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ATOMIC ENERGY COMMISSION

INVESTIGATION OF RADIATION INCIDENT AT THE WESTINGHOUSE
TESTING REACTOR, WALTZ MILL, PENNA.

Note by the Acting Secretary

1. The General Manager has requested that the attached summary of the report of the subject incident submitted by the Director of Inspection, be circulated for the information of the Commission.

2. The General Manager has approved the recommendations of the investigating committee. Copies of the full committee report may be obtained from the Director of Inspection.

Harold D. Anamosa

Acting Secretary

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*1 copy to each field director
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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D. C.

May 27, 1960

MEMORANDUM

TO : Curtis A. Nelson, Director
Division of Inspection

FROM : Marvin M. Mann, Chairman
Investigating Committee

SUBJECT: INVESTIGATION OF RADIATION INCIDENT AT THE WESTINGHOUSE
TESTING REACTOR, LICENSE TR-2, WALTZ MILL, PENNSYLVANIA

SYMBOL : INS:MMM

Transmitted herewith is the report of investigation of the subject incident.

This incident resulted in partial destruction of one reactor fuel element through overheating and subsequent melting. The technical origin of the incident is not yet known, but it is likely that either or both of two factors played a major role:

- (1) inadequate coolant flow under conditions existing at the time,
- (2) defective metallurgical bonding in the fuel element.

No personnel overexposures occurred and no offsite contamination was found.

However, this incident, but for a fortunate circumstance, could have been rather more serious. The element which failed was new, and having been irradiated for only two days at high power, its fission product content was relatively low.

The WTR organization functioned effectively in coping with the after effects of the incident. Evacuation of the facility, necessitated by the gamma radiation emanating from the process water head tank, was effected expeditiously, and radiation surveys of the surrounding territory were instituted promptly.

Persons in the small settlements a few miles away were alerted on the chance that detectable airborne radiation might obtain temporarily in these areas. It appears that the public relations factor worked out favorably.

Removal of the reactor core, including the damaged fuel, and decontamination of the reactor has proceeded without incident.

In addition to the technical factors mentioned above in connection with the incident, certain features of the WTR organization appear to have played important roles.

It is a matter of record that the WTR Safeguards Committee had reviewed the series of experiments being conducted to study the onset of boiling in the WTR, and as a consequence, to set certain technical standards for normal operation. It was during one of these experiments that the incident occurred.

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The WTR Safeguards Committee had written technical specifications and operational limits for the tests, but no detailed written operating procedures had been provided.

For the test run on the date of the incident a specification had been prepared by the Chairman of the Safeguards Committee. The full committee did not review this test, although flow, temperature, and power limits differed from those specified for previous tests. Furthermore, possible abnormal situations had not been fully considered, and no written operating procedures for handling thereof had been provided.

While a number of individuals in the WTR organization are knowledgeable and experienced in reactor technology and operation, the reactor supervisor on duty during the incident had had only three months' experience. The committee interviewed this man, and found that his understanding of reactor operation was severely limited. This, coupled with the lack of detailed operating procedure for the test, constituted a substandard situation, leaving the operation, in our opinion, effectively unsupervised. While WTR management was present during the test, no special measures were taken to offset the deficiency in supervision.

The results of this situation were that the rapid and spontaneous decrease in power* was not recognized as abnormal, and the supervisor apparently instructed the operator to recover specified power, a move inconsistent with safety of operation.

While Westinghouse personnel are studying the possible causes of the incident, the company has not formally convened a group to investigate all aspects of the incident, nor does it appear that the roles of management, organization and procedure have been objectively considered by the company.

Since the committee's visit to the WTR facility, experts in heat transfer phenomena at ORNL and at Westinghouse have made calculations on the basis of reactor conditions presumed to have existed at the time of the incident. Metallurgical studies of the damaged element are under way.

The committee believes that the heat transfer studies do not exclude the possibility that the phenomenon of "flow disease" caused the incident. It appears that until metallurgical studies of the damaged element are completed, it will not be possible to assess the probable cause of the incident.

The Division of Inspection continues to follow the studies mentioned and will report results as they become available.

Finally, this incident has raised an interesting question in regard to the philosophy of the design of the WTR. This reactor has been provided with a containment building, ostensibly for the purpose of retaining therein such radioactivity as might be released from the reactor as the result of incidents such as, but not restricted to, the subject incident. As a matter of fact, the

* It is our tentative opinion that the power decrease signalled the beginning of the incident, and that the following increase in power, caused by the directed withdrawal of control rod, merely aggravated the situation.

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provision of a venting system for the process water head tank and for the process water surge tank, in the view of the committee, substantially negates the purpose and efficacy of the containment building. While the committee recognizes that this feature of the design was duly approved via the licensing process, it is believed that such features deserve further consideration.

It is recommended that the licensee be required to report to the Commission:

1. A detailed account of the incident.
2. Results of technical and managerial studies of the incident and its implications.
3. Steps taken or planned in regard to equipment, organization, and procedure to prevent recurrence of the incident.