OIT Inc. Heat Recovery Project

OIT, Inc.
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Partners:
OIT Inc.
Northland Fuels and Energy a Division of OIT Inc.
Turbo-Steam LLC – Turbine Design
Alstrom Power Thermal Products Inc – Heat exchanger/Boiler Design
Industrial Electric (IEI) – Electrical Consultant

Total Project Cost: $3,000,000
Grant Funds Requested: $1,500,000

Project Description:
Organic Incineration Technology (OIT) is seeking to modify its Moose Creek Remediation Plant by incorporating a co-generation electricity producing steam generator system made operable through recovery of waste heat energy from the remediation process. This project would utilize a specifically designed Heat Exchanger (boiler) which in turn will extract usable waste heat energy created during the remediation process. This co-generation process consists of a Heat Exchanger (boiler) utilized to produce the high pressure super-heated steam which will be used to drive the steam turbine generator having the capacity to produce 900 KWh of electricity. An additional building to house the generator and switching gear will be needed in addition to piping, electrical wiring, foundation and reconfiguration of the remediation system.

Founded in 1992 OIT Inc. is a locally owned and operated company that provides high temperature incineration services for remediation and disposal of petroleum contaminated soils and non-hazardous oily waste. OIT operates throughout Alaska, and our clients consist of oil industry and government entities with contaminated soil, sludge's and oily waste problems. This project would be unique to Alaska and the arctic environment.

Project Eligibility:
It is assumed the OIT Recoverable Energy Co-generation project would qualify under requirements of the Alaska Energy Authority's Emerging Energy Technology program. The OIT project would incorporate both new and existing technology and components. Some of these technologies and components have been installed in similar projects throughout the lower 48 states. Important to note however; is this particular application though fully capable to operate in extreme climates has yet to be utilized in Alaska under artic conditions. The OIT project will provide a new more affordable source of electricity for interior Alaska and the Fairbanks region. It will assist in GVEA in reaching their goal of 20% alternative energy by year 2014. The OIT Waste Heat Recovery project will enhance electrical energy diversification, use local skilled labor, American technology and components and provide for long-term employment for Alaskan's. This project will offer low cost alternative to the GVEA grid supplementing conventional electrical power with a recoverable electricity source produced by an Alaskan company under the guidelines of the CHP-EPA partnership program.

Approximately 16% or 145 KW of the Steam Turbine systems 900KW output would be used to replace the electricity currently purchased from GVEA and used to operate the OIT plant. The remaining 84% or 755KW of electrical power would be sold back to the Golden Valley Electric Association grid. A Level One Feasibility Study completed by the Combined Heat and Power Partnership / CHP-EPA Partnership Program confirms OIT's belief that our plant produces enough recoverable energy during remediation processing to cogenerate a significant amount of supplemental electricity.

This project could be completed within 12 – 18 months of being granted funding.

Project Innovation:

Using the current plant configuration (diagram below) OIT would incorporate customized state-of-the-art steam turbine and heat exchanger (boiler) technologies to produce the supplementary electrical power. The project will allow the plant which generates in excess of 17,000,000 BTU's (energy) per hour the opportunity to apply its

waste heat stream currently exhausted out the stack to use in generating an affordable recoverable energy source. In all probability this type of energy recovery co-generation project would be the first of its kind in Alaska under artic conditions and if successful it would be possible to be reproduced throughout the state. OIT Inc. is fully compliant and permitted to operate under the guidelines of the Alaska Department of Environmental Conservation. **(Treatment System Process Diagram)**

2.0 GENERAL THERMAL OXIDIZER DESCRIPTION

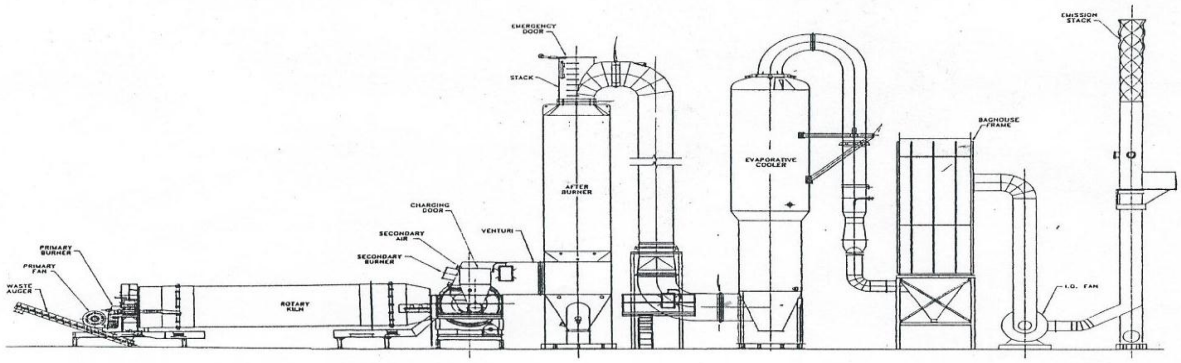
The Thermal Treatment System primary components are; 1) Rotary Combustion Kiln, 2) Air Mixing Section, 3) Secondary Combustion Chamber, 4) Cooling (Quench) Tower, 5) Two Bag Houses, 6) Induction Fan, and 7) Emission Stack.

