Monthly Progress Report
1 December - 30 December 1961

CONDENSER HEAT REJECTION SYSTEMS

Prepared for

Technical Director
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1. SUMMARY

During the past reporting period testing of large diameter (0.75" i.d.) spray condensers was continued. A transparent mixing section constructed of quartz was used to enable flow visualization. High speed motion pictures (5000 fps) were taken of the condensation process to gain insight into the physical processes occurring. Modifications to the turbulating sections of the liquid lines enabled the flow rates of 3600 lb/hr liquid and 214 lb/hr vapor to be tested. Previous maximums were 2000 lb/hr for liquid and 124 lb/hr for vapor.

With these increases the maximum pressure rise attained was increased from 1.7 to 7.0 psid, which occurred at a value of mass flow ratio of liquid to vapor of 16. The ratio of pressure rise to injected kinetic energy, I_a^o, is within $\pm$ 20 percent of theoretical for all test runs with the interface at the throat inlet. The highest value of I_a^o during this test series was 3.3 which was obtained for the test run resulting in the pressure rise of 7.0 psid.

Two major failures of loop components occurred during this period which reduced the time available for testing. The pump bearings failed (after 8 months operation) and during a later run a boiler heater burned out, arcing to the boiler wall and causing a large mercury spill. It is estimated that a total of 1-1/2 to 2 weeks were lost due to subsequent shutdown, repair and start up for these two occurrences. However, the components have been repaired and testing is proceeding.

Design of the multitube test apparatus has been completed and fabrication was begun during the last report period.

2. LABOR HOURS

During the period 2 December 1961 to 30 December 1961 a total of 788.50 labor hours were expended.

3. FUTURE EFFORTS

During the next reporting period the following progress is anticipated:

a. Continued testing of large diameter spray condensers

b. Initial installation of multitube test unit

c. Analysis of test data

Figure 1 furnishes a comparison of technical effort estimated at the inception of the four-month extension with that actually expended.