PRELIMINARY REPORT ON W.I.F.S.

INTRODUCTION:

Wax Impregnated Foam System was designed to produce on a mass-production level, paraffin impregnated expanded polystyrene sheets for evaporation suppression. Preliminary results under small-scale laboratory conditions indicated sufficient impregnation under low pressure conditions that would make a large-scale system feasible.

PRELIMINARY RESULTS:

A variety of combinations of types of wax and types of foam were run in pressure vessels under various conditions of temperature, pressure and time. It was found that common commercial grade paraffin was readily obtainable and cost-effective at a density of 5-15 pounds per cubic foot of foam. To achieve this density required less than 10 psi pressure and a run time less than 30 minutes. Wax temperature was kept below 200°F but was not critical except at higher temperatures where deformation of expanded polyst_____ occurs.

DESIGN:

With only preliminary results as a guide, a system was designed to duplicate the conditions achieved in the laboratory, i.e. a pressure vessel capable of 10 psi and 200°F for 1/2 hour containing 48 cubic feet of expanded polyst_____. Whereas the small experiments required little in the way of auxiliary systems, it was soon realized that a production system had more stringent requirements. Not only are the quantities much larger (300-400 pounds of wax per run) but the energy (efficiency and requirements) become critical. A drawing and description of the system installed at the WRRC laboratory is shown.

MODIFICATIONS:

Transfering wax from solid blocks into the impregnation chamber required a preheater, heater, pump and transfer lines between preheater, pump, heater and chamber. To avoid an impossibly complicated valve system, three flexible

hoses were used to connect the parts of the system under use at each step of the process. The problem arose of solidification of wax at valve body and pump causing malfunctions. Insulation was tried but failed to prevent solidification. Electrical resistance element in the form of flexible insulated types work but require some thermostatic control. No apparent problems involve the flexible hose except for integrity of the fittings. Once the solidification problem arose, it was obvious that the steel pressure chamber would be subject to s similar problem. The solution seems to be to insulate the external surface adequately and preheat the metal prior to introducing the wax and foam. As a general solution to the heat retention problem, a shelter was constructed that will be insulated to maintain a high environmental temperature during production. Personnel will not be necessary inside, except rarely, to regulate valves, load and unload, etc. However, the structure itself complicates access to the system and on one occasion has presented a safety hazard. Further modification will be necessary as circumstance demands.

SUGGESTIONS:

Step-by-step evaluation of system components will spotlight weaknesses. Modifications of the system that provide safety or convenience should be encouraged. Liquid wax is difficult to handle and flammable, making operator conscientiousness critical. During initial testing two operators would be advisable to share duties and limit hardships and accidents. There will be continual modifications as new situations arise. However, this should not justify postponing operations any longer than necessary. In my estimation, production of wax-impregnated foam sheets can be started on a trial basis by March 11.

Steve