July 21, 1999

AAD Document Control
Federal Energy Technology Center
U.S. Department of Energy
PO Box 10940, MS 921-143
Pittsburgh, PA 15236-0940

Dear AAD Document Control:

Subject: Final Report for JSRP Task 1 – Air Quality: Mercury, Trace Elements, and Particulate Matter Conference; DOE Contract Agreement No. DE-FC26-98FT40321; Fund 4763

Please find enclosed one copy and an electronic version of the final report for the subject project entitled “JSRP Task 1 – Air Quality: Mercury, Trace Elements, and Particulate Matter Conference.” Also enclosed is the Request for Patent Clearance for Release of Contracted Research Documents.

If you have any questions, please feel free to contact me by phone at (701) 777-5124, fax at (701) 777-5181, or e-mail at slandis@eerc.und.nodak.edu.

Sincerely,

Sheryl E. Landis
Manager, Contracts and Intellectual Property
Business and Operations

Enclosure

SEL/drh

U.S. DEPARTMENT OF ENERGY
Federal Energy Technology Center

**REQUEST FOR PATENT CLEARANCE FOR
RELEASE OF CONTRACTED RESEARCH DOCUMENTS**

TO:

- For Technical Reports
AAD Document Control
U.S. Department of Energy - FETC
MS 921-143
P.O. Box 10940
Pittsburgh, PA 15236-0940

◆Contract Agreement No.
DE-FC26-98FT40321

Name & Phone No. of DOE COR

Thomas Brown (412) 386-4691

- For Technical Papers/Journal Articles/Presentations
Mark P. Dvorscak
U.S. Department of Energy
9800 S. Cass Avenue
Argonne, IL 60439
FAX: (630) 252-2779

A. CONTRACTOR ACTION (CONTRACTOR COMPLETES PART A. 1-5)

1. Document Title: Final Report for JSRP Task 1 – Air Quality: Mercury, Trace Elements, and Particulate Matter Conference; DOE Contract Agreement No. DE-FC26-98FT40321; Fund 4763
2. Type of Document: ☐ Technical Progress Report   ☒ Topical Report   ☐ Final Technical Report
☐ Abstract   ☐ Technical Paper   ☐ Journal Article   ☐ Conference Presentation
☐ Other (please specify): _____
3. Date clearance needed: _____
- ◆4. Patent information.
Yes	No	
☐	☒	Is any patentable subject matter disclosed in the report?
☐	☐	If so, has an invention disclosure been submitted to DOE Patent Counsel? If yes, identify disclosure number or DOE Case Number _____
☐	☒	Are there any patent-related objections to the release of this report? If so, state the objections. _____ _____

- ◆5. Signed _____ Date July 21, 1999
(Contractor)

Name & Phone No. Sheryl E. Landis, Manager, Contracts and Intellectual Property (701) 777-5124

Address Energy & Environmental Research Center, PO Box 9018, Grand Forks, ND 58202-9018

B. DOE PATENT COUNSEL ACTION

- ☐ Patent clearance for release of the above-identified document is granted.
☐ Other: _____

Signed _____ Date _____
(Patent Attorney)

◆ Must be completed by the contractor.

JSRP TASK 1 – AIR QUALITY: MERCURY, TRACE ELEMENTS, AND PARTICULATE MATTER CONFERENCE

Final Report

For the period of February 11, 1998, to March 31, 1999

Prepared for:

U.S. Department of Energy
Federal Energy Technology Center
626 Cochran's Mill Road
PO Box 10940, MS 922-273C
Pittsburgh, PA 15236-0940

Cooperative Agreement: DE-FC26-98FT40321
Performance Monitor: Thomas D. Brown

Prepared by:

John H. Pavlish
Steven A. Benson

Energy & Environmental Research Center
University of North Dakota
PO Box 9018
Grand Forks, ND 58202-9018

99-EERC-07-07

July 1999

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.

This report is available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; phone orders accepted at (703) 487-4650.

ACKNOWLEDGMENT

This report was prepared with the support of the U.S. Department of Energy (DOE) Federal Energy Technology Center Cooperative Agreement No. DE-FC26-98FT40321. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors(s) and do not necessarily reflect the views of DOE.

EERC DISCLAIMER

LEGAL NOTICE This research report was prepared by the Energy & Environmental Research Center (EERC), an agency of the University of North Dakota, as an account of work sponsored by the U.S. Department of Energy Federal Energy Technology Center, the U.S. Environmental Protection Agency through the EERC Center for Air Toxic Metals, and Northern States Power Company. Because of the research nature of the work performed, neither the EERC nor any of its 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 or recommendation by the EERC.

