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Fuel Element Technology
(M-3679, 19th Ed.)

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PRODUCTION TESTS

300 SERIES

FILED A BIBLIOGRAPHY

By

B. J. Schmidt

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Technical Information
Laboratory Auxiliaries Operation

March 1, 1957

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Work performed under Contract No. W-31-109-Eng-52 between
the Atomic Energy Commission and General Electric Company

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PRODUCTION TESTS
300 SERIES

INTRODUCTION

This bibliography is a compilation of reports on production tests performed in the 300 Area from May, 1944 to February, 1957. It includes all tests covering (1) engineering and physics experiments in the Hanford Test Reactor (2) development; fabrication and subsequent irradiation of fuel elements and (3) melt plant (slug fabrication) procedures. Irradiation testing of fuel elements in Hanford Reactors is presented in HW-37110, "Production Tests, 105 Series: A Bibliography" by R. L. Steach.

The bibliography has been compiled in loose-leaf form to facilitate revision. It will be revised periodically as new test authorizations are issued and as final reports on existing tests are written.

The report is divided into four sections. Each section deals with a separate series of production tests and the pagination is derived from these divisions. The 305 Series, dealing with physics and engineering experiments in the Hanford Test Reactor, is numbered consecutively in the 1000 section, i. e., PT 305-1-I is numbered 1001. The 313-x-M Series, dealing with fuel element fabrication is contained in the 2000 section; the 313-105-x-M and 313-x-MT Series, concerned with fabrication and irradiation of fuel elements, in the 3000 section; and the 314-x-M Series, dealing with slug fabrication procedures, in the 4000 section.

A brief explanation of the numbering systems used in the 300 Series Production Tests is presented on pages vi and vii.

Subject, author and report number indexes are included. Addendum I gives the reactor production test number under which the fuel elements were irradiated.

B. J. Schmidt

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NUMBERING SYSTEM FOR 300 SERIES PRODUCTION TESTS

PT 305-1-I

Tests originated by the Instrument Department are numbered consecutively beginning in July, 1944 with this number.

PT 305-4-IDS

Tests originated by the Instrument Design Section are numbered consecutively beginning in September, 1951 with this number.

PT 305-1-L

Test originated by J. B. Lambert, June 11, 1947.

PT 305-1-P

From startup until October, 1951, tests originated by Pile Engineering were numbered consecutively beginning with this number.

PT 305-16-A

Tests originated by Pile Engineering are numbered consecutively beginning in October, 1951 with this number.

PT 305-1-N

Tests originated by Pile Physics are numbered consecutively beginning in January, 1952 with this number.

PT 305-1-SE

Tests originated by Separation Engineering are numbered consecutively beginning in October, 1944 with this number.

PT 313-1-M

Tests written to cover fabrication of fuel elements are numbered consecutively beginning in May, 1944 with this number.

PT 313-1-L

Test originated by J. B. Lambert in March, 1947.

PT 313-105-1-M

Tests written to cover the fabrication and subsequent irradiation of fuel elements are numbered consecutively beginning in October, 1951 with this number.

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PT 313-38-MT

Tests written to cover fabrication of fuel elements are numbered consecutively beginning May, 1954 with this number. Subsequent irradiations were authorized by 105 Production Tests.

PT 105-601-A-53-MT

Tests written to cover fabrication and subsequent irradiation of fuel elements are numbered consecutively (by the final suffix, 53-MT) beginning in June, 1955 with this number.

PT IP-1-A-73-MT

Tests written to cover fabrication and subsequent irradiation of fuel elements are numbered consecutively (by the final suffix, 73-MT) beginning in September, 1956 with this number.

PT 314-1-M

Tests issued to cover melt plant (slug fabrication) procedures are numbered consecutively beginning in September, 1944 with this number.

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Page: 1001-1

PRODUCTION TEST 305-1-I

CALIBRATION OF CHAMBER FOR 105-B.
C. I. Bradford. July 18, 1944.

Authorization
HW-3-364

Objective: : To test General Electric neutron chambers
and determine their sensitivity.

3-1-57
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PRODUCTION TEST 305 -1-L

REACTIVITY MEASUREMENTS. J. B. Lambert.
June 11, 1947.

Authorization
GEH-10892

Objective: To determine the reactivity of boron
impregnated materials and to compare them with
cadmium.

3-1-57

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Page: 1003-1

PRODUCTION TEST 305-1-N

IRRADIATION OF ARGON-40. J. W. Culvahouse.
June 6, 1952.

Authorization
HW-24691

Objective: To test the accuracy with which small
aliquots of radioactive argon can be taken.

IRRADIATION OF ARGON-40. J. W. Culvahouse.
November 19, 1952.

Final Report
HW-26287

Results of this test did not furnish enough data for
probable errors in measurements to be assigned,
but they indicated the error was considerably less
than 5 per cent. A sampling apparatus to reduce
the counting error with argon was to be built into
the xenon generator.

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Page: 1004-1

PRODUCTION TEST 305-1-P

STANDARDIZATION OF 105 INSTRUMENTS -
STANDARDIZATION OF FOILS IN BUILDING 305.
J. B. Miles, July 12, 1944.

Authorization
HW-3-332

Objective: To obtain a source of slow neutrons of known intensity to calibrate instruments and foils required for measuring the power level of the 105 units during startup.

NEUTRON FLUX STANDARDIZATION. J. Marshall
November 7, 1944.

Final Report
HW-3-1035

The thermal neutron flux was determined at various positions along the vertical axis of the 305 standard pile. With mixed sources Nos. 68 and 69, the values agreed, within 1.5 per cent with those obtained by gold foil comparison with the Argonne standard pile. For the purposes of instrument and foil calibrations, the standardization was considered satisfactory.

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PRODUCTION TEST 305-1-SE

PREPARATION OF 39 TRACERS. J. Squires.
October 16, 1944.

Authorization
HW-3-893

Objective: To produce a neptunium-239 tracer for
use on 200 Area problems by the Process Chemistry
Section and the Analytical Sections.

This production test was cancelled. Personal communication
with H. A. Fowler, January 10, 1957.

3-1-57

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PRODUCTION TEST 305-2-I

PROPORTIONAL COUNTER TESTS. M. H. Wilkening. Authorization
July 28, 1944 HW-3-444

Objective: To take characteristic curves on two
proportional counter sets, to calibrate them, and
to check their linearity of response to high counting
rates.

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PRODUCTION TEST 305-2-N

REACTIVITY MEASUREMENTS ON SHIELDED
PLUTONIUM SLUGS. H. W. Lefevre.
January 15, 1953.

Authorization
HW-26839

Objective: To make reactivity measurements in
the test pile on two nickel canned plutonium slugs
to provide experimental evidence for the feasibility
of converting Pu-240 to Pu-241 by exposing shielded
plutonium to selectively transmitted pile neutrons.

EXPERIMENTAL RESULTS OBTAINED FROM
TEST PILE REACTIVITY MEASUREMENTS ON
PLUTONIUM. H. W. Lefevre and J. R. Triplett.
April 28, 1953.

Final Report
HW-27851

Reactivity measurements were made to determine the
amount of poisoning produced by cadmium and tantalum
sleeves and the relative loss of Pu-239 when using this
method of Pu-240 removal was determined.

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PRODUCTION TEST 305-2-P

CALIBRATION OF 100 AREA INSTRUMENTS BY P. W. Crane. Authorization
MEANS OF THE BUILDING 305 PILE. HW-3-514
August 10, 1944.

Objective: To check and calibrate instruments for Building 105 and to irradiate materials to be used in such calibrations by use of the 305 pile as a radiation source. The pile will be used as a source in those cases where available natural radioactive sources do not provide sufficient intensity or the desired irradiation conditions.

CALIBRATION OF 100 AREA INSTRUMENTS BY W. R. Kanne. Final Report
MEANS OF THE BUILDING 305 PILE. HW-3-2455
May 23, 1945.

The work done and references giving the final results of this work are (1) the standardization of foils and counting sets for measurements in the 105 piles, (See Report on Production Test 105-7-P, Document No. 3-1560, January 3, 1945). (2) the calibration of the water monitoring ion chambers in the sampling system. (See memorandum Jordan to File, Document No. 3-1121, November 25, 1944).

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PRODUCTION TEST 305-2-SE

IRRADIATION OF UNH IN 305 UNIT. J. E. Willard. Authorization
November 2, 1944. HW-7-839

Objective: To provide a supply of Np-239 tracer for
work in conjunction with 200 Area problems.

This production test was cancelled. Personal
communication with H. A. Fowler, January 10, 1957.

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PRODUCTION TEST 305-3-I

CALIBRATION OF GAS CHAMBERS FOR 105-B.
C. I. Bradford. August 14, 1944.

Authorization
HW-3-532

Objective: To calibrate a gas ion chamber with a
quantity of activated argon gas.

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PRODUCTION TEST 305-3-N

STANDARDIZED IRRADIATIONS FOR RELATIVE
CONVERSION RATIO DETERMINATIONS.
H. W. Lefevre. October 27, 1954.

Authorization
HW-33568

Objective: To obtain irradiated foils of uranium with
known irradiation histories for use in standardizing
counters.

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PRODUCTION TEST 305-3-P

305 TEST OF UNBONDED SLUGS. P. W. Crane.
November 18, 1944.

Authorization
HW-3-1077

Objective: To determine by standard tests in the
305 Building an indication of the effect on the
reproduction factor of the use of unbonded slugs.

305 TEST OF UNBONDED SLUGS. G. L. Weil.
January 8, 1945.

Final Report
HW-3-1437

The observed and expected difference in cross-
section between bonded and unbonded slugs was
found to be substantially in agreement. The
discrepancy, if assumed real, could be accounted
for by the presence of the order of 7×10^{-4} grams
of boron or cadmium in the bonding layer.

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PRODUCTION TEST 305-4-IDS

WATER CHAMBER TESTS. C. I. Bradford.
September 1, 1944.

Authorization
HW-3-640

Objective: To test two ion chambers designed for monitoring the activity of the discharge water from the 105 B pile. The sensitivity in terms of number of disintegrations per cc. per sec. per micromicroampere is to be determined.

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PRODUCTION TEST 305-4-P

DETERMINATION OF EFFECTIVENESS OF A POISON COLUMN. H. Worthington. January 9, 1945. Authorization HW-3-1376

Objective: To determine the effectiveness of a poison column as a function of the proportion of lead and lead-cadmium dummies in the column, by tests with the 305 pile.

DETERMINATION OF EFFECTIVENESS OF A POISON COLUMN. G. L. Weil. March 3, 1945. Final Report HW-3-2087

The reactivity of the several combinations of lead slugs and poison slugs that are possible was determined, and results calculated by two different methods are tabulated.

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PRODUCTION TEST 305-5-IDS

F - COUNTER TESTS. W. H. Wilkening.
October 3, 1944.

Authorization
HW-3-804

Objective: To test and calibrate a fission counter in
the 305 standard pile.

3-1-57

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PRODUCTION TEST 305-5-P

DETERMINATION OF EASE OF ACTIVATION OF
PROPOSED INSERTS FOR VERTICAL SAFETY
RODS. H. Worthington. February 20, 1945.

Authorization
HW-3-1670

Objective: To measure the ease of activation of the
phenolic resin plastics proposed as inserts for the
vertical safety rods.

DETERMINATION OF EASE OF ACTIVATION OF
PROPOSED INSERTS FOR VERTICAL SAFETY
RODS. W. E. Jordan. June 10, 1945.

Final Report
HW-3-2566

Experience with the use of poison columns to compensate
reactivity gains, with relatively small effect on the
efficiency of the vertical rod system, showed that the
need for increasing the margin of control in these rods
by means of inserts was very improbable. The development
of this method was discontinued.

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PRODUCTION TEST 305-6-IDS

TESTS ON THREE INCH NEUTRON CHAMBERS.
C. I. Bradford. October 3, 1944.

Authorization
HW-3-803

Objective: To determine the characteristics of three inch neutron chambers. These chambers are being depended upon to indicate low power levels of the 105-B pile. In particular a new three inch differential neutron chamber will be tested as soon as possible.

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PRODUCTION TEST 305-6-P

ACTIVATION OF PROCESS WATER ADDITIVES.
H. Worthington. June 26, 1945.

Authorization
HW-3-2697

Objective: To determine the activation of various
chemicals used as additives in the 105 process water.

ACTIVATION OF PROCESS WATER ADDITIVES.
J. M. West and J. J. O'Connor., January 29, 1946.

Final Report
HW-3-3398

Samples of all chemical additives used in the treatment
of 100 Area process water, as well as residues from
evaporated water samples, were activated in the 305
Test Pile. These samples included Ferrifloc, sodium
dichromate, lime, sodium silicate, and diatomaceous
earth. Decay curves are given and analyzed for each
material.

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PRODUCTION TEST 305-7-IDS

TESTS ON A FIVE INCH DIFFERENTIAL NEUTRON
CHAMBER. C. I. Bradford. October 3, 1944.

Authorization
HW-3-805

Objective: To establish the characteristics of the
five inch differential neutron chamber which is now
being built in Building 3706 for use in Building 105-B.

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PRODUCTION TEST 305-7-P

DISCHARGE LUBRICATION. C. N. Gross and
H. Worthington. July 24, 1945.

Authorization
HW-7-2040

Objective: To find a substitute soluble oil for
Standard Oil of California's Calol (Soluble Oil A-60)
which is being discontinued in the near future.

DISCHARGE LUBRICATION. J. S. Allen.
September 19, 1945.

Final Report
HW-7-2443

After testing the old Calol, new Calol (substitute
offered by vendor) and duPont's Textile Softener No. 3,
it was recommended that the new Calol soluble oil be
accepted as replacement for the old Calol as a discharge
lubricant.

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PRODUCTION TEST 305-8-IDS

CALIBRATION OF STAINLESS STEEL CHAMBER.
C. I. Bradford. October 23, 1944.

Authorization
HW-3-904

Objective: To calibrate a water monitoring ion chamber made of stainless steel. This unit, when approved, will serve as a model for the rest of the chambers of this type.

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PRODUCTION TEST 305-8-P

RELATIVE POISONING EFFECTIVENESS OF
THORIUM AND Pb-Cd SLUGS. L. Marshall.
October 19, 1945.

Authorization
HW-7-2616

Objective: To measure the relative effectiveness
of thorium slugs and lead-cadmium slugs for reducing
pile reactivity.

RELATIVE POISONING EFFECTIVENESS OF
THORIUM AND Pb-Cd SLUGS. H. A. Fowler and
C. W. J. Wende. December 21, 1945.

Final Report
HW-7-3205

As a result of measurements made in the 305 Test
Pile, replacement of a column of uranium slugs at
the center of a 105-Pile by thorium slugs was calculated
to produce a reactivity loss of 34.4 ± 5 inhours; lead
slugs, seven inhours; a column of lead-cadmium slugs,
68 inhours.

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PRODUCTION TEST 305-9-IDS

COUNTING LOSS TEST ON BF₃ PROPORTIONAL COUNTER SET. C. I. Bradford. November 28, 1944 HW 3-1137 Authorization

Objective: To determine the counting losses at high counting rates of a proportional counter set to be used in the 105-D startup.

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PRODUCTION TEST 309-9-P

POISONING EFFECTIVENESS AND UNIFORMITY
OF MYRNALLOY SLUGS. C. W. J. Wende.
February 19, 1946.

Authorization
HW-7-3486

Objective: To determine the poisoning effectiveness
and uniformity of a batch of approximately thirty thorium
slugs prior to charging into the B pile.

POISONING EFFECTIVENESS AND UNIFORMITY
OF MYRNALLOY SLUGS. C. W. J. Wende.
April 2, 1946.

Final Report
HW-7-3834

A full column of thorium slugs located in an unshadowed
position at the center of an unflattened 2004-tube pile
was estimated to absorb 39 inhours. A high degree of
uniformity was demonstrated by tests in which the slugs
were handled in batches of four.

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PRODUCTION TEST 305-10-IDS

CALIBRATION OF STAINLESS STEEL CHAMBERS.
C. I. Bradford. November 28, 1944.

Authorization
HW-3-1136

Objective: To calibrate eight stainless steel water monitoring ion chambers. These units, when approved, will be used in the 105-D Building in the water monitoring rooms.

3-1-57

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PRODUCTION TEST 305-10-P

SLUGS OF SPECIAL IRRADIATION REQUEST
NO. 15. C. W. J. Wende. March 26, 1946.

Authorization
HW-7-3700

Objective: To determine the poisoning effectiveness of slugs which are to be irradiated according to Request No. 15 (Metallurgical Laboratory's request - Worthington to Daniels, document no. DuH-7843).

SLUGS OF SPECIAL IRRADIATION REQUEST
NO. 15. C. W. J. Wende. April 5, 1946.

Final Report
HW-7-3869

A full column of slugs of the type employed under Request No. 15. when located in the center of an unflattened 2004-tube pile, was estimated to absorb approximately 50 inhours.

For pile irradiation see P. T. 105-55-P.

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PRODUCTION TEST 305-11-P

IRRADIATION OF URANIUM HYDROXIDE.
J. M. West. June 18, 1947.

Authorization
HW-7-6425

Objective: To determine the rate of emission of xenon-135 from various samples of uranium hydroxide under neutron irradiation.

IRRADIATION OF URANIUM HYDROXIDE.
J. M. West. May 20, 1948.

Supplement A
HW-9847

Objective: To test the operation of special slugs containing a mixture of uranium and thorium hydroxides as a generator of xenon-135.

This production test was not completed. The results are included in P. T. 305-15-P. Personal communication with H. A. Fowler, January 10, 1957.

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PRODUCTION TEST 305-12-P

REACTIVITY EFFECT OF AQUADAG. J. M. West.
July 21, 1947.

Authorization
HW-7186

Objective: To determine whether the presence of
"Aquadag" on process tubes would affect the reactivity
of the 105 piles.

REACTIVITY EFFECT OF AQUADAG. J. M. West.
August 29, 1947.

Final Report
HW-7416

The application of two ounces (wet form) of "Aquadag"
to each process tube in a 100 Area pile was found to
decrease the reactivity by less than one inhour.

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PRODUCTION TEST 305-13-P

REACTIVITY MEASUREMENTS OF A LARGE
ANNULUS PROCESS TUBE. H. A. Fowler.
February 5, 1951.

Authorization
HW-20168

Objective: To determine the reactivity effect of
using large annulus tubes in the C Piles.

This production test was cancelled. Personal
communication with H. A. Fowler, January 10, 1957.

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PRODUCTION TEST 305-14-P

305 REACTIVITY TEST OF "J" SLUG AFTER
DISCHARGE FROM A 105 PILE. P. F. Gast.
March 13, 1951.

Authorization
HW-20170

Objective: To determine the U^{235} burnout in an
aluminum- U^{235} ("J") slug discharged after a normal
exposure in a 105 pile.

305 REACTIVITY TEST OF A "J" SLUG AFTER
DISCHARGE FROM A 105 PILE. W. A. Clark.
May 9, 1951.

Supplement A
HW-21057

Objective: To determine the U^{235} burnout and
amount of residual fission product poison in a
series of "J" slugs discharged at different exposure
levels from a 105 pile.

This production test was never completed. Twenty-five
"J" slugs were irradiated and discharged at different
exposure levels. The fuel elements were sent off-site
to be tested for U^{235} burnout. The twenty-five Hanford
fuel elements were dissolved with 69 fuel elements from
another site so that measurements were inconclusive.
The test was not repeated. Personal communication
with H. A. Fowler, January 10, 1957.

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PRODUCTION TEST 305-15-P

IRRADIATION OF URANIUM HYDROXIDE.
G. P. Kerr. September 16, 1951.

Authorization
HW-22446

Objective: To irradiate a special slug containing a mixture of uranium and thorium hydroxides, and to test methods of separating, collecting, and assaying the Xe^{135} produced.

IRRADIATION OF URANIUM HYDROXIDE.
PRODUCTION OF Xe^{135} FOR LABORATORY
PURPOSES. J. W. Culvahouse, J. W. Finnigan,
H. W. Lefevre and R. E. Peterson. July 15, 1953.

Final Report
HW-28732

The absolute assay of Xe^{135} samples was determined. For theoretical yields of 10^{10} to 10^{12} atoms of Xe^{135} , overall efficiencies of 10 to 30 per cent were realized for the production of Xe^{135} samples of high radiochemical purity.

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PRODUCTION TEST 305-16-A

TEST PILE FLUX MEASUREMENTS. M. V. Davis.
March 7, 1952.

Authorization
HW-23738

Objective: To determine the flux distribution in the
Hanford Test Pile.

HANFORD TEST PILE. M. V. Davis and
H. A. Fowler. June 7, 1956.

Final Report
HW-43547

This report serves as the final report for this production
test. It describes the reactor and the operating
procedures used, and presents the latest results of
calibrations performed.

DECLASSIFIED

HW-47000 DEL
Page: 1033-1

PRODUCTION TEST 305-17-A

FLUX MEASUREMENTS ON A HANFORD TYPE
SLUG. M. V. Davis. November 20, 1952.

Authorization
HW-26291

Objective: To determine the neutron distributions
in a Hanford type uranium fuel element.

FLUX MEASUREMENTS ON HANFORD TYPE
LOADINGS. H. A. Fowler. March 16, 1954.

Supplement A
HW-31151

Objective: To determine the neutron distributions
in Hanford type loadings; both present type and
proposed type loadings.

DECLASSIFIED

HW-47000 DEL

Page: 1034-1

PRODUCTION TEST 305-18-A

IMPURITY BURNOUT IN GRAPHITE. H. A. Fowler. Authorization
March 10, 1954. HW-31094

Objective: To measure the neutron induced changes
in the elemental purity of graphite after exposure in a
production pile.

This test was performed and results were reported in
HW-33487, ADSORPTION PROPERTIES OF VIRGIN
AND IRRADIATED GRAPHITE, C. N. Spalaris,
November 24, 1954.

DECLASSIFIED

HW-47000

DEL

Page: 1035-1

PRODUCTION TEST 305-19-A

FLUX AND REACTIVITY MEASUREMENTS ON ANP
TYPE FUEL ASSEMBLY. H. A. Fowler.
December 1, 1954.

Authorization
HW-33957

Objective: To determine the neutron distribution in
and reactivity effects of an ANP type fuel assembly.

CONDITIONS FOR IRRADIATION OF GE-ANP
AIRCRAFT REACTOR FUEL ELEMENT IN C PILE.
W. E. Niemuth. March 7, 1955.

Final Report
HW-35658

Measurements were made in the test pile on the effect
of the test element and its liner on test pile reactivity
and the neutron density of the ANP element relative
to that in adjacent natural uranium. (This report was
not issued as a formal production test.)

DECLASSIFIED

HW-47000

DEL

Page: 1036-1

PRODUCTION TEST 305-20-A

FLUX AND REACTIVITY MEASUREMENTS ON A
KAPL-120 FUEL ASSEMBLY. H. A. Fowler.
June 3, 1955.

Authorization
HW-37120

Objective: To determine the neutron distribution and
the reactivity effects of the KAPL-120 fuel assembly.

A SUMMARY OF PHYSICS STUDIES PERFORMED
AT HANFORD WITH REGARD TO THE KAPL-120
LOOP. W. E. Fry. September 4, 1956.

Final Report
HW-45199

Thermal neutron flux measurements were conducted
in the Hanford Test Pile to determine if the KAPL-120
Loop had sufficient cooling for the proposed fuel loading.
Cooling was found to be adequate. (This report was not
issued as a formal production test.)

DECLASSIFIED

HW-47000

DEL

Page: 1037-1

PRODUCTION TEST 305-21-A

REACTIVITY TESTS OF NORMAL URANIUM SLUGS
AFTER DISCHARGE FROM A 105 PILE.
H. A. Fowler. August 3, 1955.

Authorization
HW-38502

Objective: To determine the long term gain transients
which result from the change in the effective macroscopic
fission and adsorption cross sections with irradiation
of uranium.

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WITH DELETIONS

HW-47000

DEL

Page: 1038-1

PRODUCTION TEST 305-22-A

FLUX AND REACTIVITY MEASUREMENTS OF A
KAPL-120 FUEL ASSEMBLY. (special request
KAPL-120) H. A. Fowler. February 28, 1956.

Authorization
HW-41688

Objective: To determine the neutron distribution and
the reactivity effects of the KAPL-120 fuel assembly.

A SUMMARY OF PHYSICS STUDIES PERFORMED
AT HANFORD WITH REGARD TO THE KAPL-120
LOOP. W. E. Fry. September 4, 1956.

Final Report
HW-45199

Thermal neutron flux measurements were conducted
at the Hanford Test Pile on an improved prototype
assembly to obtain a better estimate of the thermal
neutron flux in the KAPL-120 Loop.

DECLASSIFIED
WITH DELETIONS

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[REDACTED]
DECLASSIFIED

HW-47000

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PRODUCTION TEST 305-23-A

FLUX AND REACTIVITY MEASUREMENTS ON
ARMY GAS LOOP LINER MOCK-UP ASSEMBLY.
W. E. Fry and H. A. Fowler. May 24, 1956.

Authorization
HW-43374

Objective: To determine the neutron distribution and
reactivity effects of a prototype Army Gas Loop
liner assembly.

NEUTRON FLUX AND REACTIVITY STUDIES
PERTAINING TO THE PROPOSED ARMY GAS
LOOP. W. E. Fry. July 2, 1956.

Final Report
HW-44039

Thermal neutron and pile reactivity estimates obtained
for the Army Gas Loop with the aid of a mock-up test
in the Hanford Test Pile showed that the maximum
thermal neutron flux that could be expected in the in-
pile test section of the loop would be 1.6×10^{13} n/cm²/sec.
(This report was not issued as a formal production
test report.)

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2

DECLASSIFIED

HW-47000

DEL

Page: 2001-1

PRODUCTION TEST 313-1-M

CANNING PROCEDURE STUDY - DIPPING TIME
IN AlSi BATH. S. J. Bugbee. May 20, 1944.

Authorization
HW-7-117

Objective: To improve bond by increasing dipping
time.

DIPPING TIME IN AlSi BATH. K. G. Jones and
H. Hall. June 19, 1944.

Final Report
HW-3-269

A dip time of six seconds was recommended as
a result of this test in place of the two second
dip time previously used. A further test, using
longer dip times with more rigid control of process
variables, particularly can pre-heating time and
AlSi pouring temperature, was to be made.

DECLASSIFIED

HW-47000

DEL

Page: 2002-1

PRODUCTION TEST 313-2-M

CANNING PROCEDURE STUDY - FLUX FOR AlSi BATH. S. J. Bugbee. May 20, 1944

Authorization
HW-7-117

Objective: To improve bonding by the use of flux to prevent oxide formation.

FLUX FOR AlSi BATH. H. Hall, July 14, 1944.

Final Report
HW-3-369

Tests were made to determine increase or decrease in quality when a flux composed of 45% CaCl_2 , 30% BaCl_2 , 20% NaCl , and 5% NaF was used. No conclusive results as to its effectiveness were obtained.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2003-1

PRODUCTION TEST 313-3-M

CANNING PROCEDURE STUDY - CANNING
RECLAIMED SLUGS. S. J. Bugbee. May 20, 1944.

Authorization
HW-7-117

Objective: To study the feasibility of canning
experimentally reclaimed slugs.

CANNING OF RECLAIMED SLUGS. D. G. Jones
and H. Hall. June 28, 1944.

Final Report
HW-3-282

Twenty five canned pieces were reclaimed by chemical dissolution of the aluminum and part of the bond. The remainder of the bond was removed by mechanical action of a sand blaster. The resulting pieces were warped no worse than average pieces and ran about 0.005 inch undersize. The results indicated that canning of reclaimed slugs was feasible.

DECLASSIFIED

HW-47000

DEL

Page 2004-1

PRODUCTION TEST 313-4-M

CANNING PROCEDURE STUDY - FLUX HEATED
CAPS WITH COLD CONICAL PLUNGER. S. J.
Bugbee. May 20, 1944.

