Agency: Commerce, Community and Economic Development

Grants to Municipalities (AS 37.05.315)

Grant Recipient: Galena **Federal Tax ID:** 92-0044429

Project Title: **Project Type:** Remodel, Reconstruction and Upgrades

Galena - GILA Steam Plant Fire Safety, Generator Maintenance and Energy Improvements

State Funding Requested: $1,476,760 **House District:** 6 / C

One-Time Need

Brief Project Description:

CITY OF GALENA'S STEAM PLANT FIRE PROTECTION AND AUTOMATION UPGRADE RECOMMENDATIONS AND CONCEPT DESIGN

Funding Plan:

Total Project Cost:	$1,476,760
Funding Already Secured:	($0)
FY2012 State Funding Request:	($1,476,760)
Project Deficit:	$0

Detailed Project Description and Justification:

GILA STEAM PLANT FIRE PROTECTION AND AUTOMATION
UPGRADE RECOMMENDATIONS AND CONCEPT DESIGN
I. EXECUTIVE SUMMARY
The City of Galena operates the Central Steam Plant (Building #1499) and associated utilidor system initially used by the United States Air Force Base and currently used by GILA.
The Galena Interior Learning Academy is a secondary educational institution located in Galena, Alaska. The City and the Academy has integrated several of the existing Galena AFS facilities into its campus structure.
The Steam Plant is critical to the City and GILA. It provides the primary source of thermal energy (heating and domestic hot water) for the GILA facilities. The Steam Plant is also a major operating cost for GILA. Plant operating and maintenance costs are passed through to GILA in the form of energy rates. It is in the best interest of GILA to ensure the Steam Plant remains highly reliable. In addition, any opportunity to improve the efficiency of the Plant and reduce operating and maintenance costs impacts the City's residents and GILA's operating cost directly.
This Study documents the existing Steam Plant systems and recommends upgrades which will enhance Plant reliability, reduce operating costs, and improve efficiency. The Study recommends a number of upgrades, including:
• Upgrades to Plant Fire Protection Systems
• Automatic Controls for Steam Boilers and Associated Auxiliary Systems
• Upgrades to Auxiliary Systems

For use by Co-chair Staff Only:

$1,476,800
Approved

10:25 AM 5/27/2011

Contact Name: Kimberly
Contact Number: X3473

• Installation of Systems to Enable Remote Monitoring
The Study includes a Concept Design and Engineer's Cost Estimate for the recommended upgrades. The total cost of the upgrades is on the order of $1,477,000. A suggested phasing and prioritization of the upgrade work is included, should that be necessary.
It is estimated the upgrade work will save approximately $100,000 annually in energy savings, and potentially saving approximately $50,000 annually in labor costs, by enabling part-time unattended operation. If realized, the total cost of upgrades achieves a simple payback of 10 years.

Project Timeline:

One year from start to finish. See attachment for staging details.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

City of Galena

Grant Recipient Contact Information:

Name:	Tom Corrigan
Title:	Galena City Manager
Address:	PO Box 149
	Galena, Alaska 99741
Phone Number:	(907)656-1301
Email:	tcorrigan@ci.galena.ak.us

Has this project been through a public review process at the local level and is it a community priority? [X] Yes [ ] No

For use by Co-chair Staff Only:

10:25 AM 5/27/2011

Contact Name: Kimberly
Contact Number: X3473

CITY of GALENA
GILA STEAM PLANT
FIRE PROTECTION AND AUTOMATION

FEBRUARY 2011

Prepared for:

City of Galena
Galena, Alaska 99741

Prepared by:

PDC INC. ENGINEERS

PDC Inc. Engineers
2700 Gambell Street, Suite 500
Anchorage, Alaska 99503

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GILA STEAM PLANT FIRE PROTECTION AND AUTOMATION

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- Upgrades to Plant Fire Protection Systems
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- Upgrades to Auxiliary Systems
- Installation of Systems to Enable Remote Monitoring

The Study includes a Concept Design and Engineer's Cost Estimate for the recommended upgrades. The total cost of the upgrades is on the order of $1,477,000. A suggested phasing and prioritization of the upgrade work is included, should that be necessary.

It is estimated the upgrade work will save approximately $100,000 annually in energy savings, and potentially saving approximately $50,000 annually in labor costs, by enabling part-time unattended operation. If realized, the total cost of upgrades achieves a simple payback of 10 years.

II. INTRODUCTION

The Galena Interior Learning Academy is a successful and growing statewide secondary educational institution. It is located in central Interior Alaska in the hub community of Galena and provides educational opportunities for students around the state.

The Galena Interior Learning Academy campus is located on the former site of the U.S. Air Force Station (AFS) adjacent to the City of Galena. The Galena AFS has been inactive since the mid 1990s. Through the Base Realignment and Closure (BRAC) process, the AFS facilities and infrastructure have been conveyed to the City of Galena.

The Galena Interior Learning Academy has effectively and successfully incorporated several of the existing Galena AFS facilities into their campus structure. These facilities are served by the existing Galena AFS infrastructure, including the Central Steam Plant and associated utilidor distribution system.

Historically, the steam plant was operated by the Air Force. While aged, the facility was well maintained. The plant is clean and appears well cared for. The steam plant is now operated by the City of Galena and serves the buildings used by GILA.

The Steam Plant is critical to the City and GILA. It provides the primary source of thermal energy (heating and domestic hot water) for the GILA facilities. The Steam Plant is also a major operating cost for GILA. Plant operating and maintenance costs are passed through to GILA in the form of energy rates. It is in the best interest of both the City and GILA to ensure the Steam Plant remains highly reliable. In addition, any opportunity to improve the efficiency of the Plant and reduce operating and maintenance costs impacts the City's residents and GILA's operating cost directly.

Previous consideration had been given to performing limited modifications to the existing Steam Plant to allow some periods of unattended operation. Currently the steam plant is operated manually and manned on a 24/7 basis. The objective of unattended operation would be to reduce the operating cost of the steam plant and to ultimately reduce the utility costs for the City and subsequently to GILA.

The existing City Power Plant is also manned on a 24/7 basis. During unattended operation of the steam plant, remote monitoring could be provided at the City Power Plant.

In addition to controls and instrumentation to enable automation, the steam plant requires some minimum upgrades to improve reliability of subsystems. Such upgrades will improve the overall reliability of the plant and enable automation and unattended operation at a reduced risk. Recommended upgrades to the Plant fire protection systems further enhances reliability.

PDC Inc. Engineers (PDC), under a term service agreement with Architects Alaska and GILA, was tasked with developing a recommended Concept Design and associated cost estimate for

such improvements to the Steam Plant. This document presents a review of the existing facility and systems, a recommended concept design and associated cost estimate. This document also prioritizes upgrade work to provide flexibility in proceeding relative to funding availability.

The primary objective of the Steam Plant Automation is to reduce operational costs through automation to allow part-time unattended operation and to enhance overall Plant reliability. The project achieves several secondary objectives as well:

- Improves energy efficiency
- Enhances maintenance operations
- Optimizes use of resources
- Allows future full integration with City Power Plant and perhaps other City utilities

While the character and condition of other elements of the Steam Plant were observed during execution of this project, they are not within the scope and objective of this project and are not further developed. Such components include:

- Steam Plant building structure and envelope
- Existing hazmat potential (including hazardous materials within the building construction, site contamination and below slab contamination). Hazardous materials abatement to the extent required to accomplish proposed upgrades is considered incidental work and is included in cost estimates. All other potential hazmat is not considered.
- Non-boiler related building plumbing systems, floor drains and trench drains.
- Non-boiler related building HVAC systems
- Non-boiler related building electrical systems
- Electrical utility class systems in the attached, adjacent Power Plant. The campus distribution switchgear currently operates unattended. The existing diesel-electric generator is for emergency standby use and is operated manually on an as-needed basis.

