

Lyall E. Johnson, Chief
Licensing Branch

Clifford K. Beck, Chief
Hazards Evaluation Branch

CURTISS-WRIGHT RESEARCH REACTOR

On April 29, 1958, a license was issued to Curtiss-Wright Corporation authorizing operation of its one megawatt research reactor at Quehanna, Pennsylvania. Pending the installation of the complete cooling system, consisting of a primary heat exchanger and a secondary heat exchanger with a cooling tower, operation was limited to a maximum to 100 kilowatts.

On March 9, 1959, an application for an amendment to the construction permit was filed; this amendment described a new cooling system with adequate capacity to permit operation up to 4 megawatt thermal power. In order to achieve this higher power level new fuel elements containing more uranium were specified; these modified fuel elements were also described in the application.

On April 27, 1959, another amendment to the license was filed requesting operation up to 1.7 megawatts with the existing 10 plate fuel elements and up to 4 megawatts with the proposed 19 plate fuel elements. On April 1, 1960, the applicant submitted additional information. Based on the above documents it is our opinion that the operation as proposed by Curtiss-Wright Corporation can be safely carried out without any due hazard to the safety of the public.

Discussion

Under normal operating conditions the shielding provided for the reactor will limit radiation levels to safe values. To investigate the results of various possible accidents at the 4 megawatt power level the applicant assumed that all available excess reactivity was added at the maximum rate available; this is equal to 1.0% $\Delta k/k$. The applicant further states that no experiment with a total worth of more than 1.5% $\Delta k/k$ will be installed in the reactor under any circumstances.

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While no mechanism was postulated which would result in fuel element meltdown and escape of fission products, the applicant calculated radiation doses as a result of fission product releases at the site boundary. The maximum credible accident is considered one in which due to a combination of instruments and human failures of power excursion occurs of sufficient magnitude to cause the melting of the fuel elements. This would result in the disruption of the core geometry which would cause a reactor shutdown. However, it is assumed that the temperature would be sufficient to cause a molten aluminum-water reaction and as a result 10% of all fission products would be liberated as particles sufficiently small so that they remain airborne and leave the reactor vicinity. As a result the radiation dose to a person at the nearest site boundary - which is a location in the State Forest land, and has no inhabitants - was conservatively calculated to be: inhalation dose 0.60 rep, external beta dose 0.04 rep, external gamma, 0.04 rep, 12 hour fallout dose 0.40 rep, 12 hour rainout dose 3.20 rep.

It is our opinion that the probability of such an accident occurring in this reactor is small and that the calculated doses at the site boundary from such an accident are greater than would be received due to the conservatism in the assumptions made for the analysis.

Conclusion

We concur, therefore, with the applicant that the operation of the reactor represents no undue hazard to the safety of the public.

OFFICE ▶	HEB:DL&R	HEB:DL&R	HEB:DL&R			
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DATE ▶	6/9/60	6/9/60	6/9/60			

UNITED STATES GOVERNMENT

Memorandum

TO : Lyall E. Johnson, Chief
Licensing Branch

DATE: JUN 9 1960

FROM : Clifford K. Beck, Chief
Hazards Evaluation Branch

SUBJECT: CURTISS-WRIGHT RESEARCH REACTOR

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