Authorization
HW-7-117

Objective: To improve control of bonding tempera-
ture by elimination of plunger heater.

FLUX HEATED CAPS WITH COLD CONICAL
PLUNGER. K. G. Jones and T. Webber.
June 16, 1944

Final Report
HW-3-237

The cold plunger operated at least as well as
heated plungers and was therefore recommended
for full scale plant use. Flux heating of caps
caused difficulty in applying them to the slugs and
was therefore not recommended.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2005-1

PRODUCTION TEST 313-5-M

AlSi DIPPING BATH TEMPERATURE. H. Hall, Jr.
June 14, 1944.

Authorization
HW-3-230

Objective: To investigate the possibility of preventing AlSi can penetration by employing a colder AlSi dipping bath in the canning operation.

AlSi DIPPING BATH TEMPERATURE. H. Hall, Jr.
July 13, 1944.

Final Report
HW-3-348

Lowering the AlSi bath temperature resulted in better bonding, as judged by the frost test. More non-seating and fewer holes were observed in the test pieces as compared to control pieces. Can penetration was not lowered by using the colder AlSi dipping bath.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2006-1

PRODUCTION TEST 313-6-M

CANNING PROCEDURE STUDY - AlSi ADDED
TO CAN. K. G. Jones. June 8, 1944.

Authorization
HW-3-212

Objective: To improve bonding. Preliminary
results on canning line 1 indicated that more
AlSi added to the can might improve bonding.

AlSi ADDED TO CAN. H. Hall, Jr. July 14,
1944.

Final Report
HW-3-368

No correlation was found between total unbonded
area and the amount of AlSi added to the can
before canning. Use of larger amounts than
the 90 grams ordinarily used caused excessive
penetration.

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HW-47000

DEL

Page: 2007-1

PRODUCTION TEST 313-7-M

CANNING PROCEDURE STUDY - BARIUM
CHLORIDE BASE FLUX FOR BRONZE BATH.
K. G. Jones and R. C. Grills. June 19, 1944.

Authorization
HW-3-236

Objective: To eliminate the calcium chloride base
flux and substitute barium chloride base flux for
use on bronze dipping bath.

BARIUM CHLORIDE BASE FLUX FOR BRONZE
BATH. R. M. Treco. July 18, 1944.

Final Report
HW-3-377

Results indicated that (1) a flux consisting of 48%
 BaCl_2 , 31% KCl , and 21% NaCl caused the slug
to wet as well as the standard CaCl_2 base flux;
(2) bonding was essentially the same for both type
fluxes; (3) operational characteristics of the BaCl_2
flux were superior to standard CaCl_2 base flux;
and (4) BaCl_2 flux should be replaced every four
hours.

DECLASSIFIED

HW-47000

DEL

Page: 2008-1

PRODUCTION TEST 313-8-M

CANNING PROCEDURE STUDY - CORRELATION
OF CAN SURFACE TO CAN PENETRATION.
R. C. Grills, May 29, 1944.

Authorization
HW-3-185

Objective: To study the relationship of can sur-
face to can penetration.

CORRELATION OF CAN SURFACE CONDITION
TO CAN PENETRATION. H. Hall. June 12, 1944

Final Report
HW-3-224

It was concluded that visual inspection is not
a sufficient test for penetration, that reject
cans are not penetrated any more than standard
cans, and that completely etched cans are not
penetrated any more than cans etched on the
inside only.

3-1-57

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DECLASSIFIED

HW-47000

DEL

Page: 2009-1

PRODUCTION TEST 313-9-M

CANNING PROCEDURE STUDY - DIRECT DIPPING IN ALUMINUM-SILICON. K. G. Jones.
June 8, 1944.

Authorization
HW-3-210

Objective: To eliminate the bronze and tin baths from the dipping and canning process. Preliminary work at other sites indicates satisfactory wetting and bonding can be obtained by dipping the pieces directly into the AlSi bath.

DIRECT DIPPING IN AlSi. H. Hall and K. G. Jones. June 24, 1944.

Final Report
HW-3-272

The direct dip process appeared equivalent to the triple-dip process in visual inspection, penetration and frost tests, and in dimensional measurements. Corrosion tests showed single-dip pieces slightly inferior to those of the triple-dip process.

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HW-47000

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Page: 2010-1

PRODUCTION TEST 313-10-M

CANNING PROCEDURE STUDY - CANNING DIE
SIZE. K. G. Jones. June 7, 1944.

Authorization
HW-3-204

Objective: To reduce the diameter of canned slugs.
At this time 76 per cent of current production fails
to meet the large (1.530 - 1.535 inch) diameter
specification. Information from other sites indicates
that 1.525 inch diameter may be necessary.

CANNING DIE SIZE. H. Hall. June 23, 1944.

Final Report
HW-3-267

The decision was made to retain the 1.530 inch
diameter die for canning under existing conditions,
since the die size is not the critical factor in
determining final piece diameter.

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HW-47000

DEL

Page: 2011-1

PRODUCTION TEST 313-11-M

CANNING PROCEDURE STUDY - DROP-OUT
TEMPERATURE. K. G. Jones. June 9, 1944.

Authorization
HW-3-211

Objective: To investigate press operation with a cold drop-out. It is desirable to replace the drop-out heater with a cold drop-out plunger because of maintenance costs. Tests at other sites indicate that the cold drop-out operation is possible.

DROP-OUT TEMPERATURE. H. Hall, Jr.
July 14, 1944.

Final Report
HW-3-374

Press production quality with a cold drop-out was equivalent to that of standard operation on thin bottom cans. Because of variations in press quality at certain times, a further test seemed desirable over a longer period of time.

3-1-57

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HW-47000

DEL

Page: 2012-1

PRODUCTION TEST 313-12-M

CANNING PROCEDURE STUDY - THICK BOTTOM ALUMINUM CANS. K. G. Jones and R. C. Grills
June 19, 1944. Authorization HW-3-242

Objective: To evaluate the use of thick bottom aluminum cans.

THICK BOTTOM ALUMINUM CANS. H. Hall, Jr.
June 29, 1944. Final Report HW-3-289

Since no disadvantages accompanied preliminary tests, the decision was made to test heavy bottom cans on a long term basis.

3-1-57

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HW-47000

DEL

Page: 2013-1

PRODUCTION TEST 313-13-M

CANNING PROCEDURE STUDY - EVALUATION
OF RECLAIMED STEEL CANS. K. G. Jones.
June 19, 1944.

Authorization
HW-3-250

Objective: To evaluate the use of reclaimed cans.

EVALUATION OF RECLAIMED STEEL CANS.
E. A. Smith . February 10, 1950.

Final Report
HW-15994

Because P. T. 313-21-M indicated that the use of heavier walled sleeves offered numerous advantages, 0.140 inch wall sleeves were adopted as standard and further testing of reclaimed thin-walled sleeves was discontinued.

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HW-47000

DEL

Page: 2014-1

PRODUCTION TEST 313-14-M

CANNING PROCEDURE STUDY - LONG TERM
EVALUATION OF THICK BOTTOM ALUMINUM
CANS. K. G. Jones. June 20, 1944.

Authorization
HW-3-249

Objective: To test canning production quality
using thick bottom aluminum cans for an extended
period of time. Preliminary short test was
favorable.

LONG TERM EVALUATION OF THICK BOTTOM
ALUMINUM CANS. R. J. Schier. July 29, 1944.

Final Report
HW-3-456

Results indicated that the thick bottom cans were
equivalent to thin bottom cans in visual inspection
after canning and in frost, warp, and average
diameter inspection, were inferior in penetration
and maximum-minimum diameter, but were more
uniform in length than the thin bottom type.

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HW-47000

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Page: 2015-1

PRODUCTION TEST 313-15-M

CANNING PROCEDURE STUDY - EVALUATION
OF HIGH PURITY 13A AlSi ALLOY. K. G. Jones. Authorization
June 21, 1944. HW-3-248

Objective: To improve the quality of finished slugs
by use of a high purity alloy.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M-SERIES) R. C. Grills. February 20, 1945. Final Report
HW-3-1663

Before sufficient high purity alloy was obtained to
run a complete test on the material, it was
decided to order only high purity alloy. There-
fore, this test was never carried out.

DECLASSIFIED

HW-47000

DEL

Page: 2016-1

PRODUCTION TEST 313-16-M

CANNING PROCEDURE STUDY - EVALUATION
OF AlSi LINED ALUMINUM CANS. K. G. Jones.
June 23, 1944.

Authorization
HW-3-268

Objective: To evaluate the use of AlSi lined aluminum cans with respect to improving bonding of the finished piece.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

The high number of voids and penetrated cans in the final pieces and the fact that no vendor could be found for thick bottom AlSi cans constituted the reasons for discontinuing work on this type of can.

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HW-47000

CEL

Page: 2017-1

PRODUCTION TEST 313-17-M

CANNING PROCEDURE STUDY - EXTENDED
TEST OF DIRECT DIP IN AlSi. K. G. Jones.
June 21, 1944.

Authorization
HW-3-259

Objective: To evaluate the operability of direct
dipping in AlSi by a production run of 2000 pieces.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20,
1945.

Final Report
HW-3-1663

Surface and penetration quality of the single dip
pieces was comparable to the triple dip process.
Bonding as judged by the frost test was decidedly
inferior on the single dip pieces. Interpretation
of the classification data was limited to broad
classes and the results of the single dip pieces
appeared comparable to those with the triple-dip.

3-1-57

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Page: 2018-1

PRODUCTION TEST 313-18-M

CANNING INSPECTION STUDY - CLASSIFICATION Authorization
INVESTIGATION. K. G. Jones. June 28, 1944. HW-3-281

Objective: To obtain sufficient data on the quality
of canned slugs so that an adequate inspection
classification system for final use may be established.

CLASSIFICATION INVESTIGATION. R. J. Schier. Final Report
July 20, 1944. HW-3-386

The results of this investigation revealed that
some changes in the classification system were
desirable to obtain a better system. The system
to be adopted was presented.

3-1-57

DECLASSIFIED

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Page: 2019-1

PRODUCTION TEST 313-19-M

CANNING PROCEDURE STUDY - CAP AND
INSERT HEATING. K. G. Jones. June 28, 1944.

Authorization
HW-3-277

Objective: To reduce the complexity of the canning operation and improve slug quality by changing the method of preheating the top cap and bottom insert.

CAP HEATING. R. J. Schier. July 29, 1944.

Final Report
HW-3-455

The results of this investigation indicated that a batch method of preheating clad and unclad top caps, even in an inert atmosphere at the desired operating temperature, was not feasible because of the oxide film formed on the cap which prevents adequate bonding between the cap and the bonding metal. Additional studies were contemplated.

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Page: 2020-1

PRODUCTION TEST 313-20-M

INSPECTION PROCEDURE STUDY - PENETRATION
INSPECTION. K. G. Jones. July 1, 1944.

Authorization
HW-3-306

Objective: To obtain an improved inspection by
using an acenaphthene coating, in a similar fashion
as carried out in the frost test, on etched pieces
before inspection.

PENETRATION INSPECTION. R. J. Schier.
August 21, 1944.

Final Report
HW-3-577

Results indicated that a phosphoric acid etch alone
or combined with an acenaphthene coat on the slug
was not a satisfactory etch because iron inclusions
and penetrated areas could not be differentiated.
A nitric acid etch, which colors black only AlSi pen-
etrated areas and produces a frosty surface on the
can, was considered a satisfactory etch for penetra-
tion inspection.

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HW-47000

CEL

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PRODUCTION TEST 313-21-M

CANNING PROCEDURE STUDY - EVALUATION
OF THICK WALL STEEL CANS. K. G. Jones.
July 5, 1944.

Authorization
HW-3-307

Objective: To evaluate thick walled steel sleeves
with respect to more uniform piece dimensions, reuse
of sleeves, and press performance.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

As a result of this test, 140 mil sleeves were adopted
as optimum with respect to wall thickness.

3-1-57

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Page: 2022-1

PRODUCTION TEST 313-22-M

CANNING PROCEDURE STUDY - TIN BATH TEM-
PERATURE. K. G. Jones. July 11, 1944.

Authorization
HW-3-334

Objective: To decrease penetration by lowering
the tin bath temperature.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

This test was never carried out because all bath
temperatures were lowered before the test could
be run and there was no need for performing it.

3-1-57

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Page: 2023-1

PRODUCTION TEST 313-23-M

CANNING PROCEDURE STUDY - CONTROLLED
OXIDE LAYER ON ALUMINUM CANS. K. G. Jones. Authorization
July 12, 1944. HW-3-335

Objective: To eliminate penetration of aluminum
cans by AlSi during the canning operation.

REPORT ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945. Final Report
HW-3-1663

This test was never carried out since penetration
was brought under control by proper control of
the bath temperature.

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Page: 2024-1

PRODUCTION TEST 313-24-M

CANNING PROCEDURE STUDY - USE OF TAPERED
TOP CAPS. K. G. Jones. July 13, 1944.

Authorization
HW-3-333

Objective: To determine whether the use of a taper
on the top cap will improve top cap bonding.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Top cans with a taper of 1.365 inches (O.D. top) -
1.350 inches (O.D. bottom) yielded the best top
cap bond.

3-1-57

DECLASSIFIED

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Page: 2025-1

PRODUCTION TEST 313-25-M

CANNING PROCEDURE STUDY - ALUMINUM CAN
HEATING TIME. K. G. Jones. July 13, 1944.

Authorization
HW-3-347

Objective: To establish limits of aluminum can heating time as regards penetration and non-sealing.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

This test was never carried out because of the urgency of other work, and because sub-surface canning brought penetration and non-sealing under better control.

3-1-57

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Page: 2026-1

PRODUCTION TEST 313-26-M

CANNING PROCEDURE STUDY - VERTICAL SLUG
QUENCHING. K. G. Jones. July 17, 1944.

Authorization
HW-3-380

Objective: To obtain better top cap bonding by
vertical quenching.

VERTICAL SLUG QUENCHING. R. J. Schier.
August 14, 1944.

Final Report
HW-3-540

Results obtained showed that top cap bonding as
indicated by degree of weldability was 7 per cent
better with vertically quenched pieces than with
horizontally quenched pieces.

3-1-57

DECLASSIFIED

HW-47000

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Page: 2027-1

PRODUCTION TEST 313-27-M

CANNING PROCEDURE STUDY - AUTOCLAVE
TEST PRIOR TO WELDING. T. G. Webber.
July 19, 1944.

Authorization
HW-3-376

Objective: To develop a shorter and more positive
autoclave test.

AUTOCLAVE TEST PRIOR TO WELDING.
D. H. Edwards. August 25, 1944.

Final Report
HW-3-603

It was concluded that subjecting unwelded pieces to
the autoclave conditions did not eliminate all slugs
with faulty braze lines as indicated by subsequent
welding. No conclusion was reached as to whether
welding is beneficial to the soundness of the closure.

DECLASSIFIED

HW-47000

CEL

Page: 2028-1

PRODUCTION TEST 313-28-M

CANNING PROCEDURE STUDY - EFFECT OF SLUG SHAPE ON BONDING. H. Hall, Jr. July 19, 1944. Authorization HW-3-381

Objective: To round off the lower end of the slug so that during seating as little air as possible is trapped at the bottom of the can. Air entrapment may be affecting the bonding.

REPORTS ON PRODUCTION TESTS DURING EARLY STAGES OF CANNING DEVELOPMENT (313-M SERIES). R. C. Grills. February 20, 1945. Final Report HW-3-1663

There was no significant difference in the number of frost test rejects between the control slugs with no radius and test pieces with 1/4 inch radius.

DECLASSIFIED

HW-47000

CEL

Page 2029-1

PRODUCTION TEST 313-29-M

CANNING PROCEDURE STUDY - McCAULEY
RECLAIMED STEEL CANS. K. G. Jones.
July 22, 1944.

Authorization
HW-3-388

Objective: To evaluate McCauley reclaimed steel cans (expendable sleeves) after segregation into go and no go classes on a 1.448 inch mandrel gage.

REPORTS ON PRODUCTION TESTS DURING EARLY STAGES OF CANNING DEVELOPMENT (313-M SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

The reclaimed cans were checked and found to work satisfactorily. These cans had a wall thickness of 0.035 inch and were not satisfactory for sub-surface canning.

DECLASSIFIED

HW-47000

DEL

Page 2030-1

PRODUCTION TEST 313-30-M

CANNING INVESTIGATION STUDY - EFFECT OF
ALUMINUM CAN WALL ECCENTRICITY ON
PENETRATION. R. J. Schier. July 24, 1944.

Authorization
HW-3-430

Objective: To determine the effect of aluminum can
wall thickness on penetration.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

The test was not carried out because sufficient thin
wall cans could not be obtained and further penetra-
tion was brought under control by proper control of
bath temperature.

DECLASSIFIED

HW-47000

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Page: 2031-1

PRODUCTION TEST 313-31-M

CANNING PROCEDURE STUDY - STANDARIZATION
OF THE DEVELOPMENT CANNING LINE AND
EVALUATION OF THE HANFORD PROCESS.
R. J. Schier. July 25, 1944.

Authorization
HW-3-424

Objective: To set up the development canning line according to the Hanford operating conditions listed in the latest (7-25-44) process manual and determine the production schedule that can be maintained with the line operating under the above conditions. The Hanford process is to be evaluated once the operating conditions are determined.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

An attempt was made to follow the Hanford operating instructions of 7-25-44 and to standardize the process. This was done but it was not possible to control penetration, and so within the first week of operation, the bath and canning temperatures were lowered and work was started on sub-surface canning.

DECLASSIFIED

HW-47000

DEL

Page: 2032-1

PRODUCTION TEST 313-32-M

CANNING PROCEDURE STUDY - WETTING OF T-METAL WITH AlSi SIMULATING DIRECT DIP WITH INDUCTION HEATING. K. G. Jones. July 25, 1944.

Authorization
HW-3-421

Objective: To determine the wetting characteristics of uranium metal with AlSi when the oxide free metal has been heated to bath temperature before immersion.

REPORTS ON PRODUCTION TESTS DURING EARLY STAGES OF CANNING DEVELOPMENT (313-M SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

The surface of uranium metal wets readily in 2 or 3 seconds in AlSi at 1115 F (600 C) if the surface is relatively clean and unoxidized.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2033-1

PRODUCTION TEST 313-33-M

CANNING PROCEDURE STUDY - CORROSION TEST
WITH SPECIAL CLAD CANS. R. J. Schier.
July 26, 1944.

Authorization
HW-3-435

Objective: To determine whether twenty-five aluminum
cans clad with 72 S aluminum are more corrosion resis-
tant than unclad cans.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

This test was never carried out and subsequent tests
have shown 2S cans to have adequate corrosion resis-
tance for present use.

3-1-57

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HW-47000

DEL

Page: 2034-1

PRODUCTION TEST 313-34-M

CANNING PROCEDURE STUDY - GAS TEMPERATURE GAUGE FOR DETERMINING CANNING DIE TEMPERATURES. K. G. Jones. July 29, 1944.

Authorization
HW-3-454

Objective: To test a gas temperature gauge in production to determine whether useful information on canning failures caused by die troubles can be determined with it.

REPORTS ON PRODUCTION TESTS DURING EARLY STAGES OF CANNING DEVELOPMENT (313-M SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Work on this method of measurement was discontinued because of the poor results of this test and because measurements with this type of indicator interrupted the cycle of operation.

3-1-57

[REDACTED] **DECLASSIFIED**

HW-47000

DEL

Page: 2035-1

PRODUCTION TEST 313-35-M

No production test was issued for this number.

3-1-57 [REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 2036-1

PRODUCTION TEST 313-36-M

No production test was issued for this number.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2037-1

PRODUCTION TEST 313-37-M

CANNING PROCEDURE STUDY - EFFECT OF
ALUMINUM CAN ETCH ON PENETRATION.
K. G. Jones. July 27, 1944.

Authorization
HW-3-446

Objective: To determine the effect of a deep etch
on aluminum cans on AlSi penetration.

REPORT ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Results indicated that a deep etch on the aluminum sur-
face is detrimental to uniform wetting.

3-1-57

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HW-47000

DEL

Page: 2038-1

PRODUCTION TEST 313-38-M

CANNING PROCEDURE STUDY - ETCHING ALUMI-
NUM CANS IN NITRIC ACID PRIOR TO CANNING.
K. G. Jones. August 21, 1944.

Authorization
HW-3-572

Objective: To determine whether the removal of iron inclusions in the can surface prior to canning will reduce the number of doubtful penetrated areas occurring in the penetration inspection.

ETCHING ALUMINUM CANS IN NITRIC ACID PRIOR
TO CANNING. R. J. Schier. August 24, 1944.

Interim Report
HW-3-590

The results of this test indicated that a nitric acid pickle prior to canning did not effectively improve the penetration inspection nor decrease the frequency of doubtfully penetrated areas occurring on the can surface.

CANNING PROCEDURE STUDY - PENETRATION
INSPECTION. K. G. Jones. August 21, 1944.

Interim Report
HW-3-626

The first investigation into elimination of doubtful penetrated areas using nitric acid to remove iron inclusions in the can surface prior to canning was not successful. It was proposed to segregate cans into two lots, one containing no visible iron inclusions, the other with inclusions, run the cans in production and observe the penetration inspection results.

PENETRATION INSPECTION. J. A. Gerster.
September 9, 1944.

Final Report
HW-3-709

The results of this test indicated that when aluminum cans free of surface defects were used, the number of pieces classed as penetrated was 35 per cent less than the number of pieces classed as penetrated in the previous 4 days production where regular cans were used.

DECLASSIFIED

HW-47000

DEL

Page: 2039-1

PRODUCTION TEST 313-39-M

FUNCTIONAL USE TEST OF SPECIAL GROUPS
OF CANNED PIECES. J. A. Gerster. September
11, 1944.

Final Report
HW-3-708

The purpose of this test was to determine whether reclaimed and recanned slugs were acceptable for pile irradiation. Recanned slugs were irradiated in the 305 pile. Only those slugs which had averaged 0.29 pound weight loss per slug were not acceptable for use in the production piles. Short slugs and twice recanned slugs were acceptable.

(No formal test request was written for this production test.)

3-1-57

DECLASSIFIED

HW-47000

CEL

Page: 2040-1

PRODUCTION TEST 313-40-M

MACHINABILITY OF HEAVY METAL. R. C. Grills. Final Report
January 19, 1945. HW-3-1536

Special machining operations to be performed on uranium required that the metal be made more machinable if possible. Information from another site indicated that if uranium metal is heated, the machinability is improved. The purpose of this investigation was to determine the temperature range for optimum machinability of uranium.

Using the time required to drill a hole under constant speed and feed as a measure of machinability, it was found that the optimum temperature range for machinability of uranium was 165-175 C.

(No formal test request was written for this production test.)

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 2041-1

PRODUCTION TEST 313-41-M

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES). R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

This report, SUBMERSION CANNING, was performed
but no formal report was written up. HW-3-1117,
SUB-SURFACE SLUG ASSEMBLY, served as the
final report for this production test.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 2042-1

PRODUCTION TEST 313-42-M

CANNING PROCEDURE STUDY - WELDING AFTER
FROST TEST AND PENETRATION INSPECTION.
R. J. Schier and J. A. Gerster. September 5, 1944.

Authorization
HW-3-658

Objective: to determine whether the frost test, penetration etch and inspection of canned slugs are affected by performing these tests prior to welding and to determine whether the weldability of machined canned slugs is affected by performing these tests prior to welding.

WELDING AFTER FROST TEST AND PENETRA- Final Report
TION INSPECTIONS. J. A. Gerster. September 14, HW-3-710
1944.

The results of this test indicated that the order in which the various steps in the inspection procedure are carried out is not critical. However, penetration ratings were improved on the inspections made after welding.

DECLASSIFIED

HW-47000

CEL

Page: 2043-1

PRODUCTION TEST 313-43-M

CANNING PROCEDURE STUDY - DETERMINATION
OF TIN BUILDUP IN AlSi DIPPING BATH.
G. W. Struthers. September 18, 1944.

Authorization
HW-3-721

Objective: To determine the rate of tin buildup in the
AlSi dipping bath.

DETERMINATION OF TIN BUILDUP IN AlSi CANNING
AND DIPPING BATHS. L. D. Eubank.
February 21, 1945.

Final Report
HW-3-1669

The average rate of tin buildup in the AlSi dipping
bath was found to be 0.28 per cent per 100 slugs.
The rate of tin buildup in the assembly bath is
dependent upon the tin content of the dipping bath
and was found to vary from 0.008 per cent per 100
slugs.

(For pile irradiation see P.T. 105-79-P)

3-1-57

~~CONFIDENTIAL~~

DECLASSIFIED

HW-47000

DEL

Page: 2044-1

PRODUCTION TEST 313-44-M

This production test, TESTS FOR BRAZE QUALITY
was never performed.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2045-1

PRODUCTION TEST 313-45-M

CANNING PROCEDURE STUDY - TCP PLUG
LENGTH OF BONDED SLUGS. K. G. Jones.
October 4, 1944.

Authorization
HW-3-836

Objective: To determine if the use of long top plugs
(ca. 1-3/8 inches) improves the quality of the braze
line and simplifies machining operations.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT (313-M
SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Boss type caps 1-3/8 inches in length were tested.
Test results showed that differences were not
significant and that machining operations were not
simplified through use of the long type caps.

~~CONFIDENTIAL~~
DECLASSIFIED

HW-47000

CEL

Page: 2046-1

PRODUCTION TEST 313-46-M

CANNING PROCEDURE STUDY - SLUG TOP
CLOSURE. R. J. Schier. October 10, 1944.

Authorization
HW-3-859

Objective: To improve the quality of the top cap
brazing line.

REPORTS ON PRODUCTION TESTS DURING EARLY
STAGES OF CANNING DEVELOPMENT(313-M
SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Results indicated that the procedure then in practice
was an effective one if closer timing and control of
other variables was observed.

3-1-57

DECLASSIFIED

HW-47000

CEL

Page: 2047-1

PRODUCTION TEST 313-47-M

CANNING PROCEDURE STUDY - HEAVY BOTTOM
DRAWN CANS. R. J. Schier. October 16, 1944.

Authorization
HW-3-877

Objective: To determine the canning quality of
heavy bottom drawn cans.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

None of the cans tested were satisfactory in use
because of the high number of frost test rejects.
No etch or cleaning method tried for making cans
suitable for wetting proved to be satisfactory. The
only method found for wetting McCauley drawn
cans involved brushing the cans with a circular
steel brush after the can was filled with AlSi during
the canning operation.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2048-1

PRODUCTION TEST 313-48-M

CANNING PROCEDURE STUDY - SUB SURFACE
CANNING WITH COMPRESSED TOP CAPS (SQUASH
TYPE CAPS) R. C. Grills. November 3, 1944.

Authorization
HW-3-986

Objective: To determine if compressing the top cap
is a practical plant method of improving the present
braze line.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

This test was never carried out because of the lack of
satisfactory steel sleeves.

3-1-57

DECLASSIFIED

HW-47000 CEL

Page: 2049-1

PRODUCTION TEST 313-49-M

CANNING PROCEDURE STUDY - IMPROVED
WELDING TECHNIQUES. R. C. Grills.
November 18, 1944.

Authorization
HW-3-1083

Objective: To determine whether a change can be made in the welding technique to give a greater capacity with no decrease in slug quality. The changes proposed are: (1) decreasing the machine shoulder depth from 0.080 inch to 0.050 inch; and (2) increasing the weld amperage from 65 to 75 amperes.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20, 1945.

Final Report
HW-3-1663

Welding rejects were less than 0.5 per cent when the following conditions were used: the shoulder width was decreased from 0.080 inch to 0.050 inch; and the amperage was increased from 65 to 75 amperes.

3-1-57

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202

Resolution Test Chart Labels:

- 1.0
- 1.1
- 1.25
- 1.4
- 1.6
- 1.8
- 2.0
- 2.2
- 2.5
- 2.8
- 3.2
- 3.6
- 4.0

MANUFACTURED TO AIIM STANDARDS
BY APPLIED IMAGE, INC.

