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**Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830**

**Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
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11-11-68

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DUN-4360
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PRODUCTION TEST AUTHORIZATION 145
LOADING ADJUSTMENT TO INCREASE SPECTROMETER UTILIZATION

G. D. Guthrie

June 12, 1968

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CG-NMP-1, 8-19-94

By JE Savely 10-7-94
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PRODUCTION TEST AUTHORIZATION 145
LOADING ADJUSTMENT TO INCREASE SPECTROMETER UTILIZATION

I. OBJECTIVE

The objective of this test is to authorize loading KE Reactor tubes 4396, 4397, 4398, 4496, 4497, 4498, 4596, 4597, and 4598 with 0.947 enriched fuel in support of the X-2 level Battelle Northwest neutron spectrometer, when the spectrometer will be in use.

II. BASIS AND JUSTIFICATION

Located on the X-2 level of KE Reactor and using the 4B side-to-side channel as its source is a very high quality neutron spectrometer. The present tests scheduled for the spectrometer require a source of higher average neutron energy and higher intensity. Also if, without penalizing production and reactor life or compromising reactor safety, we can make the spectrometer a more attractive research tool, we will strengthen our diversification program.

III. TEST DESCRIPTION

The spectrometer is a line-of-sight device. That is, its neutron source must be on a line of sight to its input. The reactor graphite stack shrinkage has caused the 4B side-to-side channel to distort until the spectrometer source is the top of the channel, reaching through the reflector to approximately column 94. The test is simply the charging of enriched fuel in the local region of the source, increasing the average neutron energy of the source and increasing the source intensity by twenty percent.

IV. PROCEDURE

The nine tubes of enrichment will be charge-discharged by normal charging procedures the first opportunity after this production test is authorized. The spectrometer is scheduled to be in use well into calendar year 1969 for experiments which require the enriched loading. If the enriched loading is not necessary, Irradiation Services Engineering will notify the process physicist assigned to KE Reactor and he will recommend the necessary loading changes for the next outage. Five of the nine tubes will have spline caps installed when they are charged with enriched metal.

V. HAZARDS

There are no unusual hazards imposed by this test. Speed-of-control is not significantly affected because the reactivity gain with water loss is less with enriched metal than natural. During startup conditions, prior to the buildup of sufficient residual heat and xenon making their presence unnecessary, four full splines, distributed in the nine-tube block, will directly compensate for the nine enriched charges.

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Heat transfer requirements will be fulfilled by the installation of zone 1 venturis on tubes 4397, 4497, and 4597.

The B-range Panellit gauges which are now in place will handle the expected 230-240 pound pressures.

VI. REACTOR LIFE

The power generation in the local region of the nine-tube block will increase, at most, twenty-five percent. The temperatures in the local region will increase less than twenty-five percent because of diffusion of heat into other regions of the reactor.

The hottest thermal shield thermocouple, in the region of the proposed nine-tube block, would have to experience a thirty-five percent increase in temperature before it would reach its limit. The present AT of the thermal shield cooling water, in the region of the proposed nine-tube block, is approximately fifty percent of its limit. The graphite temperatures in the region of the proposed nine-tube block would have to increase approximately thirty-three percent to reach their allowable limit.

This production test is consistent with limitations imposed to protect reactor life.

VII. OUTAGE TIME

This production test authorizes two hours of outage time each time it is necessary to charge the nine-tube block with E Metal. Also, one hour of outage time is authorized when nozzle changes on the nine-tube block are required.

There will be some small amount of personnel exposure attributable to this test.

VIII. PROCESS STANDARDS

No process standards or reactor operating limits need be modified for this production test.

IX. ISSUE AND EXPIRATION DATES

This production test will take effect immediately after it has been approved and will be in effect for two years after that date.

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G.D. Guthrie per MC Fullmer

G. D. Guthrie, Engineer
Reactor Physics
Technology Section

RESPONSIBILITIES

The indicated organizational components shall be responsible for the stated specific phases of this test.

Process and Programs Section

Irradiation Services Engineering will be responsible for notifying the process physicist assigned to KE Reactor when the nine-tube block of enrichment is or is not needed to support the spectrometer.

T. L. Deobald, Supervisor
Irradiation Services Engineering

Process Physics will be responsible for reviewing the proposed loading changes.

F. P. Hamric, Supervisor
Process Physics

Process Engineering will be responsible for reviewing the proposed loading changes and will specify necessary orifice changes.

K. L. Hladek, Supervisor
Process Engineering

Manufacturing Section

KE Processing will be responsible for reviewing the proposed loading changes, for installing spline caps as required, for making necessary orifice changes, and for the overall safety and continuity of reactor operation.

R. G. Clough, Manager
KE Processing Unit

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