees to furnish all information, requirements, reports, data, surveys, and instructions required to execute the Modifications.

PRICING

We will provide the services listed above on a time-and-expenses basis per our current rate sheet which is enclosed for the estimated price of $46,750. The City will only be charged for actual hours worked.

If additional time or expenses exceeding $46,750 is needed, they will only be provided with approval from the City.

Our proposal is valid for 60 days.

TERMS AND CONDITIONS

The City warrants that any documents provided to Sega by the City, the City's consultant, or others, may be relied upon by Sega as to their accuracy and completeness without independent investigation by Sega. Sega is entitled to rely on such information in performing its services and shall not be held responsible for any errors or omissions that may arise as a result of erroneous or incomplete information provided by others.

The City further agrees to indemnify and hold Sega harmless for any and all claims arising out of any negligent acts, errors, or omissions by any prior consultant of the City on this Project.

This proposal is offered in accordance with the terms and conditions per the General Services Agreement in place between the City and Sega.

Thank you for the opportunity to be of continued service to the City. If you have any questions, please feel free to call.

Sincerely,

SEGA INC.

Jamie Roschak

Digitally signed by Jamie Roschak
Reason: On Behalf of the Below Author
Date: 2014.05.27 14:29:10 -05'00'

Kevin R. Kraatz
Vice President

KRK/jlr

Enc. 1

c: Joe Fehr
Ed Minnich
Joe Pozzuolo

RATE SCHEDULE FOR
INSTRUMENTATION AND CONTROL ENGINEERING SERVICES

EFFECTIVE THROUGH DECEMBER 31, 2014

FIELD SERVICES

Senior Control Specialist / Senior Engineer
Control systems as applied to utilities, coal or waste fuel fired boilers, fluidized bed boilers, microprocessor-based distributed controls, performance monitors (PMIS), or others complex systems except as noted below ..... $ 169.00/hr.

Staff Control Specialist / Staff Engineer
Combustion or burner management control systems as applied to either gas and/or oil fired industrial boilers, or single loop process controls ..... $ 154.00/hr.

Control Specialist / Engineer ..... $ 133.00/hr.

For the above services, straight time rates are charged up to 10 hours per day; time and one-half is charged after 10 hours per day and on Saturdays; double-time is charged on Sundays and holidays, and travel time is charged at the above rates.

ENGINEERING SERVICES

Project Manager / Principal Engineer ..... $ 190.00/hr.
Project Engineer / Associate Engineer ..... $ 180.00/hr.
Senior Engineer / Senior Specialist ..... $ 159.00/hr.
Staff Engineer / Staff Specialist ..... $ 144.00/hr.
Engineer / Specialist ..... $ 123.00/hr.
Assistant Engineer / Assistant Specialist ..... $ 113.00/hr.

TECHNICAL AND SUPPORT SERVICES

Senior Engineering Assistant ..... $ 113.00/hr.
Engineering Assistant / Computer Specialist ..... $ 94.00/hr.
Senior Drafting Technician ..... $ 77.00/hr.
Drafting Technician ..... $ 66.00/hr.
Engineering Secretary / Engineering Aide ..... $ 52.00/hr.
Technical Documentation ..... $ 42.00/hr.
Other services available ..... Negotiated

PROJECT-RELATED EXPENSES

1. Approved outside special consultants are billed at actual cost plus 10 percent.
2. Travel and living expenses are billed at actual cost plus 10 percent, except for personal automobile mileage that is billed according to the IRS guideline.
3. Reproduction costs such as printing, blueprints, and binding are billed at commercial rates.
4. Shipping charges are billed at cost.
5. Equipment, material, and subcontracted construction are billed at cost plus 25 percent.
6. Daily travel and living expenses incurred during long duration on-site work may be consolidated into a mutually agreeable per-diem charge.
7. Site office facilities and equipment are billed at actual cost plus 10 percent.