2 of 4

DECLASSIFIED

HW-47000

DEL

Page: 2050-1

PRODUCTION TEST 313-50-M

CANNING PROCEDURE STUDY - BLACK DEPOSITS
ON DIPPED SLUGS. R. C. Grills. November 18, 1944. Authorization
HW-3-1084

Objective: To determine if black deposits on dipped
slugs can be eliminated by close control of the make-
up of the bronze and tin bath.

CANNING PROCEDURE STUDY - BLACK DEPOSITS
ON DIPPED SLUGS. R. C. Grills. November 25, 1944. Supplement I
HW-3-1124

It was requested that a tin pot be equipped with a
new crucible and the "make-up" should be pure
virgin tin. The wetting of slugs through the bronze
and tin baths was observed for the presence of black
deposits.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES) R. C. Grills. February 20, 1945. Final Report
HW-3-1663

As a result of this test, the operating procedure was
changed to call for the use of 100 per cent virgin
material in the bronze baths.

DECLASSIFIED

HW-47000 DEL

Page: 2051-1

PRODUCTION TEST 313-51-M

CANNING PROCEDURE STUDY - CAN ETCHING
PROCEDURE. R. C. Grills. November 18, 1944.

Authorization
HW-3-1099

Objective: To check the present can etching procedure and to suggest improvements if necessary.

CAN ETCHING PROCEDURE. W. R. Myers.
February 23, 1945.

Final Report
HW-3-1684

An extensive search was made to find a suitable can etchant to remove stains and for methods which would eliminate the initial staining. It was not possible to quantitatively evaluate the various etchants tried because factors other than can surface influence the bonding of the slug to the can.

DECLASSIFIED

HW-47000 CEL

Page: 2052-1

PRODUCTION TEST 313-52-M

CANNING PROCEDURE STUDY - MEASURING
SCRATCHES ON CANS. T. J. Armstrong.
November 20, 1944.

Authorization
HW-3-1118

Objective: To provide a set of visual standards
and a gauge to measure the depth of scratches
on fuel elements.

MEASURING SCRATCHES ON SLUGS. R. C.
Grills. December 11, 1944.

Final Report
HW-3-1222'

An instrument was developed to measure the
depth of scratches on the canned slugs. This
instrument consisted of a dial gage mounted
over a contact needle supported by two
Lucite riders. The fuel element, mounted
on a dolly, was passed through the instrument.
The needle dropped into the scratches, and
the scratch depth was measured. As deter-
mined by this gage only those fuel elements
having scratches less than 0.005 inch deep
were considered acceptable for use.

3-1-57

~~CONFIDENTIAL~~
DECLASSIFIED

HW-47000

DEL

Page: 2053-1

PRODUCTION TEST 313-53-M

CANNING PROCEDURE STUDY - EVALUATION
OF THE FLUOROSCOPE AS A MEANS OF DE-
TECTING VOIDS UNDER TOP CAPS. R. C.
Grills. November 27, 1944.

Authorization
HW-3-1129

Objective: To evaluate the fluoroscope as a
method of detecting the presence of entrapped
gas at the end of the finished slug.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES). R. C Grills. February 20, 1945

Final Report
HW-3-1663

On the basis of the data, the decision was made
to reject all slugs showing light spots at the ends
when viewed in the fluoroscope.

DECLASSIFIED

HW-47000

DEL

Page: 2054-1

PRODUCTION TEST 313-54-M

This production test, MEASURING SLEEVES,
was never carried out.

3-1-57

~~CONFIDENTIAL~~
DECLASSIFIED

HW-47000

DEL

Page: 2055-1

PRODUCTION TEST 313-55-M

CANNING PROCEDURE STUDY - EFFECT OF
OUTGASSING TEMPERATURE ON SLUG WAR-
PAGE DURING CANNING. R. J. Schier.
December 11, 1944.

Authorization
HW-3-1202

Objective: To determine the effect of heating
metal extruded rods above the lower critical
point of the metal (665 C) on slug warpage and
non-seating troubles in canning.

REPORTS ON PRODUCTION TESTS DURING
EARLY STAGES OF CANNING DEVELOPMENT
(313-M SERIES). R. C. Grills.
February 20, 1945.

Final Report
HW-3-1663

Two heating procedures were used in the test:
(1) the metal was charged in the outgassing
furnace, heated to 1300 F, temperature lowered
to 1160 F, and then straightened after outgass-
ing; (2) straightened, charged in outgassing
furnace, heated to 1300 F, temperature lowered
to 1160 F, and then straightened after outgassing.
The results indicated that non-seating was not
lessened by either of these treatments.

DECLASSIFIED

HW-47000

DEL

Page: 2056-1

PRODUCTION TEST 313-56-M

CANNING PROCEDURE STUDY - SIMPLIFIED
CONTROL PRODECURE FOR MAINTAINING
NITRIC ACID CONCENTRATION OF PENETRA-
TION ETCH SOLUTION. K. G. Jones.
December 15, 1944

Authorization
HW-3-1223

Objective: To set up a simplified control proce-
dure for maintaining the nitric acid concentration
of the penetration etch solution within specified
limits of 30-40 per cent (by weight) nitric acid
and to determine when solid content of the solu-
tion reaches the maximum specified limit of
10 per cent solid.

SIMPLIFIED CONTROL PROCEDURE FOR
MAINTAINING NITRIC ACID CONCENTRATION
OF PENETRATION ETCH SOLUTION: R. C.
Grills. January 11, 1945.

Final Report
HW-3-1391

As a result of this test, specifications for acid
concentrations were changed to 40 to 50 per cent
(by weight) nitric acid, the acid temperature was
set at 80-90 C, and the allowable solids content
was decreased to 5 per cent by weight.

DECLASSIFIED

HW-47000

DEL

Page: 2057-1

PRODUCTION TEST 313-57-M

CANNING PROCEDURE STUDY - INCREASING
TIN TEMPERATURE AS A MEANS OF IMPROV-
ING FROST TEST. R. C. Grills.
December 21, 1944.

Authorization
HW-3-1263

Objective: To improve the frost test by increasing
tin temperature.

INCREASING TIN TEMPERATURE AS A MEANS
OF IMPROVING FROST TEST. R. C. Grills.
March 21, 1945.

Final Report
HW-3-1898

The tin temperature was set at 600 C after the
test results showed frost test rejects to be
approximately 2 per cent.

3-1-57

DECLASSIFIED

HW-47000

CEL

Page: 2058-1

PRODUCTION TEST 313-58-M

CANNING PROCEDURE STUDY - RECOVERY
OF LEAD DIPPED SLUGS. K. G. Jones.
December 27, 1944.

Authorization
HW-3-1293

Objective: To develop a method for recovery of
slugs which have been dipped in lead and AlSi
and canned.

RECOVERY OF LEAD DIPPED SLUGS. L. D.
Eubank. January 17, 1945.

Final Report
HW-3-1430

Lead dipped slugs, cleaned by the regular recovery process, were found to have a weight loss of about 0.03 pound per slug. Attempts to modify or shorten the procedure were not successful.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2059-1

PRODUCTION TEST 313-59-M

CANNING PROCEDURE STUDY - EFFECT OF
ROD MACHINING PROCEDURE ON WARP OF
CANNED SLUGS. K. G. Jones. January 12, 1945

Authorization
HW-3-1403

Objective: To determine the effect of producing
a machined slug from an extruded uranium rod
using a "two-cut" machining operation (instead
of the usual one-cut machining operation) upon
the amount of warp set up in hot dip canning of
a machined slug.

EFFECT OF ROD MACHINING PROCEDURE ON
SLUG WARPAGE. E. A. Smith. August 8, 1946

Final Report
HW-3-3608

It was concluded that slug warpage is not caused
by the mode of machining, and two-cut machining
was not recommended for adoption as the standard
process.

DECLASSIFIED

HW-47000 DEL
Page: 2060-1

PRODUCTION TEST 313-60-M

STUDY OF COOLANTS USED FOR MACHINING
HEAVY METAL SLUGS. L. D. Eubank.
January 12, 1945.

Authorization
HW-3-1398

Objective: To compare the soluble oils "Calol" and "Hydromite" with regard to alkalinity, change in properties with use, and storage characteristics of turnings from machining operations.

STUDY OF COOLANTS USED FOR MACHINING
HEAVY METAL SLUGS. L. D. Eubank.
March 27, 1945.

Final Report
HW-3-1961

Since "Calol" was found to possess a lower degree of alkalinity, to possess a lower fire potential and have a lower reactivity than "Hydromite" soluble oil, it was recommended that "Calol" be used for the uranium machining operation.

DECLASSIFIED

HW-47000

Page: 2061-1

DEL

PRODUCTION TEST 313-61-M

CANNING PROCEDURE STUDY - USE OF
LOWER DUPONOL - TETRA SODIUM
PYROPHOSPHATE CONCENTRATION IN
CAN AND CAP WASH SOLUTION. J. A.
Gerster. January 30, 1945.

Authorization
HW-3-1522

Objective: To determine the optimum con-
centration of the detergent chemicals used
in the Duponol-TSPP wash solutions.

USE OF LOWER DUPONOL - SODIUM
PYROPHOSPHATE CONCENTRATION IN
CAN AND CAP WASH SOLUTION. E. A.
Smith. August 8, 1946.

Final Report
HW-3-3608

It was determined in laboratory studies
(reported in Document No. HW-3-1903) that
the specified concentrations of 0.1 per cent
Duponol - 0.1 per cent TSPP were nearly
optimum and that no change was warranted.

DECLASSIFIED

HW-47000

DEL

Page: 2062-1

PRODUCTION TEST 313-62-M

CANNING PROCEDURE STUDY - EFFECT
OF BAR POSITION ON SEATING IN THE
CANNING OF HEAVY METAL SLUGS:
R. M. Treco. February 8, 1945.

Authorization
HW-3-1569

Objective: To determine whether the position
of slugs machined from extruded uranium bars
has any effect on warp or seating of canned
pieces.

EFFECT OF BAR POSITION ON SEATING IN
THE CANNING OF HEAVY METAL SLUGS.
R. C. Grills. March 21, 1945.

Final Report
HW-3-1899

The total number of not seated and warped slugs
from the front, middle, and tail of the extruded
machined bars was not considered significantly
different. The study of non-seats and warps was
continued under Production Test No. 313-67-M.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2063-1

PRODUCTION TEST 313-63-M

CANNING PROCEDURE STUDY--WIRE BRUSHING
AS A MEANS OF IMPROVING CAN QUALITY.
E. A. Smith. February 9, 1945.

Authorization
HW-3-1593

Objective: To improve the quality of output from
313 Area with respect to non-seat, wrinkled cans
and frost test rejects through use of a brushing
technique.

WIRE BRUSHING AS A MEANS OF IMPROVING
CAN QUALITY. E. A. Smith. April 14, 1945.

Final Report
HW-3-2156

A consideration of the surface condition brought
about by brushing pointed to the possibility that
the technique might help to eliminate wrinkled cans
and such non-seats as were not caused by distorted
slugs. However, the difficulty of procuring suitable
brushes, and of controlling the can-wiping operation,
together with the fact that improvements in chemical
cleaning methods reduced the incidence of non-seat,
wrinkled cans, and frost test rejects, led to the
abandonment of the proposed brushing technique.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2064-1

PRODUCTION TEST 313-64-M

CANNING PROCEDURE STUDY - EVALUATION
OF ALUMINUM COMPANY TEST CANS.
R. C. Grills. March 5, 1945.

Authorization
HW-3-1775

Objective: To determine the quality of test cans
supplied by the Aluminum Company of America.

EVALUATION OF ALUMINUM COMPANY TEST
CANS. R. C. Grills. March 21, 1945.

Final Report
HW-3-1900

With the exception of a step-mark 1 to 1-1/2 mils
deep about 3/4 inch from the bottom of the can,
all the test cans were superior in both surface
condition and general appearance to the cans then
in use.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2065-1

PRODUCTION TEST 313-65-M

CANNING PROCEDURE STUDY - USE OF
EUTECTIC AlSi ALLOY AS A MEANS OF
IMPROVING FINAL SLUG QUALITY.
R. C. Grills. March 12, 1945.

Authorization
HW-3-1838

Objective: To determine if a general improve-
ment of slug quality and more optimum operating
conditions can be obtained with a lower melting
bath.

USE OF EUTECTIC AlSi ALLOY AS A MEANS
OF IMPROVING FINAL SLUG QUALITY. L. D.
Eubank. April 17, 1945.

Final Report
HW-3-2153

A change in composition of the AlSi bath operating
at a temperature of 590-596 C was not recommended
due to the significant increases in the per cent of
wrinkles and holes observed.

DECLASSIFIED

HW-47000

DEL

Page: 2066-1

PRODUCTION TEST 313-66-M

CANNING PROCEDURE STUDY - VARIATION
IN CANNING YIELDS WITH "A" AND "Z"
SLUGS. R. C. Grills. March 15, 1945.

Authorization
HW-3-1872

Objective: To determine why higher canning
yields are obtained with "Z" slugs than with
"A" slugs. (A slugs were made from metal
obtained from Iowa State College; Z slugs from
recovered uranium.)

VARIATION IN CANNING YIELDS WITH "A"
AND "Z" SLUGS. L. D. Eubank. April 11, 1945. Final Report
HW-3-2090

It was found that the smaller diameter of "Z"
slugs was the principle reason for fewer non-
seats. Annealing treatments reduced non-seats
somewhat, but were of lesser importance as
compared to smaller diameters.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2067-1

PRODUCTION TEST 313-67-M

CANNING PROCEDURE STUDY - WARPED
SLUGS VS. NON-SEAT SLUGS. R. C. Grills.
March 20, 1945.

Authorization
HW-3-1896

Objective: To determine the number of non-
seated slugs that are caused by warped slugs.

WARPED SLUGS VS. NON SEAT SLUGS.
L. D. Eubank. April 20, 1945.

Final Report
HW-3-2165

Four hundred "A" slugs were gauged in a
1.386 inch (hot dimensions) parallel plate
gauge after the centrifuging operation. Only
the slugs passing the gauge were canned
resulting in only one non-seat and two wrinkled
cans. It was therefore concluded that warped
slugs are a principle cause of non-seats.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2068-1

PRODUCTION TEST 313-68-M

CANNING PROCEDURE STUDY - RECANNING
OF WARPED SLUGS SEGREGATED AFTER THE
CENTRIFUGE BY TECHNICAL WARP GAUGE.
L. D. Eubank. April 3, 1945.

Authorization
HW-3-2016

Objective: To recover, straighten and recan
warped slugs, which are now causing "non-
seats" when they are first canned.

RECANNING OF WARPED SLUGS SEGREGATED
AFTER THE CENTRIFUGE BY TECHNICAL
WARP GAUGE; L. D. Eubank. April 20, 1945.

Final Report
HW-3-2166

From 129 slugs rejected by the warp gauge that
were straightened, degreased, and recanned by
dipping directly into the bronze bath, only eleven
non-seats and one AlSi spill over were rejected
at the canning pot. The procedure used was re-
commended as a possible means of treating slugs
rejected in the canning operation because of warp.

DECLASSIFIED

HW-47000
Page: 2069-1

DEL

PRODUCTION TEST 313-69-M

CANNING PROCEDURE STUDY - EFFECT OF
STRAIGHTENING RODS BEFORE OUTGASSING
UPON WARPED SLUGS. L. D. Eubank.
April 4, 1945.

Authorization
HW-3-2054

Objective: To straighten a number of extruded
rods before outgassing, machine and can in the
standard manner, and observe the number of
non-seats due to warped slugs in comparison to
average production.

EFFECT OF STRAIGHTENING RODS BEFORE
OUTGASSING UPON WARPED SLUGS.
L. D. Eubank. April 24, 1945.

Final Report
HW-3-2215

Seven hundred thirty-five (735) slugs from bars
were straightened before outgassing were canned
by the standard procedure. One per cent non-seats
and 1.9 per cent wrinkled cans were noticed at the
canning pots. It was recommended that all rods
which needed straightening be passed through the
straightening operation before outgassing.

DECLASSIFIED

HW-47000

DEL

Page: 2070-1

PRODUCTION TEST 313-70-M

CANNING PROCEDURE STUDY- BEHAVIOR OF
PAUL AND BEEKMAN CANS-WASHED AND UN-
WASHED. L. D. Eubank. April 11, 1945.

Authorization
HW-3-2093

Objective: To determine the canning character-
istics of washed and unwashed Paul and Beekman
aluminum cans.

BEHAVIOR OF PAUL AND BEEKMAN CANS -
WASHED AND UNWASHED. L. D. Eubank.
April 24, 1945.

Final Report
HW-3-2217

Paul and Beekman aluminum cans, represented
by the statistical lots tested, were judged as
unsatisfactory for canning operations.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2071-1

PRODUCTION TEST 313-71-M

CANNING PROCEDURE STUDY - EFFECT OF
STORAGE UPON WETTING CHARACTERISTICS
OF ALCOA ALUMINUM CANS. L. D. Eubank.
April 11, 1945.

Authorization
HW-3-2108

Objective: To determine if the wetting character-
istics of ALCOA aluminum cans have changed
upon storage.

EFFECT OF STORAGE UPON WETTING
CHARACTERISTICS OF ALCOA ALUMINUM
CANS. L. D. Eubank. April 24, 1945.

Final Report
HW-3-2216

Results of this test indicated that no significant
changes occurred during storage of the cans.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2072-1

PRODUCTION TEST 313-72-M

CANNING PROCEDURE STUDY - DETERMINATION OF THE OPERATION DURING WHICH WARPAGE OF SLUGS OCCURS. E. A. Smith. August 8, 1945.

Authorization
HW-3-2047

Objective: To determine which operation is responsible for the occurrence of warpage in slugs during canning.

DETERMINATION OF THE OPERATION DURING WHICH WARPAGE OF SLUGS OCCURS. E. A. Smith. August 9, 1946.

Final Report
HW-3-3608

This test was never run because preparatory studies in the laboratory showed that the warped condition appears during the initial dip in a molten bath and the need for pursuing the test was eliminated.

DECLASSIFIED

HW-47000

DEL

Page: 2073-1

PRODUCTION TEST 313-73-M

METAL MACHINING STUDY - SMALL DI-
AMETER MACHINED SLUGS. E. A. Smith.
October 12, 1945.

Authorization
HW-3-3172

Objective: To determine whether the use of
machined slugs 1.353 inches in diameter will
consistently result in decreased loss of quality
due to non-seats and /or wrinkled cans.

METAL MACHINING STUDY - SMALL DI-
AMETER MACHINED SLUGS. E. A. Smith.
February 22, 1946.

Final Report
HW-3-3440

Reducing the diameter of slugs from 1.359 to
1.353 inches caused a 3 per cent improvement
in canning yield. As soon as production figures
for this test came out, the smaller diameter was
adopted as a standard process.

DECLASSIFIED

HW-47000

DEL

Page: 2074-1

PRODUCTION TEST 313-74-M

CANNING PROCEDURE STUDY - PARTIAL
SUBMERSION QUENCHING. E. A. Smith.
December 27, 1945.

Authorization
HW-3-3310

Objective: To determine whether any harmful results are brought about by the partial submersion of the canned assembly in the quench tank. A known beneficial effect is a reduction in the formation of channels through the braze due to explosive steam generation in this zone.

PARTIAL SUBMERSION QUENCH. E. A. Smith.
February 8, 1946.

Final Report
HW-3-3405

The partial submersion quench was considered satisfactory for use in canning slugs and it was recommended this method be adopted as a standard process to take advantage of the recognized beneficial effect on braze quality.

DECLASSIFIED

HW-47000

DEL

Page: 2075-1

PRODUCTION TEST 313-75-M

STUDY FOR EVALUATION OF SELECTED
CANNED MATERIAL THROUGH PROLONGED
EXPOSURE IN 100 AREA UNITS. E. A. Smith.
December 28, 1945.

Authorization
HW-3-3306

Objective: To determine whether material care-
fully selected for a high degree of solidity and
perfection of bonding becomes distorted with
prolonged exposure in high activity regions in a
100 Area pile.

STUDY FOR EVALUATION OF SELECTED
CANNED MATERIALS THROUGH PROLONGED
EXPOSURE IN 100 AREA PILES. E. A. Smith.
April 28, 1946.

Final Report
HW-3-3492

Approximately 750 slugs, called "super" slugs,
were individually examined and prepared for
irradiation. Very rigid inspections were made on
the pieces at all stages of preparation.

(For pile irradiation see P. T. 105-46-P)

RECLASSIFIED

DEL

HW-47000

Page: 2076-1

PRODUCTION TEST 313-76-M

CANNING PROCEDURE STUDY - RECOVERY OF
CANNED MATERIAL THROUGH USE OF HOT
LEAD BATH. E. A. Smith. February 27, 1946.

Authorization
HW-3-3449

Objective: To test the feasibility of recovering
canned slugs by melting off the aluminum jacket
in a hot lead bath.

RECOVERY OF CANNED MATERIAL THROUGH
USE OF HOT LEAD BATH. E. A. Smith.
August 8, 1946.

Final Report
HW-3-3608

This test was abandoned because of the termina-
tion of DuPont's contract about the time of the
test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2077-1

PRODUCTION TEST 313-77-M

CANNING PROCEDURE STUDY - STUDY FOR
EVALUATION OF BORDERLINE ACCEPTABLE
MATERIAL THROUGH PROLONGED EXPOSURE
IN THE PILES. E. A. Smith. April 1, 1946.

Authorization
HW-3-3478

Objective: To determine whether distortion of
pieces upon prolonged exposure in high activity
regions of the pile is associated with conditions
of slug metal detectable and /or measurable by
standard 300 Area tests.

STUDY FOR EVALUATION OF BORDERLINE
ACCEPTABLE MATERIAL THROUGH PRO-
LONGED EXPOSURE IN THE PILES.
W. T. Kattner. February 12, 1947.

Final Report
HW-3-5299

This report lists the preparation of approximately
150 slugs with varying borderline characteristics.
The slugs were irradiated but no inspection rejec-
tions or canning yields were listed since at the
time the formal report was written such data was
not available.

(For pile irradiation see P. T. 105-69-P)

DECLASSIFIED

HW-47000

DEL

Page: 2078-1

PRODUCTION TEST 313-78-M

CANNING PROCEDURE STUDY - STUDY FOR
EVALUATION OF SLUG DIMENSIONS.
C. P. Kidder. April 1, 1946.

Authorization
HW-7-3873

Objective: To establish minimum dimensional
limits to permit satisfactory canning of recovered
MZ slugs. (MZ slugs refers to a standard uranium
slug of 1.353 inches nominal diameter.)

STUDY FOR EVALUATION OF SLUG DIMEN-
SIONS. E. A. Smith. July 9, 1946.

Final Report
HW-3-3566

It appeared that no advantage was to be gained
from a dimensional inspection after recovery,
so dimensional inspection of recovered slugs
was dropped.

DECLASSIFIED

HW-47000

DEL

Page: 2079-1

PRODUCTION TEST 313-79-M

CANNING PROCEDURE STUDY - FACTORS IN
CANNING MATERIALS RELATING TO REAC-
TIVITY. E. A. Smith. May 13, 1946.

Authorization
HW-3-3504

Objective: To determine the effect of various
bronze flux impurities and varying bronze com-
position upon rate of uranium loss and other
factors affecting slug reactivity. Also to deter-
mine the effect of these varying conditions upon
the metallic bond between slug and can.

STATISTICAL ANALYSIS OF PRODUCTION
TEST 313-79-M. B. F. Butler. April 25, 1947.

Statistics Report
HW-3-5462

FACTORS IN CANNING MATERIALS RELATING
TO REACTIVITY. W. T. Kattner.
October 10, 1947.

Final Report
HW-7773

Data obtained in the production phase of this
test indicated that: bronze with a tin content
near the upper process limit is preferable to
compositions leaner in tin; the presence of calcium
and iron as impurities in the bronze flux in excess
of 0.5 per cent and 0.05 per cent, respectively,
results in loss of reactivity in the canned slugs;
that use of recovered bronze flux in canning
results in reactivity loss; tarnished pickled slugs
and slugs with black spots are lower in reactivity
after canning.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 2080-1

PRODUCTION TEST 313-80-M

CANNING PROCEDURE STUDY - FOUR INCH
BONDED URANIUM SLUGS. E. A. Smith.
August 7, 1946.

Authorization
HW-3-3601

Objective: To study the feasibility of producing
bonded slugs of standard 1.353 inches in diameter
and four inches in length.

FOUR INCH BONDED URANIUM SLUGS (MZ
DIAMETER). E. A. Smith. November 14, 1946.

Final Report
HW-3-5093

Canning of these slugs was accompanied by
increased surface marring, greater tendency
toward incomplete wetting of the can, a greater
number of voids and lower test pile reactivity.

DECLASSIFIED

HW-47000

DEL

Page: 2081-1

PRODUCTION TEST 313-81-M

THERMAL CYCLING OF SLUGS. E. A. Smith.
September 21, 1946.

Authorization
HW-3-5018

Objective: To reduce or eliminate warping and blistering of slugs in the piles by appropriate thermal cooling of the slugs prior to canning.

THERMAL CYCLING OF SLUGS. R. M. Treco.
April 22, 1947.

Final Report
HW-3-5484

There was no metallurgical evidence that thermal cycling of slugs prior to canning was accompanied by any advantages in the canning process. It was found that an excessive number of pieces failed to can because of warping.

(note) It has since been established that a suitably controlled thermal treatment provides the desired structure. The conditions prescribed for this Production Test were based on the results of small-scale laboratory studies, which for unknown reasons, led to the use of too high a temperature for the high side of the cycle. 720 C should have been specified, rather than 1000 C. (Private communication, E. A. Smith, 1-25-57)

DECLASSIFIED

HW-47000

DEL

Page: 2082-1

PRODUCTION TEST 313-82-M

PERIOD OF USE OF AlSi BATHS. E. A. Smith.
November 6, 1946.

Authorization
HW-3-5081

Objective: To determine the feasibility of increasing the period of use of the AlSi bath.

PERIOD OF USE OF AlSi BATHS. W. T. Kattner. Final Report
January 6, 1947.

HW-3-5206

The test runs indicated that extending the period of use of the AlSi canning bath from one shift to two was feasible.

PERIOD OF USE OF AlSi BATHS. W. T. Kattner. Supplement A
January 10, 1947.

HW-3-5238

Objective: To test, over a one-month period, the practicability of using the AlSi dipping and canning baths for two eight-hour shifts before changing.

PERIOD OF USE OF AlSi BATHS. W. T. Kattner. Final Report
March 4, 1947.

Supplement A
HW-3-5350

A test was run for a period of 12 two-day cycles with the tin content of the bronze maintained between 52.1 per cent and 53.6 per cent. Data showed no significant difference in slug yields between the first and second day of AlSi use.

DECLASSIFIED

HW-47000

DEL

Page: 2083-1

PRODUCTION TEST 313-83-M

FOUR-INCH BONDED SLUGS - 'A' DIAMETER.
E. A. Smith. November 13, 1946.

Authorization
HW-3-5106

Objective: To test the feasibility of canning and irradiating four-inch bonded uranium slugs having a bare cold diameter of 1.359 inches.

FOUR-INCH BONDED SLUGS-'A' DIAMETER.
W. T. Kattner. February 14, 1947.

Final Report
HW-3-5301

Slugs canned with a diameter of 1.359 inches (A diameter) were found superior to the slugs with a diameter of 1.353 inches (MZ diameter) with respect to can wall wetting and 305 activity. Improved techniques in handling of slugs resulted in appreciable reduction of marred surfaces of A dimension slugs as compared with the four-inch MZ's previously canned.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 2084-1

PRODUCTION TEST 313-84-M

PERIOD OF USE OF FINAL ETCH SOLUTION.
W. T. Kattner. November 7, 1946.

Authoriztion
HW-3-5082

Objective: To determine the feasibility of
increasing the period of use of the final etch
nitric acid solution.

