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PROCESS TEST MR-105-13 DETERMINATION OF THE VALUE OF ZINC INSERT EXTENSIONS IN PREVENTING STICKING FRONT NOZZLE INSERTS

AUTHOR

A. K. HARDIN

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PROCESS TEST MR-105-13 DETERMINATION OF THE VALUE OF ZINC INSERT EXTENSIONS IN PREVENTING STICKING FRONT NOZZLE INSERTS

OBJECT

It is the purpose of this test to determine or demonstrate that the presence of zinc at the end of the shielding insert will prevent or reduce removal of the zinc cladding from the C Reactor inserts and prevent insert sticking in the case of B, D, and F type nozzle inserts. It is proposed to make a study of the effects of zinc extensions to the nozzle inserts by installing 20 zinc washers to selected nozzle inserts at 100-B and 100-C.

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BASIS AND JUSTIFICATION

Considerable difficulty has been experienced with the cap supported shielding inserts corroding and sticking in the inlet nozzles. This condition has resulted in considerable time loss, particularly in those cases where the insert could not be broken loose and the nozzle was removed. The insert sticking problem was alleviated to some extent by reducing the diameter of the insert 1/8", however subsequent operation with the reduced diameter inserts has shown that even these inserts are sticking.

In 1951 the problem was so severe that several nozzles required removal each shutdown. Most of the inserts required removal with a pipe wrench and in some cases the insert was damaged beyond reuse. The cost of the problem at that time is indicated by the fact that approximately 20 minutes of shutdown time is required to remove and replace a nozzle. The cost of an insert, to replace a damaged insert, is about $15.

Although it has not happened to date, it is conceivable that a severely stuck insert could occur on a ruptured slug tube. The time required to remove the insert could mean the difference between the success or failure of a "quickie" discharge.

The incidence and severity of stuck inserts has fallen off recently, due in part to reduced diameter of the insert and possibly in part to reduced chloride content of the process water, however, the problem may become active again at any time.

Document HW-25705, "Process Test MR-105-4, was designed to investigate the radiation effects of removing the front shielding insert from a large section of the reactor. If the shielding pieces could be removed with no adverse radiation effects, the problem of sticking inserts could be eliminated by removing all inserts. Data collected as a result of this test has indicated this method is feasible. A radiation level of approximately 30 mr/hr on the front face during reactor operation could be expected and reasonable care would have to be taken during discharge operation to insure that tubes whose caps are loosen prior to discharging do not drain. There is some indication however, that barnacle formation in the nozzle will introduce another problem. The extent and result of barnacle formation in nozzles without inserts has not been fully evaluated.

A survey of all areas is now in progress to determine the present rate and relative severity of the stuck insert problem. An evaluation of the effects of removing the inserts will also be continued. Regardless of the results of the survey, this test will provide information of an insurance value in case removal of the insert proves impractical and in case of a recurrence of a large number of severely stuck inserts.

It should be pointed out that difficulty with sticking inserts has not been experienced at "C" Reactor where the inserts were clad with a thin coating of zinc. It has been noticed however, that the zinc coating is being removed from the C Reactor nozzle inserts.

PROCEDURE

At the next shutdown of 100-B Area and at the next shutdown of 100-C Area, 20 selected tubes in each area will be equipped with weighed zinc extensions to the front cap supported insert. At the same time 20 control inserts will be selected in each area. The control and test inserts will consists of newly turned down inserts in the case of B Area, and new inserts in the case of C Area, so that the starting condition of the inserts may be considered comparable. At the end of a three month period, the test inserts and control inserts will be photographed and their condition compared. At the end of a six month period the control and test inserts will again be photographed and the zinc extension removed and weighed.

By a determination of weight loss, it is expected that the life of a zinc insert extension can be calculated. By comparing the condition of the control and test inserts, the value of using a zinc sacrificial washer can be determined.

DESCRIPTION OF EQUIPMENT

The zinc extension consists of washers cut from bar zinc, they are 1-3/8" in diameter with a 3/4" center hole. Their thickness varies from 1/2" to 3/4" due to irregularities in the bar zinc. The weight of individual washers varies from 62.5 grams to 91.4 grams. The washers will be bolted to end of the insert with 3/4" - 10 Nc2 x 1-1/2" cap screws. A rubber hose washer will be placed between the cap screw and the washer to provide locking action for the screw.

SCHEDULE

The test installation will be made during the first outage following approval of this test.

EFFECTS ON PRODUCTION AND COST

Shutdown Time Required

Five hours shutdown time for each reactor, broken down as follows:

One hour front elevator time for installation.
Two hours front elevator time for three month inspection.
Two hours front elevator time for final inspection and removal.

The above estimated required times assume the worst possible case in which none of the test work can be accomplished concurrently with other shutdown work.

Cost

$450

Responsibilities

Process Sub-Section

1. Selection of tubes, installation and photographing of inserts.
2. Analysis of data, issuance of reports.

Operations Sub-Section

Removal and replacement of 40 front caps and inserts for extension installation and two subsequent inspections.

A.K. Hardin
Process Improvement
Process Sub-Section
REACTOR SECTION

AK Hardin:lac

APPROVALS:

R.O. McClanahan, Superintendent, Process Sub-Section, Reactor Section

J.W. Warren, Superintendent, Production, Operations Sub-Section, Reactor Section

Date of Issue June 11, 1953

END

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