

# **Particulate Emission Abatement for Krakow Boiler Houses**

## **Quarterly Report April 1 - June 30, 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**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## **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 currently comprises over 78% of primary energy production. This project addresses the problem of airborne dust and uncontrolled particulate emissions from boiler houses, which represents 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 a medium-efficiency Electrostatic Precipitator (ESP). Yet, its cost is substantially lower than 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, located in Katowice, is a consulting organization with extensive expertise in the Polish economy and natural environment. FEWE will also be a subcontractor to LSR.

This project will be divided into three major phases. Phase 1 is called "Infrastructure Studies" and will include business planning, and site-selection of a full-scale Core Separator Demonstration Unit. Phase 2, called "Commercial Development", will include the first Demonstration Unit in a local boilerhouse, followed by several Core Separator installations collecting flyash from different Polish coals. Also, a manufacturing facility will be equipped to accommodate the projected sales volume. If the goals of this program are met, and the Core Separator can be successfully marketed, there is a potential to significantly reduce particulate emissions in Kraków.

## Table of Contents

Title Page.....	1
Disclaimer.....	2
Abstract.....	3
Table of Contents.....	4
Executive Summary.....	5
Introduction.....	5
Results and Discussion.....	6
Conclusion.....	7
Appendices:	
Foreign Travel Report.....	8
Cost Summary Report.....	9

## **Executive Summary**

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 boiler houses to substantially reduce particulate emissions, particularly those consisting of the fraction classified as PM10.

## **Introduction**

In this project, *Core Separator* technology will be demonstrated for boiler house applications in the Kraków region. Phase I entailed business planning and infrastructure studies to determine the market for this equipment. In the second phase which began in August 1995, the technology is to be demonstrated in several boilers of different capacity and firing various grades of coal. Later, a formal business relationship with a Polish partner 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 thirteenth quarter, i.e., March 1-June 30, 1997.

## Results and Discussion

The second quarter of 1997 has been slow. Since this project is nearing completion, LSR and EcoInstal have been trying to complete our contract obligations in Kraków. The following summarizes our present status.

- (1) EcoInstal has been working with Zorza Cooperative Heating Plant in the southern part of Kraków to install dust collectors on four stoker-fed boilers. Technical documentation including detailed engineering drawings were completed when the Board that oversees the Coop decided to suspend the project for financial reasons. It has yet to be decided if this project will proceed or not. EcoInstal has made a substantial investment at this plant which may not be recovered.
- (2) Another project that EcoInstal has pursued for more than one year is the Rzaska Boiler House on a military installation just East of Kraków. This seems to be another plant trying to obtain grants and free financing without putting up any of their own money. Technical documentation and engineering drawings were completed for two WR 2.5 boilers, again without any payment. This project is also in limbo for financial reasons.
- (3) A third possible project in Kraków involves the plant AMATURA for a large WR 10 boiler. EcoInstal seems to have more confidence in this project materializing than either Zorza or Rzaska.
- (4) The following is a list of additional *Core Separator* units located outside of Kraków that went into service in 1997:

<u>Company</u>	<u>Location</u>	<u>No. of Units</u>
Przed Robot Drogowych	Kutno	2
Kamax S.A.	Kanczuga	2
PDM	Koscian	1
Ekobud	Grudziadz	1
ExBud	Tarnow	<u>1</u>
		7

## **Work Scheduled for Next Quarter**

Efforts will continue to obtain contracts at either Zorza, Rzaska, or ARMATURA. The key element is the ability of the boiler house to obtain financing of which only 50% is needed. Unfortunately, many of the plants in Kraków are looking for 100% subsidized projects.

The final installation in Kraków 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 contract. Full documentation of all costs and cost sharing will be prepared. LSR fully intends to continue doing business in all regions of Poland after this project has been completed.