PERIOD OF USE OF FINAL ETCH SOLUTION.
R. D. McGreal. May 8, 1947.

Final Report
HW-3-5498

It was recommended that the period of use of the
final etch acid should be extended to three weeks
to handle the throughpout rate of around 820 slugs
per day.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000 DEL

Page: 2085-1

PRODUCTION TEST 313-85-M

PERIOD OF USE OF CAN ETCH SOLUTION.
W. T. Kattner. November 13, 1946.

Authorization
HW-3-5107

Objective: To determine the feasibility of
increasing the period of use of the can etch
phosphoric acid solution.

PERIOD OF USE OF CAN ETCH SOLUTION.
W. T. Kattner. January 15, 1947.

Final Report
HW-3-5243

This test was dropped because of relatively
small savings that could be realized by length-
ening etch solution service.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2086-1

PRODUCTION TEST 313-86-M

CANNING OF EXPERIMENTAL SLUGS.
C. W. J. Wende. December 26, 1946.

Authorization
HW-7-5581

Objective: To can a small number of experimental solid aluminum and uranium slugs. The uranium slugs are to be canned with the canning bath temperature slightly higher than normal to provide penetrated slugs for use in development of an instrument for measuring penetration.

CANNING OF EXPERIMENTAL SLUGS.
A. T. Strand. January 15, 1947.

Final Report
HW-3-5249

Two special aluminum dummies and six slugs were canned in such a manner that AlSi penetration of the can resulted.

DECLASSIFIED

HW-47000

DEL

Page: 2087-1

PRODUCTION TEST 313-87-M

SINGLE THICK CAP - "B" PROCESS CANNING.
A. T. Strand. January 9, 1947.

Authorization
HW-3-5237

Objective: To evaluate the merits of a single cap as a replacement for the spacer and cap now used as a closure for unbonded, press canned, "B" type pieces. ("B" process refers to a canning process in which no bond is formed between the can and slug.)

SINGLE, THICK CAP - "B" PROCESS CANNING.
W. T. Kattner. March 4, 1947.

Final Report
HW-3-5354

Test data indicated that thick cap closure required less assembly time than did thin cap and spacer closure and that use of thick caps improved the welding yield.

DECLASSIFIED

HW-47000

DEL

Page: 2088-1

PRODUCTION TEST 313-88-M

SLUG WELDING. W. T. Kattner.
January 22, 1947.

Authorization
HW-3-5275

Objective: To investigate the possibilities of improving the welding procedure specified by the current operating process for AlSi bonded slugs. Optimum welding amperage, optimum shoulder dimensions, and welding techniques will be investigated.

SLUG WELDING. R. D. McGreal.
September 10, 1948.

Final Report
HW-10971

The welding process was improved by the use of a higher current of 80 to 85 amperes. At this higher current good quality welding without a cap shoulder was found to be practical.

DECLASSIFIED

HW-47000

DEL

Page: 2089-1

PRODUCTION TEST 313-89-M

REDUCTION OF URANIUM TURNING SCRAP.
E. A. Smith. April 7, 1947.

Authorization
HW-3-5446

Objective: To reduce the amount of turning
scrap produced during slug fabrication.

REDUCTION OF URANIUM TURNINGS SCRAP.
E. A. Smith. September 10, 1948.

Final Report
HW-10976

This test was performed in three parts. In Part I, emphasis was placed upon developing a technique for extruding rods of sufficiently smooth surface and uniform diameter that they could be cut to slug length and canned without further surface treatment other than normal pickling. In Part II, the feasibility of using rods slightly larger than the specified slug diameter was studied, with final sizing accomplished by centerless grinding or by pressing through a die of the required diameter. In the third step the smallest rod diameter that would insure complete lathe cleanup on a minimum of 95 per cent of the slugs machined from such rods was determined to be 1.403 inches.

DECLASSIFIED

HW-47000

DEL

Page: 2090-1

PRODUCTION TEST 313-90-M

FABRICATION OF RECEPTACLE SLUGS.
W. T. Kattner. April 2, 1947.

Authorization
HW-3-5433

Objective: To fabricate 100 special uranium slugs to be used as receptacles for fast neutron irradiation of selected materials.

FABRICATION OF RECEPTACLE SLUGS.
W. T. Kattner. November 6, 1947.

Final Report
HW-7974

Thirty-nine receptacle slugs were successfully prepared under the provisions of this test. The slugs were made with an axial tube to hold a sample surrounded by a thin aluminum tube bonded to the inner wall of a hollow uranium cylinder.

DECLASSIFIED

HW-47000

DEL

Page: 2091-1

PRODUCTION TEST 313-91-M

WEIGHTED SLUGS FOR "CHATTER" OF
SLUGS IN A PILE TUBE. A. T. Strand.
April 8, 1947.

Authorization
HW-3-5436

Objective: To prepare eight canned pieces
for a flow laboratory test concerning the
"chatter" of slugs in a pile tube.

WEIGHTED SLUGS FOR "CHATTER" TEST.
A. T. Strand. May 8, 1947.

Final Report
HW-3-5500

Eight special canned slugs were prepared.
These pieces contained lead cylinders of
various lengths separated by spacers of
aluminum tube inside a uranium cylinder.

DECLASSIFIED

HW-47000

DEL

Page: 2092-1

PRODUCTION TEST 313-92-M

CANNING SPECIAL MYNALLOY SLUGS.
E. A. Smith. April 8, 1947.

Authorization
HW-3-5447

Objective: To prepare, by a modified "B" process, as many thorium slugs as may be obtained from the 171.2 pounds of thorium rods included under SR R-3-3, received at Hanford 4-3-47. ("B" process refers to a canning process in which no bond is formed between the can and slug.)

CANNING SPECIAL MYRNALLOY SLUGS.
W. T. Kattner. March 3, 1948.

Final Report
HW-9049

The 171.2 pounds of rods received as the third shipment of thorium to be processed at Hanford were machined from rods 1.60 inches in diameter to produce slugs 4.000 inches long by 1.360 inches in diameter. The slugs were pickled in HNO_3 , canned by the "B" process, identified and shipped to the 100 Areas for irradiation.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2093-1

PRODUCTION TEST 313-93-M

RECLAMATION OF TIN SCRAP IN THE 300 AREA.
E. A. Smith. June 25, 1947.

Authorization
HW-3-5606

Objective: To develop a satisfactory method for reclaiming 300 Area scrap tin and rendering it fit for reuse in the canning process.

RECLAMATION OF TIN SCRAP IN THE 300 AREA. Final Report
W. T. Kattner. March 3, 1948.

A 75 per cent yield of usable tin was obtained from spent tin containing 5 per cent copper by a method which involves the formation of eta - phase bronze crystals (Cu_2Sn_5) from the scrapped tin and a physical separation of the crystalline mass from the molten tin.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2094-1

PRODUCTION TEST 313-94-M

DEVELOPMENT OF LEAD-DIP CANNING
PROCESS. E. A. Smith. June 30, 1947.

Authorization
HW-3-5605

Objective: To develop further the lead-dip
canning process together with necessary
controls, safety procedures and recovery
methods incidental to its use in the 300 Area.

DEVELOPMENT OF LEAD-DIP CANNING
PROCESS. W. T. Kattner. October 1, 1947

Supplement A
HW-7667

Objective: To provide about three tons of lead
dipped slugs for pile irradiation and subsequent
200 Area processing to determine the effect of
lead in the bonding layer upon the chemical
separation process.

DEVELOPMENT OF LEAD-DIP CANNING
PROCESS. E. A. Smith. January 29, 1948.

Interim Report
HW-8694

The safety of the process from the standpoint
of pyrophoric compounds was established. A
development line, consisting of an AlSi covered
lead bath, an AlSi dipping bath, and an AlSi
canning bath with necessary accessory equipment
was established. 1500 slugs (alpha-rolled and
gamma-extruded) were canned and tested.

STATISTICAL ANALYSIS: INTERIM REPORT
ON PRODUCTION TESTS 313-94-M AND
105-119-P - (SLUG BLISTERING)... B. F. Butler.
March 31, 1948.

Interim Report
HW-9350

Alpha rolled slugs were found to be less susceptible
to blistering than gamma extruded slugs and lead
dipped rolled slugs were less susceptible to
blistering than triple dipped rolled slugs.

DECLASSIFIED

HW-47000

DEL

Page: 2094-2

PRODUCTION TEST 313-94-M (Contd.)

DEVELOPMENT OF LEAD-DIP CANNING
PROCESS. W. T. Kattner. March 3, 1948.

Final Report
Supplement A
HW-9051

A total of 925 acceptable slugs were produced from the 1260 bare pieces which were canned by the lead-dip process, giving a 73 per cent yield. About one-half of the rejects were caused by gamma extruded slugs sticking in the sleeves. The alpha-rolled metal produced no stuck sleeve rejects. From a canning standpoint, the lead-dip process offered appreciable advantages over the triple-dip process except for the increased tendency toward sticking in sleeves when gamma-extruded uranium was used.

DEVELOPMENT OF A LEAD-DIP CANNING
PROCESS. W. T. Kattner. January 5, 1949.

Final Report
HW-12033

A process was developed for recovering lead-dip canning rejects by heating the canned slugs in the lead-bath to melt the AlSi bonding layer and free the slug for canning.

(For pile irradiation see P. T. 105-119-P)

DECLASSIFIED

DEL

HW-47000

Page: 2095-1

PRODUCTION TEST 313-95-M

CANNING UNOUTGASSED URANIUM.
E. A. Smith. July 11, 1947

Authorization
HW-7092

Objective: To prepare about 320 canned slugs from unoutgassed uranium rod for evaluation in the 100 Area piles, with a view towards elimination of the outgassing operation.

CANNING UNOUTGASSED URANIUM .
E. A. Smith. April 24, 1950.

Final Report
HW-17614

A decision to discontinue outgassing as a standard operation, without benefit of the results of this test, made it unnecessary to carry out this test.

3-1-57

~~CONFIDENTIAL~~ **DECLASSIFIED**

HW-47000

DEL

Page: 2096-1

PRODUCTION TEST 313-96-M

CADMIUM SHIELDED SLUGS. E. A. Smith
and J. C. Chatten. September 2, 1947.

Authorization
HW-7427

Objective: To authorize work in the 313
Building in preparing sixteen special uranium
slugs to be canned by a special process.

CADMIUM SHIELDED SLUGS. D. D. Whyte.
December 8, 1947.

Final Report
HW-8224

The procedure for this test involved the canning
of specially shaped uranium slugs in such a
manner as to surround the slugs with a continuous
layer of metal equivalent to at least one millimeter
of pure cadmium. A cadmium-tin alloy was bonded
to the slug and then bonded into a standard aluminum
can.

For further details see Special Request 40 in
Special Requests Bibliography (HW-37111).

DECLASSIFIED

HW-47000

DEL

Page: 2097-1

PRODUCTION TEST 313-97-M

CANNING UNSTRAIGHTENED URANIUM BY
THE LEAD-DIP PROCESS. E. A. Smith.
September 24, 1947.

Authorization
HW-7616

Objective: To determine the effect of cold
straightening upon the behavior of uranium
during subsequent processing and irradiation.

CANNING UNSTRAIGHTENED URANIUM BY THE
LEAD-DIP PROCESS. C. A. Bennett.
December 3, 1947.

Interim Report
HW-8174

Serial numbers for the pile loading of this
production test were assigned.

CANNING UNSTRAIGHTENED URANIUM BY
THE LEAD-DIP PROCESS. W. T. Kattner.
March 10, 1948.

Final Report
HW-9147

Three hundred and twenty slugs were prepared
for pile irradiation to test the effects of
straightening and degassing on blistering and
warping of both gamma-extruded and alpha-
rolled uranium. Because of fewer stuck
sleeves and marred surface rejects occurring
in the lead-dip canning of alpha-rolled slugs,
the yield of the rolled slugs was notably
superior to that of the gamma-extruded slugs.

(For pile irradiation see P. T. 105-124-P)

DECLASSIFIED

HW-47000

DEL

Page: 2098-1

PRODUCTION TEST 313-98-M

EVALUATION OF CUTTING OIL. E. A. Smith
December 8, 1947.

Authorization
HW-8222

Objective: To select a suitable substitute for
Calol soluble cutting oils (Formula 31273).

EVALUATION OF CUTTING OILS. D. D. Whyte. Interim Report
March 30, 1948.

HW-9488

Samples of two possible substitutes were tested:
(1) an oil bearing the same trade name as the
former, (Calol), but having different physical
characteristics and (2) Texaco soluble oil "C".
These were both found to be satisfactory re-
placements. A third, "Cim Cool", was to be tested.

EVALUATION OF CUTTING OILS. E. A. Smith. Final Report
April 30, 1948.

HW-9655

Since the "Cim Cool" soluble oil sample showed
a high boron content, it was concluded that this
product would be unsatisfactory for production
use and experimental work was discontinued.

DECLASSIFIED

HW-47000

DEL

Page: 2099-1

PRODUCTION TEST 313-99-M

LEAD-DIP CANNING OF FOUR-INCH "A"
DIAMETER SLUGS. E. A. Smith.
December 26, 1947.

Authorization
HW-8223

Objective: To develop equipment and techniques for handling and canning four-inch, 1.359 inch diameter slugs by the lead-dip process, two at a time; and to develop suitable recovery-recanning methods for rejected four-inch slugs canned by the lead-dip process.

LEAD-DIP CANNING OF FOUR-INCH "A"
DIAMETER SLUGS. E. A. Smith.
January 14, 1948.

Procedure Report
HW-8231

This report is a discussion of the procedure to be used in the canning of four-inch slugs.

LEAD-DIP CANNING OF FOUR-INCH "A"
DIAMETER SLUGS. E. A. Smith.
June 22, 1948.

Final Report
HW-10174

A canning line was operated for four-days, during which a total of 3862 four-inch, 1.359 inches in diameter, gamma-extruded slugs were canned by the lead-dip process. Some features of canning of these slugs were improved by this test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2100-1

PRODUCTION TEST 313-100-M

CANNING "RED BAND" MATERIAL.
E. A. Smith. June 8, 1951.

Proposed Test
HW-21305

This production test number was opened to provide for a test to process and can 53 "Red Band" uranium billets containing 300 to 1099 ppm of iron as an impurity. This test was to replace 314-48-M.

Before the test could be run, the "Red Band" material was shipped offsite to be reprocessed and the test writeup was never issued.

This production test number was then assigned to another test which was in process in the 300 Area.

FABRICATION OF UNANNEALED ALPHA
ROLLED URANIUM. E. A. Smith.
April 21, 1948.

Final Report
HW-9564

This production test was compiled after plant fabrication of the material was essentially completed and therefore no production test request was written. The objective of the report was to record all available pertinent data covering the fabrication of a number of four inch, 1.359 inches in diameter slugs made from unannealed alpha-rolled uranium rods. This was accomplished.

(For pile irradiation see P. T. 105-194-P)

DECLASSIFIED

HW-47000 DEL

Page: 2101-1

PRODUCTION TEST 313-101-M

CANNING 4" SLUGS OF 1.356" NOMINAL
DIAMETER. E. A. Smith. January 22, 1948

Authorization
HW-8647

Objective: To determine whether 1.356 inches in diameter slugs, four inches long, may be canned more advantageously than either "A" or "MZ" diameters in this length. ("A" diameter is 1.359 inches "MZ" diameter is 1.353 inches)

CANNING 4" SLUGS OF 1.356" NOMINAL
DIAMETER. E. A. Smith. February 5, 1948.

Procedure Report
HW-8764

Procedure to be followed in this production test is given.

CANNING 4" SLUGS OF 1.356" NOMINAL
DIAMETER. R. D. McGreal. August 5, 1948.

Final Report
HW-10666

The results of this test indicated that the "A" diameter (1.359 inch) should be retained for 4 inch slugs. "I" diameter (1.356 inch) slugs caused a lower rod-to-slug yield in machining without significant improvement in canning characteristics.

DECLASSIFIED

HW-47000

DEL

Page: 2102-1

PRODUCTION TEST 313-102-M

EVALUATION OF FOUR-INCH COMMERCIAL TOLERANCE CANS. E. A. Smith. April 29, 1948 Authorization HW-9518

Objective: To determine the operational and economic feasibility of using aluminum cans fabricated to commercial tolerance in canning four-inch bonded uranium slugs.

EVALUATION OF FOUR-INCH COMMERCIAL TOLERANCE CANS. E. A. Smith. May 26, 1948 Final Report HW-9890

Test results showed that commercial cans of the quality tested could be employed without loss of canned slug quality.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2103-1

PRODUCTION TEST 313-103-M

DETERMINATION OF LIMITS FOR LEAD CONTENT Authorization
OF CANNING BATH. E. A. Smith. April 30, 1948. HW-9654

Objective: To determine the effect upon slug quality
of using an AlSi canning bath containing lead up to the
point of saturation.

DETERMINATION OF LIMITS FOR LEAD CONTENT Final Report
OF CANNING BATH. E. A. Smith. June 10, 1948. HW-10065

This test was cancelled since the canning operation
was changed from the lead-dip process to the former
triple-dip process and need for the test was eliminated.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2104-1

PRODUCTION TEST 313-104-M

DETERMINATION OF OPTIMUM BRONZE DIP
CONDITIONS FOR ROLLED URANIUM. E. A.
Smith. June 9, 1948.

Authorization
HW-10051

Objective: To determine the bronze dip time and
temperature relationship required to produce a
satisfactory structure in alpha rolled uranium for the
piles.

DETERMINATION OF OPTIMUM BRONZE DIP
CONDITIONS FOR ROLLED URANIUM. R. J.
Schier. March 28, 1949.

Final Report
HW-12859

A bronze dip at 720C minimum for 39 seconds with
a mechanical agitation rate of 48 strokes per minute
with an eight-inch stroke assured complete slug
transformation.

DECLASSIFIED

HW-47000

DEL

Page: 2105-1

PRODUCTION TEST 313-105-M

URANIUM SLUG PICKLING. R. J. Schier.
August 16, 1948.

Authorization
HW-10750

Objective: To evaluate the uranium slug pickling
procedure for canning.

URANIUM SLUG PICKLING. W. T. Kattner.
November 22, 1948.

Final Report
HW-11634

Results showed that a one minute pickle in 50 per cent
nitric acid at 50C removed oxide as effectively as the
four minute pickle cycle and did not affect or impair
quality of the canning operation. Effectiveness of
water rinse was improved by using two rinses.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2106-1

PRODUCTION TEST 313-106-M

EFFECT OF BRONZE DIP CONDITIONS ON SLUG
BLISTERING. R. J. Schier. August 3, 1948.

Authorization
HW-11210

Objective: To determine the effect of structural
transformation, as determined by bronze dip con-
ditions, on the pile behavior of rolled metal slugs.

EFFECT OF BRONZE DIP CONDITIONS ON SLUG
BLISTERING. R. D. McGreal. February 9, 1949

Final Report
HW-12395

Measurements on completely transformed slugs
recovered after canning showed that they decreased
about 0.036 inch in length with an attendant diameter
expansion of 0.007 inch. The bronze dipping con-
ditions required to produce transformation of 1/16
and 5/16 inch were also established.

(For pile irradiation see P.T. 105-235-P)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2107-1

PRODUCTION TEST 313-107-M

EFFECT OF SLEEVE ASSEMBLY PREHEAT ON INCIDENCE OF NON-SEAT REJECTS. E. A. Smith August 25, 1948. Authorization HW-10816

Objective: To determine the effect of can-sleeve assembly preheat upon the number of canning rejects due to incomplete seating.

EFFECT OF CANNING CONDITIONS ON SLUG YIELD AND QUALITY. R. J. Schier. November 8, 1948. Supplement A HW-11493

Objective: To determine the effect of canning conditions (slug diameter, canning bath composition and temperature, and sleeve assembly preheating) on canning yield and slug quality.

EFFECT OF CANNING CONDITIONS ON SLUG YIELD AND QUALITY. W. K. Kratzer. March 1, 1950. Interim Report on Supplement A HW-17062

Slug diameter was found to greatly affect canned slug quality. A reduction of 0.009 inch in the machined slug diameter resulted in a 73.1 per cent reduction in non-seat rejects. The diameter change also substantially decreased the number of penetration rejects.

EFFECT OF SLEEVE ASSEMBLY PREHEAT ON INCIDENCE OF NON-SEAT REJECTS. W. K. Kratzer. March 1, 1950. Final Report HW-17063

Non-seat rejects were significantly reduced by a longer sleeve preheat but can wall penetration was so increased that slugs were not considered satisfactory for pile use.

DECLASSIFIED

HW-47000

DEL

Page: 2108-1

PRODUCTION TEST 313-108-M

EFFECT OF QUICK QUENCHING FROM THE BETA PHASE ON THE PILE BEHAVIOR OF URANIUM SLUGS. R. J. Schier. November 1, 1948. Authorization HW-11496

Objective: To determine the pile behavior of alpha rolled uranium slugs which have been quick-quenched from the beta phase.

EFFECT OF QUICK QUENCHING FROM THE BETA PHASE ON THE PILE BEHAVIOR OF URANIUM SLUGS. R. M. Padden. March 22, 1949. Final Report HW-12814

224 uranium slugs were prepared for pile evaluation by beta quenching using a modified triple-dip canning process. Macroscopic examination of representative samples showed them to be completely transformed with a fine grain structure free or almost free from columnar grains.

(For pile irradiation see P.T. 105-241-P)

3-1-57

DECLASSIFIED

HW-47000

CEL

Page: 2109-1

PRODUCTION TEST 313-109-M

HEAT TREATING URANIUM BY ELECTRICAL
INDUCTION. E. A. Smith. June 15, 1949.

Authorization
HW-13657

Objective: To process slugs for the pile evaluation
of transformed structures produced in alpha rolled
and gamma extruded uranium by electrical induction
methods of heat treatment.

STATISTICAL ANALYSIS OF PRE-EXPOSURE
SLUG DIMENSIONS. PT-313-109-M AND
PT-313-110-M. J.J. Lane and L. G. Waters.
January 30, 1950.

Statistical Report
HW-17285

PRE-EXPOSURE SLUG DIMENSIONS. T.S. Jones
March 31, 1950.

Interim Report
HW-17401

Diameter, length, and warp measurements on all
material loaded in the piles under this test were
recorded in this report.

HEAT TREATING URANIUM BY ELECTRICAL
INDUCTION. E. A. Smith and T.S. Jones.
December 26, 1950.

Final Report
HW-19775

Heat treatment of uranium by electrical induction
methods was found to be feasible and offered several
advantages over previous methods with respect to
processing economy and smoothness of operation.
Subsequent testing was planned.

(For pile irradiation see P.T. 105-277-P)

DECLASSIFIED

HW-47000

DEL

Page: 2110-1

PRODUCTION TEST 313-110-M

LEAD-DIP CANNING OF URANIUM. E. A. Smith.
August 18, 1949.

Authorization
HW-14187

Objective: To can, by the lead-dip process, approximately 50 slugs made from uranium metal deficient in U-235.

STATISTICAL ANALYSIS OF PRE-EXPOSURE
SLUG DIMENSIONS - PT-313-109-M and
PT-313-110-M. J. J. Lane and L. G. Waters.
January 30, 1950.

Statistical Report
HW-17285

LEAD-DIP CANNING OF SPECIAL ROLLED
URANIUM. R. Ward. (undated)

Supplement A
HW-17865

Objective: To can, by the lead-dip process, approximately 70 slugs made from uranium rolled at temperatures higher and lower than are normally used.

CANNING DEPLETED URANIUM. T. S. Jones
March 27, 1951.

Final Report
HW-20605

Uranium billets deficient in U-235 were subjected to the normal successive steps in the slug fabrication process. No unusual behavior was observed at any point in the process, thus indicating that the depleted metal from the standpoint of mechanical properties can be considered equivalent to normal uranium. The depleted slugs had about 7.4 in hours per four-inch slug lower reactivity than normal uranium.

(For pile irradiation see P. T. 105-330-P)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2111-1

PRODUCTION TEST 313-111-M

SUBSTITUTION OF CALCIUM NITRATE FOR
CALCIUM CHLORIDE IN THE CHIP RECOVERY
PROCESS. W. K. Kratzer. September 8, 1949.

Authorization
HW-14389

Objective: To determine the suitability of calcium
nitrate as a substitute for calcium chloride used as
a flocculant in the recovery of uranium from chip
recovery waste solutions.

SUBSTITUTION OF CALCIUM NITRATE FOR
CALCIUM CHLORIDE IN THE RECOVERY PRO-
CESS. R. D. McGreal. August 27, 1951.

Final Report
HW-22015

Of the flocculants tested ($\text{Ca}(\text{NO}_3)_2$, $\text{Fe}_2(\text{SO}_4)_3$,
 $\text{KAl}(\text{SO}_4)_2$, CaCl_2), CaCl_2 and $\text{Ca}(\text{NO}_3)_2$ produced
burned oxide cakes of less than 0.2% halogen content.
Cake resulting from $\text{Ca}(\text{NO}_3)_2$ settling dried more
rapidly and was denser than that resulting from
 CaCl_2 .

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2112-1

PRODUCTION TEST 313-112-M

This production test, INCREASED DIAMETER SLUGS
(1.352 INCHES), was not issued.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2113-1

PRODUCTION TEST 313-113-M

FABRICATION RELATED TO LOW TEMPERA-
TURE ROLLING EXPERIMENTS ON URANIUM.
C. E. Lacy. June 9, 1950.

Authorization
HW-18045

Objective: To can, by the triple-dip process,
approximately 600 slugs made from finish rolled
uranium with a 300 and 400 C preheat after initial
reduction by various methods at higher temperatures.

FABRICATION RELATED TO LOW TEMPERATURE Supplement A
ROLLING EXPERIMENTS ON URANIUM. C. E. HW-18944
Lacy. September 22, 1950.

Objective: To can, by the triple-dip process, approxi-
mately 325 slugs made from uranium (1) finish rolled
at 300 and 400 C. after an initial reduction at 600 C
and (2) rolled continuously from billets preheated to
370 and 480 C.

FABRICATION RELATED TO CONTINUOUS ROLL- Supplement B
ING TESTS ON URANIUM. C. E. Lacy. January HW-20104
24, 1951.

Objective: To process, by the triple-dip method,
approximately 750 slugs from nineteen uranium rods
rolled continuously from billets.

THE PROCESSING OF URANIUM ROLLED AT
300°C TO 600°C. L. A. Hartcorn and J. B.
Burnham, Jr.. August 9, 1951.

Interim Report
HW-21881

Rolling uranium at temperatures as low as 300 C
offered certain possible advantages over the standard
procedure of rolling at 600 C. These advantages
included sizing Hanford rods closer to final dimensions
and a reduction in air contamination during rolling.
These conditions were studied in this report.

(For pile irradiation see P. T. 105-503-A)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2114-1

PRODUCTION TEST 313-114-M

PREPARATION OF SLUGS FROM TWO REDOX
RODS. W. T. Kattner. July 11, 1950.

Authorization
HW-18289

Objective: To obtain information on the reactivity, the chemical composition, and the physical properties of Redox rods and to prepare acceptable slugs from these rods for subsequent 105 pile exposure. (Redox rods are rods deficient in U-235 prepared from previously irradiated and recovered uranium slugs).

PREPARATION OF SLUGS FROM TWO REDOX
RODS. W. T. Kattner. October 5, 1950.

Final Report
HW-19049

The two Redox rods were machined and canned without unusual incident. The reactivity was slightly lower than calculated. The Redox metal was found to be 10 points Rockwell C harder, and 0.2 grams per cubic centimeter less dense than normal uranium indicating the presence of about 400 ppm greater than normal impurities.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2115-1

PRODUCTION TEST 313-115-M

TRIPLE DIP CANNING OF URANIUM FINISHED BY COLD DRAWING. C. E. Lacy. April 4, 1951 Authorization HW-20705

Objective: To can, by the triple-dip process, approximately 600 slugs fabricated from rolled uranium rod sized to final slug diameter by cold drawing.