The Thermal System is controlled by a fully automated computer control system. The kiln itself is operating under negative pressure minimizing the possibility of gases escaping from the system.

Processing begins with the injection of the waste material by a 16" diameter auger. Once in the kiln, the contaminated material is exposed to temperatures of 1200-1500°F for a residence time of from 5-15 minutes depending levels of contamination. The residence time is adjusted by the rotation of kiln.

The gas vapors and particulate are drawn from the kiln in a counter current direction. The gases then enter the Air Mixing and Secondary Combustion Chamber and are exposed to temperatures from 1600-2000°F where complete oxidation occurs.

The superheated gases and airborne particulate then enter the Cooling/Quench Tower where the gases and particulate are exposed to an atomized spray of water. Here particulate temperature are reduced from approximately 1800°F to 350°F. After being cooled the particulate is removed from the air stream as it moves through the Bag Houses and exhausted through the 60' emission stack.



PROCESS VIEW

OIT, Inc.
Technical Summary 3

OIT has determined that not only can we produce electricity through energy recovery, by doing so OIT can offer a more affordable option for remediation of in state hydrocarbon contaminated waste. The Environmental Protection Agency (EPA) provides tax incentives for oily waste generators whose wastes are processed in associated with an energy recovery process used during disposal of these type materials. When incorporating the energy recovery process OIT Inc. is in a better position to offer an affordable in state option for remediation of

product currently having to be transported to a similar energy recovery facility near Spokane, Washington. Alaska hydrocarbon waste generators spend many millions of dollars annually handling, shipping and disposing of these wastes out of state.

Priority:
OIT Inc. is a licensed state of Alaska cooperation owned and operated by Alaska state residents. It is very possible that throughout the development of this project that again OIT Inc. could call on the University of Alaska to assist in and/or aid in the project. OIT has been in business since 1992 and has a proven track record of financial stability and with AEA assistance fully capable of funding this project. Moving forward it is possible these type systems could be incorporated elsewhere in Alaska. This possibility would be dependent on external sources and could be developed over time.

In 2005 a previous abstract study was conducted in conjunction with OIT Inc. by University of Alaska Fairbanks. The abstract "Hydrocarbon waste for co-generation" was submitted to the US Department of Energy. This type project has been study by OIT Inc. since 2005. Until this date the project was determined to be financially marginal. With the changes in pricing, new technologies and a greater need for additional sources of electricity this now becomes a viable project.

Objective:
OIT's intent is to modify the plant using both new and existing technology and components fully capable of energy recovery and cogeneration from our waste heat stream. This project would enable OIT Inc. to meet the special needs of many in state waste producers and at the same time produce recoverable low cost electricity addressing GVEA's search for alternative energy sources. In addition this project would create additional long-term jobs for Alaskans.
OIT has received an initial budgetary proposal from Turbo-Steam LLC for the installation a 900kw Multi-Stage Steam -Turbine Generator System. Turbosteam is an equipment manufacturer and engineering company that has experience with the CHP-EPA Partnership Program. Turbo-Steam along with Mr. Ken Brune of IEI Consultants of Fairbanks, AK will be conducting the system engineering and assessment to include a full technical proposal, preliminary drawing package, utility assessment, financial proforma, and operational data calculation.

Project Budget Summary:
Estimated costs for the project are as follows:

Heat Recovery/Turbine/Building and associated expenses	$2,200,000
Construction, labor and associated expenses	$800,000
Total Installed Cost	**$3,000,000**
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AEA Project Funding	$1,500,000
OIT Matching Funds	$1,500,000
Total Funds	**$3,000,000**

Based on initial meetings with GVEA, they believe this project is a candidate for their interconnectivity and alternative energy program. OIT has retained Ken Brune with Industrial Engineering LLC of Fairbanks, AK to serve as a technical advisor and assist with the requirements of interconnection with GVEA.

Project Team:
OIT Inc:
Mark Sanford, President OIT Inc.
Rod Chiupka, GM Northland Fuels (Responsible for project coordination)
Stacy Shreeve, Operations Manager Northland Fuels (Responsible for assisting with project coordination)
TurboSteam LLC:
Dan Kempland, Business Manager (Responsible for turbine design sizing and engineering)
Alstom Power Thermal Products – Energy Recovery:
Bob Boucher, Manager of Development and Marketing
(Responsible for heat exchanger/boiler design and engineering, calculate flow rates, volumes and temperature transfers)
Industrial Engineering LLC:
Ken Brune (Responsible for electrical calculations, switching gear, associated components, project review and consulting)

Commercialization of funded Technology:
This project will provide for a continuous alternative electricity source for interior Alaska. It will in its own way help to offset the increasing cost of electrical power for interior Alaskans. It will address GVEA's self-imposed need to search out additional energy sources. The energy produced will benefit not only the local energy market but will provide additional employment to the area. Through its success this project will allow for further development of heat recovery / co-generation options for Alaska.

Certification:
By signature on this application, I certify that we are complying and will comply with the amount of matching funds being offered.

Rod R. Chiupka

Rod R. Chiupka
General Manger, Northland Fuels and Energy
A Division of OIT Inc.

Proof of Eligibility:
OIT Inc. is an Alaskan business operating since 1992.
This project has the full support of the OIT Inc. Board of Directors.
Alaska Business # 222841 / Federal ID # 92-01235109