III. BACKGROUND

Description of Existing Systems and Operations

The existing Steam Plant is co-located with the original base electric Power Plant. The systems are described as follows:

Building Summary

Building 1499 was significantly remodeled in 1968 as the base's power and steam generation facility. It contained generators/electrical distribution equipment and boilers that could supply the base's needs. The City of Galena has removed most of the generation capability from the facility, leaving it with a single generator and the boiler operations. This building is manned on a 24-hour basis during the winter months. Summer operations consist of standard single shift work weeks while operating personnel prepare for the upcoming winter heating season. The original occupancy and construction type are unknown. The building construction is slab-on-grade with wood/metal exterior and wood interior framing.

Steam Boilers

Within the Steam Plant, steam generation is provided by three each low pressure fire tube steam boilers; Cleaver Brooks CB100X-400Z. Each boiler is rated 16,735 MBH input. The boilers are equipped with air atomizing, full modulating, automatic burners.

As the facility is currently configured, a single boiler can meet the peak heating demand. When operated by the Air Force, the boilers were operated subject to an ADEC Owner Requested Limit (#30/5ORL01).

The boilers were manufactured in 1971, installed in the mid-1970s, and re-tubed in approximately 1998. The boilers have been inspected annually by Hartford Insurance. The last inspection reviewed was dated January, 2007. It indicated overall good condition. Internal inspection showed light scale, no corrosion. The boilers were last hydro-tested in July, 2006, at 35 psi. The boilers were manufactured with a 150 psi MAWP rating, are currently equipped with 35 psi relief valves, and operate at 20 psi. Each boiler is connected to the main steam header with dual isolation valves. Each boiler is equipped with manual bottom and surface blowdown.

Steam is distributed to the campus facilities by way of an utilidor system. Steam distribution is 20 psi. Condensate is returned to the Steam Plant through the utilidor, pumped from the various end use locations. Operators report a high percent condensate return rate (greater than 95%).

Deaerator and Feedwater

Boiler feedwater is provided by a steam deaerator and boiler feedwater pumps. The deaerator is a Schaub Duo-Pak, steam injection, with duplex recycle pumps. The unit operates at 210F and is rated for 0.03% O2 concentration. In addition to condensate return, make-up water is piped to the deaerator.

There is one feedwater pump for each boiler. Any pump may be manually valved to feed any boiler.

The deaerator and feedwater pumps have a local control panel. The local control panel cycles respective boiler feed pump and is capable of annunciating high water level, low water level and surge tank low water level. There are no pump failure alarms.

Water Treatment

The Steam Plant utilizes water treatment to assure boiler water is maintained at proper conditions. Historically, the plant has practiced an excellent water treatment program. Make-up water to the deaerator is softened. Boiler water chemistry is sampled daily and chemical treatment batch fed at each boiler.

Fuel Supply

Fuel supply consists of 2 each 30,000 gallon exterior above ground self-diked operating tanks, which are pipeline filled from bulk fuel storage. The operating tanks are used to fill a boiler inside day tank and multiple generator's inside day tanks. The operating tanks are individually valved and manually selected. The system was upgraded approximately 2003.

The boiler inside day tank is a Simplex packaged unit, 275 gallon, with dike. It has a duplex fuel transfer pump set to transfer fuel from the outside operating tanks. Operations personnel report the day tank transfer pumps lose prime when the operating tanks fall below 4,000 – 5,000 gallons. The day tank transfer pump set is complete with an auto pump alternator and local alarm. The day tank provides approximately 1 hour operating capacity for the boilers.

There were a number of abnormalities noted with the fuel oil system. Both the boiler day tank and the generator day tanks fill piping is interconnected, which complicates fuel operations and there are a number of minor piping deviations.

Combustion Air

Combustion air for the boilers consists of outside air openings with manual dampers. They require plant operators to control them. Operating personnel report the combustion air dampers are usually just left in the closed position during the winter.

HVAC

The HVAC system serving the steam plant is basic. Heating is provided by low pressure steam unit heaters and heating terminal units, locally controlled. A single constant volume, variable temperature AHU with mixing box provides general cooling and ventilation air for the steam plant. A local thermostat provides basic temperature control.

Controls and Instrumentation

The controls and instrumentation serving the Steam Plant and its systems are aged and elementary. Key elements include:

- Each boiler is locally controlled and independent.
- Deaerator is locally controlled and independent.
- The fuel transfer system is locally controlled and independent.
- The AHU and space heating terminal units (steam) are locally controlled.
- A remote sensing steam pressure sensor is located in the steam plant and displays the steam pressure at some location in the distribution utilidor.
- There is a local master alarm panel that was capable of annunciating at the Fire Station. The local alarms include:
    - boiler flame failure
    - steam main pressure
    - deaerator level

Fire Protection

The facility is served by an older fire alarm system. There are no fire suppression systems.

Fire detection and alarm is provided by two separate Monaco Fire Alarm Control Panels (FACP), one covering the Steam Plant and one covering the Electric Plant. Automatic detection coverage in the Steam Plant consists of four ceiling-mounted heat detectors. The office area, switchgear room, hallway, exhaust plenum, and generator rooms are protected with heat detectors as well. There are manual pull stations at most egress doors. There is one wall-mounted fire alarm bell in the Steam Plant. There are fire alarm bells mounted in the generator rooms. There are no other notification devices in the facility.

General Facility Arrangement

The Steam Plant is co-located with the Electric Power Plant. The Steam Plant related functions are generally contained within a single room, which houses the steam boilers and related auxiliaries. There is an Operators Control Room within the boiler room.

Ancillary facility spaces include a break room, office, janitor/toilet room, and hallway.

The Electric Power Plant consists of the engine-generator room and a separate switchgear room. The engine-generator room originally contained several engine generator units and

provided prime power for the base. Most of the units have now been removed. A single engine generator unit, which is manually started and controlled, can provide emergency back-up power to the campus facilities. The switchgear room contains both generator switchgear and campus wide distribution equipment. It is the primary service location for power from the City Power Plant.

The overall building structure is a pre-engineered metal building, slab on grade, with corrugated metal siding and roofing. The roof is an unvented, hot pitched roof configuration.

There are floor drains and a floor trench system in the steam plant.

The interior construction of the exterior envelope includes corrugated metal wall panels to approximately 8’ above finished floor. There is exposed batt insulation with vapor barrier facing above that, and on the roof. Interior construction is generally gyp board walls and ceilings, with some areas of suspended ceiling construction.

The overall condition of the building is fair, but very worn. The building does experience roof eve icing in the winter.

Mode of Operation

The Steam Plant is currently operated in a fully attended mode. It is manned 24/7, except the summer months, when the Plant is taken off-line.

The existing electric generating plant is operated in an emergency mode only. It is normally unattended, and off-line. In the event of loss of power from the City Power Plant, the generator may be manually started, brought on line, and used to provide power to the campus facilities. It is attended by an operator when it is on-line.

The switchgear in the Electric Power Plant serves as the primary distribution center for the campus facilities. It receives power form the City Power Plant and distributes through feeders to campus facilities. It operates automatically, in an unattended mode.

IV. UPGRADE RECOMMENDATIONS

Based on the stated objectives and the evaluation of the existing systems, the following upgrade recommendations have been developed.

Upgrade Plant Fire Protection Systems

Upgrade Plant fire protection systems to enhance fire safety, especially the ability to detect, alarm and extinguish incipient fires in an unattended mode. Upgrades to the fire protection systems include:

- Replace Fire Alarm system
- Provide enhanced fire detection, including Flame Detection
- Retrofit Plant with fire sprinklers
- Provide enhanced fire suppression, including water-mist fire protection system

Automatic Controls for Steam Boilers and Associated Auxiliary Systems

Provide automatic controls for monitoring and control of steam boilers and associated auxiliary systems so that the central heat plant may be operated in a normal mode automatically and unattended. Routine daily checks, normally reoccurring preventive maintenance activities and non-reoccurring maintenance and repair activity will continue to be performed using plant personnel.