PRODUCTION TEST 313-105-5-M replaced this production test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2116-1

PRODUCTION TEST 313-116-M

RE-EVALUATION OF WELDING. E. A. Smith.
May 15, 1951.

Authorization
HW-21106

Objective: To establish optimum procedures for welding the closures on uranium slugs canned by the AlSi bonding process.

SLUG WELDING. W. A. Johnson. July 25, 1951

Final Report
HW-21744

The welding procedure and related operational processes and conclusions indicated that rate of welding, amperage, arc path and placement, preheat and slug profile should be changed.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2117-1

PRODUCTION TEST 313-117-M

This production test, LEAD DIP CANNING AND
IRRADIATION OF URANIUM SLUGS, was issued
as P.T. 313-105-1-M.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2118-1

PRODUCTION TEST 313-118-M

CHANGE OF LOWER TEMPERATURE LIMIT OF
ALUMINUM-SILICON CANNING FURNACE.

J. D. Sprowl. November 1, 1951.

Authorization
HW-22598

Objective: To decrease the permissible lower
temperature limit of the AlSi canning furnaces
from 590 to 585 C in the present 313 process.
The upper limit will remain at 596 C.

CHANGE OF LOWER TEMPERATURE LIMIT OF
ALUMINUM-SILICON CANNING FURNACE.

J. D. Sprowl. January 15, 1952.

Final Report
HW-23282

Several slugs canned at low temperatures ranging
from 586 C to 590 C were compared by microscopic
examination and on the basis of non-seat, frost test,
and penetration rejects with normally produced slugs.
It was recommended that the process specifications
for the AlSi canning bath temperature be amended to
include the lower temperature limit of the bath at
585 C.

DECLASSIFIED

HW-47000

DEL

Page: 2119-1

PRODUCTION TEST 313-119-M

OMISSION OF VERTICAL AGITATION IN THE
BRONZE BATH. A. C. Callen. November 9, 1951

Authorization
HW-22678

Objective: To evaluate the omission of vertical
agitation in the bronze bath. The total time in the
bronze bath will remain the same.

OMISSION OF VERTICAL AGITATION IN THE
BRONZE BATH. A. C. Callen. April 4, 1952.

Interim Report
HW-23864

The number of slugs processed was not sufficient
to provide quantitative comparison between slugs
canned with vertical agitation and those without it.
It was recommended that the number of slugs can-
ned according to this production test be increased
to 50,000 slugs canned by the present process and
50,000 canned without vertical agitation.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 2120-1

PRODUCTION TEST 313-120-M

HIGH AMPERAGE WELDING OF FOUR-INCH
TRIPLE-DIPPED CANNED SLUGS.
J. W. Lingafelter. April 4, 1952.

Authorization
HW-24021

Objective: To establish optimum procedure for
welding four-inch triple-dipped canned slugs at
high amperages.

HIGH AMPERAGE WELDING OF TRIPLE-DIPPED
CANNED SLUGS. J. W. Lingafelter. May 16, 1952. Interim Report 1
HW-24486

When employing the welding conditions of 6 RPM,
120 amperes, and a 1-1 weld pass, or 6 RPM,
110 amperes, and a 1-2 weld pass, four-inch
triple-dipped canned slugs have weld characteristics
that are equal to or better than present production
material.

HIGH AMPERAGE WELDING OF FOUR-INCH
SLUGS. J. W. Lingafelter. August 14, 1952.

Interim Report 2
HW-25348

Welding at 7 or 8 RPM produces good welds closures
on four-inch canned slugs that have sound AlSi
bonding layers. Closer attention to the welding
procedure by the operator is required to produce
good weld closures at 7 and 8 RPM than is required
at 6 RPM.

HIGH AMPERAGE SLUG WELDING. J. W. Lingafelter. Final Report
August 15, 1952. HW-27297

The use of approximately 120 amperes welding current
at a welding rate of 6 RPM with one preheat pass and
one welding pass for effecting the weld closure on
four inch canned slugs was recommended for use as
a result of this test.

DECLASSIFIED

HW-47000

DEL

Page: 2121-1

PRODUCTION TEST 313-1-L

SPECIAL SLUG CONSTRUCTION. J. B. Lambert.
March 26, 1947.

Authorization
GEH-10649
(GE-JBL-2)

Objective: To develop a special slug element for irradiating specimens in fast neutron flux at elevated temperatures. The slug element consists of a hollow uranium slug in which samples can be suspended in a helium atmosphere. The ends of the slug are capped with uranium end plugs and canned in aluminum jackets. The slug design is given in GEH-10,608 (GE-JBL-1).

PRODUCTION TEST 313-2-L

SPECIAL SLUG CONSTRUCTION NO. 2. J. B. Lambert. July 29, 1947.

Authorization
GEH-11043
(GE-JBL-3)

The special slug elements were successfully canned (P. T. 313-1-L). This test was written to authorize canning additional slugs for irradiation purposes.

3-1-57

DECLASSIFIED

HW-47000

Page: 3001-1

DEL

PRODUCTION TEST 313-105-1-M

LEAD DIP CANNING AND IRRADIATION OF
URANIUM SLUGS. J. B. Burnham, Jr.
July 30, 1951.

Authorization
HW-21782

Objective: To lead-dip can and irradiate 24 slugs of various known crystallographic orientations. The slugs should be canned in the alpha phase to give them a structure conducive to pile distortion.

300 AREA OPERATIONS AND INSPECTIONS ON
THE MATERIAL TO BE USED IN P. T. 313-105-1-M. Interim Report
M. J. Sanderson. May 1, 1952. HW-24304

This report summarizes the rolling history of the rods from which slugs were machined for the test; the results of orientation studies made on samples of the material to be irradiated; and the method of canning and identification employed on the pieces used for the pile test.

CRYSTALLOGRAPHIC PREFERRED ORIENTATION
AND DIMENSIONAL STABILITY OF URANIUM
FUEL ELEMENTS. W. V. Cummings. Final Report
June 13, 1956. HW-43742

The in-pile behavior of full size uranium slugs of known crystallographic orientation was studied to determine the relationship between dimensional stability during irradiation and during thermal cycling, impurity content, and definite types of preferred orientation. The effect of fabrication variables (rolling temperatures, roll design and rolling sequence) upon final preferred orientations in the uranium were also studied. It was concluded that a definite relationship exists between crystallographic preferred orientation and in-pile dimensional stability of uranium fuel elements.

DECLASSIFIED

HW-47000

DEL

Page: 3002-1

PRODUCTION TEST 313-105-2-M

TRIPLE-DIP CANNING AND IRRADIATION OF
EIGHT INCH URANIUM SLUGS FABRICATED IN
HEAVY WALLED ALUMINUM CANS.
J. W. Goffard. October 18, 1951.

Authorization
HW-22463

Objective: To fabricate and irradiate approximately
100,000 eight inch uranium slugs canned in heavy wall
aluminum cans by existing 313 processes.

TRIPLE-DIP CANNING AND IRRADIATION OF
EIGHT INCH URANIUM SLUGS FABRICATED IN
HEAVY WALLED ALUMINUM CANS.
H. L. Mars. June 20, 1952.

Supplement 1
HW-24804

Objective: To continue production of eight inch pieces
on a production test basis until September 30, 1952
pending further pile evaluation of the 100,000 slugs
already canned.

TRIPLE-DIP CANNING AND IRRADIATION OF
EIGHT INCH URANIUM SLUGS FABRICATED IN
HEAVY WALLED ALUMINUM CANS.
H. L. Mars. September 13, 1952.

Supplement 2
HW-25657

Objective: To continue production of eight inch slugs
beyond September 30, 1952, on a production test basis
pending further pile evaluation of the slugs.

TRIPLE-DIP CANNING AND IRRADIATION OF
EIGHT INCH URANIUM SLUGS FABRICATED IN
HEAVY WALLED ALUMINUM CANS.
A. C. Callen and J. W. Goffard. February 9, 1953.

Interim Report
HW-26596

Trial canning of the eight inch slugs prior to production
testing was satisfactory. (Rupture rate of irradiated
slugs was equal to or less than that for the best four inch
slugs.) Difficulties encountered in canning were excessive
non-sealing, severe can-wall penetration, and a high rate
of frost test rejections. Other than this, the eight inch
slug fabrication was equal to that of four inch slugs.

DECLASSIFIED

HW-47000

DEL

Page: 3002-2

PRODUCTION TEST 313-105-2-M(contd)

EIGHT INCH SLUGS IN THICK JACKETS.
C. S. Kingman. June 12, 1956.

Final Report
HW-43604

The failure-wise performance of the eight inch slugs was four fold better than the four inch slug it replaced. Careful attention to welding, increased braze depth, and halving the number of closures were contributing improvements as reflected in the absence of a single weld failure among the improved eight inch slugs. Increasing the can wall thickness by ten mils also increased production. The eight inch slug replaced the four inch slug as the standard Hanford fuel element.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3003-1

PRODUCTION TEST 313-105-3-M

FABRICATION BY ALPHA LEAD-DIP CANNING AND IRRADIATION OF SALT BATH HEAT TREATED ALPHA-ROLLED URANIUM SLUGS. J. W. Goffard.
May 9, 1952. Authorization HW-24389

Objective: To evaluate the feasibility of accomplishing the alpha-beta uranium slug transformation using a salt bath water quench heat treatment as a suitable production method. Slugs heat treated by this method will be canned by the established alpha lead-dip process and irradiated for evaluation of pile behavior.

FABRICATION BY ALPHA LEAD-DIP CANNING AND IRRADIATION OF SALT BATH HEAT TREATED ALPHA-ROLLED URANIUM SLUGS. H. R. Gardner.
September 5, 1952. Supplement 1 HW-25542

Amendments to the descriptive details and procedure of the authorization are given.

SALT-BATH HEAT TREATMENT AND LEAD-DIP CANNING. H. A. Johnson and H. R. Gardner.
May 14, 1953. Interim Report HW-27535

Approximately 26,000 four-inch and 25,000 eight-inch slugs were salt-bath heat treated and lead-dip canned. The slugs were heat treated at two temperature ranges, 700 - 715 C and 730-745 C. Salt-bath heat treatment of slugs appeared to be a satisfactory method of heat treating uranium prior to lead-dip canning. The difference in temperature ranges apparently had no effect on quality of the slugs. Lead-dip treated slugs were equal to triple-dipped slugs in all pre-irradiation tests.

DECLASSIFIED
DECLASSIFIED

HW-47000

CEL

Page: 3003-2

PRODUCTION TEST 313-105-3-M (contd)

SALT BATH HEAT TREATMENT OF MACHINED
SLUGS FOR LEAD-DIP CANNING. C. S. Kingman.
June 12, 1956.

Final Report
HW-43605

The quality of lead-dip canned slugs corresponded favorably with triple-dip canned slugs. The heat-treating and canning processes used were essentially correct and needed only a few revisions for production use. Heat treatment of uranium in slug form in a salt bath was determined to be feasible and satisfactory for lead-dip canning.

DECLASSIFIED

HW-47000

CEL

Page: 3004-1

PRODUCTION TEST 313-105-4-M

IRRADIATION OF SLUGS PRODUCED BY POWDER
METALLURGICAL TECHNIQUES. J. W. Riches.
April 30, 1952.

Authorization
HW-23611

Objective: To study the effects of pile irradiation
on 48 fuel elements produced by powder metallurgical
methods.

IRRADIATION OF URANIUM FUEL ELEMENTS
PRODUCED BY POWDER METALLURGICAL
TECHNIQUES. P. D. Wright. September 14, 1953.

Final Report
HW-29237

An in-pile test was made of 45 Sylvania powder metal
compact slugs. Results indicated that uranium compact
slugs should be stable on irradiation to 600 MWD/T.
Two slugs distorted below this goal, one each at 424
MWD/T and 572 MWD/T. These failures were due to
grain growth caused by defective fabricating equipment.
Further tests of larger numbers of compacts were
recommended.

DECLASSIFIED

HW-47000

CEL

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PRODUCTION TEST 313-105-5-M

IRRADIATION OF TRIPLE-DIP CANNED SLUGS
FROM URANIUM RODS FINISHED BY COLD
DRAWING. J. W. Riches and L. A. Hartcorn.
May 5, 1952.

Authorization
HW-24349

Objective: To irradiate triple-dip canned slugs
fabricated from alpha rolled uranium rods sized to
final slug diameter by cold drawing.

IRRADIATION OF TRIPLE-DIP CANNED SLUGS
FROM URANIUM RODS FINISHED BY COLD
DRAWING. O. W. Rathbun. August 2, 1954.

Final Report
HW-32622

Test results established that four-inch slugs
fabricated from rolled uranium rod, cold drawn
to slug diameter, and triple-dip canned can be
safely irradiated to exposure of 600 MWD/T at
up to 650 MW power levels in 2000 tube piles.
A thorough evaluation of rolled uranium rods
cold drawn to slug diameter was recommended.

DECLASSIFIED

HW-47000

CEL

Page: 3006-1

PRODUCTION TEST 313-105-6-M

IRRADIATION OF ALPHA CANNED URANIUM
SLUGS FROM RODS SALT BATH BETA HEAT-
TREATED AT LACKAWANNA. J. W. Riches.
June 27, 1952.

Authorization
HW-24849

Objective: To evaluate the feasibility of accomplishing the alpha-beta transformation by salt bath heat treating uranium rods as a suitable production method. Slugs from these rods will be canned by the established alpha process and irradiated for evaluation of pile behavior.

PRE-IRRADIATION EVALUATION OF URANIUM
RODS BETA HEAT-TREATED IN A SALT BATH.
H. R. Gardner and H. A. Johnson. November 9, 1953.

Final Report
HW-29911

Approximately 7700 eight-inch and 5600 four-inch slugs machined from salt-bath heat-treated, rapidly quenched rods were lead-dip canned and charged in 100 Area piles. From the metallurgical and canning phases of this investigation, it was concluded that: (1) On the basis of orientation structure, lead-dip canned slugs machined from salt bath heat-treated rods should be as stable during irradiation as regular triple-dip canned material. (2) Because of their generally finer grain structure the slugs are more resistant to bumping than the coarser grained triple-dip canned material.

DECLASSIFIED

HW-47000

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Page: 3007-1

PRODUCTION TEST 313-105-7-M

IRRADIATION OF ALPHA CANNED URANIUM
SLUGS FROM RODS SALT-BATH BETA HEAT-
TREATED AT FERNALD. H. R. Gardner and
J. W. Riches. June 25, 1952.

Authorization
HW-24829

Objective: To evaluate the feasibility of accomplishing
the alpha-beta transformation by salt-bath heat treating
uranium rods as a suitable production method.

(For pre-irradiation evaluation of the slugs canned in
this test, see P. T. 313-105-6-M, Document No.
HW-29911.)

IRRADIATION OF ALPHA CANNED URANIUM
SLUGS FROM RODS SALT-BATH BETA HEAT-
TREATED AT FERNALD. O. W. Rathbun.
December 14, 1953.

Interim Report
HW-30277

A program for discharge schedules of the irradiated
slugs is given.

DISPOSITION OF IRRADIATED PRODUCTION
TEST 7-M SLUGS. W. T. Kattner and H.R. Gardner. July 6, 1954.

Status Report
HW-32335

A table of the status of examination of the irradiated
slugs is given. Further examinations were scheduled.

DECLASSIFIED

HW-47000

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DEL

PRODUCTION TEST 313-105-8-M

IRRADIATION OF ALPHA CANNED SLUGS FROM
HIGH ALPHA ROLLED URANIUM SLUGS.
R. L. Knecht. April 24, 1953.

Authorization
HW-27817

Objective: To evaluate the pile behavior of alpha
canned slugs possessing a nearly random orientation
and small grain size.

THE IRRADIATION OF ALPHA CANNED URANIUM
SLUGS FROM HIGH ALPHA ROLLED RODS.
R. L. Knecht. April 24, 1953.

Supplement A
HW-29163

Objective: To determine whether untransformed
eight-inch slugs from high alpha rolled rods have
sufficient dimensional stability up to exposures of
1500 MWD/T for use in regular production. This
is a step in determining whether beta phase trans-
formation of production uranium before irradiation
is necessary.

THE PRE-IRRADIATION EVALUATION OF HIGH
ALPHA ROLLED URANIUM TO BE IRRADIATED
IN THE UNTRANSFORMED CONDITION.
R. L. Knecht. March 22, 1954.

Interim Report
HW-31680

Pre-irradiation testing of lead-dip canned untransformed,
high alpha rolled uranium indicated that the metal has
greater strength and ductility than regular production
metal. It has a completely recrystallized grain structure
approximately 1/3 the size of that of lead-dip canned
slugs.

BUMPING AND WARPING OF 8-M METAL.
P. A. Carlson. October 27, 1955.

Interim Report
HW-39633

At all exposures the irradiated test pieces showed
significantly more warping than the triple dip control
slugs. No bumping was apparent in either type of slug.

DECLASSIFIED

HW-47000

DEL

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PRODUCTION TEST 313-105-8-M(contd)

IRRADIATION OF ALPHA CANNED SLUGS FROM
HIGH ALPHA ROLLED URANIUM RODS.
O. W. Rathbun. July 9, 1956..

Final Report
HW-44091

Threetypes of four-inch slugs were alternately charged in seven HAPO reactor tubes and irradiated at tube powers of approximately 500 KW. The slugs were visually examined after exposures between 200 and 700 MWD/T. Results show that (1) there was no difference between slugs beta heat treated before irradiation and those which were not; (2) lead-dip canned slugs showed more warping and less bumping than triple-dip control slugs. The eight inch slugs were not charged.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page 3009-1

PRODUCTION TEST 313-105-9-M

IRRADIATION OF TRIPLE-DIP CANNED URANIUM
SLUGS FROM FERNALD EVALUATION METAL.
R. L. Knecht and J. W. Riches. June 23, 1952.

Authorization
HW-24803

Objective: To demonstrate whether triple-dip canned uranium slugs machined from rods rolled by a process simulating that proposed by the Fernald Feed Materials Production Center will have similar pile behavior to the present production metal.

PROCEDURE FOR MACHINING OF SIMULATED
FERNALD MATERIAL. J. W. Riches.
June 19, 1952.

Procedure Report
HW-26598

REPORT OF IRRADIATION RESULTS OF TRIPLE-
DIP CANNED URANIUM SLUGS FROM FERNALD
EVALUATION METAL. O. W. Rathbun.
August 22, 1955.

Final Report
HW-38719

This test demonstrated that slugs from simulated FMPC production rolled rod performed as well as or better than slugs from Simonds Saw and Steel Company rolled rods during triple-dip canning and subsequent irradiation to 600 MWD/T at pile power levels up to 650 MW. Pile charging of FMPC production rolled rod began in July, 1953.

DECLASSIFIED

HW-47000

DEL

Page; 3010-1

PRODUCTION TEST 313-105-10-M

FABRICATION AND IRRADIATION OF TRIPLE-DIP SLUGS CANNED IN AN AlSi BATH WITH IMPURITY LEVELS ABOVE NORMAL.

W. K. Kratzer. January 19, 1953.

Authorization
HW-26860

Objective: To determine the effect on slug quality and slug production of higher canning bath impurity concentrations than are permitted with present process specifications. It is primarily intended to show how impurities in the bath composition affect weld bead corrosion in the pile.

FABRICATION AND IRRADIATION OF TRIPLE-DIP SLUGS CANNED IN AN AlSi BATH WITH IMPURITY LEVELS ABOVE NORMAL.

W. K. Kratzer. October 20, 1953.

Interim Report
HW-29680

Can-wall penetration, X-ray examination of the braze line, and metallographic examination of the AlSi bonding layer revealed no difference between slugs canned for this production test and normal production slugs. Destructive testing showed that the slugs with higher tin concentration in the braze line had lower resistance to compound layer fracture in shear and tension. Test slugs with the weld bead removed, leaving the AlSi braze line exposed, showed increasing anodicity of the braze line with increasing tin content. Test slugs with weld beads intact showed no variation of anodicity with tin. Tin and copper contents of the AlSi bath increased with continued use while normal impurities remained the same.

IRRADIATION EFFECTS ON CERTAIN PHYSICAL PROPERTIES OF TRIPLE-DIPPED 8-INCH SLUGS.
D. O. Richards and D. W. Gaylor. June 10, 1955.

Interim Report
HW-37179 RD

The physical characteristics studied were warp, diameter change, length change and breaking strength of slugs after irradiation. Results are tabulated.

DECLASSIFIED

HW-47000

DEL

Page: 3010-2

PRODUCTION TEST 313-105-10-M (contd)

FABRICATION AND IRRADIATION OF TRIPLE-DIP SLUGS CANNED IN AN AlSi BATH WITH IMPURITY LEVELS ABOVE NORMAL.
W. K. Kratzer. November 10, 1955.

Final Report
HW-39882

The effect of tin in the AlSi canning bath on subsequent weld bead corrosion of the slugs during irradiation was studied. Forty tubes of triple-dip slugs were irradiated. The test slugs were canned in AlSi containing up to 2.0 per cent tin. These were compared with control slugs canned in a bath with maximum tin concentration of 0.2 per cent. No difference in weld bead corrosion between test and control slugs was observed after irradiation to tube exposures up to 800 MWD/T at a maximum of 30 KW/ft.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3011-1

PRODUCTION TEST 313-105-11-M

EVALUATION OF SURFACE FINISH OF SLUGS
MACHINED AT FERNALD FROM STANDARD RODS
ROLLED AT SIMONDS. H. A. Johnson.
September 12, 1952.

Authorization
HW-25623

Objective: To evaluate the canning and irradiation characteristics of Fernald 'as machined' (smooth) and 'simulated Hanford' (rough uranium) slugs machined from standard production rods rolled at Simonds.

EVALUATION OF SURFACE FINISH OF SLUGS
MACHINED AT FERNALD FROM STANDARD RODS
ROLLED AT SIMONDS. A. C. Callen.
August 10, 1956.

Final Report
HW-44907

Slug cores with two surface finishes were prepared from Simonds' rolled rod, canned by the triple-dip process, and irradiated up to 1092 MWD/T without slug failure. Degree of surface roughness or method used for finishing did not affect either canning or irradiation behavior.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3012-1

PRODUCTION TEST 313-105-12-M

EXPOSURE BEHAVIOR OF UNBONDED C SLUGS.
G. A. Wheeler. December 3, 1952.

Authorization
HW-26398

Objective: To obtain information on the exposure behavior of unbonded C slugs, which will be evaluated with the aid of data obtained from enriched tubes in C Pile. It has been found (P.T. 105-502-A) that unbonded slugs behave much like the bonded slugs previously used. Simplified testing and canning procedures which are used with unbonded slugs, led to the decision to fabricate the C Pile enriched material by the cold canning process. (C slug refers to an enriched uranium - aluminum alloy slug.)

EXPOSURE BEHAVIOR OF UNBONDED C SLUGS.
A. C. Callen. June 6, 1956.

Final Report
HW-43524

C alloy slugs were charged in C and H Piles. Early examination of the unbonded slugs was necessitated by numerous slug failures. The in-pile behavior of the C slugs was evaluated from examination of the failed slugs and their comparison metal and the production test tubes were then irradiated as part of the production charge. The majority of the slug failures were caused by entrance of water through defective weld bead closures. The resulting corrosion of the alloy core had not been anticipated as out-of-pile tests had indicated that the 7-1/2 per cent uranium alloy was relatively corrosion resistant.

DECLASSIFIED

HW-47000

DEL

Page: 3013-1

PRODUCTION TEST 313-105-13-M

INITIAL IRRADIATION OF 0.4 ATOMIC PER CENT
Cr-U ALLOY. M. A. Ryan. February 19, 1953.

Authorization
HW-27192

Objective: To study the relative dimensional
stability of 0.4 - 0.5 atomic per cent chromium
alloy during irradiation.

EXAMINATION OF IRRADIATED URANIUM-
CHROMIUM ALLOY SLUGS. W. K. Kratzer.
February 14, 1955.

Final Report
HW-35189

Five tubes, each containing six four-inch uranium-
chromium alloy slugs, were irradiated to exposures
ranging from 156 to 834 MWD/T to determine the
relative stability of this material during irradiation.
The slugs were visually examined after pile exposure
and breaking strengths were determined. There was
a high tendency of the alloy slugs to crack during
exposure, probably aggravated by surface flaws
present on the alloy cores before charging in the pile.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3014-1

PRODUCTION TEST 313-105-14-M

IN-PILE EVALUATION OF 63S ALUMINUM PROCESS TUBES AND JACKETED SLUGS. A. T. Taylor. Authorization
March 17, 1953. HW-27204

Objective: To obtain performance data of 63S aluminum alloy when used as process tube and slug jacket material.

PRE-IRRADIATION EVALUATION OF 63S ALUMINUM PROCESS TUBES AND 63S ALUMINUM JACKETED SLUGS. A. T. Taylor. November 2, 1953. Interim Report
HW-29811

The quality of 63S aluminum jacketed slugs canned by the AlSi triple-dip process was equal to or better than those fabricated from 2S aluminum. Marred surface rejects were less, whereas weld rejects were slightly higher. Unclad 63S aluminum process tubes may be Van Stone flanged by impact flanging technique. The material in the 63S-T83 unclad process tubes exhibited superior tensile properties.

EVALUATION OF 63S ALUMINUM AS A SLUG JACKETING MATERIAL. A. T. Taylor. Final Report
July 8, 1954. HW-32369

63S aluminum jacketed slugs were triple-dip canned and their performance compared to 2S aluminum jacketed slugs. The 63S slugs were canned with a lower percentage of rejects than the 2S slugs. Corrosion data from in-pile exposure indicated that 63S slugs corroded more slowly than 2S jacketed slugs over a temperature range from 25 C to 65 C. The quality of the data was poor due to a short term of exposure and to lack of slug weasel measurements to allow accurate calculation of slug surface temperatures. Results of the investigation of ruptured slugs are included.

DECLASSIFIED

HW-47000

DEL

Page: 3015-1

PRODUCTION TEST 313-105-15-M

FABRICATION AND IRRADIATION OF FOUR-INCH
TRIPLE-DIPPED SLEEVELESS CANNED SLUGS.
W. K. Kratzer. January 12, 1953.

Authorization
HW-26797

Objective: To gain operating experience in the triple-
dip canning of uranium slugs by the sleeveless canning
method, and to observe the pile behavior of sleeveless
canned slugs.

OPERATIONS UNIT PROCEDURES FOR
FABRICATION AND IRRADIATION OF FOUR-INCH
TRIPLE-DIPPED SLEEVELESS CANNED SLUGS.
W. K. Kratzer. March 23, 1953.

Interim Report
HW-27477

FABRICATION AND IRRADIATION OF FOUR-INCH
TRIPLE-DIPPED SLEEVELESS CANNED SLUGS.
W. K. Kratzer. December 12, 1955.

Final Report
HW-40408

This test was cancelled before the slugs were charged
when it became apparent that, despite successful
irradiation of the material, the development effort
necessary to perfect the method would be better used
for improving the existing process. Some of the
fabrication experience is discussed.

DECLASSIFIED

HW-47000

DEL

Page: 3016-1

PRODUCTION TEST 313-105-16-M

EVALUATION OF DIVERSEY 514 AS AN ETCHANT
IN THE ALUMINUM COMPONENT CLEANING
PROCESS. E. A. Weakley. April 20, 1953.

Authorization
HW-27550

Objective: To determine the feasibility of replacing H_3PO_4 with Diversey 514 in the aluminum component cleaning process. Surface resistance measurements show that cleaning is more efficient with use of Diversey 514 and that etching time is not critical.

EVALUATION OF DIVERSEY 514 AS AN ETCHANT
IN THE ALUMINUM COMPONENT CLEANING
PROCESS. E. A. Weakley. June 26, 1953.

Interim Report
HW-28371

Diversey 514 was used at a concentration of 16 oz/gal at room temperature with an immersion time of five minutes for both caps and cans. Reject data, penetration results, radiographic cap examinations, ultrasonic cap bonding tests and cap resistances indicated that Diversey 514 was as good or better than H_3PO_4 as an aluminum etchant.

