

### STATEMENT OF CONSIDERATIONS

Request by Praxair, Inc. for an advance waiver of domestic and foreign rights to inventions made under Contract No. DE-FC04-96AL89608 entitled "Waste Heat Driven Thermal Swing Oxygen Production System" between Praxair, Inc. and the U.S. Department of Energy. W(A)96-024.

Petitioner Praxair, Inc. has requested a waiver of all domestic and foreign patent rights to inventions which it may conceive or first reduce to practice in the course of work under Contract DE-FC04-96AL89608 entitled "Waste Heat Driven Thermal Swing Oxygen Production System" with the U.S. Department of Energy (DOE).

The work to be done is to implement a development program that will demonstrate the waste heat driven thermal swing adsorption (TSA) process as a commercially economical oxygen producing system for industries using oxyfuel furnaces. The program consists of three phases: (1) to characterize and evaluate available adsorbent materials and systems; (2) to design, fabricate, and test a pilot scale system; and (3) to demonstrate the system at a commercial location.

The contract covers a period of four years at a cost of approximately \$3.98 million. The three phase program will consist of a one year evaluation period, a two year pilot plant period, and a one year commercial demonstration period. The government contribution will be funded by the Office of Industrial Process Systems under B&R code ED2102 to the extent of \$174,000, \$500,000, and \$0 for each phase, respectively. The parallel Praxair contribution will be \$339,455, \$1,186,696, and \$1,775,408, adding up to \$3,301,559 or 83% of the total contract cost. The stated program period runs from October 1, 1996 to September 30, 2000. However, the actual start date has not yet been fixed.

Praxair has had a continuing research and development effort relative to adsorption separation technology since the 1950's. It has worked on materials, processes, and systems associated with the commercial plants that it has provided worldwide. The programs involved have represented over 200 man-years of effort. In 1996, 15 man-years and \$2.6 million were expended on the technology. Praxair holds 36 patents and pending patent applications and has published or participated in over 20 articles, presentations, and seminars in the adsorption technology area.

Praxair, formerly the Linde Division of Union Carbide Corporation, is the world's largest supplier of oxygen producing systems utilizing pressure swing adsorption (PSA). These PSA and vacuum pressure swing adsorption (VPSA) systems provide an alternative to liquid oxygen delivery and can be used anywhere for waste treatment, metal treatment, metal production, combustion, and other applications. To carry out these activities, Praxair has built up the necessary organization that includes research and development, engineering, marketing, and sales groups. It can properly analyze customers' needs and provide competitive plant offerings. The grant of the requested waiver will allow Praxair to completely assimilate the temperature swing adsorption (TSA) technology into its organization and thus enhance commercialization efforts. The requirements of each customer will be reviewed and the best PSA, VPSA, or TSA oxygen supply system will then be designed and provided to satisfy the customer's needs.


The work performed under the contract and any invention that may result from it should not adversely impact public health, safety or welfare; rather, the increased availability of industrial quantities of oxygen in remote locations would facilitate certain desirable applications such as waste treatment.

Praxair agrees to abide by 35 U.S.C. §§ 202, 203, and 204, and has accepted the terms and conditions of the Standard Patent Rights Clause for an Advance Waiver. Praxair further agrees that any product embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States, unless it can show to the satisfaction of DOE that it is not commercially feasible to do so. Praxair will abide by the Export Control laws and will remind its licensees, if any, to do the same.

Praxair states that the grant of the waiver will not decrease competition, cause undesirable market concentration, or place Praxair in a dominant market position. Praxair is one of four major worldwide industrial gases suppliers, which include Air Products and Chemicals, the British Oxygen Group, and L'Air Liquide. Each of these firms has its own adsorption systems for gas separations and each has an aggressive technology development and marketing program. Hence, any significant improvement by any firm is most likely to be counteracted by developments from the other firms. However, the granting of the waiver to Praxair will allow Praxair maximum flexibility to commercialize the temperature swing adsorption system.

Considering, finally, Petitioner's pioneering and on-going contribution to the gas separation art, its existing manufacturing, marketing, and sales organization and experience in the related pressure swing adsorption and vacuum pressure swing adsorption processes and equipment, and considering further that the marketing of any new thermal swing oxygen system that may arise from the work under the new contract will be most easily commercialized by assimilation into Praxair's PSA and VPSA lines, it is concluded that the grant of the requested waiver is most likely to achieve commercial success of such inventions in the shortest possible time.

Accordingly, on the basis of the above fact and representations and upon evaluating the petition in view of the foregoing objectives and the considerations set forth in 41 CFR 9-9.109-6, all of which have been considered, it is recommended that the requested waiver be granted.



Armand McMillan  
Patent Attorney

Date: 12/13/96

Based on the foregoing Statement of Considerations and the representations made in the attached Petition, it is determined that the interests of the United States and the general public will be best served by grant of the requested waiver and, therefore, the waiver of patent rights of the scope described above is hereby granted. This waiver does not apply to any modification or extension of the Agreement other than those described in this Statement, when through such modification or extension the purpose, scope, or funds applied to the Agreement become substantially altered.

CONCURRENCE:



Diane E. Bird  
Director, Office of Development and  
Technology Transfer

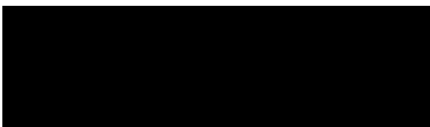
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Douglas E. Kaempf  
Director, Office of Industrial Process  
System, EE-22, HQ

Date: \_\_\_\_\_

APPROVAL:



Paul A. Gottlieb  
Assistant General Counsel for Technology  
and Intellectual Property, GC-42, HQ

Date: 1-24-97

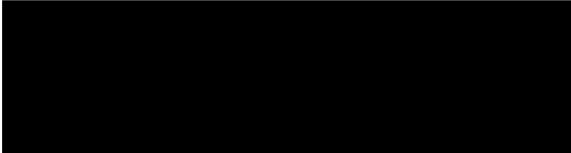
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Diane E. Bird  
Director, Office of Development and  
Technology Transfer

Date: \_\_\_\_\_

  
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Douglas E. Kaempf  
Director, Office of Industrial Process  
System, EE-22, HQ

Date: 1/21/97

APPROVAL:

\_\_\_\_\_  
Paul A. Gottlieb  
Assistant General Counsel for Technology  
and Intellectual Property, GC-42, HQ

Date: \_\_\_\_\_

## WAIVER ACTION - ABSTRACT

DOCKET NO.

W(A)96-024

REQUESTER

Praxair, Inc.

CONTRACT SCOPE OF WORK

Contract No. DE-FC04-96AL89608  
Thermal swing oxygen production  
system

RATIONALE FOR DECISION

Petitioner has vast experience in gas separation systems and can integrate any subject invention into its marketing of such systems to achieve early commercialization.