

Office Memorandum • UNITED STATES GOVERNMENT

BUCKET INC.

50-39

TO : H. L. Price, Director
Division of Licensing and Regulation

DATE: JUN 4 1959

FROM : Marvin M. Mann, Assistant Director for Compliance
Division of Inspection *m*

SUBJECT: CURTISS-WRIGHT RESEARCH REACTOR

SYMBOL: INS:PAM

Attached is Division of Inspection Report CF-112 concerning the subject reactor. Operation of the reactor appears to have been in compliance with the terms and conditions of the license, as amended, and with the rules and regulations of the Commission, and to have presented negligible risk of hazard to the health and safety of the public.

In view of the language of the original license and Amendment No. 2, in particular, and our observation that the primary and secondary cooling systems are installed and operable, we believe that Curtiss-Wright is now authorized to operate the reactor continuously at one megawatt, under the terms of its license, as amended, and the rules and regulations of the Commission.

We make no recommendation concerning this reactor at this time.

Attachment:

Div. of Inspection Report
CF-112, Copy No. 2

D-150

UNITED STATES
ATOMIC ENERGY COMMISSION

**DIVISION
OF
INSPECTION**

REPORT

U. S. ATOMIC ENERGY COMMISSION
DIVISION OF INSPECTION
REPORT CP-112

By: Peter A. Morris, Inspection Specialist
Division of Inspection, Hq.

Date: JUN 4 1959

Title: CURTISS-WRIGHT RESEARCH REACTOR

SUMMARY

A visit was made to the Curtiss-Wright Corporation swimming pool reactor, in Quehanna, Pennsylvania, on May 28, 1959, to review the status of changes made and to be made to the facility as described in applications for a construction permit and a license amendment (dated March 9, 1959 and April 27, 1959, respectively; not yet approved). The reactor had not been operated between March 23, 1959 and May 25, 1959. Changes to the primary coolant system and installation of the secondary coolant system were accomplished during this interval. "Zero" power operation of the reactor took place on May 26, 1959.

DETAILS

1. Scope of Visit

A visit was made to the Curtiss-Wright research reactor at Quehanna, Pennsylvania, on May 28, 1959, by Dr. P. A. Morris, Division of Inspection, Hq. The primary purpose of the visit was to review the status of changes in and additions to the primary and secondary coolant systems in relation to actual reactor operations and to applications for a construction permit and a license amendment. The principal Curtiss-Wright people contacted were Mr. George Anderson, Manager, Nuclear Power Department (who has very recently replaced Mr. E. J. Meizer); Mr. F. Nolan, Chief, Research Reactor Division (who has very recently replaced Mr. P. R. Liller, Acting Chief); and Mr. P. R. Liller, Head, Reactor Operations Section. The visit included physical inspection of the facility and review of reactor operating history, physical changes to the facility and plans for future operation.

Distribution:

M. L. Price, DIR
Dr. C. K. Beck, DIR
L. E. Johnson, DIR
General Counsel (Mr. Eason)

Approved: *Peter A. Morris*
Asst. Director for Compliance

2. Results of Visit

a. Chronology

From review of documents and the reactor console log books, the following chronology was established:

April 29, 1958 - Facility License R-36 issued.

This license was issued with the following condition (paragraph 4.2.(2)):

"Curtiss-Wright shall not operate the facility at a power level in excess of 1000 kilowatts (thermal); provided, however, that Curtiss-Wright shall not operate the facility at a power level in excess of 100 kilowatts (thermal) until provision has been made for cooling by forced circulation."

April 29, 1958 - Initial critical operation took place.

June 11, 1958 - The primary system was complete and operable before this date - no secondary system had been installed, or even specified, except that by implication it would have to allow steady operation of the reactor at 1000 kilowatts (thermal) to fulfill the original design intent for this reactor.

July 21, 1958 - Reached a power level of 96 kw for the first time. (Natural convection cooling)

August 8, 1958 - Amendment No. 1 to license issued to allow 4.7 kilograms of U-235 (instead of 4.5 kg).

January 14, 1959 - Amendment No. 2 to license issued, as follows:

"In addition to the activities previously authorized by the Commission under License No. R-36, as amended, Curtiss-Wright Corporation is hereby authorized to operate the facility without secondary cooling at power levels up to one megawatt (thermal) for test runs as described in the application for license amendment dated November 7, 1958, subject to the terms and restrictions contained therein. In addition, no test authorized by this Amendment No. 2 shall exceed 10 hours in duration."

February 2, 1959 - Reached a power level of one megawatt for the first time (primary coolant flow of 700 gallons per minute).

March 9, 1959 - Curtiss-Wright applied for a construction permit to allow modification of the facility. The proposed modifications were:

Secondary coolant cooling tower (design for 4 MW operation)
Heat exchanger
Additional primary coolant pump
Secondary coolant pumps
Increased capacity of water purification system
Building modifications as necessary for above

March 23, 1959 - Reactor shut down and construction begun.

April 27, 1959 - Curtiss-Wright applied for amendment to license to allow operation at 1.7 megawatts with fuel elements of current design, and 4.0 megawatts with 19 plate fuel elements.

May 1, 1959 - Installation of the additional primary coolant pump was complete.

May 26, 1959 - Reactor operated, at low power, for first time since March 23, 1959.

May 28, 1959 - Final test of secondary cooling system conducted.

b. Current Status

Visual inspection of the primary and secondary coolant systems showed the equipment and piping to be installed and operable and in substantial conformity with the construction permit and license applications.

The cooling tower was in operation, with low fan speed, and was stated, by Mr. Liller, to be capable of 5 MW heat dissipation on all but a few days of the year at this site.

The primary coolant system has one 700 gpm pump and one 1200 gpm pump in parallel. By procedure, only one pump will be in service at one time.

The secondary coolant system has one 800 gpm pump and one 1600 gpm pump. Either or both of these parallel pumps may be operated at one time.

The water purification system may be operated with either 15 gpm or 50 gpm flow.

A "skimmer" system has been added to the primary coolant system that allows water from the pool to be taken from the surface, as well as from the bottom. Also, a filter has been installed in this purification system.

c. Current Plans

There are no plans for operation in excess of 1.7 MW with fuel elements of current design, or 4.0 MW with the proposed design, until measurements can be made of the temperature distribution within a fuel element. Plans for such measurements and construction of special thermocouple devices are well along.

There are no plans for installation of a test loop of any size, internal or external to the reactor core.

It is planned to install an additional control-safety rod and additional thermocouples in the primary coolant systems before operation at the increased power levels. It is also planned to use additional graphite

reflector elements with test holes in them; a total of 5 wet and 2 dry holes ($1\frac{1}{4}$ to $1\frac{1}{2}$ inch diameter), one hole per element, are planned.

A "graphic panel" control board for control of primary and secondary coolants and the purification system is under construction. It will be hinged to the wall of the reactor room near the remote control room. (There are no plans to move the control console from the bridge to the remote control room.)