EVALUATION OF DIVERSEY 514 AS AN ETCHANT
IN THE ALUMINUM COMPONENT CLEANING
PROCESS. E. A. Weakley. May 15, 1956.

Final Report
HW-43051

Diversey 514 was found to be as good as, or better than phosphoric acid for component preparation. It was also easier to handle and control. In August, 1953, Diversey 514 replaced phosphoric acid as an aluminum etchant for preparing aluminum canning components.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3017-1

PRODUCTION TEST 313-105-17-M

IRRADIATION OF 63S ALUMINUM JACKETED
SLUGS. A. T. Taylor. February 20, 1953.

Authorization
HW-27205

Objective: To obtain performance data on 63S
aluminum jacketed slugs irradiated in 72S clad 2S
aluminum tubes for comparison with 2S jacketed
slugs.

For pre-irradiation evaluation and the final report
see P. T. 313-105-14-M, Document Numbers
HW-29811 and HW-32369.

3-1-57

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DECLASSIFIED

HW-47000

DEL

Page: 3019-1

PRODUCTION TEST 313-1-5-19-M

IRRADIATION OF TRIPLE-DIP CANNED URANIUM
SLUGS FROM RODS ROLLED AT FERNALD.
R. L. Knecht. January 16, 1953.

Authorization
HW-26851

Objective: To compare pile behavior of triple-dip
slugs from Fernald with that of presently used
Simonds metal.

A COMPARISON OF SOME PROPERTIES OF
URANIUM ROLLED AT THE FEED MATERIALS
PRODUCTION CENTER AND AT SIMONDS SAW
AND STEEL CO. R. L. Knecht. October 9, 1953.

Interim Report
HW-29741

Uranium rolled at FMPC and Simonds exhibited average
grain diameters from .015 to .049 millimeters.
Mechanical properties of the metal from both sites
differed only in ultimate strength. No gross differences
in canning performances were noted.

IRRADIATION OF TRIPLE-DIP CANNED URANIUM
SLUGS FROM RODS ROLLED AT FERNALD.
W. T. Kattner. November 9, 1955.

Final Report
HW-40417

Slug rupture rates of the Fernald and Simonds rolled
triple-dip canned material were approximately the
same. Local bumping of Fernald slugs increased
the can slug diameter a maximum of about 20 mils
at exposures from 600 to 1290 MWD/T. Warping
rate was about the same for metals from both sites.

DECLASSIFIED

HW-47000

DEL

Page: 3020-1

PRODUCTION TEST 313-105-20-M

This report was never issued although the operating procedure for the test was issued in document HW-27525. Personal communication with C. S. Kingman on 12-15-56 confirmed that Production Tests 313-105-20-M, 313-105-21-M, and 313-105-22-M were not issued as separate tests but combined under Production Test 313-105-24-M.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3023-1

PRODUCTION TEST 313-105-23-M

EVALUATION OF FILLERWELDING OF EIGHT-
INCH TRIPLE-DIPPED CANNED SLUGS.

J. W. Lingafelter. May 4, 1953.

Authorization
HW-27934

Objective: To evaluate the manufacturing feasibility
for Fillerwelding eight-inch slug closures and to
evaluate pile behavior of Fillerwelded slug closures.

FILLERWELDING EIGHT-INCH SLUGS.

J. W. Lingafelter. January 4, 1954.

Final Report
HW-30318

Results of tests on 1250 eight-inch triple-dip canned
uranium slugs with Fillerwelded end closures showed
that the closures were free from porosity, voids and
inclusions, were more resistant to corrosion, met all
production requirements and increased weld yields
by reducing poor bond rejects.

DECLASSIFIED

HW-47000

DEL

Page: 3024-1

PRODUCTION TEST 313-105-24-M

PILE EVALUATION OF TRU-LINE CANS AND CAPS. Authorization
J. W. Lingafelter. May 12, 1953. HW-28040

Objective: To evaluate the effect eight-inch Tru-line
slugs will have on pile process tube and slug corrosion
and to evaluate 313 Building processing methods for
the well type cap.

PILE EVALUATION OF TRU-LINE CANS AND CAPS. Supplement 1
J. W. Lingafelter. August 3, 1953. HW-28903

Objective: To determine the effect eight-inch Tru-
line slugs, charged in bowed tubes, will have on
process tube and slug corrosion.

TRU-LINE SLUGS. J. W. Lingafelter.
November 9, 1953.

Interim Report 1
HW-29885

Approximately 5000 eight-inch slugs were canned in
Tru-line cans and caps. The only difficulties experienced
were floating of the caps in the AlSi bath, wall corrosion
by AlSi, and seating of the well-type caps. Further tests
and canning were scheduled.

DECLASSIFIED

HW-47000

DEL

Page: 3025-1

PRODUCTION TEST 313-105-25-M

LEAD-DIP CANNING AND IRRADIATION OF
URANIUM SLUGS MACHINED FROM SALT-BATH
HEAT-TREATED FERNALD-ROLLED SLUGS.
H. A. Johnson. May 22, 1953.

Authorization
HW-28149

Objective: To further evaluate the lead-dip canning
procedure for uranium fuel slugs.

LEAD-DIP CANNING OF RECOVERED REJECT
SLUGS. O. H. Greager. November 7, 1953.

Extension Request
HW-29914

A request was made to modify the original test to
include the lead dip canning of slugs recovered from
slugs triple-dip canned.

(A large number of slug failures in the canning and
irradiation phases prompted several investigations
as to the cause of the failures. Reports HW-29549,
HW-32502, and HW-33084 present the investigation
studies.)

DECLASSIFIED

HW-47000

DEL

Page: 3026-1

PRODUCTION TEST 313-105-26-M

This production test, IRRADIATION OF HOT PRESS
CANNED SLUGS, was issued as Production Test
313-42-MT.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3027-1

PRODUCTION TEST 313-105-27-M

EVALUATION OF NORMAL URANIUM PRODUCED
FROM UF_6 PARENT MATERIAL. O. W. Rathbun.
July 2, 1953.

Authorization
HW-28605

Objective: To evaluate the suitability of unblended
uranium produced from UF_6 parent material for use
at Hanford.

TRIPLE DIP CANNING AND IRRADIATION OF
NORMAL URANIUM PRODUCED FROM UF_6
PARENT MATERIAL. O. W. Rathbun.
February 27, 1956.

Final Report
HW-41539

UF_4 , produced from UF_6 either with hydrogen
or with simulated cracked ammonia as reductant,
was reduced to the metal and fabricated by normal
methods at FMPC. The results from pre-irradiation
and post-irradiation tests of 350 pieces showed that
this material performed as well as normal slugs
under irradiation to exposures of 1000 MWD/T at
tube powers of 500 KW.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3028-1

PRODUCTION TEST 313-105-28-M

This production test was not issued as a formal test, but the material is presented in this report.

IRRADIATION OF URANIUM POWDER METAL
COMPACT SLUGS. P. D. Wright. April 16, 1955.

Final Report
HW-31491 RD

Powder metal uranium compacts, produced by Sylvania Electric Products Company, were canned and irradiated. Pre-irradiation evaluation showed that the fuel elements had an extremely fine grain size and a random orientation. The material had a very low ductility and a larger number of inclusions than wrought uranium. The slugs were scheduled to be irradiated in May, 1955 at 600 MWD/T. No post-irradiation results were given.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3029-1

PRODUCTION TEST 313-105-29-M

MEASUREMENT OF THE THERMOGALVANIC
EFFECT ON SLUGS. C. Groot. October 8, 1953.

Authorization
HW-28624

Objective: To measure thermogalvanic corrosion
of slugs under pile conditions.

THERMOGALVANIC CORROSION OF SLUGS.
C. Groot. February 3, 1955.

Final Report
HW-33882

Thermogalvanic corrosion tests were made in
water containing 2 ppm sodium dichromate. No
corrosion was found in dichromate inhibited water
at pH 7.7, neither in the laboratory nor in the pile.
Revaluation of the frost test, the main purpose of
which has been the prevention of thermogalvanic
corrosion, was to be revaluated.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3030-1

PRODUCTION TEST 313-105-30-M

This production test was cancelled.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3031-1

PRODUCTION TEST 313-105-31-M

IRRADIATION OF ALPHA EXTRUDED URANIUM.
P. J. Pankaskie. October 7, 1953.

Authorization
HW-29560

Objective: To gain performance data on the dimensional behavior of normal uranium fuel elements fabricated from rods extruded in the high alpha phase temperature range and beta heat treated prior to canning.

EVALUATION OF ALPHA EXTRUDED URANIUM.
P. J. Pankaskie, L. D. Schaffer and P. D. Wright.
November 10, 1955.

Interim Report
HW-33418

Rods extruded in the 500-600 C temperature range showed a fine recrystallized grain structure and sharper orientation texture than alpha rolled uranium rods. Mechanical properties of the two types are comparable. Slug elements made from the extruded rod and irradiated to exposures of 700 MWD/T showed an eight-fold improvement in warp behavior, compared to rolled and heat treated uranium.

IRRADIATION OF ALPHA EXTRUDED URANIUM.
P. A. Carlson. October 27, 1955.

Final Report
HW-39659

Four tubes of alpha extruded, beta heat treated, lead dip canned slugs were irradiated to 750-800 MWD/T at about 550 KW. Alpha extruded slugs warped significantly less than alpha rolled material under the same radiation conditions. No other difference in irradiation behavior was observed.

DECLASSIFIED

HW-47000

DEL

Page: 3032-1

PRODUCTION TEST 313-105-32-M

This production test was combined with Production
Test 313-105-28-M.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3033-1

PRODUCTION TEST 313-105-33-M

This production test, EVALUATION OF WELDING
EIGHT INCH STEP CUT SLUGS, was never issued.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3034-1

PRODUCTION TEST 313-105-34-M

This production test, PILE IRRADIATION OF VACUUM
CANNED SLUGS, was never issued.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3035-1

PRODUCTION TEST 313-105-35-M

SLUG EVALUATION AT INCREASED IRRADIATION
LEVELS FOR TRITIUM PRODUCTION. L. W. Lang.
January 18, 1954.

Authorization
HW-30532

Objective: To determine whether the fuel slugs and
target pieces used in tritium production, both of
present and improved design, can be successfully
irradiated at higher tube powers.

(For pile irradiation see P. T. 105-506-A and P. T.
105-562-A.)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3036-1

PRODUCTION TEST 313-105-36-M

IN-PILE BEHAVIOR OF SLUGS MARKED WITH
TRANSPARENT INK. R. S. Dalrymple, March 11,
1954.

Authorization
HW-30580

Objective: To investigate the effect on slug
corrosion of the lacquer type colored ink used
for identifying slugs, such as those used in
in-pile tests.

IN-PILE BEHAVIOR OF SLUGS MARKED WITH
TRANSPARENT INK. B. Griggs. June 4, 1956

Final Report
HW-43496

Five different colors of ink were tested for suitability
for use during charging operations. No corrosion
resulted during the irradiation since the inks washed
off during exposure. The results showed that these
inks could safely be used for identification of slugs up
to and during charging.

DECLASSIFIED

HW-47000

DEL

Page: 3037-1

PRODUCTION TEST 313-105-37-M

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS. R. S. Dalrymple. March 8, 1954.

Authorization
HW-30581

Objective: To compare the protective value of the oxide films formed on aluminum jacketed slugs by autoclaving in aqueous media and steam at 100 psig and 170 C. Distilled water, deionized water, and steam condensate with additions of several ppm to several per cent sodium dichromate, chromic acid, nitrates, nitrites and silicates will be tested.

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS. R. L. Dillon. June 2, 1954.

Supplement A
HW-32012

Objective: To demonstrate the in-pile corrosion resistance of a new sealing technique (water autoclave) for anodized aluminum.

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS. R. L. Dillon. February 16, 1955.

Supplement B
HW-35220

Objective: To determine the effectiveness of two high temperature sealed anodic films in preventing slug jacket penetration in 110-120 C process water.

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS (ANODIZED COATINGS). R. L. Dillon
and R. E. Wilson. October 24, 1955.

Final Report
Supplement A
HW-37637

Anodized slug elements sealed at 170 C were subjected to exposures up to 712 MWD/T. The sealing process paralleled the standard autoclave test. The solution used was either distilled water or 0.1% $\text{Na}_2\text{Cr}_2\text{O}_7$. Sealed pieces showed little evidence of charging damage. Maximum weight losses for autoclaved slugs and the anodized pieces in high exposure tubes were approximately the same.

DECLASSIFIED

HW-47000

DEL

Page: 3037-2

PRODUCTION TEST 313-105-37-M (contd.)

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS (ANODIZED COATINGS). R. L. Dillon.
August 24, 1956.

Final Report
Supplement B
HW-44539

Fuel elements were prepared for this test in two ways. One set of fuel elements was anodized in oxalic acid. The second set was anodized in sulfuric acid. The sets were charged in the pile with standard water autoclaved fuel elements. After discharge, it was determined that properly sealed anodic coatings on fuel elements were abrasion resistant and at least as corrosion resistant as the autoclave coated control pieces. The oxalic acid films were more corrosion resistant than the sulfuric acid anodized films.

IN-PILE BEHAVIOR OF WATER AUTOCLAVED
SLUGS. B. Griggs. August 16, 1956.

Final Report
HW-44953

Twenty tubes having six different types of autoclave treatment were exposed from 700 to 900 MWD/T. Only those slugs autoclaved in steam condensate - 1 per cent CrO_3 showed a significant difference from control pieces. Weight loss differences were small or inconsistent in the other five cases.

DECLASSIFIED

HW-47000

DEL

Page: 3038-1

PRODUCTION TEST 313-105-38-M

This production test, IRRADIATION OF HOLLOW EXTERNALLY COOLED ONLY FUEL ELEMENTS, was never issued.

PRODUCTION TEST 313-38-MT

CANNING OF CORED URANIUM SLUGS.
P. D. Wright. May 18, 1954.

Authorization
HW-31900

Objective: To can by the lead dip-canning process approximately 300, four-inch cored and 300, four-inch uranium pieces.

FABRICATION AND CANNING OF CORED NATURAL URANIUM SLUGS. P. D. Wright and W. E. Ray. December 1, 1954.

Final Report
HW-33757

The cored slugs were closed with uranium end plugs and were canned. An extremely low canning yield necessitated the fabrication of 400 additional slugs. Testing of paired sets of cored and solid fuel elements indicated that cored pieces withstood approximately three times as many cycles to failure than the solid companion pieces.

(For pile irradiation see P. T. 105-570-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3039-1

PRODUCTION TEST 313-39-MT

CANNING OF SEVERAL THOUSAND URANIUM
POWDER METAL COMPACT SLUGS. M. A. Ryan.
May 26, 1954.

Authorization
HW-31955

Objective: To can for irradiation approximately 4000
powder metal compact slugs produced in the Sylvania
Electric Products Company pilot plant.

(For pile irradiation see P. T. 105-576-A.)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3040-1

BA

PRODUCTION TEST 313-40-MT

COMPARISON OF SLUG CORE AND COMPONENT
PREPARATION METHODS FOR THE HOT PRESS
CANNING OF "J" ALLOY CORES. E. A. Weakley.
August 12, 1954.

Authorization
HW-32193

Objective: To prepare "J" alloy fuel elements fabricated from components and slug cans cleaned by dip methods and by scouring with abrasive cleaner in order to choose the most suitable and economic fabrication method. ("J" alloy designates an enriched uranium - aluminum alloy.)

STATUS OF PREPARATION OF HOT PRESSED "J"
AND "C" SLUGS FROM OCTOBER 20, 1954 TO
MARCH 25, 1955. E. A. Weakley. March 25, 1955.

Final Report
HW-35970

This production test was not completed due to a de-emphasis in U-233 production. The "J" fuel elements that were canned for PT-40 MT are reported in this status document.

4-1-58

DECLASSIFIED

HW-47000 DEL

Page: 3041-1

PRODUCTION TEST 313-41-MT

FABRICATION OF UNBONDED URANIUM SLUGS.
A. C. Callen. July 9, 1954.

Authorization
HW-32378

Objective: To fabricate unbonded uranium fuel elements for the evaluation of their behavior during irradiation, particularly resistance to rupture.

FABRICATION AND IRRADIATION OF UNBONDED URANIUM SLUGS. A. C. Callen. January 10, 1956. Final Report
HW-40835

Both solid and cored slugs tested failed at 180-326 MWD/T. Cause of the failures was not conclusively determined. The solid slugs used were either freshly etched, allowed to oxidize or nickel-plated before canning.

(For pile irradiation see P. T. 105-578-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3042-1

PRODUCTION TEST 313-42-MT

FABRICATION OF HOT-PRESS CANNED SLUGS Authorization
FOR PILE CHARGING. J. D. Sprowl. July 13, 1954. HW-30045

Objective: To determine in-pile behavior of hot-press
canned fuel elements and to demonstrate that future
production use of these slugs is consistent with
economic operation.

IRRADIATION OF SOLID AND CORED HOT-PRESS Final Report
FUEL ELEMENTS. H. Harty. June 21, 1956. HW-43875

The three ruptures which were permitted in the
production test of hot-press fuel elements occurred
at exposures of about 600 MWD/T. The failures of
the two solid core fuel elements were classified as
jacket ruptures, the cored fuel element as a uranium
core failure. A statistical analysis showed with a 98
per cent probability that the rupture resistance of
hot-press fuel elements was inferior to the dip-canned
control material.

(For pile irradiation see P. T. 105-577-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3043-1

PRODUCTION TEST 313-43-MT

PREPARATION OF SLUGS WITH COLD PRESSURE-
WELDED CLOSURES FOR PILE TESTING.

Authorization
HW-33016

E. A. Smith. September 9, 1954.

To develop procedures for large scale production of uranium slugs having cold welded closures, and prepare for testing, a three tube charge of (1) four-inch slugs with mechanically keyed jackets and cold welded closures, (2) four-inch slugs with unbonded slugs with unbonded jackets and cold welded closures, (3) four-inch lead-dipped slugs for comparison and (4) four-inch cored slugs with mechanically keyed jackets and cold-closures.

PREPARATION OF SLUGS WITH COLD PRESSURE-
WELDED CLOSURES FOR PILE TESTING.

Final Report
HW-33866

E. A. Smith. December 20, 1954.

This report described the materials and processes employed in the preparation of 200 cold closure unbonded and 200 cold closure mechanically bonded test slugs.

CANNING OF CORED FOUR-INCH SLUGS WITH
COLD PRESSURE-WELDED CLOSURES.

Supplement A
HW-34894 RD

E. A. Eschbach. February 3, 1955.

This report outlines plans for supplementary tests performed before transferring responsibility of the production test from E. A. Eschbach to R. W. Benoliel.

PREPARATION OF SLUGS WITH COLD PRESSURE-
WELDED CLOSURES FOR PILE TESTING.

Supplement A
HW-42455 RD

E. A. Smith. January 31, 1955.

Objective: To prepare for in-pile evaluation, a two tube charge of each type of slug: (1) unbonded, cold pressure-closed slugs; (2) mechanically bonded, cold pressure-closed cored slugs; and (3) lead-dip canned cored slugs.

(For pile irradiation see P. T. 105-584-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3044-1

PRODUCTION TEST 313-44-MT

CANNING OF CORED EIGHT-INCH SLUGS FROM
HOLLOW EXTRUDED ROD. R. D. Wright and
W. E. Ray. August 23, 1954.

Authorization
HW-32822

Objective: To can by the lead-dip canning process
approximately 100 eight-inch slugs fabricated from
extruded hollow rods for subsequent irradiation.

A HISTORY OF THE DEVELOPMENT OF EXTRUDED Interim Report
CORED FUEL ELEMENTS. P. D. Wright. HW-40271
December 5, 1955.

Slugs were canned and irradiated in 105 C reactor.
Results of irradiation of cored fuel elements were
rather inconclusive, and further irradiation tests
were planned.

(For pile irradiation see P. T. 105-588-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3045-1

PRODUCTION TEST 313-45-MT

FABRICATION OF HOT PRESSED CANNED,
INTERNALLY AND EXTERNALLY COOLED, FUEL
ELEMENTS FOR PILE CHARGING. W. J. Bailey
and H. P. Oakes. October 20, 1954.

Authorization
HW-32902

Objective: To determine the in-pile behavior of hot-
press canned hollow slugs and to demonstrate on
the basis of performance that these slugs are capable
of attaining (without failure) consistently higher
exposures than externally cooled slugs.

(For pile irradiation see P. T. 105-587-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3046-1

PRODUCTION TEST 313-46-MT

IRRADIATION OF URANIUM-1.5 ATOMIC PER
CENT SILICON ALLOY SLUGS. M. A. Ryan and
W. E. Ray. August 31, 1954.

Authorization
HW-32907

Objective: To can by the lead-dip process approximately
50 uranium-1.5 atomic weight per cent silicon extruded,
beat heat treated standard fuel elements.

(For pile irradiation see P. T. 105-586-A.)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3047-1

PRODUCTION TEST 313-47-MT

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. W. P. Wallace. October 8, 1954.

Authorization
HW-33189

Objective: To determine the pile performance characteristics of cored uranium slugs from alpha phase extruded blanks and cored uranium slugs machined from alpha phase rolled rods.

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. W. P. Wallace. February 3, 1955.

Supplement A
HW-34893

Due to the unavailability of material from pickled derbies, which were specified for slugs from rolled rods, it was decided to incorporate slugs for this production test from mechanically cleaned only derbies as well as from pickled derbies.

OFFSETS IN CENTER OF DRILLED CORED SLUGS.
W. T. Kattner. February 10, 1955.

Interim Report
HW-35060

All of the slugs obtained contained offsets, since slugs were prepared by drilling from opposite ends. The slugs (in both alpha and beta phases) were tested by thermal cycling. Methods were suggested by NLO for eliminating the offsets caused by drilling. Tests were resumed on the available cored slugs even though they contained the offsets.

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. E. A. Weakley. March 31, 1955.

Supplement B
HW-35914

Objective: To determine the reactor performance of drilled cored slugs sealed with aluminum end plugs.

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. R. K. Koler. May 23, 1955.

Supplement C
HW-36187

Objective: To prepare for irradiation drilled cored slugs sealed for dip canning by crimping the slug counterbore edge over the edge of uranium end plugs.

DECLASSIFIED

HW-47000

DEL

Page: 3047-2

PRODUCTION TEST 313-47-MT (contd)

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. E. A. Weakley. June 30, 1955.

Supplement D
HW-37714

Objective: To fabricate production quantities of
drilled and extruded cored slugs with aluminum end
plugs for in-pile evaluation.

CORED SLUGS FROM EXTRUDED BLANKS AND
ROLLED RODS. S. M. Graves. August 10, 1956.

Supplement E
HW-44902

Objective: To fabricate production quantities of 1/2
inch drilled cored slugs sealed with aluminum end
plugs for in-pile evaluation.

PRODUCTION TEST 105-603-A-47-MT

IRRADIATION OF CORED SLUGS WITH CRIMPED
URANIUM END PLUGS; F. W. Van Wormer.
June 3, 1955.

Authorization
HW-36708

Objective: To authorize irradiation and special pickup
of cored slugs with crimped uranium end plugs. These
slugs will be irradiated to exposure levels of 300, 600
and 900 MWD/T.

(For pile irradiation see P. T. 105-591-A and
P. T. 105-593-A.)

DECLASSIFIED

HW-47000

DEL

Page: 3048-1

PRODUCTION TEST 313-48-MT

IRRADIATION OF LARGE GRAINED ALUMINUM
JACKETS. J. D. Sprowl. November 23, 1954.

Authorization
HW-33869

Objective: To evaluate the in-pile effect of coolant
water on aluminum jackets with various grain sizes.

IRRADIATION OF LARGE GRAINED ALUMINUM
JACKETS. C. H. Bloomster. March 6, 1956.

Final Report
HW-41757

Corrosion rates of slug jackets under irradiation
were independent of grain size. No specific type of
corrosion could be attributed to a particular grain
size.

(For pile irradiation see P. T. 105-549-E.)

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3049-1

PRODUCTION TEST 313-49-MT

This production test, DETERMINATION OF THE EFFECT
OF HYDROGEN AND ROLLING DEFORMATION ON
IRRADIATION CHARACTERISTICS OF NORMAL URANIUM,
was never issued.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3050-1

PRODUCTION TEST 313-50-MT

CANNING OF EIGHT INCH SLUGS PLUGGED WITH
ALUMINUM END PLUGS. This production test was
cancelled.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3051-1

PRODUCTION TEST 313-51-MT

CANNING OF SLUGS FROM UNALLOYED DINGOT Authorization
URANIUM FOR PILE IRRADIATION. H. A. Johnson. HW-34511
February 7, 1955.

Objective: To can slugs produced from unalloyed dingot
uranium for pile irradiation to determine irradiation
characteristics.

CANNING OF SLUGS FROM UNALLOYED DINGOT Interim Report
URANIUM FOR PILE IRRADIATION. H. A. Johnson. HW-36544
May 4, 1955.

Pre-irradiation testing and canning data showed that
the slugs fabricated from dingots (after a thermal
treatment to reduce the surface hydrogen concentrations)
were equal to or better than the slugs from ingots with
respect to their canning characteristics and quality.

(For pile irradiation see P. T. 105-596-A.)

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3052-1

PRODUCTION TEST 313-52-MT

This production test, INSULATED CORE PRODUCTION TEST, was never issued.

3-1-57

[REDACTED]

DECLASSIFIEDPRODUCTION TEST 313-53-MT

EFFECT OF SLUG HEAT TREATMENT
MODIFICATIONS UPON IN-PILE STABILITY OF
SLUGS. W. T. Kattner and H. R. Gardner.
March 1, 1955.

Authorization
HW-35590

Objective: To prepare for pile charging uranium slugs
heat treated by modifications of the present HAPO
process that are expected to be less susceptible to
warping than current production slugs.

EFFECT OF SLUG HEAT TREATMENT
MODIFICATIONS UPON IN-PILE STABILITY OF
SLUGS. H. R. Gardner. April 5, 1955.

Supplement A
HW-36071

Objective: To increase the number of slugs to be
irradiated from 50 to 100 tons.

EFFECT OF SLUG HEAT TREATMENT
MODIFICATIONS UPON IN-PILE STABILITY OF
SLUGS. H. A. Johnson. April 26, 1955.

Supplement B
HW-36408

Objective: To increase the number of slugs to be
heat treated and canned from 100 to 160 tons.

DESIRED CHARGING OF URANIUM SLUGS HEAT
TREATED USING DELAYED QUENCH.
O. W. Rathbun. April 27, 1955.

Final Report
HW-36433

Approximately 28,000 eight-inch slugs were heat
treated with equal numbers air delayed prior to
quenching for 35, 43, 50 and 80 seconds. About
500 of these slugs were measured for charging in
16 control tubes.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3053-2

PRODUCTION TEST 105-601-A-53-MT

THE EFFECT OF SLUG HEAT-TREATMENT
MODIFICATIONS UPON IN-PILE STABILITY.
F. W. Van Wormer. June 3, 1955.

Authorization
HW-36129

Objective: To obtain in-pile data pertaining to metal growth and warp by irradiating metal with varied heat treatment history and to evaluate the effects of slug power, coolant temperature, exposure and thermal cycling as they apply to this test.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3054-1

PRODUCTION TEST 105-613-A-54-MT

DETERMINATION OF THE EFFECT OF A MODIFIED Design Report
BETA HEAT TREATING CYCLE ON IN-PILE HW-39128 A
DIMENSIONAL STABILITY OF SOLID SLUGS.
W. C. Riley and F. W. Van Wormer. September 6, 1955.

Objective: To evaluate the effect of modifying the beta
heat treating cycle for uranium rods on the dimensional
stability of solid uranium slugs.

DETERMINATION OF THE EFFECT OF A MODIFIED Authorization
BETA HEAT TREATING CYCLE ON IN-PILE HW-39128 B
DIMENSIONAL STABILITY OF SOLID SLUGS.
A. C. Callen. October 26, 1955.

