



# Project Summary

## Investigation of Ammonia Equipment Configurations for Supermarket Applications

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**The report gives results of a study that provided information regarding the merits of using ammonia with a secondary brine loop for supermarket refrigeration systems. The ammonia systems were compared with an equivalent R-22 system. The models used in the study are provided with the final report.**

***This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).***

### The Program

The objectives of this project were to quantify the advantages and disadvantages of using ammonia with a secondary brine refrigerant compared to R-22 in supermarket refrigeration applications. These objectives were achieved by numerical experiments using simulations. Mechanistic models of refrigeration system compo-

nents were used, based on fundamental principles, accepted heat transfer/pressure drop correlations, and available manufacturers' data. Available thermodynamic and transport property data correlations for ammonia and R-22 were used in the models. The parameters of these models were varied to determine their effect on system performance and locate optimum values. A modular approach was used in which each component was separately modeled allowing simple changes in system configurations.

The combined component models resulted in a large set of coupled nonlinear algebraic equations for the quasi-steady systems that did not involve brine storage. The systems involved differential and algebraic equations. These equations were solved using the general-purpose simulation programs EES and TRNSYS. EES is a robust nonlinear equation-solving program with built-in thermophysical property data. TRNSYS is a sequential modular simulation program that employs schemes to solve coupled algebraic and differential equations.

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*The complete report and diskette, entitled "Investigation of Ammonia Equipment Configurations for Supermarket Applications," (Order No. PB95-502555; Cost: \$90.00, subject to change) will be available only from:*

*National Technical Information Service*

*5285 Port Royal Road*

*Springfield, VA 22161*

*Telephone: 703-487-4650*

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EPA/600/SR-95/028

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