To enable automatic operation of the steam boilers, the following steam boiler modifications are required:

- Replace burner controls and components
- Provide multi-boiler controller
- Provide motorized boiler stop valves

Upgrade Auxiliary Systems

Upgrade auxiliary systems such that auxiliary systems are code compliant, align with applicable industry standards for performance and reliability, and are configured with standby capability such that failure of a single auxiliary system does not take the central heat plant off-line. Upgrades to the auxiliary systems include:

- Monitoring and control of all subsystems. Monitoring and control will enable automatic operation and annunciation of trouble or failure conditions.
- Upgrade of boiler auxiliaries shall ensure prime movers and key components are duplexed, with auto start, such that failure of a single key component will not shutdown either the auxiliary system or the boilers.
- Upgrade Fuel Oil system
- Upgrade deaerator and feedwater
- Upgrade combustion air

Enable Remote Monitoring

Allow remote monitoring of the steam plant systems at the existing City Power Plant. Upgrade work shall include:

- Provide remote HMI (operator's terminal) at City Power Plant networked with the Steam Plant boilers and auxiliary systems control and monitoring system.
- Provide remote visual monitoring with CCTV system. Remote visual monitoring provides additional capabilities to detect and respond to abnormal conditions.

Items Not Included In Upgrade Recommendations

A number of issues and items were considered but ultimately not included in the proposed upgrade recommendations. They may be worthy of future consideration, but they do not materially affect the objective of implementing unattended automated operation of the Steam Plant.

- Incorporate monitoring of the existing distribution utilidor and mechanical and electrical systems in other GILA facilities. While not accomplished now, the Steam Plant monitoring and control system could accommodate such additional functions in the future.
- Expanded monitoring and control of the City Power Plant auxiliary systems. To a great extent, the existing City Power Plant auxiliary systems would benefit from enhanced monitoring and control. While not associated with this scope of work, the new Steam Plant control and monitoring system will be compatible with and capable of integrating the City Power Plant.
- Modify the existing emergency diesel-electric generating system for automatic start, dispatch and operation. The existing generator is capable of meeting the campus wide electrical requirements in an emergency mode, and is also capable of providing emergency power to the Steam Plant.
- Upgrade of the Steam Plant structure, envelope and interior construction. The steam plant has been well maintained. It is however an aging structure. There may be benefits in upgrades to improve efficiency, improve cold regions performance, reduce seismic risk, and prolong the useful life.

V. CONCEPT DESIGN

The following defines the concept design for the recommended upgrades. Concept drawings and supporting data may be found in the Appendices.

Upgrade Plant Fire Protection Systems

Remove the existing building fire alarm system and replace with new. The new system shall be a multi-zone, supervised fire alarm and detection system with fully addressable devices. The fire alarm system shall be fully compatible with the planned campus standard. It shall include:

- Single control panel, capable of remote reporting
- Automatic detectors, heat or smoke, as appropriate for the space
- Manual pull stations at egress doors
- Notification appliances (horns and strobes)It is highly recommended any upgrade include replacement of the control panel with a single new panel with new detectors.

Option: In addition to the new fire alarm system, provide enhanced detection in the Steam Plant. Enhanced detection consists of IR/UV flame detectors. The system would be focused on potential fuel related fires and would provide advance detection in an unattended condition.

Provide a complete wet pipe sprinkler system throughout the existing Steam Plant and Power Plant. The sprinkler system shall be Ordinary Hazard, Group I. Water supply shall be a 6” service, extended from the existing campus distribution system through the utilidor.

Option: In addition to sprinkler system, provide water mist fire sprinkler system to protect high risk equipment or areas. Water mist may be local application or total flooding. Where total flooding, water mist may substitute for wet pipe sprinklers. Areas to be protected include:

- Switchgear equipment
- Generator and day tank
- Boilers and day tank

Water mist system shall include:

- Detection and control system
- Interface with fire alarm system
- Compressed gas and high pressure pump for atomization

Automatic Controls for Steam Boilers and Associated Auxiliary Systems

Upgrade existing boiler burners and controls and provide multi-boiler sequencer. Burner controls and multi-boiler sequencer would be as manufactured by the existing boiler manufacturer.

Upgraded burner controls shall include:

1. PLC based burner control complete with all control and safeties. Enhanced control features shall include oxygen trim and parallel positioning.
2. VFD drive for burner motor, to enhance electrical energy efficiency.

Multi-boiler controller shall be PLC based and shall provide integrated control of each of the 3 boilers. Multi-boiler control shall be capable of:

1. Lead-lag or parallel modulating operation of boilers to meet system demand.
2. Bring on back-up boiler should lead boiler fail or fail to meet system demand.
3. Maintain off-line boilers in either a hot, warm or cold standby mode.
4. Automatically start and warm-up off-line boilers.
5. Take boilers safely off line and isolate from system should remote system failure be detected (utilidor steam piping failure, etc.).

Boiler control system shall include local HMI and shall allow remote monitoring and control through web based interface. Boiler control system shall include data processing capabilities for creating and storing trend logs for all monitored points, processing alarms, etc.

Provide motorized boiler stop valves in each boiler HPS connection. Motorized valves shall be used to automatically isolate off-line boilers. Operators shall be capable of automatic operation and local, manual override. Valves shall fail in closed position. Valves shall be controlled by boiler/burner control system.

Upgrade Auxiliary Systems

Upgrade boiler auxiliary systems to reliably support automatic, unattended operation of existing boilers.

Upgrade existing boiler fuel supply system. Upgrade work shall include:

1. Remove interconnection between boiler fuel system and power plant diesel-electric generator fuel system. Provide new duplex fuel transfer pump set serving generator day tank. Locate pump in power plant. Modify FOS and FOR piping accordingly. Fuel transfer pump set shall be complete with automatic controls.
2. Modify existing boiler fuel supply day tank piping. Eliminate existing FOR. Provide dual shutoff valves on FOS for overfill protection. Modify day tank normal and emergency relief vents for proper termination on exterior of building. Remove isolation valves on FOR piping. Provide check valves as required for fuel flow control.
3. Provide monitoring of existing fuel system through new Steam plant monitoring and control system. Key points shall include:
    a. Day tank low level
    b. Day tank low-low level alarm
    c. Day tank high level
    d. Day tank high-high level alarm
    e. Transfer pump status (on-off)

   f. Transfer pump lead pump failure alarm
4. Option: Increase capacity of day tank storage for increased response time during unattended operation. Increased capacity is limited to 660 gallons. Capacity shall be increased by replacing existing day tank with new packaged system. Use existing fuel transfer pump set to serve Power plant day tank.

Upgrade existing deaerator and boiler feedwater system. Upgrade work shall include:

1. Provide monitoring of deaerator and feedwater pumps through new steam plant monitoring and control system. Key points shall include:
   a. Deaerator low level.
   b. Deaerator low-low level alarm.
   c. Deaerator overflow.
   d. Deaerator fill valve position.
   e. Feedwater pump status (on-off).
   f. Feedwater pump failure alarm.

Upgrade boiler combustion air:

1. Upgrade existing boiler combustion air system. Upgrade work shall include:
   a. Modify existing boiler plant air system to accommodate boiler space cooling and combustion air requirements by the addition of a new supply fan with mixing box, and operation interlocked with boiler firing.
   b. Revise outside air intake and exhaust locations to accommodate new airflows.
   c. Interlock operation of revised air system to operate supply air in conjunction with boiler operation levels.
   d. Provide new relief air opening to facilitate air exiting the space to maintain pressurization.

Provide air monitoring of the space to detect carbon monoxide and other hazardous materials.

Enable Remote Monitoring

Provide DDC based monitoring and control system for the Steam Plant. System shall be used to control and/or monitor HVAC, electrical, fire, security systems and other equipment as noted in this document. All equipment provided shall be connected with all functions monitored and, controlled by the DDC. System shall have an operator programmable system to perform closed-loop, modulating control of building equipment. Connect all digital controllers through the new communication network to share common data and report to the workstation computer. Provide workstation DDC software capable of programming and monitoring the digital controllers. The control system shall be capable of downloading programs between the workstation and digital controllers. New software programs shall integrate all existing control systems and devices.