This report is the authorization for the 300 Area
portion of this test.

DETERMINATION OF THE EFFECT OF A MODIFIED Authorization
BETA HEAT TREATING CYCLE ON IN-PILE HW-39128 C
DIMENSIONAL STABILITY OF SOLID SLUGS.
R. W. Van Wormer. November 7, 1955.

This report is the authorization for the 105 Area
portion of this test.

DETERMINATION OF THE EFFECT OF A MODIFIED Supplement A
BETA HEAT TREATING CYCLE ON IN-PILE HW-39128 D
DIMENSIONAL STABILITY OF SOLID SLUGS.
W. C. Riley and F. W. Van Wormer. September 16, 1955.

Objective: To authorize the irradiation of the test
material in a K Pile.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3055-1

PRODUCTION TEST 313-55-MT

This production test, CORED SLUGS WITH CRIMPED
URANIUM END PLUGS, was never issued.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3056-1

PRODUCTION TEST 313-56-MT

CANNING OF FOUR TONS OF DINGOT URANIUM
FOR PILE IRRADIATION. J. W. Riches.
June 30, 1955.

Authorization
HW-37695

Objective: To evaluate the feasibility of the dingot
process as a production method by canning and
irradiating pilot lots of four tons of unalloyed
dingot uranium.

CANNING OF PILOT AMOUNTS OF DINGOT
URANIUM FOR PILE IRRADIATION. P. D. Wright.
July 20, 1955.

Supplement A
HW-38207

Objective: To evaluate the feasibility of the dingot
process as a method of producing fuel cores for HAPO
by canning and irradiating pilot lots of up to 33 tons
per month.

PRE-IRRADIATION EVALUATION OF DINGOT
URANIUM. P. D. Wright. October 18, 1955.

Final Report
HW-39313

The results of this investigation indicated that the
behavior during irradiation of high purity uranium
fabricated from dingots could be compared with the
behavior of slugs fabricated from ingot uranium.

PRODUCTION TEST 105-608-A-56-MT

IRRADIATION OF DINGOT URANIUM.
F. W. Van Wormer. July 15, 1955.

Authorization
HW-37720

Objective: To investigate the in-pile stability of dingot
uranium having various mechanical and heat treatment
histories.

DECLASSIFIED

HW-47000

DEL

Page: 3056-2

PRODUCTION TEST 105-608-A-56-MT (contd)

IRRADIATION OF DINGOT URANIUM.
F. W. Van Wormer. August 15, 1955.

Supplement A
HW-38867

Objective: To authorize a program for the quantity
charging of dingot uranium.

IRRADIATION OF DINGOT URANIUM.
F. W. Van Wormer. August 15, 1955.

Supplement B
HW-38868

Objective: To determine the relative rupture resistance
of slugs made of dingot uranium by irradiating these
slugs to rupture and comparing their performance with
that of the conventional production uranium slugs.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3057-1

PRODUCTION TEST 313-57-MT

PREPARATION OF ENRICHED CORED SLUGS FOR
PILE TESTING. G. Miller and G. S. Allison.
June 21, 1955.

Authorization
HW-37741

Objective: (1) To evaluate the performance of cored lead dipped fuel elements in the piles at higher specific powers by the use of enriched (1.75 weight per cent U-235) uranium; (2) to compare the performance of cored enriched lead dipped fuel elements fabricated with end plugs of pressed aluminum and welded uranium; and (3) to compare fuel elements with core hole sizes of 3/8 inch and 5/8 inch.

PRODUCTION TEST 105-607-A-57-MT

IRRADIATION OF ENRICHED CORED SLUGS WITH
ALUMINUM END PLUGS, WELDED WITH PLUGS,
AND OF TWO CORE DIAMETERS. F. W. Van Wormer.
July 25, 1955.

Authorization
HW-38257

Objective: To determine the effect of core diameter and method of core closure on the rupture resistance of cored slugs.

IRRADIATION OF ENRICHED CORED SLUGS OF
TWO CORE DIAMETERS. FUEL EVALUATION
REPORT. W. K. Kratzer. July 23, 1956.

Interim Report
HW-44315

Comparative rupture resistance of cored slugs with 3/8 inch and 5/8 inch core diameters were determined. For the material and irradiation conditions, the 3/8 inch slugs showed a rupture rate at least 125 times greater than the 5/8 inch cored slugs at the 95 per cent confidence level. The method of core closure had no significant effect on the slug rupture resistance, dimensional distortion, or amount of uranium in the beta phase during irradiation.

DECLASSIFIED

HW-47000

DEL

Page: 3058-1

PRODUCTION TEST 313-58-MT

FABRICATION OF DOUBLE LENGTH "C" SLUGS.
J. W. Lingafelter and J. T. Mommsen.
June 20, 1955.

Authorization
HW-37412

Objective: To prepare double length Al-U-235 ("C") slugs by fusion welding two slug assemblies end to end for in-pile comparison with single unit hot pressed truline slugs.

FABRICATION OF DOUBLE LENGTH "C" SLUGS.
R. M. Fryar. May 11, 1956.

Revision 1
HW-43030

A revised production test was issued because the diminishing failure rate and reduction of "C" slug requirements made it unnecessary to run comprehensive production tests.

EVALUATION OF "C" ALLOY FUEL ELEMENTS.
S. M. Graves and F. W. Van Wormer. May 18, 1956.

Revision 1
HW-42961 A

Objective: To evaluate by in-pile testing and post irradiation examination candidate "C" alloy fuel elements.

EVALUATION OF "C" ALLOY FUEL ELEMENTS.
V. R. Cooper. May 18, 1956.

Authorization
HW-42961 B

This memorandum authorized the 300-area portions of this production test.

DEVELOPMENT TEST 105-636-A-58-MT

EVALUATION OF "C" ALLOY FUEL ELEMENTS.
F. W. Van Wormer. June 22, 1956.

Authorization
HW-42961 C

Objective: To evaluate, by in-pile testing, double length "C" alloy fuel elements and regular length hot pressed "C" alloy fuel elements with true line end contours, which have been seated against the rear end caps.

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3059-1

PRODUCTION TEST 313-59-MT

This production test, HOT PRESS SOLID CORED SLUGS,
was never issued.

3-1-57

[REDACTED]

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3060-1

PRODUCTION TEST 313-60-MT

EVALUATION OF THE IRRADIATION
CHARACTERISTICS OF VERTICALLY HEAT
TREATED URANIUM. J. W. Riches. July 19, 1955.

Authorization
HW-38092

Objective: To can slugs from uranium rods that have
been heat treated in a salt bath so that the irradiation
characteristics of this material can be determined.

PRODUCTION TEST 105-610-A-60-MT

IRRADIATION OF VERTICALLY HEAT TREATED
URANIUM. F. W. Van Wormer. October 27, 1955.

Authorization
HW-38258

Objective: To determine the relative dimensional
stability of uranium slugs which have been machined
from rods that were suspended vertically in a salt
bath during beta heat treatment and that have had
various quench treatments.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3061-1

PRODUCTION TEST 313-61-MT

This production test was never issued.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3062-1

PRODUCTION TEST 105-614-A-62-MT

EVALUATION OF ANODIZED HOT PRESS SOLID
FUEL ELEMENTS. W. C. Riley and
F. W. Van Wormer. November 1, 1955.

Design Report
HW-39746 A

Objective: To evaluate by in-pile testing anodized
hot press solid fuel elements.

EVALUATION OF ANODIZED HOT PRESS SOLID FUEL ELEMENTS. W. C. Riley. December 1, 1955. Authorization
HW 39746 B

This report is the authorization for the 300 Area portion
of the test.

EVALUATION OF ANODIZED HOT PRESS SOLID FUEL ELEMENTS. W. E. Foust and W. T. Kattner. April 25, 1956. Final Report
HW-39746 D

Pile testing of the hot press fuel elements was not
performed because of imperfections in the assembled
element. The improvements achieved in the canning
quality of the hot press fuel elements were increased
wall-thickness, increased strength of closure due to
an 80 per cent increase of weld interface, a more
abrasion resistant jacket and better control of process
variables.

DECLASSIFIED

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3063-1

PRODUCTION TEST 105-615-A-63-MT

EVALUATION OF I AND E SLUGS CANNED BY THE
LEAD DIP PROCESS. F. W. Van Wormer and
W. C. Riley. November 10, 1955.

Design Report
HW-39886 A

Objective: To evaluate the irradiation performance
of lead dip canned internally and externally cooled
slugs and to investigate other factors associated with
the further development of fuel elements of this geometry.

EVALUATION OF I AND E SLUGS CANNED BY THE
LEAD DIP PROCESS. W. C. Riley.
December 1, 1955.

Authorization
HW-39886 B

This report is the authorization of the 300 Area portion
of this test.

EVALUATION OF INTERNALLY AND EXTERNALLY
COOLED SLUGS CANNED BY THE LEAD DIP
PROCESS. F. W. Van Wormer. November 17, 1955.

Authorization
HW-39886 C

This report is the authorization for the 105 Area
portion of this test.

OPERATIONAL ASPECTS OF NEAR TERM I AND E
SLUG IRRADIATION. K. J. Bell. January 16, 1956.

Interim Report
HW-40734

A summary of the calculations for this test is given
as an appendix to this report.

IN-PILE CONVERSION EFFICIENCY MEASUREMENTS
IN I AND E SLUG LATTICE. A. G. Dunbar and
W. E. Niemuth. March 12, 1956.

Addendum Report
HW-41889

Objective: To irradiate I and E slugs in a small scale
C-pile to determine the conversion ratio. Measurements
will include a direct chemical determination by measuring
the integrated power developed and the plutonium separated,
and determination of the resonance escape probability by
measuring the neutron distribution during a short, low
level irradiation.

DECLASSIFIED

HW-47000

DEL

Page: 3063-2

PRODUCTION TEST 105-615-A-63-MT (contd)

IN-PILE CONVERSION RATIO EXPOSURE RESULTS Summary Report
RELATIVE TO P. T. 105-615-A-63-MT. HW-45931
A. G. Dunbar. November 7, 1956.

Two channels of I and E slugs and two channels of solid slugs were charged in the C Pile. Data are given for daily and accumulated integrated exposures for each tube, individual channel uranium fuel weight, weasel data, and in-pile environment conditions.

DIMENSION BEHAVIOR OF I AND E FUEL Interim Report
ELEMENTS. P. A. Carlson. November 9, 1956. HW-46139

Measurements of five tubes of I and E fuel elements irradiated to exposures of 55-500 MWD/T at 900 KW/tube indicated that I and E fuel elements warp on the average 3.5 mils(15-20 per cent) less than solid fuel elements and increase in diameter on the average three mils more than solid fuel elements.

PREPARATION OF I AND E FUEL ELEMENTS. Interim Report
C: H. Bloomster and G. Miller. November 21, 1956. HW-46794

Because of the need for obtaining irradiation data on I and E fuel elements as soon as possible and rather than awaiting receipt of special jacket components, several tubes of fuel elements were prepared with modified canning components for the first canning run. Low canning yields (25-28 per cent) were realized, due principally to bad welds, porous cap brazes, and numerous unbonded areas between the core and can.

DECLASSIFIED

HW-47000 DEL

Page: 3064-1

PRODUCTION TEST 105-616-A-64-MT

EVALUATION OF SLUGS HAVING PROJECTION
FOR USE IN RIBLESS PROCESS TUBES
W. C. Riley and F. W. Van Wormer.
February 24, 1956.

Design Report
HW-41532 A

Objective: To evaluate fuel elements with projections
which will support the element in a process tube having
no ribs.

EVALUATION OF SLUGS HAVING PROJECTIONS
FOR USE IN RIBLESS PROCESS TUBES.
W. C. Riley. February 24, 1956.

Authorization
HW-41532 B

This report is the authorization for the 300 Area
portion of the test.

DECLASSIFIED

HW-47000

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Page: 3065-1

PRODUCTION TEST 105-620-A-65-MT

IRRADIATION OF SLUGS HAVING TRU-LINE END
CONTOURS. W. C. Riley and F. W. Van Wormer.
December 21, 1955.

Design Report
HW-40526 A

Objective: To evaluate the effectiveness of slugs having
tru-line end contours in preventing the excessive corrosion
of slug jackets as a result of slug misalignment.

IRRADIATION OF SLUGS HAVING TRU-LINE END
CONTOURS. V. R. Cooper and K. V. Stave.
December 22, 1955.

Authorization
HW-40526 B

This report is the authorization for the 300 Area portion
of the test.

IRRADIATION OF SLUGS HAVING TRU-LINE END
CONTOURS. F. W. Van Wormer. December 27, 1955.

Authorization
HW-40526 C

This report is the authorization for the 105 Area portion
of the test.

DECLASSIFIED

HW-47000

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Page: 3066-1

PRODUCTION TEST 313-66-MT

EVALUATION OF ALUMINUM CAPS AND CANS
FROM NEW VENDORS. W. C. Riley and
F. W. Van Wormer. December 21, 1955.

Authorization
HW-40527 A

Objective: To determine, by in-pile testing, the
quality of caps and cans purchased from new vendors.

3-1-57

DECLASSIFIED

HW-47000

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Page: 3067-1

PRODUCTION TEST 105-621-A-67-MT

EVALUATION OF SLUGS HAVING SEALED
ANODIZED COATINGS. G. F. Jacky and
F. W. Van Wormer. December 9, 1955.

Design Report
HW-40587 A

Objective: To evaluate the in-pile performance of
slugs having a sealed anodized coating. The slugs
will be anodized with oxalic acid and sealed either
with water or silicic acid.

EVALUATION OF SLUGS HAVING SEALED
ANODIZED COATINGS. V. R. Cooper.
December 9, 1955.

Authorization
HW-40587 B

This report is the authorization for the 300 Area portion
of this test.

EVALUATION OF SLUGS HAVING SEALED
ANODIZED COATINGS. F. W. Van Wormer.
February 3, 1956.

Authorization
HW-40587 C

This report is the authorization of the 105 Area portion
of this test.

DECLASSIFIED

HW-47000

DEL

Page: 3068-1

PRODUCTION TEST 105-622-A-68-MT

IN-PILE EVALUATION OF GENERAL CORROSION
CHARACTERISTICS OF Ni-Al ALLOY M388 SLUG
JACKETS. W. C. Riley and F. W. Van Wormer.
January 30, 1956.

Design Report
HW-41178 A

Objective: To compare in-pile corrosion characteristics
of M388 (1 per cent nickel, 0.25 per cent iron) aluminum
alloy with those of the M329 (high purity 2S) aluminum
being used for slug jackets at the present time.

IN-PILE EVALUATION OF GENERAL CORROSION
CHARACTERISTICS OF Ni-Al ALLOY M388 SLUG
JACKETS. V. R. Cooper. January 30, 1956.

Authorization
HW-41178 B

This report is the authorization for the 300 Area portion
of this test.

PRODUCTION TEST 105-565-E-68-MT

(This production test replaces P. T. 105-622-A-68-MT.)

EVALUATION OF GENERAL CORROSION
CHARACTERISTICS OF Ni-Al ALLOY M388 SLUG
JACKETS. R. B. Richman. March 8, 1956.

Authorization
HW-41178 C

Objective: To determine the general corrosion
characteristics of slug jackets made of M388 alloy.

PRODUCTION TEST IP-42-A

(This production test replaces P. T. 105-565-E-68-MT.)

DECLASSIFIED

DEL

HW-47000

Page: 3069-1

PRODUCTION TEST 105-624-A-69-MT

This production test, EVALUATION OF LEAD DIP
CANNED I AND E SLUGS JACKETED IN TWO
COMPONENT CANS, was never issued. The subject
of this production test was covered by P. T. 105-615-A-63-MT.

3-1-57

[REDACTED] **DECLASSIFIED**

HW-47000

DEL

Page: 3070-1

PRODUCTION TEST 105-625-A-70-MT

This production test, EVALUATION OF ANODIZED HOT
PRESSED I AND E FUEL ELEMENTS, was cancelled.
Personal communication with W. E. Foust, January 11, 1957.

3-1-57

[REDACTED]

DECLASSIFIED

HW-47000

DEL

Page: 3071-1

PRODUCTION TEST 313-71-MT

EVALUATION OF MIZ-2 SEPARATION AS A
CRITERION FOR ELIMINATING RUPTURE-PRONE
SLUGS. W. C. Riley and F. W. Van Wormer.
March 20, 1956.

Design Report
HW-42087 A

Objective: To determine the effect on core failure rate
of rejecting approximately the poorest 5 per cent of the
cores as categorized by the quality metal tester.

EVALUATION OF MIZ-2 SEPARATION AS A
CRITERION FOR ELIMINATING RUPTURE-PRONE
SLUGS. V. R. Cooper. April 1, 1956.

Authorization
HW-42087 B

Authorization for the 300 Area portion of the production
test was given.

METAL QUALITY TESTING(MIZ-2) IN THE 313
BUILDING. E. F. Baroch. December 21, 1956.

Final Report
HW-42087 C

Approximately 230,000 fuel elements were tested with
the MIZ-2 (Metal Internal Impedance) tester and charged
into the high-exposure zones of the piles. The low quality
material, as determined by the tester, were segregated and
charged separately.

3-1-57

DECLASSIFIED

HW-47000

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Page: 3072-1

PRODUCTION TEST 105-627-A-72-MT

EFFECT OF SONOBOND SEPARATION ON FAILURE Design Report
RATE OF SOLID SLUGS. W. C. Riley and HW-42917 A
F. W. Van Wormer. May 1, 1956.

Objective: To determine the effect of slug quality
separation by sonobond on failure rate of solid slugs.

EFFECT OF SONOBOND SEPARATION ON FAILURE Authorization
RATE OF SOLID SLUGS. W. C. Riley. May 7, 1956. HW-42917 B

This report is the authorization for the 300 Area portion
of this test.

3-1-57

DECLASSIFIED

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HW-47000

Page: 3073-1

PRODUCTION TEST 313-73-MT

CANNING OF ENRICHED I AND E's. W. T. Kattner. Initial Report
June 11, 1956. HW 43584

This report summarizes procedures desired for
canning of enriched I and E slugs for this production
test.

PRODUCTION TEST 105-629-A-73-MT

EVALUATION OF I AND E SLUGS OPERATING AT
HIGH SPECIFIC POWERS. W. C. Riley and F. W. Van Wormer. May 16, 1956. Design Report
HW-43078 A

Objective: To evaluate the rupture resistance and to
investigate the dimensional properties of internally
and externally (I and E) cooled slugs operating at high
powers.

EVALUATION OF I AND E SLUGS AT POST CG-558 Authorization
SLUG POWER. W. C. Riley and F. W. Van Wormer. HW-43078 B
May 16, 1956.

This report is the authorization for the 300 Area portion
of the test.

PRODUCTION TEST IP-1-A

(This production test replaces 105-629-A-73-MT)

EVALUATION OF I AND E SLUGS OPERATING AT
HIGH SPECIFIC POWERS. F. W. Van Wormer. Authorization
September 13, 1956. HW-43078 C

This report is the authorization for the 105 Area
portion of this test.

DECLASSIFIED

HW-47000

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Page: 3074-1

PRODUCTION TEST 105-631-A-74-MT

PRELIMINARY EVALUATION OF SLUGS WITH THIN CAPS AND CAN BASES. W. C. Riley and F. W. Van Wormer. May 11, 1956. Design Report HW-43032 A

Objective: To obtain preliminary information on the effect of thin caps and can bases on fuel element behavior and performances.

PRELIMINARY EVALUATION OF SLUGS WITH THIN CAPS AND CAN BASES. W. C. Riley and F. W. Van Wormer. May 15, 1956. Authorization HW-43032 B

This report is the authorization of the 300 Area portion of this test.

PRELIMINARY EVALUATION OF SLUGS WITH THIN CAPS AND CAN BASES. F. W. Van Wormer. June 12, 1956. Authorization HW-43032 C

This report is the authorization of the 105 Area portion of this test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3075-1

PRODUCTION TEST 105-632-A-75-MT

PRELIMINARY EVALUATION OF VERTICALLY
SEGMENTED I AND E SLUGS. W. C. Riley and
F. W. Van Wormer. June 25, 1956.

Design Report
HW-43439 A

Objective: To evaluate the characteristics of vertically
segmented I and E slugs by visual examination and
dimensional measurements after irradiation to
specific goal exposures.

PRELIMINARY EVALUATION OF VERTICALLY
SEGMENTED I AND E SLUGS. W. C. Riley and
F. W. Van Wormer. June 25, 1956.

Authorization
HW-43439 B

This report is the authorization for the 300 Area portion
of this test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3076-1

PRODUCTION TEST 313-76-MT

DISTRIBUTION OF BRAZE LAYER VOIDS AS A
CRITERION OF SLUG WARPAGE. W. C. Riley and F. W. Van Wormer. June 26, 1956. Authorization
HW-43459 A

Objective: To determine whether slug warp is related to
the distribution of voids in the bonding layer.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3077-1

PRODUCTION TEST 105-637-A-77-MT

DETERMINATION OF OPTIMUM CORED SLUG
HOLE SIZE. W. C. Riley and F. W. Van Wormer.
June 23, 1956.

Design Report
HW-43897 A

Objective: To determine, on an economic basis, the optimum cored slug hole size for use in HAPO piles at post CG-558 conditions. Factors to be considered are (1) failure rate, (2) downtime loss associated with slug failures, (3) reactivity and conversion ratio, (4) stuck charges resulting from dimensional instability and (5) fuel fabrication costs.

DETERMINATION OF OPTIMUM CORED SLUG HOLE Authorization
SIZE. W. C. Riley. June 23, 1956. HW-43897 B

This report is the authorization for the 300 Area portion of this test.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 3078-1

PRODUCTION TEST 105-638-A-78-MT

DETERMINATION OF OPTIMUM SLUG LENGTH FOR Design Report
CORED SLUGS. W. C. Riley and F. W. Van Wormer. HW-44067 A
July 18, 1956.

Objective: To determine the optimum length for cored
slugs by a run-to-rupture test of four charges each
of four, six and eight-inch cored slugs to be irradiated
in C Pile.

DETERMINATION OF OPTIMUM SLUG LENGTH Authorization
FOR CORED SLUGS. V. R. Cooper. July 18, 1956. HW-44067 B

This report is the authorization for the 300 Area portion
of this test.

3-1-57

DECLASSIFIED

HW-47000

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Page: 3079-1

PRODUCTION TEST 105-639-A-79-MT

IRRADIATION OF "OLD" PILE I AND E SLUGS
CANNED BY THE LEAD DIP PROCESS.
S. M. Graves and F. W. Van Wormer. July 18, 1956.

Design Report
HW-44255 A

Objective: To evaluate the performance of lead dip
canned I and E slugs in one of the old piles.

IRRADIATION OF "OLD" PILE I AND E SLUGS
CANNED BY THE LEAD DIP PROCESS.
V. R. Cooper. July 18, 1956

Authorization
HW-44255 B

This report is the authorization for the 300 Area portion
of this test.

DECLASSIFIED

HW-47000

DEL

Page: 3080-1

PRODUCTION TEST 105-640-A-80-MT

IRRADIATION OF "K" PILE I AND E SLUGS
CANNED BY THE LEAD DIP PROCESS.
S. M. Graves and F. W. Van Wormer. July 11, 1956.

Design Report
HW-44256 A

Objective: To evaluate the performance of lead-dip
canned I and E slugs in K piles.

IRRADIATION OF "K" PILE I AND E SLUGS
CANNED BY THE LEAD DIP PROCESS.
P. H. Reinker and W. M. Mathis. November 2, 1956.

Authorization
HW-44256 B

This report is the authorization for the 300 Area portion
of this test.

3-1-57

DECLASSIFIED

HW-47000

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Page: 3081-1

PRODUCTION TEST 105-641-A-81-MT

RUN TO RUPTURE EVALUATION OF VERTICALLY
SEGMENTED I AND E SLUGS. E. A. Evans.
July 13, 1956.

Notebook
HW-44257

3-1-57

DECLASSIFIED

HW-47000

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Page: 3082-1

PRODUCTION TEST 105-642-A-82-MT

PRELIMINARY EVALUATION OF E-N LOADS FOR
COMBINED PLUTONIUM-TRITIUM PRODUCTION.
W. C. Riley and J. W. Sowards. August 20, 1956.

Design Report
HW-44538 A

Objective: (1) To determine the corrosion efficiency of
an enriched uranium and lithium-aluminum alloy loading,
(2) to provide preliminary estimates of fuel element
stability, and (3) to estimate the value of shield protection
which is provided by a suitable fringe tube loading of "N"
and "E" slugs.

PRELIMINARY EVALUATION OF E-N LOADS FOR
COMBINED PLUTONIUM-TRITIUM PRODUCTION.
R. H. Reinker and W. M. Mathis. November 2, 1956.

Authorization
HW-44538 B

This report is the authorization for the 300 Area portion
of this test.

PRELIMINARY EVALUATION OF E-N LOADS FOR
COMBINED PLUTONIUM-TRITIUM PRODUCTION.
J. J. Bollen. November 5, 1956.

Supplement Report
HW-47683

This report gives supplemental instructions to be followed
in canning "E" slugs (0.94 per cent U-235 slugs).

DECLASSIFIED

HW-47000

DEL

Page: 4001-1

PRODUCTION TEST 314-1-M

STUDY OF BRAZED CAPS - REAUTOCLAVING OF
AUTOCLAVED PIECES AFTER FACING OFF THE
WELD. L. D. Eubank. September 18, 1944.

Authorization
HW-3-742

Objective: To determine whether welding of canned
pieces weakens the braze line of brazed-in caps or
whether welding covers over a faulty braze of the cap.

STUDY OF BRAZED CAPS. F. P. Fowler and
L. D. Eubank. October 16, 1944.

Final Report
HW-3-873

The results of this test indicated that welding
covered over faulty brazes of the caps in some
instances, particularly minute breaks in the AlSi
braze line. Welding did not open up otherwise
perfectly brazed in caps and development line
submarine canning was proved to be better than
press canning from the standpoint of brazing of
the top caps.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 4002-1

PRODUCTION TEST 314-2-M

STUDY OF "SNIFFER" TESTED UNBONDED SLUGS - Authorization
"SNIFFER" TESTED IN AUTOCLAVE. HW-3-808
L. D. Eubank. September 18, 1944.

Objective: To determine if slugs judged as non-leakers by the "sniffer" test will pass the steam autoclave test.

STUDY OF "SNIFFER" TESTED UNBONDED
PIECES. F. P. Fowler. October 6, 1944. Final Report
HW-3-832

Canned unbonded pieces were tested for leaks by the "sniffer" test. The "sniffer" test is a method whereby the pieces are subjected to helium gas under pressure, and after aerating, the pieces are classed as non-leakers or leakers depending upon the amount of residual helium remaining in the pieces as determined by the mass spectrograph. One thousand fifty (1050) unbonded canned pieces that had been judged as non-leakers by the "sniffer" test were autoclaved for 80 hours at 100 psi steam pressure. No failures resulted in the steam autoclave. Ninety (90) unbonded canned pieces judged as leakers were autoclaved in the same manner. Approximately 87 per cent of these did not fail in the autoclave. The "sniffer" test was adopted as a satisfactory procedure for classifying canned unbonded pieces as non-leakers.

3-1-57

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HW-47000

Page: 4003-1

PRODUCTION TEST 314-3-M

STUDY OF SLUGS FAILING TO PASS DIMENSIONAL GAGE AFTER PLANT STEAM AUTOCLAVE TEST - Authorization
RETESTING IN STEAM AUTOCLAVE. HW-3-743
L. D. Eubank. September 18, 1944.

Objective: To determine if an abnormally large number of failures will occur among warped slugs after the standard plant steam autoclave test.

STUDY OF SLUGS FAILING TO PASS DIMENSIONAL GAGE AFTER PLANT STEAM AUTOCLAVE TEST. Final Report
L. D. Eubank. October 16, 1944. HW-3-872

It was concluded that change of dimension (warp) of classified pieces could not be used as a basis for predicting future failures in reactors since none of the warped pieces of this test failed in the autoclave.