ALL PRODUCTS AND SERVICES WILL BE PROVIDED IN ACCORDANCE WITH SEGA'S STANDARD TERMS AND CONDITIONS (597101ECI)

Optimizing the Utilization of Resources

4/24, 2014 **CPL Job # 13183**

REPAIR PROPOSAL

For

THE CITY OF COFFEVILLE
COFFEYVILLE, KS
BOILER #4 and 5

Attention:
Michael D. Shook
Deputy Director of Electric Utilities
City of Coffeyville
P.O. Box 1629
Coffeyville, KS 67337

Prepared By:
Luke Conner, President
CPL Systems, Inc.
P.O. Box 60160
Lafayette, LA 70596
Phone: (337) 269-4699/Fax: (337) 269-0853

Job Number 13183 Coffeyville Utilities #5 Boiler

Introduction

Based on the results of the testing performed on the burner management system, combustion controls and instrumentation on the #5 boiler, the following revisions are required items to be addressed in order to safely and reliably operate the boiler.

This proposal includes working on #4 boiler to improve the response to load changes due to the combustion controls configuration.

This proposal is based on being able to use the existing SLC controllers to implement all of the revisions for interlocks and process controls changes.

In order to have the burner management system meet NFPA 85, FM Loss Prevention Documents Requirements, the demands of the burner, operate more reliably and protect the system, we recommend the following:

Scope of Work

The following changes are required in the BMS if the current design of BMS remains:

1. Move the GSR relay contact into the MFT relay string so that any of the running interlocks
2. Implement a relay output from the PLC to the MFT relay string so that any starting interlocks drop out the hard wired interlock string in the MFT circuit. Currently, only the MFT relay breaks the MFT latch circuit. Only the MFT button is breaking the latch.
3. Install a high furnace pressure trip sensor
4. Install off delay timers on all of the running interlocks so that a spurious input does not drop out the hard wired string.
    a. Low Gas Pressure 4 seconds
    b. High Gas Pressure 2 seconds
    c. FD fan running status 4 seconds
    d. Low Water Cutouts 10 – 30 seconds
    e. Low Combustion air flow 4 seconds
    f. High High steam pressure 10 - 30 seconds
    g. High Furnace Pressure (no delay)
    h. Low Instrument air pressure 5 seconds
5. Install a pressure switch at the rear of the furnace in the tap area and set at a pressure 130% above the normal furnace pressure or at the 15% below casing pressure of the boiler. See the boiler OEM information for recommendations of settings.

6. Implement a Low Low O2 interlock from the combustion controllers, with annunciator using an analog trip relay.
7. Implement a low low air/fuel ratio interlock from the combustion controllers with annunciator using a differential trip relay with delay.
8. Implement a high high air/fuel ratio interlock from the combustion controllers with annunciator using a differential trip relay with delay.
9. Revise the logic of the BMS so that the problems with the main trial for ignition logic is rectified.
10. Replace the existing 5/02 SLC processor with a new Ethernet processor with EEPROM capability.
11. Change the flame fail response time on the flame detectors to 1 second FFRT.

Combustion controls Changes Required:

The following changes are required to meet the operational requirements of the burner system:

1. Implement a double cross limiting strategy in the combustion controllers to prevent deviations of more than 7% in a lean condition from 30% firing rate to 100% firing rate and 0% in a rich condition from minimum firing rate to 100% of firing rate.
2. Implement a high air/fuel deviation interlock if fuel deviates low from air flow by 10% for more than 10 seconds with an inverse time relationship that approaches 0 seconds delay when the deviation reaches 20% after the burner is above 40% firing rate.
3. Implement a low air/fuel deviation interlock if the fuel deviates high from the air by 10% for more than 10 seconds with an inverse time relationship that approaches 0 seconds when the deviation reaches 20% after the burners are released to modulation.
4. Implement an alarm that is connected to an audible annunciator for the following CCS alarms.
    a. Loss of Fuel Gas Flow signal
    b. Loss of pressure compensator signal on fuel gas flow
    c. Loss of combustion air flow
    d. Over range of Fuel gas flow signal
    e. Over range of fuel gas flow signal
    f. Over range of fuel gas pressure compensator
    g. Over range of combustion air flow sensor
    h. Over range of O2 sensor
    i. Under range of O2 sensor
    j. Loss of communications for Yokogawa LAN
5. Implement an O2 trim controller constraint when the firing rate is above 40% firing rate to prevent controller wind-up by the O2 trim controller attempting to richen burner operations below 40% firing rate
6. Revise the logic for the following conditions:
    a. Loss of pressure compensator on fuel gas flow signal
        i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm

   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

b. Over-range of pressure compensator on fuel gas flow signal
   i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

c. Over-range on fuel gas flow signal
   i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

d. Under-range or loss on fuel gas flow signal
   i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

e. Over-range on air flow signal
   i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

f. Under-range or loss on air flow signal
   i. Cause both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active (will likely interlock boiler)
   iii. Ensure that the low low excess O2 interlocks remains active

g. Over-range on excess O2 signal
   i. Cause excess O2, both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active
   iii. Ensure that the low low excess O2 interlocks remains active

h. Under-range or loss on O2 signal
   i. Cause excess O2, both fuel flow and air flow controllers to reject to manual mode and lock in last position, provide audible alarm
   ii. Ensure that the air/fuel deviation interlocks remains active
   iii. Ensure that the low low excess O2 interlocks remains active (will likely interlock the boiler)

7. Re-tune the combustion air flow and fuel gas flow controller response times to more closely match response time in load changes so that the fuel and air maintain closer air/fuel ratio during load changes.
    a. Note: This change may require the replacement of the combustion air inlet damper actuator! The damper must be able to travel 0 – 100% or 90 deg in less than 60 seconds
8. Re-configure the alarms on the display panel so that the alarm panels are disabled and moved out of the operators view and prevent the operator access to keep the boiler running.

Instrumentation changes that are required:

1. The combustion air flow sensor is designed to use the piezometer ring assembly that was part of the original burner design. During the inspection it was determined that the averaging ring is not installed on the burner and based on the OEM recommendations and our experience with this burner the air flow sensor when used as a metering feedback in the throat of the burner, the average pressure should be used. An averaging ring must be installed in the burner windbox around the throat of the burner and connected to the existing air flow sensor.
2. The existing combustion air flow sensor is mounted below the taps on the windbox enabling moisture to build in the impulse lines for the transmitter. Even with drain or drip legs, it is not recommended to install the air flow transmitter below the process taps. The air flow sensor must be relocated.
3. A furnace pressure switch must be installed at the rear of the furnace and wired to the BMS as discussed in the BMS section.
4. The fuel gas train on this system does not meet the design conditions of the burner and it appears that switch settings have been made to account for the pressure drop in the fuel train as installed. The burner pressure does match the data sheet within reason for this burner. With this said, it is not required that the fuel train be modified. This problem has not contributed to the problems with the burner with the exception that when fuel supply pressure does in fact get low on the fuel header, the boiler output is limited. With the existing controls strategy, the limited fuel supply can in fact present a scenario where the burner can go lean at high fire, however with the revised combustion controls changes, that situation is mitigated. The fuel train can still limit the boiler performance as fuel supply pressure does in fact drop from the utility company.
5. A combustion air discharge damper is routinely installed on this style of burner especially if the burner is required to operate in the 25 to 40% firing range. This system does not appear to need to operate in this level of firing rate for any amount of time, and the burner did not appear to be rough while operating in this range and therefore we are not recommending a discharge damper for this application.