System shall provide the following control and monitoring functions:

1. Monitoring and control for all upgraded auxiliary systems.
2. Monitoring and control for new boiler control system.
3. Replace existing monitoring points that were remoted to the Base Fire Station in the original control system.
4. Local HMI for operator interface. Local HMI shall be capable for data processing, trend logging, alarm processing, etc. Local HMI shall support graphics for ease of interface.
5. Remote monitoring and control access through web-based interface.
6. Remote HMI installed in the City Power Plant control room.

In addition, provide the following special control functions:

1. Space temp alarm in Steam Plant High and low space temp alarms can be used to detect potential freeze-up condition in plant or steam piping leak (high space temp).
2. Liquid detection on low point of Steam Plant floor. Can be used to detect potential pipe leak or tank overflow.
3. Steam pressure and steam flow on steam main to utilidor. Can be used to detect abnormal steam flow or potential steam piping failure in utilidor.

DDC control system shall have the capability to expand to accommodate additional monitoring and control functions, including; other systems within the Steam Plant and Power Plant, other GILA facilities and the City Power Plant.

Option: Provide remote visual monitoring of the Steam Plant primary boiler systems and associated support equipment with a CCTV system. Visual monitoring system shall consist of local CCTV cameras. All cameras will be able to be viewable through remote access software from monitoring and control system HMI located at the Operator's Station in the City Power Plant or other authorized systems.

General Requirements

All work shall be accomplished in accordance with the following general requirements:

- All work shall be in accordance with applicable codes and standards and good cold regions practices.
- Steam valves shall be flanged or welded, Class 150. Steam piping shall be schedule 40, black steel, welded steel.
- Fuel piping shall be schedule 40, black steel, welded or threaded. All fuel piping specialties shall be UL listed for the application.
- Provide hangers and supports, and equipment bases and supports for all new piping and equipment. Brace and reinforce as required for seismic loads.
- All hot piping shall be insulated. All cold piping and ductwork shall be insulated and have vapor barrier jacket to prevent condensation.
- Fans and air handling units shall be premium quality units, braced and reinforced for operating pressures. Units shall be thermally and acoustically lined. Units shall be complete with mixing boxes, control dampers and filters.

- All motors shall be high efficiency.
- Electrical work shall be in accordance with the NEC. All wiring shall be in conduit.
- Fire alarm and detection system shall be in accordance with NFPA 72 Code Ch5/7
- Fire sprinkler systems shall be in accordance with NFPA 13. Piping shall be schedule 40, black steel minimum. Water mist systems shall be in accordance with NFPA 750.
- Provide hazardous materials abatement to the extent required for new work
- Patch and repair existing systems, surfaces and finishes as required for work under his project.
- Provide complete O&M data and O&M training for all new equipment and systems.
- All new piping, conduit, bracing and supports and equipment shall be painted for protection against corrosion and for finished appearance. Provide tagging of all equipment, instruments, valves and devices. Provide identification coding of all piping.

Concept Cost and Recommended Prioritization

A concept level Engineer's Cost Estimate has been developed for the upgrade recommendations. The engineer's estimate is based on the concept design and the following general assumptions:

1. Construction shall occur in 2011.
2. All work shall be accomplished through a single construction contract with a General Contractor.
3. The construction contract shall be procured through a competitive process.
4. The estimate includes a 15% estimator's contingency, based on the level of design development.
5. Vendor's quotes for the boiler control upgrade work.
6. The estimate does not include A-E fees, nor the Owner's administration and other projected related costs.

The total estimated construction cost for the recommended upgrades is $1,250,000. A breakdown of the costs may be found in the Appendices.

It may be possible to accomplish the work in phases as construction funding becomes available. We have developed the following recommended phasing and prioritization:

1. Upgrade Plant Fire Protection Systems.
    a. Total Cost: $657,000

2. Automatic Controls for Steam Boilers and Associated Auxiliary Systems.
    a. Total Cost: $590,000

3. Upgrade Auxiliary Systems.
    a. Total Cost: $55,200

4. Enable Remote Monitoring.
    a. Total Cost: $176,000

Appendix A - Concept Drawings / PFDs

Sketches In process

Appendix B - Cost Estimate

GILA STEAM PLANT COST ESTIMATE PACKAGE

2/4/2011
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	Item	qty	units	Unit Cost	Subtotal	Remarks
	Automatic Controls for Steam Boilers					
1	PLC based burner controls - CB Hawk ICS system	1	Set	$400,000	$400,000	Appen-C, 2/4/11 value
2	O2 Trin, Parallel Positioning, Burner motor VFD drive, for 3 boilers	1	Set		$0	Included in above
3	Multi-boiler master controller	1	Ea.		$0	Included in above
4	Motorized stop valves - high performance butterfly valves, for 3 boilers	1	Set		$0	Included in above
5	Hazmat allowance	1	Lot	$5,000	$5,000	Not discussed in quote - added item
6	Electrical Support	1	man-wk	$5,000	$5,000	electrical instalation, materials, wiring
7						
8	Subtotal				$410,000	
9	Contingency				$61,500	+15%*Subtotal
10	Subtotal				$471,500	BaseSubtotal+Contingency
11	General Conditions, OH&P				$117,875	+0.25% Contractor
12	Total				**$589,375**	
13						
14						
15	Upgrade Auxiliary Systems					
16	Upgrade existing boiler fuel supply					
17	Separate fill piping for generator day tank	1	Lot		$1,000	
18	Transfer pumps for generator day tank	1	Set		$3,000	
19	Modify day tank piping	1	Lot		$1,000	
20	Monitorng & control (under Remote Monitoring)	1	Lot		$0	Covered under remote monitoring
21						
22	Upgrade existing dearator and boiler feedwater					
23	Monitorng & control (under Remote Monitoring)				$0	Covered under remote monitoring
24						
25	Subtotal				$5,000	
26	Contingency				$750	+15%*Subtotal
27	Subtotal				$5,750	BaseSubtotal+Contingency
28	General Conditions, OH&P				$5,750	+0.25% Contractor, +0.75% Regional
29	Total				**$11,500**	
30						
31						
32	Upgrade Boiler Combustion Air					
33	Demo Existing materials as necessary	1	Lot	$2,500	$2,500	
34	New Supply Fan with filters, mixingbox, intake louvers	1	Ea	$5,000	$5,000	
35	New Relief / Exhaust air openings	1	Ea	$1,500	$2,000	
36	New Interlocked control system with boiler operation	1	Ea	$3,000	$3,000	
37						
38	Subtotal				$12,500	
39	Contingency				$1,875	+15%*Subtotal
40	Subtotal				$14,375	BaseSubtotal+Contingency
41	General Conditions, OH&P				$14,375	+0.25% Contractor, +0.75% Regional
42	Total				**$28,750**	
43						
44						
45	Increase Day Tank Capacity					
46	Remove Existing day tank	1	Lot	$500	$500	Remove (E) 275 gal tank, related piping
47	New Day tank, options, piping, connections	1	Ea	$4,500	$4,500	
48	Controls, alarms, connections	1	Lot	$1,500	$1,500	
49						
50	Subtotal				$6,500	
51	Contingency				$975	+15%*Subtotal
52	Subtotal				$7,475	BaseSubtotal+Contingency
53	General Conditions, OH&P				$7,475	+0.25% Contractor, +0.75% Regional
54	Total				**$14,950**	
55						
56						
57	Enable Remote Monitoring					
58	Plant DDC system	1	Lot	$1,500	$5,000	
59	Plant HMI	1	Lot	$7,500	$7,500	
60	Monitor Boiler Control	1	Lot	$5,000	$5,000	
61	Day Tank M&C	1	Lot	$8,000	$8,000	
62	Dearator/Feedwater M&C	1	Lot	$10,000	$10,000	
63	Combustion Air M&C	1	Ea	$15,000	$15,000	
64	Existing Plant M&C	1	Lot	$5,000	$5,000	
65	Web interface	1	Lot	$3,000	$5,000	
66	City PP HMI	1	Lot	$8,000	$8,000	
67						