JSRP TASK 1 – AIR QUALITY: MERCURY, TRACE ELEMENTS, AND PARTICULATE MATTER CONFERENCE

ABSTRACT

This final report summarizes the planning/preparation, facilitation, and outcome of the conference entitled “Air Quality: Mercury, Trace Elements, and Particulate Matter” that was held December 1–4, 1998, in McLean, Virginia (on the outskirts of Washington, DC). The goal of the conference was to bring together industry, government, and the research community to discuss the critical issue of how air quality can impact human health and the ecosystem, specifically hazardous air pollutants and fine airborne particles; available and developing control technologies; strategies and research needs; and an update on federal and state policy and regulations, related implementation issues, and the framework of the future.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1.0 BACKGROUND	1
2.0 GOALS/OBJECTIVES	1
3.0 CONFERENCE PLANNING, PREPARATION, AND FACILITATION	2
3.1 Conference Planning	2
3.2 Technical Program Development	3
3.3 Conference Mailings/Marketing	4
4.0 CONCLUSION	5
5.0 REFERENCES	6

JSRP TASK 1 – AIR QUALITY: MERCURY, TRACE ELEMENTS, AND PARTICULATE MATTER CONFERENCE

EXECUTIVE SUMMARY

Through Energy & Environmental Research Center (EERC) programs such as the Center for Air Toxic Metals (CATM), the EERC has been positioned globally as one of the leading groups on issues related to mercury and other trace elements associated with fine particles. Drawing on this expertise, the EERC, along with the U.S. Environmental Protection Agency (EPA) through the EERC's CATM, and the U.S. Department of Energy Federal Energy Technology Center collaboratively organized and sponsored a conference on Air Quality: Mercury, Trace Elements, and Particulate Matter that took place December 1–4, 1998, in Tysons Corner, McLean, Virginia.

With recent promulgation of more stringent fine-particle regulations and the final release of two EPA reports to Congress, much controversy and discussion regarding the need to regulate have been generated. The goal of this conference was to bring government, industry, and the research community together to discuss the critical issues of how air quality can impact human health and the ecosystem, specifically hazardous air pollutants and fine airborne particles; available and developing control technologies; strategies and research needs; and an update on federal and state policy and regulations, related implementation issues, and the framework of the future.

The conference was attended by over 200 individuals from 31 states and the District of Columbia, as well as three Canadian provinces, the United Kingdom, and Australia. The goal of pulling together industry, research, government, and academia was certainly fulfilled, as final demographic results indicate that industry representatives made up the majority of conference attendees at 38%, followed closely by government at 34%, and research at 18%. The remaining attendees consisted of academia, press, lawyers, and consultants. We received numerous comments from attendees regarding the excellence of the conference, including the following:

“The guest speakers were excellent.”

“The conference served to define the cutting edge for mercury.”

“Best source of information on some of the more controversial issues of our age.”

“Excellent source of current information.”

“The conference was well organized, had knowledgeable speakers, and provided valuable information, both technical and otherwise, to all. The clear message (or at least one) is to strike a balance between policy and science and to continue valuable research on air quality issues.”

Highlighted conference presentations included keynote addresses by U.S. Secretary of Energy Bill Richardson on “Air Quality in the Future of Power Generation” and U.S. Senator Kent Conrad on “Making Public Policy in the Face of Uncertainty: The Need for Solvent Scientific Information” as well as a banquet address by Dirk Forrister, Chairman of the White House Climate Change Task Force.

Plans are currently under way for Air Quality II.

JSRP TASK 1 – AIR QUALITY: MERCURY, TRACE ELEMENTS, AND PARTICULATE MATTER CONFERENCE

1.0 BACKGROUND

Human health and the ecosystem are impacted by air quality, specifically hazardous air pollutants (HAPs) and particulate matter (PM). Human exposure to mercury has been associated with serious neurological and development effects, especially for women of child-bearing age. Epidemiological information indicates a direct relationship between human mortality rates and the mass of less than 2.5-micron-size particles (PM_{2.5}) in the air. Studies to assess mercury and other hazardous air pollutants have been conducted in response to the 1990 Clean Air Act Amendments. Recently, two final reports were submitted by the U.S. Environmental Protection Agency (EPA) to Congress: the *Mercury Study Report to Congress* (December 1997) and the *Study of Hazardous Air Pollutants Emissions from Electric Utility Steam Generating Units – Final Report to Congress* (February 1998). For some sources, HAP emission standards have been issued, while for others, more research is still needed. EPA has promulgated rules revising the primary and secondary national ambient air quality standards. PM standards have been expanded by adding new annual and 24-hour PM_{2.5} standards. Over the past several years, an enormous amount of research has been conducted by government, industry, and the research community, including the Energy & Environmental Research Center (EERC) Center for Air Toxic Metals (CATM) program.

