Particulate Emission Abatement for Krakow Boilerhouses

Technical Progress Report #12

Period: January 1, 1997 - March 31, 1997

April 30, 1997

Prepared for:

Federal Energy Technology Center
U.S. Department of Energy
P.O. Box 10940
Pittsburgh, PA 15236

DOE Project Manager

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Prepared by:

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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 more than 2,000 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 several 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 will support 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 be a subcontractor to LSR.

This project will be divided into three major phases. Phase 1 is called "Infrastructure Studies" and includes business planning, and site-selection of a full-scale *Core Separator* Demonstration Unit. Phase 2, 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. Such equipment cannot meet the emission standards of most industrial 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. Later, a joint venture company (JV) 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 twelfth quarter, i.e., January 1 - March 31, 1997.

Results and Discussion

The first quarter of 1997 has been relatively quiet, although a few significant items have taken place. The following is a summary of those items:

(1) A meeting of the U.S./Polish Steering Committee was held in Tampa, Florida, on January 13. Presentations of project status were made by three DOE contractors including LSR. LSR's presentation was made to satisfy concerns of certain steering committee members, especially related to project cost/financing. A full report of project expenditures and cost sharing was made to the committee. A similar summary was made of all commercial units (*Core Separators*) sold in Kraków and other regions of Poland. Several committee members seemed surprised, both in the number of contracts completed by EcoInstal and in the extent of cost sharing absorbed by EcoInstal and LSR. This was probably due to the fact that cost-sharing documentation from EcoInstal was given to us in December and very few people had access to this information.

(2) In our 11th Quarterly Progress Report, it was reported that a contract had been entered into with the Zorza Cooperative Heating Plant in Myslenice (a suburb of Kraków). This contract or, more accurately, *letter of intent*, encountered a serious setback due to the departure of a key employee of CTI Polska, the prime contractor for this project. EcoInstal, which completed all of the engineering drawings and began construction of *Core Separator* modules was not compensated for their work when the project was stopped. Just recently, it has been learned that the Board which oversees the coop is trying to obtain financing to continue the project. It consists of four small stoker boilers and the installation of new combustion controls and emission controls. If this project goes forward, we will have completed our obligations in Kraków and can close out our contract with DOE.

(3) The *Core Separator* installation for FIAT Auto Poland recently went into operation. No unusual problems were encountered and the startup was very successful. The dust collector system will be performance-tested in another two or three months, as is the Polish norm. This installation was not financed under the DOE project since it is located just outside of the Kraków Voivodeship. It is, however, quite important in that it is LSR's largest installation to date.

Work Scheduled for Next Quarter

The major milestone for the next quarter will be to put into place a contract with Zorza for the installation of four new dust collectors. The engineering for these units has already been completed, and all material has been procured. The remainder depends on financing.

The Zorza units, when operational, will fulfill LSR's obligations under our Cooperative Agreement for number of installations. Following this milestone, we intend to make preparations to close out our Cooperative Agreement. Full documentation of all costs and cost sharing will be prepared. However, LSR fully intends to continue doing business in all regions of Poland in the near and distant future.

LSR Technologies, Inc.

Environmental and Energy-Related Systems

May 6, 1997

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:

There was no foreign travel made during 1st quarter 1997 in conjunction with this Cooperative Agreement. 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	4/1/97 through 6/30/97

4. Name and Address	5. Program/Project Start Date
LSR Technologies, Inc. 898 Main Street Action, MA 01720-5808	April 1, 1994
	6. Completion Date: August 31, 1997 (est.)

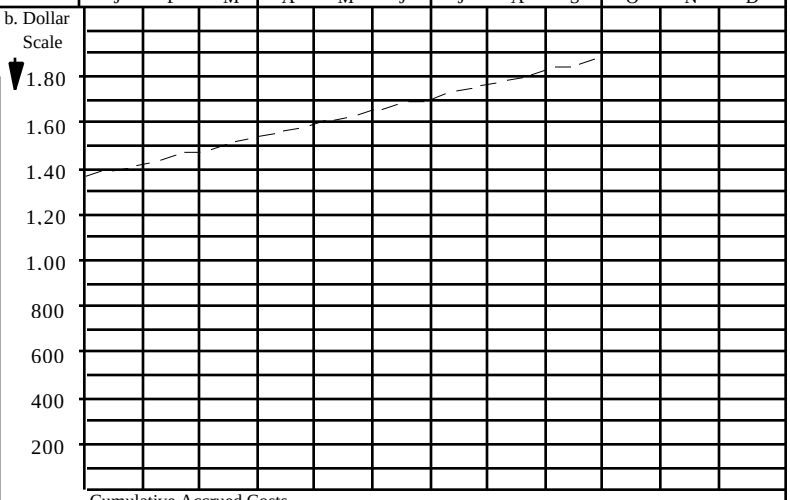
7. FY 1997 — 8. Months or Quarters: Months/Quarters

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	80.3	0.0	924.5	240.9
	A	80.3	80.3			844.1	160.6
LSR	P	80.3	80.3	80.3	0.0	924.5	240.9
	A	80.3	80.3			844.1	160.6
	P						
	A						
	P						
	A						
Total P							
Total A							
Variance							

P = Planned A = Actual



Total Planned Costs for Program Project		1st 1997 J	F	M	2nd 1997 A	M	J	3rd 1997 J	A	S	4th 1997 O	N	D
$156,744 - First Budget Period	Planned	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	0.0	0.0	0.0
$1,692,264 - Second Budget Period	Actual	26.7	26.7	26.7	26.7	26.7	26.7						
	Variance	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	Δ
T2-2 Commercial Units	P 75%	
	90% C	Δ
T2-3 Establish JV	P 100%	
	100% C	Δ
T2-4 Modernize Mfg. Facility	P 80%	
	80% C	Δ
T2-5 Tech. Training	P 80%	
	100% C	Δ
	P	
	C	
	P	
	C	
	P	
	C	

12. Remarks

13. Signature of Recipient and Date	14. Signature of U.S. Department of Energy (DOE) Reviewing Representative and Date
S. R. Wyde	