GILA STEAM PLANT COST ESTIMATE PACKAGE

2/4/2011
\\pdcserv03\Projects\2009\A09015.08\5Rprts\[GILA COST ESTIMATE PACKAGE 2-4-11.xls]GILA COST EST

	Item	qty	units	Unit Cost	Subtotal	Remarks
68	Subtotal				$68,500	
69	Contingency				$10,275	+15%*Subtotal
70	Subtotal				$78,775	BaseSubtotal+Contingency
71	General Conditions, OH&P				$78,775	+0.25% Contractor, +0.75% Regional
72	Total				**$157,550**	
73						
74						
75	CCTV monitoring of Steam Plant					
76	CCTV system	1	Lot	$5,000	$5,000	(3) cameras at 1k each, 2k in connections
77	DDC/HMI interface	1	Lot	$3,000	$3,000	Connections, software, etc
78						
79	Subtotal				$8,000	
80	Contingency				$1,200	+15%*Subtotal
81	Subtotal				$9,200	BaseSubtotal+Contingency
82	General Conditions, OH&P				$9,200	+0.25% Contractor, +0.75% Regional
83	Total				**$18,400**	
84						
85						
86	Upgrade Steam Plant Building Fire Protection Systems					
87	New Fire Alarm System, Bldg #1499	8,121	$/SQFT	$10	$81,210	8,121 sqft
88	New Fire Sprinkler System, Bldg #1499	8,121	$/SQFT	$10	$81,210	8,121 sqft, $10/sqft
89	Water service, revise water service, utilidor to building, 150 feet approx	1	EA	$40,000	$40,000	
90						
91	Subtotal				$202,420	
92	Contingency				$30,363	+15%*Subtotal
93	Subtotal				$232,783	BaseSubtotal+Contingency
94	General Conditions, OH&P				$232,783	+0.25% Contractor, +0.75% Regional
95	Total				**$465,566**	
96						
97						
98	Enahnced fire systems in Steam Plant - 8121 sqft					
99	Water mist system in Steam Plant (2,700sqft)	1	Lot	$24,300	$24,300	$9.00/sqft
100	Water mist system in Switchgear room (2,700sqft)	1	Lot	$24,300	$24,300	$9.00/sqft
101	Water mist system in Generator room (2,700sqft)	1	Lot	$24,300	$24,300	$9.00/sqft
102	Water mist detection and control	1	Lot	$10,000	$10,000	(2) flame detectors at 2.5k ea+3k other elec
103						
104	Subtotal				$82,900	
105	Contingency				$12,435	+15%*Subtotal
106	Subtotal				$95,335	BaseSubtotal+Contingency
107	General Conditions, OH&P				$95,335	+0.25% Contractor, +0.75% Regional
108	Total				**$190,670**	
109						
110	**GRAND TOTAL**				**$1,476,761**	

Appendix C - Vendor quotes

Headquarters:
5924-203rd St. SW
Lynnwood, WA 98036
425-774-6602: Phone
425-775-2272: Fax

-Seattle
-Portland
-Yakima
-Medford
-Boise

Lifetime Value *Expert Support*

TO: PDC Engineers
Anchorage

ATTENTION: Matt Leistico
TELEPHONE: 907-743-3200

DATE: February 4, 2011
QUOTE NO.: 9815-Rev01
PROJECT: **GALENA CITY GILA PROJECT: BOILER CONTROLS & ENERGY UPGRADE FOR AUTOMATIC BOILER OPERATION AND REMOTE MONITORING**

PROPOSAL

In response to your request, we are pleased to offer the following:

PROBLEM STATEMENT

The City of Galena currently operates a steam plant continually consisting of three Cleaver Brooks 500 HP oil fired boilers and one atmospheric DA tank. The boilers are rated at 150 PSIG and operate at 20 PSIG steam. The plant was designed and built for 24 hour per day attendance by a boiler operator. Due to the fully attended operation and the low pressure of steam delivered to the users, the boilers do not have stop-check valves in their steam connections to the main steam header. Instead, two manually operated stop valves are used. This means that, under current design, a boiler operator must open the stop valves to put a boiler on line.

Further, with one boiler operating, subsequent boiler(s) are kept in hot standby manually, by operating the related boiler controls to achieve proper standby temperature. If the lead boiler fails, the next hot boiler is manually started and connected to the load by opening the stop valves.

The City has voiced a desire to automate the above operation, with the ability to monitor the steam plant from the City's power plant. In addition, the City has asked for recommendations for energy conservation measures which could be obtained during the plant automation.

PROPOSED SOLUTION

This proposal offers a solution to the operation and monitoring issues above, as well as the energy conservation measures which can be achieved by the controls and stack economizers. This proposal includes three (3) parts:

1st part: Site Visit with evaluation report, and detailed proposals
2nd part: Automation and Controls/Energy Upgrade Proposal
3rd part: Stack Economizer Proposal

1st part: Site Visit with evaluation and detailed proposals

A Cole Industrial Service Technician would be sent to the jobsite for a one or two day visit & evaluation. The Service Tech would bring back to Cole Industrial data and details required to provide an evaluation of the project, including more accurate ROI calculations. Cole Industrial shall then provide detailed proposals regarding the 2nd part and 3rd part of this proposal. All expenses related to this part of the proposal (air fare, travel time, labor, housing, etc) are included.

PRICE .....$10,000.00 for Site Visit, Evaluation, and Detailed Proposals
(Ten thousand and no/100 US Dollars)

2nd part: Automation and Controls/Energy Upgrade Proposal

The proposal shall consist of new Cleaver-Brooks Hawk ICS combustion and burner management systems for each boiler, which can communicate to the remote location for monitoring and supervisory control. In addition, as a part of the package we expect to offer a new CB-Hawk ICS Plant Master Panel controller for boiler lead / lag control, which also allows selection of hot standby boiler temperature, as well as the automatic firing of two or three boilers in unison as required. We also expect to include replacement of the 3 existing boilers' first manual stop valves with automated high performance butterfly valves which will be automatically commanded to open when a boiler is directed to fire, thus eliminating the manual valve operation currently required.

The CB-Hawk ICS Control shall include the following three energy conserving features: **O2 Trim**, which continuously monitors the excess O2 in the flue gas and trims the air / fuel ratio to achieve the ideal excess air for the burner, **Parallel Positioning** air / fuel ratio control, which eliminates the jackshaft and linkage inaccuracies, and **VFD** control of the blower motor, which saves electrical energy by running the forced draft fan at the speed required to deliver the correct volume of combustion air at all times without losing fan horsepower across the damper.

The proposal shall also include a communications package to monitor the Steam Plant, by an operator who is in the Power House. The package is expected to include: (a) a new PC running Allen Bradley RS View software located in the Power House which shall communicate to (b) the CB-Hawk ICS Master Panel located in the Steam Plant. The communications link is Ethernet IP. The local phone or communications people should be able to help you with the link. The application is already loaded on the PC. Our technicians will train you in the use of the system on site.

All of the new control system components and systems, except the new automatic stop valves, are manufactured by Cleaver Brooks and are built for your boilers. The system description is as follows:

Boiler Control and Burner Management System CB HAWK ICS:
A totally integrated pre-configured Allen Bradley CompactLogix PLC based boiler control system featuring independent burner management to comply with the requirements of NFPA 85. This advanced safety and control system features a 10" full color touchscreen HMI. Burner management is accomplished through CB780E integrated controller with UV scanner and amplifier with all information and functions available on the HMI.

