DE-FC22-94PC94111--15

Particulate Emission Abatement for Krakow Boiler Houses

Quarterly Report
October 1 - December 31, 1997

Work Performed Under Contract No.: DE-FC22-94PC94111

For
U.S. Department of Energy
Office of Fossil Energy
Federal Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880

By
LSR Technologies, Inc.
898 Main Street
Acton, Massachusetts 01720

Disclaimer

Abstract

Environmental clean-up and pollution control are considered the foremost national priorities in Poland. The target of this cleanup is the Polish coal industry, which supplies the fuel to generate over 78% of Poland's primary energy production. This project addresses the problem of airborne dust and uncontrolled particulate emissions from boilerhouses, which represent a large fraction of the total in Poland. In Kraków alone, there are numerous uncontrolled boilers accounting for about half the total fuel use. The large number of low-capacity boilers poses both technical and economic challenges, since the cost of control equipment is a significant factor in the reduction of emissions.

A new concept in dust collection, called a *Core Separator*, is proposed for this important application. The *Core Separator* is an advanced technology developed through research sponsored by the Department of Energy. It utilizes a highly efficient collector, which functions on the principle of inertial separation. The system is able to control fine particulate matter, as in the PM10 regulations, which limit the emission of dust particles below 10 microns in diameter. Its dust removal performance has been shown to be comparable to that of a medium-efficiency electrostatic precipitator (ESP). Yet, its cost is substantially lower than that of either an ESP or fabric filter. While the *Core Separator* achieves high efficiency, its power consumption is just slightly higher than that of a cyclone. It functions dry and without the aid of energy-consuming enhancements. It is simple, reliable, and unlike the ESP and fabric filter, easy to maintain. This combination of features make it ideal for the small boiler market in the City of Kraków.

A highly qualified team has been assembled to execute this project. LSR Technologies, Inc., a technology-based company located in Acton, Massachusetts, is the developer of the *Core Separator* and holder of its patent rights. LSR has sold many of these units in the U.S. and Europe. EcoInstal, a leading supplier of environmental equipment in Poland, is licensed to sell the *Core Separator*, and is supporting LSR as a subcontractor. The Polish Foundation for Energy Efficiency (FEWE), located in Katowice, is a consulting organization with extensive expertise in the Polish economy and natural environment. FEWE is also a subcontractor to LSR.

This project is divided into two major phases. Phase I is called "Infrastructure Studies" and includes business planning, and site-selection of a full-scale *Core Separator* Demonstration Unit. Phase II, called "Commercial Development," includes the first Demonstration Unit in a local boilerhouse, followed by several *Core Separator* installations collecting flyash from different Polish coals. Also, a manufacturing facility is to be equipped to accommodate the projected sales volume. If the goals of this project are met and the *Core Separator* can be successfully marketed, there is a potential to significantly reduce particulate emissions in Kraków.

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Introduction

This project involves the implementation of a new particulate control technology called a "*Core Separator*" for low-emission sources (LES) in Kraków. With several hundred boiler sites in the city burning low-grade coal, existing pollution control equipment consists primarily of low-efficiency cyclones. This equipment does not meet the emission standards of Western European nations. More importantly, these conditions have been the cause of low ambient air quality in Kraków from suspended particles. The *Core Separator* can be retrofitted onto these boilerhouses to substantially reduce particulate emissions, particularly those consisting of the fraction classified as PM10.

In this project, *Core Separator* technology is being demonstrated for boilerhouse applications in the Kraków region of Poland. Phase I entailed business planning and infrastructure studies to determine the market for this equipment. In the second phase, the technology is being demonstrated in several boilers of different capacity and firing various grades of coal. Finally, a permanent business entity, either joint venture of license agreement, was to be established with the capability of manufacturing and supplying this equipment in Kraków and throughout Poland.

The contract between DOE and LSR began April 1, 1994, although DOE permitted some work to commence prior to that time. This report documents work completed during the fifteenth quarter, i.e., October 1 - December 31, 1997.

Results and Discussion

The last remaining milestone for this project is to find another site in Kraków for the installation of *Core Separator* units. The sites which remain under consideration include:

(1) Zorza Cooperative Heating Plant -- 4 WCO-80 Boilers
(2) Rzaska Boilerhouse -- 2 WR 2.5 Boilers
(3) Armatura -- 1 WR 10 Boiler

In October, Mr. Jacek Ginter, President of EcoInstal, visited LSR and provided an update of *Core Separator* installations in Poland. According to Mr. Ginter, sales of equipment in Kraków have been more difficult than other regions. In November, EcoInstal exhibited at the large environmental trade show in Poznan called EcoPol. Several new contracts resulted from this trade show. By year's end, the total number of *Core Separator* installations or commitments for units reached 45.

Apparently, some renewed interest has resurfaced for a boilerhouse rehabilitation at Rzaska. A company called Tawimex, CTI Polska, EcoInstal, and LSR have had discussions toward initiating this project. The major obstacle has been financing which has not been finalized.

