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ARMY GAS - COOLED REACTOR SYSTEMS PROGRAM

GCRE-I HAZARDS SUMMARY REPORT

ADDENDUM III

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ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM

GAS-COOLED REACTOR EXPERIMENT-I

HAZARDS SUMMARY REPORT

ADDENDUM III

I. INTRODUCTION

This addendum to the GCRE-I Hazards Summary Report has been prepared to reflect certain changes made to the equipment as a result of operating experience. These changes include: the addition of a startup interlock circuit; the modification of a startup interlock circuit; several minor modifications to the control rod actuators; and the addition of the tube-sheet cooling system.

II. REVISIONS

(NOTE: Page numbers refer to IDO-28506; underlined portion represents revision.)

Pg. 25, Item 2-a-(1):

"All carriages must be in full-in position".

This circuitry revision was made to prevent possible damage to the rod actuators; rods must be in when carriages are in.

Pg. 26, Item 2-a-(8), (new item):

"(8) The tube sheet cooling water pump must be operating".

This circuitry revision was made to insure that the newly installed tube-sheet cooling system is operating before the reactor is started up.

Pg. 29, Item d; revised to read:

"The actuator mechanism is sealed from the pool water by a housing. The seal is provided by two "U" cup chevrons in the case of the safety and shutdown rods, and by double "O" rings for all other rods. An electrode-type liquid detector in each of the actuator mechanism housings sounds an alarm in the control room if water leaks into the housing. The double "O" ring seal has been tested by continuous cycling for 1000 hours under water with no evidence of leakage."

The drain system referred to in the earlier report has been eliminated as a result of operating experience

Pg. 29 Item f, revised to read:

"The electrical wiring for the motor controls, ball latches, and limit switches for each rod is contained in flexible, high-pressure rubber hose that is sealed to the actuator housing and suspended from the pool wall above the pool water level."

Experience has shown that the rubber hose is easier to handle, requires less maintenance, and satisfies all engineering requirements.

Pg. 29, Item a, revised to read, in part:

"a Safety Rod

This rod is withdrawn . ball-detent latch. When withdrawn, the rod is held against the 150 psig nitrogen pressure in the housing by the ball-detent latch When a scram signal occurs, the magnet in the ball latch is de-energized and the rod is driven in by the nitrogen pressure in the housing "

Experience has shown that the spring referred to in the original report will not scram the rod when no pressure exists in the housing In addition, the presence of the spring so severely restricts the space available for magnet lead wires that repeated failures were experienced with the very small wire used in the original design Tests have demonstrated that the spring reduces the scram time of the rod in an amount equivalent to increasing the gas pressure 25 psig

Since the rod performs satisfactorily at pressures well below the design point, since the spring alone did not scram the rod, and since the spring was contributing to other problems, it was removed

Pg. 30, Item b, revised to read:

"b. Shutdown Rod

This actuator mechanism is identical to that of the safety rod except that: (a) the housing is pressurized only to 12 psig to deter water in-leakage; (b) the ball latch is of a slightly different design to reduce the release force; and (c) a spring, which is the prime actuator in the scram condition, is installed to drive the piston.

This revision reflects proven modifications to the rod design

Addendum II, Item A - Insert a new paragraph between the second and third paragraphs:

"Internal cooling passages are provided in both tube sheets to reduce the stresses in the tube sheet that result from temperature gradients generated by conduction and gamma heating. Pool water is circulated through these passages by a small pump submerged in the pool."

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