Burner management shall provide:

- Automatic sequencing of the boiler through standby, pre-purge, pilot flame establishing period, main flame establishing period, run and post purge
- Flame proving and lockout on flame failure during pilot flame proving, main flame proving, or run
- Low fire damper/valve position for flame ignition trials
- Full modulating control of fuel and combustion air
- Utilize solid state controls and sensors to provide various control functions

Boiler Control functions include but are not limited to:

- Modulating control algorithm shall be Proportional-Integral-Derivative (PID) type
- Three boiler lead-lag control based on PID algorithm and/or remote setpoint
- Thermal shock protection based on water temperature and setpoint
- Various high and low limit alarms and shutdowns
- 10" color touch screen (HMI) graphical operator interface and monitoring
- Manual control of the boiler-firing rate utilizing control screens on the HMI to increment and decrement the firing rate
- On screen real-time display of all connected process parameters, system alarms and faults, as well as the recommendation for troubleshooting fault conditions.
- Stack temperature safety switch
- Running boiler efficiency calculation and display

Options included in this proposal:

- Variable Speed Drive
- Parallel Positioning Control
- O2 Trim

The 3 new automated stop valves (one per boiler) are also included in this Automation and Controls/Energy Upgrade Proposal and will be installed and integrated into the system by our personnel.

A 2-4-11 Preliminary Estimated ROI calculation sheet is attached to show the payback of this upgrade. The ROI calculation is based on one boiler. I have used the cost of 1/3 of the entire Automation & Controls/Energy Upgrade Proposal Cost (which includes installation of all components including the 3 automated stop valves) because there are 3 boilers on this project. In this manner an accurate estimated payback has been determined. I have used information gathered in 2008 and 2009 regarding operation use of each boiler over the year, electric cost, and fuel oil cost, for the ROI sheet

ESTIMATED PRICE, Ex Works, Full Freight Allowed to Galena Alaska, Installed
..... $390,000.00 for the Automation and Controls/Energy Upgrade Proposal
(Three Hundred Ninety Thousand and no/100 US Dollars)

ESTIMATED SUBMITTAL DRAWING PREPARATION…….3-4 WEEKS
ESTIMATED SHIPPING .. 12 WEEKS AFTER APPROVAL & RELEASE FOR FABRICATION

3rd part: Stack Economizer Proposal

We expect to provide a quotation for three (3) boiler stack economizers (one per boiler). Stack economizers trap waste heat going up the stack and put it into the feedwater going to the respective boiler. We shall use either Cannon Boiler Works or Cleaver-Brooks stack economizer based on our evaluation.

The materials of construction shall be of the type that will not corrode from the combustion gases of burning #2 oil. The lower transition shall be fitted with a series of baffles, drains and dams to collect and divert flue gas condensate from entering the boiler, and shall act as an expansion joint. The upper transition will be supplied with a ring dam to collect and drain any outer stack condensate into the lower transition and its dam system.

The cost of installing the stack economizers is included.

Payback will be provided with the evaluation and detailed report. Typically 2% to 5% efficiency gain results from stack economizers. It is expected to be a short payback time (less than 3 years) due to the high price of fuel oil.

ESTIMATED PRICE, Ex Works, Full Freight Allowed to Galena Alaska, Installed
.....$255,000.00 for the Stack Economizer Proposal
(Two Hundred Fifty-Five Thousand and no/100 U.S. Dollars)

ESTIMATED SUBMITTAL DRAWING PREPARATION…….3-4 WEEKS
ESTIMATED SHIPPING .. 12 WEEKS AFTER APPROVAL & RELEASE FOR FABRICATION

CLARIFICATIONS:

1. **COLE INDUSTRIAL, INC TERMS AND CONDITIONS ARE ATTACHED.**
2. **SALES AND/OR USE TAX NOT INCLUDED IN ABOVE PRICING.**
3. **PRICES ARE ESTIMATED BUDGETARY ONLY, BUT ARE EXPECTED TO BE VALID THROUGHOUT 2011**
4. **Payment terms will be required for Part 2 and Part 3 of this proposal. Progress payment schedule to be determined at a later date.**

4. Water treatment chemical, fuel, and electricity required during commissioning process and after system is completed to be provided by others.

5. Supervision of boiler system operations during temporary heating use or permanent use is by others.

6. Equipment Submittals shall be manufactures standard, only.

Please contact me with questions as needed.

Regards,

Russel "Rusty" West
Alaska Sales Manager
Cole Industrial, Inc.
Office: 425-774-6602, ext 2139
Direct Line: 425-977-2139
Mobile: 206-909-3664
Fax: 425-775-2272
rwest@coleindust.com

Cole Industrial, Inc. Terms and Conditions of Sale

Except as specifically modified by the typed or handwritten portions of this proposal on the face side, the proposal is subject to the following terms and conditions.

ACCEPTANCE OF PROPOSAL: By signing and returning a copy of this proposal or a purchase order to the Seller, the Buyer shall be deemed to have accepted this proposal and agreed to the terms and conditions set forth herein. Seller may not amend or revoke this proposal for a period of 30 days from date hereof. If Buyer's acceptance is not received within such a period, Seller may amend or revoke this proposal at any time. Buyer understands that Seller is an independent sales representative and does not own or manufacture any of the new equipment covered by this proposal. Thus, upon acceptance by Buyer, it is understood that Seller's obligations hereunder are subject to the further conditions that the manufacturer will promptly approve and requires any adjustments in the prices or terms hereof unacceptable to Buyer. Seller shall have the option to void this entire proposal or substitute comparable equipment at the same or lower prices as quoted herein. However, the right of substitution shall not apply when the proposal is made as part of a bid on a construction project whose specifications expressly require use of equipment made by a manufacturer who does not approve the sale.

TERMS OF PAYMENT AND PRICES: The standard terms of payment are 30 days (O.A.C) from the date of shipment of any equipment or completion of the performance from the date of shipment of any equipment. In some instances progress payments will be required. If sale consists of equipment and

startup services, payment terms shall be Net 30 days from date of shipment regardless of whether or not field services have been completed. If partial shipments are made or several types of services to be performed, Buyer may be invoiced as such partial shipment is made or upon completion of each type of service performed. In addition to the purchase price, Buyer shall pay all shipping costs or, if by prior arrangement Seller is to advance such shipping costs, reimburse Seller for such costs, Buyer shall also pay excise, sales, uses or other taxes or duties which the Seller may be required to pay because of the sale, delivery or use of equipment or services covered hereby, unless Buyer timely provides Seller with a resale certificate or other document acceptable to the appropriate taxing agency establishing an exemption from such taxes or duties. If after acceptance of this proposal Buyer requests changes in the equipment or services to be rendered or delays progress of the manufacturer or delays shipment of the equipment, or the performance of such services later than the dates specified herein, the price therefore shall be appropriately increased.

RETENTION: No retentions shall be withheld by Buyer unless agreed upon as part of a progress payment schedule.

SHIPMENT: Unless otherwise specified, shipment of the equipment shall be FOB the place of manufacture of equipment. The Seller's responsibility for shipment shall cease and Buyer shall assume all risks of loss upon delivery to the transporting carrier. Any claims for shortages, delays or damages occurring thereafter shall be made by the Buyer directly to the transporting carrier. Any claims against the Seller for shortages in shipment shall be made written 15 days after receipt of shipment by Buyer.

DELIVERY: Seller will use its reasonable best efforts to cause shipment of equipment as scheduled, but all shipment dates are approximate only. Delays in delivery of equipment or the performance of services shall be excused when caused by strikes, lockouts, accidents, fire, acts of God, embargoes, or governmental action or any other cause beyond the reasonable control of the Seller or manufacturer/supplier, whether the same as or different from the instances therein specifically enumerated. If for some reasons, Seller or manufacturer/supplier is unable to ship within a reasonable time after the date scheduled, Seller may, at its option, cancel the agreement without liability, except for return of any amounts previously paid. In no event shall the Seller be responsible or incur any liability for an costs or damages or any nature sustained by Buyer due to any delay in delivery or failure to make delivery as scheduled due to circumstances beyond reasonable control.