The conference was specifically aimed at addressing key issues facing many industrial sources, in particular, the utility power sector. Coal combustion is the primary source of anthropogenic mercury emissions in the United States, accounting for 72 tons/yr of the 158 tons/yr of total point-source mercury emissions (1). Mercury from coal-fired utilities is the HAP of greatest potential public health concern (2). Many research and development organizations, including the EERC, are striving to develop effective and economical mercury control technologies and predictive mercury speciation models for coal-fired utility boilers. Recent regulatory actions and congressional reports have prompted much controversy and discussion regarding the need to regulate. Discussion is needed on whether appropriate cost-effective technologies are available to meet suggested emission reductions. The intent of this conference was to bring together all interested parties from government, industry, environmental groups, and the research community to further discuss and resolve critical questions concerning health risks, policy and regulatory actions, transformations and pathways, sampling and measurement of emissions, predictive modeling, and related control technologies.

2.0 GOALS/OBJECTIVES

The goal of this project was to coordinate and conduct a conference focused on key issues related to trace elements and fine particles that would be widely attended by government, industry, environmental groups, and the research community to inform, discuss, and resolve critical questions concerning health risks, policy and regulatory actions, source emissions,

transformations and pathways, sampling and measurement of emissions, predictive modeling, and related control technologies. Specific objectives and agenda items for the conference were as follows:

- An update on policy and regulations regarding trace elements and particulate matter
- A review of the effects of trace elements and particulate matter on human health and the environment
- Identification of potential sources of emissions and actions taken by industry
- Developmental and commercial technologies available to control the emission of trace elements and particulate matter
- Application of innovative sampling and analysis methods, focused on providing information for source apportionment
- Presentation of new scientific data related to atmospheric reaction mechanisms, transport, and deposition
- A review of current atmospheric and source-modeling methodologies
- Panel discussion to identify future directions and research needs for mercury and particulate matter

3.0 CONFERENCE PLANNING, PREPARATION, AND FACILITATION

3.1 Conference Planning

Planning for the conference was initiated in February 1998 with the establishment of a time line for the major tasks involved. Funding and cosponsors were established, and conference technical coordinators were determined from each of the conference sponsoring organizations, including Thomas Brown, U.S. Department of Energy Federal Energy Technology Center; William Stelz, EPA; and Steven Benson and John Pavlish, EERC CATM. Their input was incorporated as a preliminary agenda for the conference was developed; a preferred location of the Washington, DC, area was selected; and two optional dates for holding the conference were determined. With these criteria in place, a site visit for hotels in the Washington, DC, and Baltimore areas was conducted during the last week of February 1998. After a comparison of viable hotels, preferred space/layouts, and dates available, the conference date and location were decided upon for December 1–4, 1998, at the McLean Hilton in McLean, Virginia (on the outskirts of Washington, DC).

3.2 Technical Program Development

With the date and location established, attention turned to development of the technical program during the month of March. An opening session followed by six technical sessions and two closing panels with associated session goals were finalized as follows:

- Opening Session – Welcomes and Keynote Speakers
- Session 1: Health Effects – Provide an overview and explore newly found effects of trace elements and particulate matter on human health and the environment.
- Session 2: Policy and Regulations – Provide an update on federal and state policy and regulations, related implementation issues, and the framework of the future.
- Session 3: Industry Perspective: Challenges and Solutions – Present case studies on industrial source emissions and/or actions taken by industry.
- Session 4: Pollution Prevention and Control Technologies – Discuss the developmental and commercial status of technologies and strategies for control of the emission of trace elements and particulate matter.
- Session 5: Measurement/Characterization – Discuss the application of innovative sampling and analysis methods, focused on providing information related to source emissions and apportionment.
- Session 6: Transport, Atmospheric Reactions, and Modeling – Present current scientific data related to formation of chemical species and fundamental reaction mechanisms; transport and atmospheric deposition, source modeling methodologies, assumptions, and limitations; and identification of research and development (R&D) needs.
- Environmental Policy Panel – Representatives of key committees of the U.S. Congress, administrative departments and agencies of federal and state government, environmental advocacy groups, and industry will address the competing environmental and economic priorities shaping future regulatory action and enabling R&D.
- Science and Technology Panel – Leading experts representing health and environmental sciences, state and federal regulators, and technologists involved with control measures will focus on mercury and other trace element emissions and fine respirable particulates (PM_{2.5}) to review the issues defining what can and should be done to deal with these air pollutants.

A team of researchers affiliated with the EERC was appointed as session coordinators (one for each of the six sessions), and the EERC's principal research advisor was appointed to serve as session coordinator for the panel sessions. At this time, it was also determined that a poster session would be beneficial and that a call for posters would be included in the initial conference

mailing. An additional EERC researcher was appointed as coordinator for the poster session after the receipt of several dozen abstract submittals.

