U. S. ATOMIC ENERGY COMMISSION
REGION I
DIVISION OF COMPLIANCE

Report of Inspection

CO Report No. 50-47/68-1

Licensee: U. S. ARMY MATERIAL RESEARCH AGENCY
LICENSE NO. R-65
CATEGORY E

Date of Inspection: February 27 and 28, 1968

Date of Previous Inspection: July 20, 1967

Inspected By: G. L. Madsen — Reactor Inspector — 3/14/68
(Name) (Date)

Accompanied By: J. R. Sears — Reactor Inspector
(Name)

Reviewed By: N. C. Moseley — Sr. Reactor Inspector — 3/14/68
(Name) (Date)

Proprietary Information: No X Yes ___ Pages None

SCOPE

A scheduled inspection was made to the U. S. Army Materials Research Agency (AMRA), 2 MW research reactor, at Watertown, Massachusetts. Mr. Sears accompanied the reactor inspector to assist in the inspection and for the purpose of transferring inspection responsibilities to Mr. Madsen. The inspection included an evaluation of a previously reported personnel overexposure and a review of reactor modification completed in preparations for the proposed increase in reactor power level to 5 MW

SUMMARY

Safety Items - The proposed Safety Analysis report and Technical Specification for increasing power level to 5 MW has not been approved by DRL. The modification of the reactor is nearly complete. ARMA presently plans to operate at 2 MW with the reactor modification, until the 5 MW proposal has been approved. ARMA has agreed to provide a request to DRL for approval to operate in this manner. (See Section T)

Noncompliance Item - One individual received a 1.3 rem gamma dose during a two-month period which was in excess of the 1.25 rem quarterly limit. (See Section P.1)

Unusual Occurrences - No unusual occurrences were noted or reported to the inspector during the visit.

Status of Previously Reported Problems - No problems were noted or reported to the inspector during the visit.

Other Significant Items - No significant items were noted or reported to the inspector during the visit.

Management Interview - The inspector held an exit interview with Mr. O'Connor at the conclusion of the visit. Items discussed included:

1. Reactor Modifications

   The degree of completion of the various reactor modifications, for the proposed increase in power to 5 MW, were discussed. Mr. O'Connor indicated that the work should be completed in 2 to 3 weeks. The inspector indicated that a DRL approval of the modifications prior to resumption of reactor operation was in order. After additional discussions, Mr. O'Connor agreed to submit the information to DRL requesting approval to operate a 2 MW with these reactor modifications.

2. Radiation Exposure Occurrence

   The noncompliance item relative to the 1.3 rem quarterly exposure of one individual was discussed. The inspector indicated that normally an AEC Form 592 would be issued, but since their previous ARMA report provided the necessary information this action was not deemed necessary.

3. Beam Tubes

   The modifications to the beam tubes was discussed. Mr. O'Connor indicated that consideration is being given to removal of the beam tubes without draining the reactor pool. He feels that some amount of leakage from the pool could be expected; however, the condition was not considered intolerable. The inspector indicated that this procedure appears undesirable and would be evaluated further during the next visit.

DETAILS

A. Persons Contacted

Mr. Jack O'Connor, Reactor Director
Mr. Charles Dady, Health Physicist
Mr. Leo Foley, Health Physicist

B. Administration and Organization

Colonel Riordan has replaced Colonel Kellog as Director of ARMA. Colonel Riordan is scheduled for reassignment to another position about April 1, 1968. His replacement has not been announced.

C. Operation

The reactor has been in a shutdown condition since that last inspection.* Modifications are nearly complete for the proposed increase of operating level to 5 MW. Present plans call for operation of the reactor at a 2 MW level until the proposed 5 MW Safety Analysis and Technical Specifications have been approved. The inspector indicated an apparent need for the notification of and approval by DRL prior to resumption of reactor operation. After considerable discussion, Mr. O'Connor agreed to submit a report to DRL, which will outline the completed reactor modifications and the proposed 2 MW operational plans, for review and approval according to 10 CFR 50.59.

E. Primary System

1. Pool Liner

The installation of a stainless steel pool liner is complete. Leak testing revealed some areas which required repairs. The present leak rate through the liner was measured to be 2 gallons per day. Mr. O'Connor indicated that this appears to be an acceptable condition. A spot inspection of the liner welds revealed some evidence of questionable quality. Mr. O'Connor stated that problems had been encountered with the welding of the liner plates but felt that the weld quality was acceptable for this application.

