

## STATEMENT OF CONSIDERATIONS

REQUEST BY PRAXAIR, INC., FOR AN ADVANCE WAIVER OF DOMESTIC AND FOREIGN INVENTION RIGHTS UNDER DOE COOPERATIVE AGREEMENT NO. DE-FC26-01NT41147; W(A)-03-024, CH-1148

The Petitioner, Praxair, Inc. (Praxair), was awarded this cooperative agreement for the performance of work entitled, "Advanced Oxyfuel Boilers and Process Heaters for Cost-Effective CO<sub>2</sub> Capture and Sequestration" The purpose of the cooperative agreement is to develop and commercialize a high efficiency boiler or process heater that can provide a CO<sub>2</sub>-rich product stream that can be inexpensively purified and compressed for sequestration. This boiler should provide a system with low greenhouse gas and other pollutant emissions, and have higher system efficiencies than currently available technology. This novel concept of integrating oxygen transport membranes (OTM)s with combustion systems is the basis for this program. The program will initially focus on a conceptual design effort that will evaluate current system design concepts for the integrated system to identify the optimal design based on technical performance and commercialization potential. These efforts will include an analysis of the impacts of the various designs on CO<sub>2</sub> capture costs. The program will also consist of a number of experimental and modeling efforts to select, characterize, and develop combustion strategies and configuration. A conceptual design for a laboratory scale 0.15-0.30 MWt (0.5-1 MMBtu/h) boiler simulator will be developed to establish a foundation for continued commercial development after completion of the program.

The total estimated cost of the cooperative agreement is \$5,836,482, with the DOE share being \$4,085,538, or 70%, while the remaining cost share of 30%, or \$1,750,944, will be provided by Praxair. The period of performance is forty eight (48) months, from January 1, 2002 through December 31, 2005.

In its response to question 4 of the attached waiver petition, Praxair has described its technical competence in the field of oxygen transport membranes and CO<sub>2</sub> capture and sequestration. Praxair details its substantial oxy-fuel combustion experience, including about 100 U.S. Patents in the last 20 years. Praxair has teamed with Department of Energy Laboratories in a CRADA to explore how various oxygen techniques and system integration strategies impact the economics of a boiler conversion to oxy-fuel firing. Praxair also details its experience in ceramic membrane technology, including powder synthesis, element fabrication, coating technologies, materials, process cycles, OTM Reactor design, and vertical integration. These competencies are detailed in response to question 4, and a list of relevant Praxair patents is attached to the petition as Appendix A. Praxair's response fully demonstrates its technical competency in the field of oxygen transport membranes and carbon dioxide production.

In its response to question 9 of the attached waiver petition, Praxair states it is one of five major worldwide industrial gas suppliers, currently including Air Products and Chemicals, British Oxygen Group, Air Liquide and Linde AG. Each firm has development programs in carbon dioxide production. While Praxair expects the development of ceramic membranes (OTM) to ultimately reduce the cost of carbon dioxide ceramic production, granting Praxair a waiver will increase its incentive to rapidly commercialize the technology to benefit the U.S. economy and create another carbon dioxide supply alternative in the market place. It is believed that this will increase competition, lowering the cost of carbon dioxide supply by all supply methods, thereby bringing additional benefits to the U.S. economy. Therefore grant of the waiver will have a positive effect on competition and market concentration.

The subject cooperative agreement will be modified to add the Patent Rights--Waiver clause in conformance with 10 CFR 784.12, wherein Praxair has agreed to the provisions of 35 U.S.C §§ 202, 203, and 204. This waiver clause will also include a paragraph entitled U.S. Competitiveness, in which Praxair agrees to substantial U. S. manufacture of subject inventions (attached hereto). Additionally, Praxair agrees not to transfer subject inventions to any other entity unless that other entity agrees to these same requirements. The petitioner has further agreed to modification of the data clause of the subject cooperative agreement (48 C.F.R. 952.227-14) by adding paragraph (k), Alternative VI, concerning contractor licensing of data

Considering the foregoing, it is believed that granting the waiver will provide the Petitioner with the necessary incentive to invest resources in the commercialization of the results of the agreement in a fashion which will make the agreement's benefits available to the public in the shortest practicable time. In addition, it would appear that grant of the above requested waiver would not result in an adverse effect on competition nor result in excessive market concentration. Therefore, in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver, as set forth above, be granted.

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Mark P. Dvorscak  
Assistant Chief Counsel  
Intellectual Property Law Division

Date: July 2, 2003

Based on the foregoing Statement of Considerations and the representations in the attached waiver petition, it is determined that the United States and the general public will best be served by a waiver of rights of the scope described above, and therefore the waiver is granted. This waiver shall not apply to any modification or extension of this agreement, where through such modification or extension, the purpose, scope, or cost of the agreement is substantially altered.

CONCURRENCE:

[Redacted signature]

George Rudins  
Deputy Assistant Secretary  
Office of Fossil Energy  
Coal and Power Systems

APPROVAL:

[Redacted signature]

Paul A. Gottlieb  
Assistant General Counsel  
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