Amended Final Report
1/24/2012

Cook Inlet Tribal Council, Inc
Final Progress Report
Grant Term: 6/1/10 to 12/31/10
U.S. Department of Energy Grant
DOE Award #: DE-EE0002509
Tribal Energy Program
Project Title: Improving the Efficient of Ernie Turner Center
Submitted by: Amy Fredeen

Summary Comparison of Accomplishments with the goals and objectives:
The objective of this project was to complete the specifications and drawings for a variable speed kitchen exhaust system and the boiler heating system which when implemented will improve the heating efficiency of the building.

Design work has been complete for the approved projects. See schedule status below.

Discussion of accomplishment during reporting period:
A bid process was done to select an engineering firm to perform the design work and RSA Engineering was selected to complete the work. RSA Engineering (RSA) came out and did a site review of the facility and completed design work by the 12/31/10. No construction was performed as part of this grant.

Detailed Report of work completed:
Design work Summary:
The design work was focused in two key areas: kitchen ventilation and heating for the Ernie Turner Center building (ETC). RSA completed design work and issued a set of 100% drawings. RSA also worked with a cost estimator to put together a detailed cost estimate for the project. The design components are summarized below.

Kitchen Ventilation: The existing kitchen exhaust hood is a 2,100 cfm, constant volume, Type I hood. The exhaust hood is 48" long by 42" wide. A 2,100 cfm air handler with a hydronic pre-heat coil provides makeup air to the kitchen. Makeup air must be heated from ambient conditions to approximately 70°F prior to entering the kitchen space. When operational, the kitchen hood exhausts the heated air in the kitchen to the exterior of the building. To conserve energy, the existing kitchen exhaust system could be replaced with a variable speed exhaust system. Variable speed kitchen exhaust systems are capable of decreasing the amount of air exhausted to the exterior based upon actual exhaust needs, thus decreasing the amount of heat energy being "wasted" to the exterior of the building. Since the cooking load varies throughout the day, the exhaust system may not need to run at the maximum flow all day. The new system could monitor the cooking operation and adjusts the exhaust, supply, and rooftop unit fans based on actual cooking load when the cooking load is reduced, then the fans would operate at a reduced level and save energy.

The benefits of installing a variable speed kitchen exhaust system are as follows:

- heating of makeup air may be significantly reduced,
- energy consumed by fan motors may be reduced appreciably,
- potential energy savings from the reduced load and utilization of the fan units and ventilation systems, improved efficiency by reducing fan speed, and
- reduced sound levels in kitchen.

Heating :The facility is currently heated by central hydronic boiler system. The hydronic heating system consists of a 1,700 MBH cast iron boiler, baseboard fin tube heaters, and a glycol circulation pump. The existing boiler provides heat for space heating, domestic water heating, and exterior snow melt. Heating glycol is circulated throughout the building via a continuously operating single speed pump. With the facility's domestic water heating load removed from the space heating boiler, the size of the boiler(s) could be reduced. New, higher efficiency boilers with thermal efficiencies could be installed in place of the existing boiler. The existing glycol circulation pump could be replaced with a variable speed pump.

Boiler/Pump replacement benefits include:

- new higher efficiency boilers can provide required building heating with reduced
- natural gas consumption due to higher thermal efficiencies, and
- the use of multiple boilers in lieu of a single boiler might allow lead/lag operation of the boilers, resulting in a single boiler being able to operate closer to its full load capacity when the facility heating demand is less than full load.

Boilers reach their highest thermal efficiency when operating at full load capacity, the higher efficiency boilers have greater turndown ratios, which allow the boilers to consume less fuel during low load conditions, the installation of a variable speed pump should save energy by decreasing the pump input power to accommodate part load conditions and the natural gas load due to building heating may decrease.

<u>Design Implementation Cost Estimate Detail:</u>

The costs estimates were computed with the following assumptions:

- Contract: Standard construction contract without restrictive bidding clauses.
- Bidding Situation: Competitive bids assumed.
- Bid Date: Spring 2011
- Start of Construction: Summer 2011
- Months to Complete: Within (4) weeks
- Pricing was based on the current material, equipment and freight costs.
- Labor rates based on Alaska Statue Title 36
- The costs excluded
    - architecture /engineering design fees
    - administrative and management costs
    - hazardous material abatement, if found during construction

Design implementation costs summary:

	Material	Labor	Total
Mechanical	$ 63,567	$ 37,896	$ 101,463
Electrical	5,730	7,002	12,732
Finishes	432	1,356	1,788
General Requirements:			
Mobilization and demobilization	500	1,000	1,500
Site Staff	285	8,430	8,715
Temporary Construction	800	1,000	1,800
Equipment & Tools	3,900	260	4,160
Misecellaneous	1,400	950	2,350
Labor employement costs	-	8,400	8,400
Home Office			5,002
Contractor's fee and overhead			12,572
Bonds			1,846
Insurance			2,029
Contingency			9,728
Total Estimated Construction Costs			$ 174,085
Cost per square food			$ 250
Gross Floor Area			696

Funding to perform the implementation of the design has not been secured as of the end of this grant period. Upon securing funds, CITC will review the design work for updates to local building codes, make design revisions as needed and bid out the work to be completed.

Grant Funds Cost Status Summary:
$31,992.18 of the $57,298 award was spent as of 12/31/2010. We do not anticipate incurring any additional expenses on this design work. We are not requesting a no cost extension. No funds were spent on construction.

Schedule Status:
Work was completed by 12/31/10

Change in Approach or aims: None

Change in Key Personnel: None

Description of products or technology transfer activities accomplished during reporting period:
Design drawings and specifications were obtained to perform the improvement work needed.