

State of California
AIR RESOURCES BOARD

Resolution 01-41

October 25, 2001

Agenda Item No.: 01-8-2

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a proposal, number 01-47, entitled "The GTI High-Performance Radiant Tube System", has been submitted by Gas Technology Institute in response to the 2001 Innovative Clean Air Technologies (ICAT) Program solicitation;

WHEREAS, the proposal has been independently reviewed for technical and business merit by highly qualified individuals; and

WHEREAS, the Research Division staff and the Executive Officer and Deputy Executive Officers have reviewed and recommend for funding:

Proposal Number 01-47, entitled "The GTI High-Performance Radiant Tube System", submitted by Gas Technology Institute, for a total amount not to exceed \$152,773.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby approves the following:

Proposal Number 01-47, entitled "The GTI High-Performance Radiant Tube System", submitted by Gas Technology Institute, for a total amount not to exceed \$152,773.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and agreements for the efforts proposed herein, and as described in Attachment A, in an amount not to exceed \$152,773.

I hereby certify that the above is a true and correct copy of Resolution 01-41, as adopted by the Air Resources Board.

Marie Kavan, Clerk of the Board

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

“The GTI High-Performance Radiant Tube System”

Background

In some industrial furnaces, the combustion gases are contained within tubes that radiate heat into the furnace, rather than allowing direct contact of the gases and the furnaces' contents. Radiant-tube heating is used where the chemical properties of the combustion gases would damage the product and where a uniform temperature is needed within the furnace. Radiant tube furnaces in use today in the metals industry emit high concentrations of NO_x, typically 200 to 250 ppm, because of the high temperatures caused by burning the fuel in a small volume. The geometric restrictions prevent the economical use of standard combustion modifications for NO_x control. There are an estimated 43 furnaces using radiant-tube burners in California.

Objective

The project would demonstrate 60 percent reduction of NO_x emissions from a continuous-strip steel-annealing furnace at California Steel Industries in Fontana. Also, CO and CO₂ emissions each would be reduced by three percent via improved fuel economy. The reductions would result from the transfer of a proven technique, internal gas recirculation, to the new application of radiant-tube burners in metal furnaces.

Methods

GTI will retrofit the forced internal recirculation (FIR) burners on 20 radiant tubes on a continuous steel strip-annealing furnace at California Steel in Fontana. NO_x and CO emissions and fuel use will be measured in the furnace exhaust before and after the retrofit. The performance of the furnace will be tested. The FIR burners must be manufactured for the specific application.

Expected Results

A low-NO_x, energy-saving retrofit technology would be commercially demonstrated.

Significance to the Board

Widespread adoption of the technology by operators of radiant-tube furnaces would reduce NO_x emissions in California by about 0.5 tons per day, CO emissions by about 30 tons per day, and CO₂ emissions by about 12 tons per day.

Applicant: Gas Technology Institute

Project Period: 18 months

Principal Investigator: Harry Kurek

ICAT Funding: \$152,773

Cofunding: \$488,000

GTI	\$100,000
SoCal Gas	\$100,000
California Steel	\$269,000
Eclipse combustion	\$ 19,000

Past Experience with This Principal Investigator:

ICAT grant 99-1, performed satisfactorily. The project demonstrated oscillating combustion (pulsed fuel flow for NO_x control) at a forging furnace.

Prior ICAT Funding to Gas Technology Institute (formerly, Institute of Gas Technology)

Year	2000	1999	1998
Funding	\$0	\$161,803	\$ 0

BUDGET SUMMARY

Gas Technology Institute

The GTI High-Performance Radiant Tube System

<u>Direct Costs and Benefits</u>	<u>ICAT</u>	<u>Total</u>
1. Labor	\$ 45,748	\$203,272
2. Employee Fringe Benefits	\$ (included)	\$ (included)
3. Subcontractors	\$ 0	\$ 0
4. Equipment	\$ 0	\$ 60,000
5. Travel and Subsistence	\$ 20,573	\$ 39,586
6. Materials and Supplies	\$ 1,000	\$160,400
7. Other Direct Costs	\$ 0	\$ 0
Total	\$ 67,321	\$463,258
<u>Indirect Costs</u>		
1. Overhead	\$ 54,897	\$ 92,414
2. Other Indirect Costs	\$ 30,555	\$ 85,101
Total	\$ 85,452	\$177,515
Total Project Costs	<u>\$152,773</u>	<u>\$640,773</u>