EQUIPMENT WARRANTY: The Seller warrants that the equipment to be furnished pursuant to this proposal will conform to the description contained therein. However, the Seller does not warrant that any new equipment will be free of defects in design, material or workmanship and such equipment is sold subject to such warranties as are made by the manufacture/supplier for breach of any such manufacturer's supplier's warranty, any expense to be for Buyers account.

SERVICE WARRANTY: Seller warrants that all installation, start-up or other services to be performed by Seller as described in this proposal will be performed in a workmanlike manner and in accordance with the applicable laws and regulations. However, Buyer shall be responsible for obtaining any required permits or other governmental approvals required as a condition precedent to Seller's performance of such services. Such warranty hereunder shall extend for a period of 90 days after completion of such services. If several different types of services are to be performed, such 90-day period shall run from the completion date of each type of service. Any claimed deficiency in the matter in which such services are performed must be brought to Seller's attention in writing in such 90-day period. Upon lapse thereof without such claim being made, this warranty shall lapse. This warranty is limited to the repair or redoing without charge to Buyer of any defective or non-conforming services. At Seller's option, any warranty work will be performed only during regular working days. This warranty shall be inapplicable if the Buyer or any third party first attempts such repairs or redoing or if the equipment involved has been tampered with, altered, abused, subjected to abnormal treatment or maintained and operated in accordance with the Seller's or manufacturer's instructions and applicable methods.

DISCLAIMER: THE FOREGOING IS IN LIEU OF ALL OTHER CLAIMS OR WARRANTIES, ORAL, EXPRESSED, OR IMPLIED, INCLUDING ANY WARRANTY OR MECHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER BASED ON WARRANTY, TORY OR CONTRACT THEORIES, SELLER MAKES NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANT-ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WITH ERSPECT TO USED EQUIPMENT, BUYER TAKES ANY USED EQUIPMENT "AS IS". Seller shall not be liable for any direct, special or consequential changes or loss to the Buyer or any third party as a result of defects in the equipment sold nor any damage to the equipment itself or caused by the equipment. Nor shall Seller be liable for any direct, special or consequential changes or loss to the Buyer or any third party as a result of any defective or non-conforming services performed hereunder.

PATENT INFRINGEMENT: Seller shall not be liable for any change, loss or expenses incurred by Buyer in the event of any suits the Buyer for an alleged infringement of any patent rights, covering equipment sold to buyer hereunder. However nothing herein shall be construed as relieving the manufacturer of such equipment from any responsibility it may have to the Buyer in connection with such a claim.

SECURITY INTEREST: Except in cases where payment of the purchase price has been guaranteed by the posting of an adequate bond benefiting the Seller and to secure payment of the purchase price. Buyer agrees that the Seller shall retain a security interest in the equipment until Buyer shall have paid in cash the full purchase price for all equipment sold and services performed hereunder. This security interest shall cover any proceeds of the equipment. Upon Seller's request, Buyer shall execute and deliver to Seller any financing statement or other documents requested by Seller reflecting its security interest. The equipment shall at all times be considered and remain the personal property. If full payment of the purchase price is not made when due, Buyer shall pay interest on the delinquent amount at the highest lawful contract rate, not to exceed 18% per annum, and all costs of collection, including reasonable attorney's fees. Such interest and costs shall be deemed secured by the foregoing security interest.

INSURANCE: So long as any portion of the purchase price remains unpaid, Buyer at its cost shall obtain insurance against loss or damage from all external causes, naming the Seller as an insured in an amount and form sufficient to protect the Seller's security interest in the equipment.

APPLICABLE LAW: The validity, performance and construction of the proposal shall be governed by the laws of the State of Washington.

AFFIRMATIVE ACTION**: On purchase orders of $10,000 or more, vendor or subcontractor shall comply with current affirmative action requirements for Disabled Veterans and Veterans of the Vietnam Era and for Handicapped workers as described in FAR 52.222-35 and 36 respectively.**

ROI Savings Calculator

02-04-2011

Customer: Galena City Steam Plant
City: Galena
State/Province: AK
CB Rep: Cole Industrial
Total Hardware Cost: $65,000.00
Total Labor Cost: $65,000.00
Total Cost: $130,000.00
Total Savings Before Rebate: $100,938.08
Rebate Potential: $0.00
Total Savings with Rebate: $100,938.08
Projected ROI: 1.2879 Years

Boiler Horse Power: 500
Average Input: 48%
Average Input Efficeiency: 81 %
Projected Efficeiency with O2 Trim: 82%
Run Hours Per Year: 8760
Fuel Cost: $3.12 per Therm
Electric Cost: $0.440 Per KW Hour

Boiler Firing Rate	0%	20%	40%	60%	80%	100%
Percent of Year	0	20	40	20	20	0

O2 Trim Calculation

Average Horse Power Output: 240
Average BTU/Horse Power Output: 8,034,000.00
Projected Efficiency Gain: 1 %
Average BTU/Horse Input with No Trim: 9,918,518.52
Average BTU/Horse Input with Trim: 9,797,560.98
Annual Fuel Cost with No Trim: $2,710,850.13
Annual Fuel Cost with Trim: $2,677,790.99
Annual Projected Savings: $33,059.15

These are estimated savings only. Cleaver-Brooks will not be responsible for any savings or failure to achieve the numbers in conjunction with this program.

Cleaver-Brooks Inc.
07/07 CBROI V2.0

Variable Speed Drive Calculation

Motor Horse Power: 10
Cost of KW per Hour: $0.440
Total KW Hours with No VSD: 52,784.44
Total KW Hours with VSD: 10,532.74
Average Operating Cost No VSD: $23,225.15
Average Operating Cost with VSD: $4,634.41
Annual Projected Savings: $18,590.75

Parallel Positioning Calculation

Average Horse Power Output: 240
Average BTU/Horse Power Output: 8,034,000.00
Projected Gain: 1.5 %
Average BTU/Horse Input with No PP: 9,918,518.52
Average BTU/Horse Input with PP: 9,738,181.82
Annual Fuel Cost with No PP: $2,710,850.13
Annual Fuel Cost with PP: $2,661,561.95
Annual Projected Savings: $49,288.18
(Removal of Linkage - 0.5%, Improved Combustion - 0.5%, Increased Turndown - 0.5%)

Appendix D - Photos

Fig-1. Typ interior, alarm bell, Extinguisher

Fig-2. Fire Alarm Panel

Fig-3. Boiler Panel

Fig-4. Daytank location

Fig-5. Generator

Fig-6. Switchgear

Fig-7. Boilers

Fig-8. Steam Header

Fig-9. Air opening, Ducting

Fig-10. Ceiling Detail

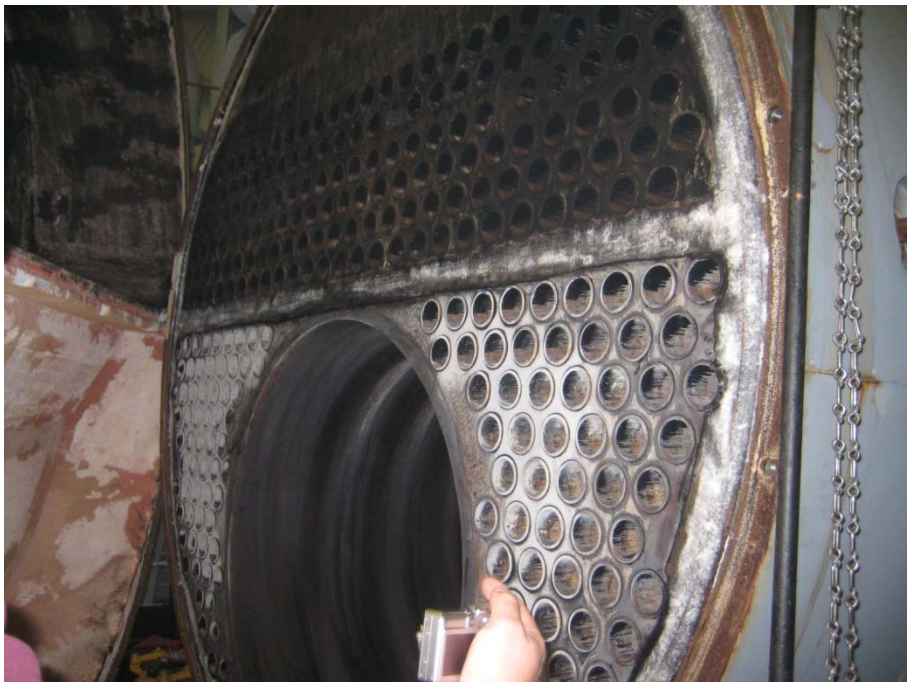

Fig-11. Typical Boiler Tubes

Fig-12. Typical Boiler Face

Appendix E - Preliminary points list

List of control points to be monitored (IN PROCESS)

Boiler System

- ..
- ..
- ..

