U. S. ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE
COMPLIANCE DIVISION

By: John R. Sears, Compliance Division
New York Operations Office

Title: THE WATERTOWN ARSENAL REACTOR

SUMMARY

A visit was paid to the Watertown Arsenal Reactor on November 3, 1960. The low level test program and 1 megawatt operation has been concluded without any trouble, other than normal instrumentation difficulties. There had been a number of leaks in the main pool and in the annulus. Most of these leaks have now been repaired.

Reviewed by: Robert W. Kirkman, Director
Compliance Division

Period of Inquiry: November 3, 1960

DETAILS

I. Scope of Visit

A visit was made to the Watertown Arsenal Reactor at Watertown, Massachusetts, by John R. Sears, NYOO, on November 3, 1960. The visit included a tour of the reactor, and a discussion with Mr. John O'Connor, the Reactor Administrator, on their progress in repairing leaks in the reactor pool.

II. Results of Visit

Mr. O'Connor said that the low power tests, that is, determination of temperature coefficient, void coefficient, reactivity worth of beam tubes, and rod calibrations, have now been completed. Worth of the beam tubes was gotten without the use of skin diving. This experiment was not as time-consuming as originally thought, since the annulus was used as a reservoir for pool water, and it was not necessary to dump all the water in the inner pool after each run. O'Connor also said that Mr. Nielson, the Curtis-Wright man who was most interested in investigating the use of skin diving as an aid in these experiments, had been called back to the main office of Curtis-Wright about one week after the initial approach to criticality to solve another pressing problem. Mr. William Hall stayed until about one week prior to the inspection; when he left to take up a job on the University of Buffalo reactor. William Alderholt, the reactor instrument man, is still at the Watertown Arsenal Reactor. Mr. O'Connor said that he is very pleased with Mr. Alderholt's job on instrument maintenance, and he would like to hire Mr. Alderholt as a full-time employee. However, O'Connor said that he was afraid of a conflict of interest difficulty here, since he still has some contractual problems to work out with Curtis-Wright. He is in hopes of signing off the Curtis-Wright contract shortly, and he said then he would feel free to make a job offer to Alderhold.

One of the reasons for the difficulty in loading the row of fuel behind the control rods and ion chambers during the initial approach was that the control rod drive motors and assemblies on top of the reactor were in the way of an operator attempting to manipulate a handling tool. Mr. O'Connor demonstrated to the inspector that wiring from the control rod magnets has now been fitted with a disconnect coupling just below the location of the rod drive motors. This makes it fairly easy to disconnect the wiring and swing the rod drives out of the way.

A. Leaks in Pool

Inside of the pool, inside of the annulus, and outside of the concrete shield, had been coated with Amercoat. However, a number of leaks showed up on the outside of the shield, particularly around locations where either a metal insert or a pipe, or a beam tube sleeve penetrated the concrete shield. O'Connor said that the principal leak has now been discovered and eliminated. This leak was from an aluminum pipe which penetrated the shield up to the annulus. The purpose of this pipe was to drain out the annulus if needed. According to the specifications, the pipe should have been coated with bituminous mastic material prior to the concrete being poured around it. However, O'Connor said that the contractor's people could not remember that this pipe was so coated, and it is felt that an alkaline reaction occurred between the concrete and the aluminum pipe, which resulted in a leakage between the annulus down around the outside of the pipe to the outside of the shield. O'Connor said he feels that any break in the Amercoat film on the inside

allows water to make its way through the shield until it finds a break on the outside. Thus, the path of leaking water through the shield may be very tortuous. The metal inserts on the outside of the shield constitute a break in the outside Amercoating, and so they allow any leaks which may come from almost any place inside the shield to come out. O'Connor said that he is repairing some leaks in the annulus by means of fiberglass and permagils #10, which he said is a polysulfide based epoxy resin. He said that experiments have been performed at Battelle that indicated that epoxy resin on the inside surface of the pool would not be suitable, since it has a limited life in a high radiation field. Furthermore, the sulfur in the resin would become activated and would present a real radiation hazard in case the pool ever had to be emptied. Thus, O'Connor is not putting any of this material in the inside pool, but he is using this material in the annulus.

O'Connor said that he thought one contributing factor to the leaks in the pool could be the fact that the balconies in the reactor building are supported from the concrete reactor shield. He felt that, when the sun beats down on the west face of the containment shell, which is uninsulated on the outside, this results in some differential expansion of the 30 foot balcony beams, and this possibly results in unequal stresses. This then could easily lead to some small cracks in the concrete, with attendant leakage from the pool.