2. Primary Coolant Loop

The installation of a replacement heat exchanger and an additional heat exchanger and pump is complete. This portion of the primary loop was satisfactorily tested at 50 pounds pressure. Normal operating pressure is 35 pounds or below.

*CO Report No. 46/67-2

G. Core and Internals

The Reactor fuel and control rods have been stored in the gamma facility pit since the last inspection. A new grid plate has been fabricated to the original specification and will be used on resumption of reactor operation.

The Log N-Period system has been modified to incorporate the use of transistorized system in place of the previously employed vacuum tube system. The system is scheduled to be checked for proper operation prior to resumption of reactor operation.

I. Auxiliary System

A second cooling tower has been installed and is available. The demineralization system has been modified to include an additional mixed bed ion exchanger and incorporation of an automatic regeneration cycle. Cartridge type filters were observed to be installed at the inlet and the outlet of each ion column.

K. Containment

Mr. O'Connor stated that prior to reloading of the reactor, a reactor containment test will be conducted.

N. Emergency Power

The inspector reviewed the occurrence of an emergency system overload condition at a similar reactor facility. Mr. O'Connor stated that a recent review and load test of the emergency power system indicated that a sufficient load capacity was available.

O. Fuel Handling

Reactor fuel is presently in storage in the gamma facility. No movements of metal have been made since that last inspection.

P. Radiation Protection

1. Personnel Exposures

A review of personnel exposures for calendar year 1967 indicated that one individual received a 1.3 rem gamma dose during a two-month period, which exceeds the 1.25 rem quarterly limit.* Discussions with Mr. Dady revealed that a Form AEC-4 had not been completed for this

*10 CFR 20, paragraph 20.101

individual prior to the receipt of the radiation exposure. ARMA's report of this occurrence included the required information according to 10 CFR 20, paragraph 20.405. The report indicated that the exposure was not considered to have been accidental, but rather to have been received under a controlled condition. A review of personnel records and discussions with Mr. Dady indicated that accumulated daily dosimeter readings had been maintained and that an inadequate amount of potential variation between dosimeter and film badge results had been anticipated. Mr. Dady was informed that this occurrence was an item of technical noncompliance. Mr. Dady was aware of this fact. An AEC Form 592 was not issued, since the conditions associated with this occurrence were adequately defined in the previously issued report.*

2. Health Physics Records

A review of records associated with the pool liner installation revealed that airborne activity during grinding and welding was about 1×10^{-10} uc/cc. The isotope present was principally Co-60 which has an MPC of 3×10^{-7} uc/cc for restricted areas and 1×10^{-8} uc/cc for unrestricted areas. Mr. Dady informed the inspector that the welder also wore Scott air packs during grinding and welding; however, no credit was taken for the usage.

3. Radiation Monitoring Instrumentation

The control room radiation monitoring instrumentations have been modified to incorporate the use of a transistorized system. A systems check was in progress at the time of the visit.

Q. Radioactive Wastes

A review of radioactive release records for calendar year 1967 indicated that airborne and liquid effluents were less than the 10 CFR 20 limits.

S. Experiments and Tests

The beam tubes have been modified as described previously,** except that gate valves, not flapper valves, were installed on the inner side of the pool wall. The modification will permit removal of beam tube without entering the reactor pool and corsideration is being given to removal of beam tubes without draining the water from the pool. The inspector plans to investigate this matter during the next inspection.

The pneumatic facility lines have been removed from the reactor pool.

*Letter to Director of Division of Reactor Licensing from C. E. Dady, ARMA, Radiological Safety Office, dated December 15, 1967.
**CO Report No. 47/67-2, paragraph II.H.

T. Facility Modifications

The following modifications to the reactor have been completed in preparation for increasing reactor power to 5 MW.

1. Installation of a stainless steel pool liner (Section E).

2. The replacement of the existing heat exchanger and the installation of a new pump and heat exchanger in parallel (Section E).

3. Incorporation of a transistorized system in the Log N (Section G) and Radiation Monitoring systems (Section P.3.).

4. Installation of a second cooling tower (Section I).

5. Automation of the demineralizer systems (Section I).

6. Modification of the beam tube facilities (Section S).

These modifications will require DRL approval* prior to resumption of reactor operation, since this facility does not presently have technical specifications.

*10 CFR 50, paragraph 50.59(c)