

THE PENNSYLVANIA STATE UNIVERSITY
University Park, Pennsylvania

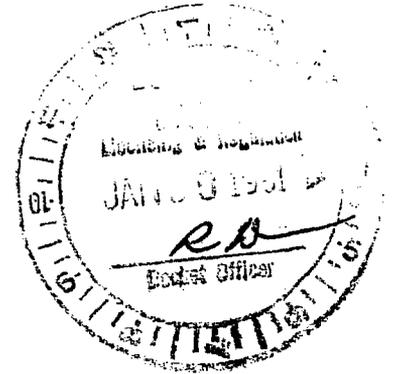
50-5
File 4

Vice President for Research

January 25, 1961

Dr. Harold L. Price, Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Re: Licenses R-2 (Docket 50-5)
R-72 (Docket 50-174)



Dear Dr. Price:

Reference is made to your telegram of January 11, 1961 requesting information on the nuclear characteristics of the two reactors licensed to The Pennsylvania State University.

Since the University has a license to possess and not to operate the nuclear research reactor located at the Curtiss-Wright Nuclear Research Laboratory of The Pennsylvania State University (R-72, Docket 50-174) and since all current information about the reactor in its present state is contained in our recent license application (dated September 29, 1960) for that reactor, we contend that the information which you request is not pertinent at this time to this reactor. The information that you request will be supplied at the time that application is made to operate this reactor.

In compliance with your request, the following information about the nuclear research reactor located at our Nuclear Reactor Facility (R-2, Docket 50-5) on the University Park Campus is supplied in the order that it was requested in your telegram.

1. The maximum authorized excess reactivity of this reactor is 3.0% delta k/k above cold clean critical plus samarium poisoning. However, during normal operation, the excess reactivity is kept to the absolute minimum required by the particular experiments in progress. This minimum, of course, is below 3.0% delta k/k. For example, most experiments are conducted with less than 0.8% delta k/k above cold clean critical and samarium poisoning.

2. The total worth of the three safety rods and one regulating rod is 7.9% delta k/k.

3. The minimum shutdown margin is 4.9% delta k/k. At 200 kw and with the large bulk of water available, the room temperature and operating temperature are essentially the same.

4. The maximum worth of a single safety rod of highest reactivity value is 2.53% delta k/k. (Most frequently used loading.)

B/n

5. No other methods are used for reactivity control in this reactor.

6. The maximum individual or total worth of any fixed or movable experiments inserted in the reactor is 1.5% delta k/k.

7. A) The basis for reactivity values of the regulating and safety rods is by measurement by the "Inhour Method".

B) The condition of the core during these measurements is in an operating condition. Latest measurements were with approximately 0.9% by weight fuel burn-up.

C) The reactivity values of the safety rods were last determined on June 6, 1960. The last time that the regulating rod was calibrated was December 28, 1960.

8. A) Special precautions taken to prevent inadvertent criticality during shutdown include:

1. The reactor is maintained with a minimum of excess reactivity during shutdown.

2. The fuel handling tool is locked with the distribution of keys to this lock limited to experienced reactor supervisors.

3. The movable reactor bridge is kept locked with the distribution of keys to this lock limited to experienced reactor supervisors.

4. The addition of any fuel, experiment, etc. to the reactor which would in any way appreciably affect the shutdown margin is accomplished with the rods approximately half way withdrawn, with all reactor instrumentation on and attended, and under the direction of a competent reactor supervisor. (See 8C for further detail.)

B) Nuclear instrumentation is always used when the reactivity of the reactor is to be affected or if rod drives, etc. are being repaired.

C,D,E) Only known fuel loadings are used in the reactor without a special critical experiment being conducted under the personal direction of the Facility Director and/or the Assistant Director. However, the Assistant Director will never undertake to conduct a new critical fuel loading without the prior knowledge and approval of the Director. Any change from one known loading to any other known loading must be done under the direction of an experienced reactor supervisor, but permission must be obtained from the Facility Director or the Assistant Director prior to changing the loading. Not more than one fuel element may be added at one time (<1.5% delta k/k). After each element added a check on criticality is made to determine that the shutdown margin is adequate for any following fuel addition. The safety rods are withdrawn 12 inches from their fully inserted position during core reactivity changes. At this position they can be called upon to insert approximately 3.6% delta k/k negative reactivity effect if necessary and yet in this position provide a shutdown margin of at least 1% delta k/k even when the maximum allowable reactivity is in the core.

As previously stated, all reactivity changes are accomplished with all nuclear instrumentation operating and being observed. Close communication is always established between the operator and the person making the reactivity change. A verbal check list between the two is carried out (i.e., "approaching core," "above position," "lowering," "fuel element in position," "remove handling tool," etc.) in order that the change may be stopped at any time.

F. The above operations are conducted in accordance with the written operating procedures for the reactor.

Sincerely,



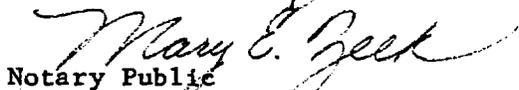
E. F. Osborn
Vice President for Research

EFO/FJR/RS

cc: M. A. Williamson
N. J. Palladino
F. J. Remick

Commonwealth of Pennsylvania
County of Centre :ss

Subscribed in form to before me
this 27th day of Jan. 1961.


Notary Public

MARY E. GECK, Notary Public
STATE OF PENNSYLVANIA, Pa
COUNTY OF CENTRE
MY COM. EXPIRES
FEBRUARY 20, 1962



To

Dr. Harold L. Price, Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Vice President for Research

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