Work Scheduled for Next Quarter

The last remaining milestone will be to negotiate a contract for one more dust collector site in Kraków. EcoInstal has assured us that every effort will be made to complete this installation as soon as possible. LSR has been working closely with Control Techtronics Inc. to activate the Rzaska Boilerhouse project, since the emission controls and combustion controls will be integrated. An extension has been requested for our contract with DOE in order to complete this installation.

LSR Technologies, Inc.

Environmental and Energy-Related Systems

January 20, 1998

Reports Receipt Coordinator
Federal Energy Technology Center
U.S. Department of Energy
P.O. Box 10940
Pittsburgh, PA 15236-0940

Re: Foreign Travel Report, "Particulate Emission Abatement in Kraków Boilerhouses," DE-FC22-94PC94111

Dear Sir or Madam:

Concerning foreign travel during the 4th quarter 1997 for this Cooperative Agreement, Mr. Jacek Ginter of EcoInstal visited LSR offices during the third week of October. The purpose of his visit was to conduct meetings concerning *Core Separator* installations, review performance testing, and plan for completion of another site in Kraków. If you require additional information, please let me know.

Sincerely,

S. R. Wysk

S. Ronald Wysk
Managing Director

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U.S. DEPARTMENT OF ENERGY
FEDERAL ASSISTANCE MANAGEMENT SUMMARY REPORT
OMB BURDEN DISCLOSURE STATEMENT

OMB Control No.
1910-0400

1. Program/Project Identification No.	2. Program/Project Title	3. Reporting Period
DE-FC22-94PC94111	Particulate Emission Abatement for Krakow Boiler Houses	10/1/97 through 12/31/97

4. Name and Address
LSR Technologies, Inc.
898 Main Street
Action, MA 01720-5808

5. Program/Project Start Date
April 1, 1994

6. Completion Date
9/30/98

7. FY 1997

8. Months or Quarters
Months/Quarters

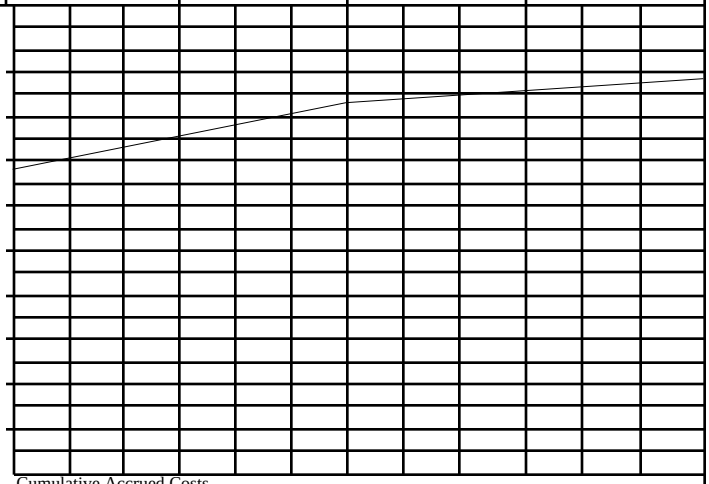
9. Cost Status a. Dollars Expressed in Thousands

b. Dollar Scale

10. Cost Chart

Fund Source		Quarter 1st	2nd	3rd	4th	Cum to Date	Tot Plan 1997
DOE	P	80.3	80.3	40.15	40.15	924.5	240.9
	A	80.3	80.3	40.15	40.15	880.2	200.8
LSR	P	80.3	80.3	40.15	40.15	924.5	240.9
	A	80.3	80.3	40.15	40.15	880.2	200.8
	P						
	A						
	P						
	A						
Total P							
Total A							
Variance							

P = Planned A = Actual



Cumulative Accrued Costs

		1st 1997 J	F	M	2nd 1997 A	M	J	3rd 1997 J	A	S	4th 1997 O	N	D
Total Planned Costs for Program Project	Planned	26.7	26.7	26.7	26.7	26.7	26.7	13.35	13.35	13.35	13.35	13.35	13.35
$156,744 - First Budget Period	Actual	26.7	26.7	26.7	26.7	26.7	26.7	13.35	13.35	13.35	13.35	13.35	13.35
$1,692,264 - Second Budget Period	Variance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

11. Major Milestone Status	Units Planned / Unites Complete
T2-1 Prototype Demonstration	P 100% / 100% C
T2-2 Commercial Units	P 90% / 90% C
T2-3 Establish JV	P 100% / 100% C
T2-4 Modernize Mfg. Facility	P 100% / 100%
T2-5 Tech. Training	P 100% / 100% C
	P / C
	P / C
	P / C
	P / C
	P / C

12. Remarks

13. Signature of Recipient and Date
S. R. Wyatt 1/26/98

14. Signature of U.S. Department of Energy (DOE) Reviewing Representative and Date