Customer Requirements

1. Provide all conduit and wire for the installation of the furnace pressure switch
2. Provide any welding that is needed to mount the furnace pressure switch
3. Lock out boiler and prepare for entrance into the windbox for air flow sensor repairs
4. Relocate air flow sensor above the taps and re-locate impulse lines and conduit connections

Commercial Terms

The following is the quote for the services described in this document:

System Engineering, Documenation, Drawings and Configuration	$21,600
Field Installation, Commissioning, Tuning and Documentation	$22,200
Upgraded Controller Hardware	$12,500
Timing Relays, and MCR relay	$500
Pressure Switch, Flame Amplifiers, Panel materials	$13,500
Analyzer and Calibration Gear	$800
Total	**$71,100**

Any existing hardware that cannot be reused during this project and is not supplied by CPL by the scope of this work is supplied as required with a change order process.

Any and all change orders will be reviewed and approved by plant management prior to proceeding with the change order. Approval of change order comes in the form of a Customer generated PO or change order to original PO.

Terms and Conditions

Validity

This proposal is valid for 30 days. Because of fluctuation in the market prices of critical equipment and materials, any significant price increase (> 10%), will be reflected as an adjustment to the quoted item(s), at CPL's cost, with dated back-up showing the cost increase of the item(s).

Shipment

ARO 4-6 weeks

Terms Of Payment
Payments shall be net 30 days, as follows:

- 40% ARO
- 20% Upon Design Acceptance
- 30% Upon Mobilization
- 10% Upon Final Documentation

Purchase Order

CPL must receive a signed copy of a purchase order before any order can be accepted and processed. Purchase orders should be issued to "CPL Systems, Inc." and can be sent by e-mail, fax, or mail.

BY E-MAIL:
Send your signed purchase order as an attachment to purchaseorder@cpl-systems.com. Adobe PDF is the preferred file format

BY FAX:
Fax number: 337-269-0853
Attention: Accounting Department

BY MAIL:
CPL Systems, Inc.
ATTN: Accounting Department
PO Box 60160
Lafayette, LA 70596

General Terms and Conditions

CPL warrants its design and workmanship for a period of ONE (1) YEAR from the date of shipment/installation. Warranties for products manufactured by others are LIMITED to the warranty extended by the manufacture.

In the event of a cancellation after an order has been placed with CPL a TEN-PERCENT (10%) cancellation fee is billed to the customer in addition to all labor, material/subcontractor and overhead expended up to the date of cancellation.

Liability for Delayed Shipment or Erection

The CPL shall not be liable for any loss or damage resulting from delay in shipment and/or erection (if CPL has assumed any obligations with respect to erection hereunder) caused by fires, floods, strikes, riots, thefts, accidents, acts of Government, or any other cause whatsoever beyond the reasonable control of CPL which may delay or prevent delivery and/or erection of the equipment to be furnished hereunder.

Protection of Equipment

Unless erection of the equipment is to be performed by CPL and, in any case, in the event of delay in or postponed erection arising from causes beyond the control of CPL the **CUSTOMER** shall protect any equipment delivered to the project by CPL against damage from weather or other causes.

Consequential or Other Damages:

CPL shall not be liable in any event for loss of anticipated profits, loss by reason of plant shut-down, non-operation or increased expense of operation of other equipment, or other consequential loss or damage of any nature.

Warranty and Limitation of Liability of Company:

CPL shall repair or replace, f.o.b. point of shipment, any parts of said equipment which within one year from the date of initial shipment are found to be defective in design, workmanship or material and shall repair or replace any erection work (if erected by CPL) found to be defective within said period of one year, provided said equipment is operated by the **CUSTOMER** in accordance with generally approved practice and in accordance with the conditions of service. No other warranty, other than title, shall be implied from the manufacture, sale, furnishing or erection of any of the said equipment to be furnished hereunder, or its use, except as may be otherwise specifically provided herein. CPL shall not be responsible for work done, equipment or parts furnished, or a repair made by others, or for any loss, damages, or expense arising from such work, equipment, parts or repairs. CPL disclaims the implied warranty of fitness, for a particular purpose provided for in the Uniform Commercial Code as to anything covered by this proposal not designed by CPL. No claim of any kind hereunder shall exceed in amount the pro rata price of that part of the materials or workmanship established to be defective. The **CUSTOMER** shall give prompt written notice to CPL of observed defects.