Several meetings and conference calls were held with the technical and session coordinators to brainstorm a list of names for potential speakers and chairs associated with each session, as well as panelists and moderators for the panels. Discussions were made regarding suggested names for session chairs, a consensus was reached, and invitations sent out. Upon receiving agreements from the chairs, the coordinators worked closely with them to review previously suggested names for speakers and pull in additional suggestions by the chairs to develop the speakers/topics for each session. Session chairs were actively involved in discussions with potential speakers and their individual session coordinators, who issued invitations to speakers as appropriate.

3.3 Conference Mailings/Marketing

While the development of the technical program was taking place, mailing lists from several sources were compiled in preparation for the conference mailings. The initial conference announcement and call for papers was distributed in late April to a mailing list of 10,000 and at several conferences, including:

- Air and Waste Management Association
- Pittsburgh Coal Conference
- Power Generation Conference
- American Chemical Society
- International Symposium on Combustion
- Spectrum 98—Conference on Hazardous Waste Management
- Symposium on Measurement of Air Toxics and HAPs

The conference was also advertised in the following newsletters, magazines, journals, etc., to run in their individual Event Calendars from May through December 1998:

• <i>Elsevier Event Line</i>	• <i>Coal Week</i>
• <i>Power Generation</i>	• <i>Coal Outlook</i>
• <i>National Mining Association</i>	• <i>Eastern Europe Business Information Center</i>
• <i>Alternate Fuel News</i>	• <i>EM</i>
• <i>American Gas Association Newsletter</i>	• <i>Energy Daily</i>
• <i>Chemical Engineering</i>	• <i>IEA Coal Research</i>
• <i>Chemical Engineering Progress</i>	• <i>Journal of Commerce</i>
• <i>Coal Magazine</i>	• <i>Pollution Engineering</i>
• <i>AMC Journal</i>	• <i>Environmental Progress — AIChE</i>
• <i>ASEAN Journal</i>	• <i>Journal of Coal Quality</i>
• <i>Chemical Engineering News</i>	• <i>Oil & Gas Journal</i>
• <i>Coal & Synfuels Technology</i>	• <i>Power Magazine</i>
• <i>Coal People Magazine</i>	• <i>Power Engineering</i>
• <i>Coal Tech International</i>	• <i>Scientific Information Service, Inc.</i>

- *Coal Voice*
- *Department of the Interior Office of Surface Mining*
- *ECOAL — World Coal Institute*
- *Energy Conference and Symposia*
- *The Pace Synthetic Fuels Report*
- *Resource Recovery Report*
- *Technology Transition Corporation*
- *The Petroleum Independent*

In addition, the following press releases were sent out:

- October 21 – “Air Quality Experts to Meet for International Conference”
- November 19 – “Energy Secretary Richardson to Speak at DOE–EPA–EERC Air Quality Conference”
- November 30 – “Vice President Al Gore to Speak at Air Quality Conference Dec. 1”

The final preconference brochure was sent out to a mailing list of over 11,000 in early October, and a final conference brochure was provided to conference attendees as part of their registration packet. The final program can be accessed at the EERC’s Web site, www.eerc.und.nodak.edu or by contacting the EERC.

4.0 CONCLUSION

The conference was attended by over 200 individuals from 31 states and the District of Columbia, as well as three Canadian provinces, the United Kingdom, and Australia. The goal of pulling together industry, research, government, and academia was certainly fulfilled, as final demographic results indicate that industry representatives made up the majority of conference attendees at 38%, followed closely by government at 34%, and research at 18%. The remaining attendees consisted of academia, press, lawyers, and consultants. We received numerous comments from attendees regarding the excellence of the conference, including the following:

“The guest speakers were excellent.”

“The conference served to define the cutting edge for mercury.”

“Best source of information on some of the more controversial issues of our age.”

“Excellent source of current information.”

“The conference was well organized, had knowledgeable speakers, and provided valuable information, both technical and otherwise, to all. The clear message (or at least one) is to strike a balance between policy and science and to continue valuable research on air quality issues.”

Proceedings can be obtained by contacting the EERC. A special issue of *Fuel Processing Technology* with copies of peer-reviewed papers that were presented at the conference is also in process at this time.

A further indication of the success of the conference is in the requests for information regarding the next Air Quality Conference, of which we have received several. Initial plans are under way for an Air Quality II Conference, possibly for the spring of 2000.

5.0 REFERENCES

1. U.S. Environmental Protection Agency. *Mercury Study Report to Congress, Volume I: Executive Summary*, Office of Air Quality Planning and Standards and Office of Research and Development, Dec 1997.
2. U.S. Environmental Protection Agency. *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units Final Report to Congress: Executive Summary*, Office of Air Quality Planning and Standards and Office of Research and Development, Feb 1998.