Fuel System

- ..
- ..
- ..

Air System

- ..
- ..
- ..

Fire System

- ..
- ..
- ..

Building Status

- ..
- ..
- ..

Appendix F - Excerpt from FA report

Occupancy Classification

The original Occupancy Classification of the building is unknown.

Occupancy Classification and fire protection requirements for areas of the building:

Building/ Area	Date Built	Occupancy Classification [1]	Description	Fire Protection Requirements	Existing Sprinklers
Boiler / Generator Rooms	1968	F-1	Factory Group	Manual Fire Alarm System	No

[1] Occupancy Classification and fire protection requirements based on IBC 2006 and how the building space is currently occupied.

Existing Fire Protection Features

The nearest fire hydrant is located approximately 110 feet off the east side of the building, across the street. Approximate location is shown on the city water utility drawing currently on file at the Headquarters Building in Galena. A preliminary review of the fire hydrants showed that they are within the required distance of all points on the building.

This building is currently protected by a Manual & Automatic Fire Alarm system. The building currently does not have an automatic sprinkler system.

Building Water Supply

The building water supply is located on the south wall in the boiler room, and is equipped with a 2-inch water meter. The existing service is likely not large enough to supply an automatic sprinkler system.

Automatic Sprinkler System Installation and Deficiencies

Currently no automatic sprinkler system is installed.

Fire Detection and Alarm System Installation and Deficiencies

1. Building 1499 has two separate Monaco Fire Alarm Control Panels (FACPs); one for the Steam Plant, and one for the Electric Plant.
2. The FACP covering the Electric Plant is located on the south wall inside the main hallway.

3. The FACP covering the Steam Plant is located on the north wall of the Steam plant.
4. The office area, switchgear room, hallway, exhaust room and generator rooms are protected with heat detectors.
5. The Steam Plant is covered by four ceiling-mounted heat detectors.
6. There are fire alarm bells mounted in the generator rooms. There are no notification devices mounted in the office area, the switchgear room, the exhaust room, or either hallway.
7. There is one wall-mounted fire alarm bell in the Steam Plant.
8. There is one manual pull station mounted within 5 feet of the west egress door.
9. There are manual pull stations mounted within five feet of most of the egress doors, except for the main entrance.
10. While manual pull stations were installed to the recommended heights as part of the original installation, the current ADA Standards for Accessible Design require that the operable part of the device be no more than 48 inches above finished floor. All of the manual pull stations are currently mounted at a height that puts the operable part of the device more than 48 inches above finished floor. The manual pull stations installed in this building vary in height, with some mounted as high as 65 inches.
11. In addition to the code deficiencies noted above, there are also upgrages that can be done to bring the current system up to the current industry standards.

Recommendations

Automatic Sprinkler System

Per current IBC code and the square footage of this building, an automatic sprinkler system is not required.

Fire Detection and Alarm System

The original installation appears to have met the design requirements for fire alarm and detection systems at the time of construction. The following changes are recommended to improve the building's fire detection and alarm capabilities to current standards:

1. Provide new notification appliances (horns and strobe devices) to meet NFPA requirements.
2. Correction of the height of pull stations within the facility.
3. The Monaco fire alarm systems have reached the end of their production life. Parts are generally available through third parties or can be reclaimed from demolished systems. It is highly recommended any upgrade include replacement of the control panels. It is also recommended that they be

replaced with one Fire Alarm Control Panel equipped to handle the detection and alarm requirements of both the Electric Plant and the Steam Plant sections of the building.

4. Provide new automatic detection devices (smoke and heat detectors) to meet NFPA requirements.
5. Consider inclusion of flame detectors for a quicker response to fires from the facility boilers.
6. Provide remote monitoring of alarm conditions as part of an overall campus system.

Appendix G - Field notes from FA report

Steam & Electrical Plant 1499

Steam & Electrical Plant 1499				No Fire Protection
Room	**Room Name**	**Floor**	**Photo Nos.**	**Notes**
N/A	Entry Corridor	1	1742	9' GWB, TYP
N/A	Main Office	1	1743	8' 2X4, 9' GWB Above
N/A	Office	1	1744	8' 2X4, 9' GWB Above
N/A	Laundry Area	1	1745	
N/A	Generator Room	1	1746-54	Roof Chicken Wire & Insulation, Exposed Ceiling, No Sprinklers, TYP, Storage
N/A	Corridor to Additional Gen. Room	1	1760	No Sprinklers, See Photo
N/A	Additional Generator Room	1	1755-59	
N/A	Switchgear Room	1	1761	
N/A	Boiler Room	1	1762-74	2" Water Meter

Appendix H – DEC Air Quality ORL Statement

Matt Leistico

From: Yap, Jimmy N (DEC) [jimmy.yap@alaska.gov]
Sent: Wednesday, February 03, 2010 3:10 PM
To: Matt Leistico
Cc: Ryan, Sally A (DEC)
Subject: RE: GILA Boiler automation info.

Matt,

Hereunder is the summary of information gathered from you and based on ORL documents AQ0305ORL01Rev 2 for Galena , with corresponding Department's response to your query:

Galena Airport (now owned by the City of Galena after transfer of ownership from US Air Force) operates under AQ0305ORL01, Rev2. Currently, they are operating three boilers in addition to some other equipment. They are planning to change the mode of operating the boilers (switching on and off) from manual to automatic. The automation project will be monitored by the Central City Power Plant.

Matt is inquiring whether this automation project constitutes a modification or if this requires permit from ADEC.

The source is classified under 18 AAC 50.502(c)(1) because emissions of NO_X and SO_2 are above the thresholds in 18 AAC 50.502(c)(1). Alaska regs in 18 AAC 50.502(c)(3) say an owner or operator of a source classified under (c)(1) must obtain a minor permit before *"beginning a physical change to or a change in the method of operation of an existing source"* if the change will cause an increase in emissions greater than the amounts listed in 18 AAC 50.502(c)(3).
This is not a physical change but it is a change in the method of operation. However, it will only trigger permitting under 18 AAC 50.502(c)(3) if it will cause an increase in pollutant emissions greater than the amounts listed in the subsections of this cited regulation.

Based on information provided, the described project will not trigger an air permit under 18 AAC 50.

Jimmy Yap
Environmental Engineer Assistant 1
Division of Air Quality, Department of Environmental Conservation
(907) 465-5123 Phone
(907) 465-5129 Fax
jimmy.yap@alaska.gov

From: Matt Leistico [mailto:mattleistico@pdceng.com]
Sent: Wednesday, February 03, 2010 3:02 PM
To: Yap, Jimmy N (DEC)
Subject: GILA Boiler automation info.

Looking for info about Galena boiler upgrade – Owner Requested Limit #30/5ORL01

Matt

Matt Leistico, PE, Associate
Mechanical Engineer

PDC Inc. Engineers
Planning Design Construction