3-1-57

DECLASSIFIED

HW-47000

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Page: 4004-1

PRODUCTION TEST 314-4-M

OUTGASSING TIME CYCLE. R. J. Schier.
December 12, 1944.

Authorization
HW-3-1204

Objective: To determine whether the outgassing time cycle can be reduced to eleven hours in place of the present fourteen hours.

PRODUCTION TEST SUMMARY - BUILDING 314.
(P.T. No. 314-3-M, No. 314-9-M, No. 314-25-M,
and No. 314-35-M.) R. J. Schier. August 11, 1946.

Final Report
HW-3-3613

This test was not run because degassing containers were changed to handle 160 rods per heat in place of 90 rods and consequently there was no necessity to reduce the time cycle in order to increase the rate of production.

3-1-57

DECLASSIFIED

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HW-47000

Page: 4005-1

PRODUCTION TEST 314-5-M

METAL FABRICATION STUDY - EFFECT OF BILLET
TYPES AND AGING TIME ON CANNING REJECTS.
R. P. King. February 16, 1945.

Authorization
HW-3-1636

Objective: To determine whether particular types of
billets (particularly T and BT) produce greater than
average warped slugs or rejections for other reasons.
Also to determine whether aging of metal after
machining affects warping. (BT designates virgin
uranium metal from Metal Hydride; TX, uranium
turnings from machining.)

METAL FABRICATION STUDY - EFFECT OF BILLET
TYPES AND AGING TIME ON CANNING REJECTS.
T. C. Evans. March 2, 1945.

Supplement 1
HW-3-1742

Conditions are outlined in this report for the extrusion
of 18 - 22 inch billets for this test.

EFFECT OF BILLET TYPES AND AGING TIME ON
CANNING REJECTS. R. P. King. March 22, 1945.

Final Report
HW-3-1965

Billets (both BT and TX) canned after aging for one
week following machining showed a higher percentage
of rejects than billets canned immediately after
machining.

DECLASSIFIED

HW-47000

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Page: 4006-1

PRODUCTION TEST 314-6-M

FABRICATING RESULTS FROM 7 SELECTED "K"
BILLETS. R. P. King. February 17, 1945.

Authorization
HW-3-1660

Objective: To determine effect on fabrication
(extrusion-canning) of reported chemical abnor-
malities in seven billets. (K billets refers to
virgin uranium metal supplied by Mallinckrodt
Chemical Works.)

FABRICATING RESULTS FROM 7 SELECTED
"K" BILLETS. R. P. King. May 8, 1945.

Final Report
HW-3-2368

BILLETS which had high iron and magnesium
contents when extruded produced satisfactory
sound rods with no evidence of pyrophoricity.
The number of billets observed (seven) was
too small to furnish any conclusive data.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 4007-1

PRODUCTION TEST 314-7-M

METAL FABRICATION STUDY - USABILITY OF
"RED-BAND" MATERIAL. K. G. Jones.
February 22, 1945.

Authorization
HW-3-1685

Objective: To determine whether rods outside
present chemical impurity limits, as established
for Revere extrusion work, are usable or
objectionable in machining or canning. ("Red-
Band" material refers to billets containing more
than 299 ppm iron.)

USABILITY OF "RED-BAND" MATERIALS.
R. P. King. April 3, 1945.

Final Report
HW-3-2025

Extrusion, machining, and canning yields of
"Red-Band" materials were comparable to
or slightly less than the normal Group O UM
material. (UM refers to uranium supplied
by the Engineer Corps.)

DECLASSIFIED

HW-47000

DEL

Page: 4008-1

PRODUCTION TEST 314-8-M

METAL FABRICATION STUDY UTILIZATION OF
LONG BILLETS WITH AVAILABLE EQUIPMENT.

Authorization
HW-3-1704

Objective: To develop a suitable method of preparing approximately 500 26 - 27 inches long RU type billets now on hand for use with the present extrusion equipment. The maximum length billet that can be handled with the Hanford press is 22 inches. This will entail the design and adaption of suitable fixtures for equipment used to machine and subsequently break the billets mentioned. (RU designates uranium metal supplied by Electromat.)

UTILIZATION OF LONG BILLETS WITH AVAILABLE EQUIPMENT. R. P. King and T. C. Evans. March 21, 1945.

Final Report
HW-3-1941

Based on the results of this test and previous experience at Revere, a process was issued to Operations, and accepted by them, for the scoring and breaking of double length billets. The process employed a wedge-shaped groove near the center of the billet 1/2 inch deep with an included angle of 60 degrees and pressure between 20 and 35 tons.

DECLASSIFIED

HW-47000

DEL

Page: 4009-1

PRODUCTION TEST 314-9-M

BILLET BRUSHING. R. J. Schier. February 27, 1945.

Authorization
HW-3-1710

Objective: To determine the necessity of brushing billets after preheating and prior to extrusion in order to determine the effects of the removal of scale on rod quality and satisfactory press operation.

PRODUCTION TEST SUMMARY - BUILDING 314
(P. T. 314-4-M, 314-9-M, 314-16-M, 314-25-M,
and 314-35-M.) R. J. Schier. August 11, 1946.

Final Report
HW-3-3613

This test was started, but it was observed that billet brushing by hand was inadequate and reproducible results could not be obtained on successive runs. Since mechanized equipment for brushing was not available, all work on the test was dropped.

3-1-57

DECLASSIFIED

HW-47000

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Page: 4010-1

PRODUCTION TEST 314-10-M

METAL FABRICATION STUDY - TYPE K BILLET
QUALITY. R. J. Schier. February 28, 1945.

Authorization
HW-3-1752

Objective: To determine the consistency of K
billet quality as to physical appearance and
chemical uniformity.

TYPE K BILLET QUALITY. R. P. King.
April 12, 1945.

Final Report
HW-3-2169

The three groups of K billets (virgin uranium
metal from Mallinckrodt Chemical Works) inspected
had similar chemical analyses. Except for top
porosity, the billets were physically sound. All
billets produced visually sound rods on extrusion.
None of the rods were pyrophoric.

DECLASSIFIED

HW-47000 DEL

Page: 4011-1

PRODUCTION TEST 314-11-M

METAL FABRICATION STUDY - STUDY OF
ABNORMAL PYROPHORIC RU RODS.
R. J. Schier. March 5, 1945.

Authorization
HW-3-1786

Objective: To determine the usability of slugs
machined from pyrophoric RU rods. (RU
designates virgin uranium metal supplied by
Electromet.)

STUDY OF ABNORMAL PYOPHORIC RU RODS.
R. J. Schier and R. P. King. April 4, 1945.

Final Report
HW-3-2026

Pyrophoric RU rods were found to give lower
extrusion yields (4 per cent less) than the
average of all material extruded during the
month of the test. Machining yields were
appreciably lower (21 per cent primarily because
many of the rods oxidized on the run out table
to such an extent that the rod would not clean up in
machining. Nothing unusual was noted in canning.

DECLASSIFIED

HW-47000

DEL

Page: 4012-1

PRODUCTION TEST 314-12-M

METAL FABRICATION STUDY - BILLET PRE-
HEATING. R. J. Schier. March 23, 1945.

Authorization
HW-3-1945

Objective: To determine the optimum conditions
of length of billet preheat and furnace atmosphere
consistent with a billet preheat temperature of
1650 F on all furnace zones.

BILLET PREHEATING. R. P. King and
R. J. Schier. April 20, 1945.

Final Report
HW-3-2198

The process conditions observed at 1650 F were
approximately the same for sound operation as at
1700 F. It was concluded that billet preheating
time should be held to a minimum to avoid end
swelling of the billets and reduce oxidation and
yet be long enough to insure proper heating. The
lower preheat also reduced the pyrophoric nature
of the billets.

3-1-57

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PRODUCTION TEST 314-13-M

This production test was not issued.

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Page: 4014-1

PRODUCTION TEST 314-14-M

METAL FABRICATION - LUBRICANT FOR
CONTAINERS, DIE, AND DUMMY BLOCKS.
R. M. Treco. March 22, 1945.

Authorization
HW-3-1928

Objective: To determine composition limits
for a satisfactory lubricant for use on press
components in the extrusion of rods from billets.

METAL FABRICATION STUDY - LUBRICANT FOR
CONTAINER, DIE, AND DUMMY BLOCKS.
R. M. Treco. May 4, 1945.

Supplement A
HW-3-2322

Objective: To determine composition limits for
a satisfactory lubricant (specifically duPont
oil A-20 and Dixon powdered graphite No. 2)
for use on press components in the extrusion of
rods from billets.

LUBRICANT FOR CONTAINER, DIE AND
DUMMY BLOCKS. R. M. Treco. April 10,
1945.

Preliminary Report
HW-3-2094

An oil-graphite mixture was found to be the
best available lubricant and efforts were
concentrated on the optimum mixtures for
each press component.

LUBRICANT FOR CONTAINER, DIE, AND
DUMMY BLOCKS. R. P. King. July 30,
1945.

Final Report
HW-3-2937

The final lubricant decided on was an oil-
graphite mixture composed of duPont oil
Spec. No. A-4 and Dixon No. 2 graphite.
Different concentrations of the mixture
were required for the three processes
involved.

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Page: 4015-1

PRODUCTION TEST 314-15-M

ROD INTERNAL QUALITY. T. C. Evans. April 5, 1945. Authorization
HW-3-2089

Objective: To determine the causes of porosity or foreign inclusions in uranium billets and to determine their effects during extrusion runs in order to recommend corrective procedures.

ROD INTERNAL QUALITY. R. P. King.
July 21, 1945.

Final Report
HW-3-2862

Four hundred and ninety-five billets of K material (virgin uranium metal from Mallinckrodt) were extruded under various conditions. The rods were examined for internal defects and the resulting data was analyzed by statistical methods. No one test condition produced results which varied significantly from the average of all conditions.

3-1-57

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HW-47000

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PRODUCTION TEST 314-16-M

DUMMY BLOCKS - DESIGN AND OPERATING
CONDITIONS. R. P. King. June 5, 1945.

Authorization
HW-3-2527

Objective: To determine design specifications
and operating temperatures for dummy blocks
to be used to improve butts and butt ends in the
extrusion of uranium billets.

DUMMY BLOCKS - DESIGN AND OPERATING
CONDITIONS. R. J. Schier. July 20, 1945.

Interim Report
HW-3-2847

Specifications are given for six concave dummy
blocks and the procedure to be used in evaluating
the blocks in extrusion runs.

DUMMY BLOCK DESIGN AND USE. R. P. King.
August 18, 1945.

Preliminary Report
HW-3-3055

Results showed that scale was not entrapped in
a rod if the relationship of butt thickness to
amount of scale was such that the butt just
absorbed all of the scale at the end of the
extrusion stroke.

PRODUCTION TEST SUMMARY - BUILDING 314.
(P. T. 314-4-M, 314-9-M, 314-16-M, 314-25-M,
314-35-M). R. J. Schier. August 11, 1945.

Final Report
HW-3-3613

No work was done on the dummy blocks because
it was found that concave blocks did not materially
reduce the oxide present for extrusion into the
rod as extrusion pipe.

DECLASSIFIED

HW-47000

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Page: 4017-1

PRODUCTION TEST 314-17-M

METAL FABRICATION STUDY - "RED BAND"
MATERIAL. R. J. Schier. April 5, 1945.

Authorization
HW-3-2053

Objective: To determine the extrusions conditions required to process about 184 "Red Band" billets and to observe the quality of the material produced. ("Red Band" billets refers to uranium with more than 299 ppm iron inclusion.)

"RED BAND" MATERIALS. R. J. Schier and
R. P. King. June 5, 1945.

Final Report
HW-3-2545

Normal operating conditions were used to extrude the "Red Band" material and nothing unusual was encountered in running the material through extrusion, machining and canning. The canning yield of all "Red Band" material was comparable to that of the control material canned during the test.

3-1-57

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HW-47000

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Page: 4018-1

PRODUCTION TEST 314-18-M

BX MATERIAL. R. P. King. April 7, 1945.

Authorization
HW-3-2077

Objective: To determine the fabrication and canning behavior, and to investigate any abnormalities in the processing of 13 BX billets. (BX material is virgin uranium metal obtained from Revere.)

BX MATERIAL. R. P. King. May 22, 1945.

Final Report
HW-3-2459

Thirty BX billets are processed in two separate runs and the material was found to be unusable. In general, the rods produced were harder and more brittle than material from other sources. Machining yields were higher, but extrusion and canning yields were lower. Further use was not recommended.

DECLASSIFIED

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HW-47000

Page: 4019-1

PRODUCTION TEST 314-19-M

METAL FABRICATION STUDY - XC AND XCR
MATERIAL. R. P. King. April 11, 1945.

Authorization
HW-3-2113

Objective: To determine the behavior of XC and
XCR material during extrusion, quenching, out-
gassing, straightening, machining and canning.
(Uranium rods from Iowa State College are
designated as XC and XCR.)

XC AND XCR MATERIAL. R. P. King and
R. J. Schier. June 1, 1945.

Final Report
HW-3-2546

The XCR material (made by melting and
solidifying metal in the same vessel) exhibited
normal behavior. The XC material (cast rods)
differed materially from XCR and other normal
material. Rods from XC billets under normal
extrusion conditions contained seams or small
tears and pits, unlike any material previously
run. The machining and canning yields were
extremely low.

3-1-57

DECLASSIFIED

HW-47000

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Page: 4020-1

PRODUCTION TEST 314-20-M

SMALL DIAMETER ROD PRODUCTION.
R. P. King. April 28, 1945.

Authorization
HW-3-2252

Objective: To produce rods, of random lengths, including extrusion and straightening for shipment, but not machining, of various small (1/2, 7/8, 1 inch) diameters for shipment offsite.

SMALL DIAMETER ROD PRODUCTION.
R. P. King. June 2, 1945.

Final Report
HW-3-2544

Rods of 7/8 inch and 1 inch diameter were extruded without difficulty. The quality was satisfactory but yields were lower than normal because of the shorter billets used. The quality of 1/2 inch rods was not as good as that of 7/8 inch and 1 inch primarily because rapid cooling caused transverse cracks in some of the rods.

DECLASSIFIED

HW-47000

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Page: 4021-1

PRODUCTION TEST 314-21-M

This production test was not issued.

3-1-57

DECLASSIFIED

HW-47000

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Page: 4022-1

PRODUCTION TEST 314-22-M

REDUCED DIAMETER RODS. R. P. King.
May 12, 1945.

Authorization
HW-3-2390

Objective: To demonstrate the usability of extruded rods smaller in diameter than present practice, to improve yield of usable slugs from rods and billets, and to reduce machining scrap.

REDUCED DIAMETER RODS. W. B. Stevenson.
June 21, 1945.

Supplement 1
HW-3-2665

Objective: To determine standards for producing reduced diameter rods by extrusion of uranium billets into rods using dies of 1.460 inches in diameter.

REDUCED DIAMETER RODS. R. P. King.
June 23, 1945.

Interim Report
HW-3-2735

Rods with an average diameter of approximately 1.420 inches were produced without difficulty. Extrusion yields were not improved but machining and canning yields showed considerable improvement. The final yield of canned slugs was approximately 6.5 per cent higher than the average for the month of May.

REDUCED DIAMETER RODS. R. P. King.
August 27, 1945.

Final Report
HW-3-3071

The results of this test showed that it was entirely feasible to process reduced diameter rods. Savings in material were predicted, and objectionable results were not expected to be encountered in subsequent operations and in the final product.

DECLASSIFIED

HW-47000

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Page: 4023-1

PRODUCTION TEST 314-23-M

COMPARATIVE PERFORMANCE OF FIVE
TYPES OF MATERIAL. R. J. Schier.
May 17, 1945.

Authorization
HW-3-2850

Objective: To compare four types of material
(E, UM, F, and TX) received in shipments B-31-
B-35 inclusive and Type E material from shipment
B-26, 27, and 28 as to extrusion, machining, and
canning performance when extruded under the
same conditions.

(Letters designate: E, virgin uranium from
Electromet; UM, uranium rod ends from the
Engineer Corps; F, uranium from Mallinckrodt;
and TX, uranium turnings from machining.)

COMPARATIVE PERFORMANCE OF FIVE
TYPES OF MATERIAL. R. P. King.
July 26, 1945.

Final Report
HW-3-2915

Yield data from extrusion, machining and canning
indicated that there was no significant difference
between types E, UM, F and TX materials from
the May shipments nor between type E material
from two successive shipments.

3-1-57

DECLASSIFIED

HW-47000

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Page 4024-1

PRODUCTION TEST 314-24-M

UM MATERIAL - GROUP 2 AND HIGH TIN.
R. P. King. July 20, 1945.

Authorization
HW-3-2848

Objective: To determine the effect, if any, of tin and iron impurities in certain UM (uranium from the Engineer Corps) billets on behavior in extrusion and machining.

UM MATERIAL - STUDY OF IMPURITIES.
R. P. King. September 4, 1945.

Supplement 1
HW-3-3127

Objective: To determine the effect of impurities in certain UM billets on behavior in extrusion and canning. Billets to be tested have copper, lead, iron and/or tin content beyond usual limits, and in different amounts and combinations.

UM MATERIAL - GROUP 2 AND HIGH TIN - PART I. Preliminary Report
R. P. King. October 5, 1945. HW-3-3162

Twenty-two UM billets received in the July shipment had abnormal chemical compositions, thirteen with high tin and nine with high iron. The latter pieces were "Red Band" material classed as Group 2. These billets behaved normally in extrusion and machining. A normal number of rejects occurred after canning. The results were inconclusive and further studies and tests were to be made on the September shipment.

UM MATERIAL -- ABNORMAL CHEMICAL
COMPOSITION - PART II. R. P. King.
November 7, 1945.

Supplement 2
HW-3-3269

This report gives the procedure for testing UM billets, received in September 1945, which had abnormal impurities of silicon, copper and lead.

DECLASSIFIED

HW-47000

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Page: 4024-2

PRODUCTION TEST 314-24-M (contd)

UM MATERIAL. R. P. King. January 31, 1946.

Final Report
HW-3-3402

All billets which were selected for observation behaved normally through extrusion, machining and canning. None of the canning rejects could be attributed to failure because of chemical impurities.

DECLASSIFIED

HW-47000

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Page: 4025-1

PRODUCTION TEST 314-25-M

ROD QUENCHING TEMPERATURES. R. P. King.
June 16, 1945.

Authorization
HW-3-2629

Objective: To determine the best temperatures at which to quench rods in the extrusion of various types of uranium billets.

PRODUCTION TEST SUMMARY - BUILDING 314
(P.T. 314-4-M, 314-9-M, 314-16-M, 314-25-M, 314-35-M). R. J. Schier. August 11, 1946.

Final Report
HW-3-3613

This test was not run due to the installation of rod-handling equipment which removed the necessity for conducting the test.

DECLASSIFIED

HW-47000

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Page: 4026-1

PRODUCTION TEST 314-26-M

PRODUCTION YIELD AND SCRAP DATA.
R. J. Schier. July 28, 1945.

Authorization
HW-3-2912

Objective: To make a complete yield and scrap analysis of the fabrication of uranium metal from billet to canned slug.

PRODUCTION YIELD AND SCRAP DATA.
R. J. Schier. August 21, 1946.

Final Report
HW-3-3614

Based on the extrusion lots studied, it was concluded that maximum yields were being obtained from the extrusion and machining operations with existing conditions. Recommendations were made for improving part of the processes to realize greater yields.

3-1-57

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HW-47000

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Page: 4027-1

PRODUCTION TEST 314-27-M

CRACKED TX BILLETS. R. J. Schier.
June 18, 1945.

Authorization
HW-3-2630

Objective: To investigate the nature of cracks in heated and quenched TX type billets (made from uranium machining turnings) and to observe the behavior of the billets in extrusion and the resulting rods in machining.

CRACKED TX BILLETS. R. P. King.
July 5, 1945.

Final Report
HW-3-2743

The four cracked billets behaved normally in extrusion. No flaws were observed in the machined and etched slugs that could be attributed to the cracks in the billets.

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Page: 4028-1

PRODUCTION TEST 314-28-M

REMOVING RODS FROM EXTRUSION DIES.
R. P. King. June 16, 1945.

Authorization
HW-3-2631

Objective: To determine the feasibility of pushing one rod out of the extrusion die with the next following rod.

REMOVING RODS FROM EXTRUSION DIES.
R. P. King. July 21, 1945.

Final Report
HW-3-2845

Pushing one rod out of the die with the following rod appeared to be feasible. The higher temperatures required would have shortened die life and lack of lubrication would have affected rod quality. Long billets (18 - 22 inches) made the method impractical with the equipment then in use.

3-1-57

DECLASSIFIED

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Page: 4029-1

PRODUCTION TEST 314-29-M

METAL FABRICATION STUDY - STRAIGHTENING
RODS WHILE HOT. E. A. Smith. July 5, 1945.

Authorization
HW-3-2746

Objective: To determine the feasibility of putting
rods through the Medart straightener following
outgassing at a temperature in excess of 200 C.

STRAIGHTENING RODS WHILE HOT. E. A. Smith.
August 13, 1945.

Final Report
HW-3-3021

Two test runs conducted on slugs made from rods
straightened at temperatures above 200 C indicated
that hot straightening had little, if any, beneficial
effect on the dimensional stability of slugs.

DECLASSIFIED

HW-47000

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Page; 4030-1

PRODUCTION TEST 314-30-M

PRELIMINARY INVESTIGATION OF CAST X
METAL PIECES. R. J. Schier. July 31, 1945.

Authorization
HW-3-2913

Objective: To investigate and compare the quality
and fabrication of cast uranium slugs to slugs made
from extruded rod.

CAST MATERIAL R. P. King. September 10, 1945.

Interim Report
HW-3-3112

Casting slugs in "dogs" of one or more slug lengths
was considered as an attractive possibility to reduce
losses of metal in billet casting and extrusion. Cast
material was machined and canned without rejects or
abnormalities, and passed final inspection and frost
tests.

(For pile irradiation, see P. T. 105-45-P.)

DECLASSIFIED

HW-47000

DEL

Page: 4031-1

PRODUCTION TEST 314-31-M

METAL FABRICATION STUDY - ROLLED
MATERIAL. R. P. King. August 2, 1945.

Authorization
HW-3-2936

Objective: To obtain information on and samples
of a special lot of rolled uranium rods recently
received from M. S. A. and now being processed.

ROLLED MATERIAL. R. P. King.
September 15, 1945.

Final Report
HW-3-3113

No unusual results were observed in machining
or canning. Yields were rather low, due to many
short pieces of rod and limited machining allowance
on the previously machined pieces. In spite of the
excess diameter as rolled (1.800 inches), characteristic
surface flaws were noted on machined slugs like those
observed on previous rolled material.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 4032-1

PRODUCTION TEST 314-32-M

METAL FABRICATION STUDY - CAST DOGS-
AUGUST SHIPMENT. C. P. Kidder.
September 28, 1949.

Authorization
HW-3-3150

Objective: To investigate the quality and fabrication
of a production lot of cast dogs from Ames, Electromet,
and the National Bureau of Standards.

MEMORANDUM - CAST DOGS - AUGUST SHIPMENT. Interim Report
R. P. King. October 2, 1945. HW-3-3167

Information is given on identification and size of rods,
casting procedure, type of mold, uniformity, need of
annealing and outgassing.

METAL FABRICATION STUDY - CAST DOGS -
AUGUST.. R. J. Schier. December 31, 1945.

Supplement 1
HW-3-3316

Objective: To complete the investigation of cast
dogs from the August shipment.

METAL FABRICATION STUDY - CAST MATERIAL.
R. P. King. December 6, 1945.

Preliminary Report
HW-3-3270

Results indicated that outgassing and straightening of
the cast material was not required at Hanford Works
prior to machining and canning. A control method was
devised to test as-received cast material for warpage
and gas content.

CAST DOGS - AUGUST SHIPMENT. R. J. Schier.
March 7, 1946.

Final Report
HW-3-3468

Detailed studies of the 300 Area operations and tests
performed in the fabrication of Ames, Electro Met Co.
(EM), and National Bureau of Standards (NBS) triple
and double length slugs (dogs) indicated that the Ames
material was superior to the EM and NBS materials.
Additional tests were considered advisable.

(For pile irradiation see P. T. 105-61-P.)

DECLASSIFIED

HW-47000

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Page: 4033-1

PRODUCTION TEST 314-33-M

METAL FABRICATION STUDY - REDUCED
DIAMETER RODS. R. P. King. October 17, 1945.

Authorization
HW-3-3181

Objective: To establish conclusive results, from a sustained production run, of improved yields and satisfactory operation performance using rods about .050 inch less in diameter than present standard dimension, i. e., rod diameter 1.410-1.420 inches rather than 1.460-1.470 inches.

REDUCED DIAMETER RODS. R. P. King.
February 8, 1946.

Final Report
HW-3-3407

A reduction of 3.3 per cent in the turning scrap produced with reduced diameter rods was realized as compared to all material with a nominal diameter of 1.460 inches extruded between 5-22-45 and 9-17-45. An increased yield resulted from this scrap reduction and the proposed change in rod diameter appeared desirable.

3-1-57

DECLASSIFIED

HW-47000 DEL

Page: 4034-1

PRODUCTION TEST 314-34-M

STUDY AND IMPROVEMENT OF MACHINING SCRAP. Authorization
R. P. King. November 7, 1945. HW-3-3213

Objective: To develop machining tool accessories, such as chip breakers, in order to produce metal scrap from the machining operations which is clean, reasonably consistent as to size and in the form of relatively flat chips so that it can be washed and briquetted easily.

MACHINE SCRAP STUDY. C. P. Kidder and
R. J. Schier. January 14, 1946.

Supplement 1
HW-3-3391

Objective: To place a coolant system on the machining cut-off lathes to secure a quantity of unburned chips for the briquetting operation.

CUT-OFF OPERATION - MACHINING SCRAP
STUDY. R. J. Schier. February 13, 1946.

Final Report
Supplement 1
HW-3-3424

A coolant system was devised for the machining cut-off lathes which eliminated almost entirely the ignition of chips on the cut-off operation.

DECLASSIFIED

HW-47000 DEL

Page: 4035-1

PRODUCTION TEST 314-35-M

METAL FABRICATION STUDY - STUDY OF BT
MATERIAL. R. P. King. December 14, 1945.

Authorization
HW-3-3288

Objective: To determine whether billets with high T.D.S.
(total danger sum) values are suitable for use at
Hanford.

STUDY OF BT MATERIAL. R. P. King.
February 1, 1945.

Preliminary Report
HW-3-3397

The BT material (virgin uranium metal from Metal
Hydrides) tested behaved normally in extrusion,
machining, and canning with no flaws or difficulties
that could be attributed to high T.D.S. values.

PRODUCTION TEST SUMMARY - BUILDING 314 Final Report
(P.T. 314-4-M, 314-9-M, 314-16-M, and 314-35-M). HW-3-3613
R. J. Schier. August 11, 1946.

When it was determined in the 305 Building test that
BT material high in T.D.S. values was acceptable
for use if blended with normal material, further
work on the test was dropped.

DECLASSIFIED

HW-47000

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Page: 4036-1

PRODUCTION TEST 314-36-M

METAL FABRICATION STUDY — ADDITION OF
MAGNESIUM TO CHIP BRIQUETTES.

R. J. Schier. March 11, 1946.

Authorization
HW-3-3461

Objective: To furnish a quantity of chip briquettes
with and without the addition of magnesium in order
to determine the effect of the magnesium addition on
the casting yield of billets made from briquettes.

ADDITION OF MAGNESIUM TO CHIP BRIQUETTES.
R. J. Schier. March 29, 1946.

Final Report
HW-3-3479

The effect of the magnesium addition to briquettes
on casting yield was to be determined by the vendor
processing the chip briquettes.

DECLASSIFIED

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Page: 4037-1

PRODUCTION TEST 314-37-M

METAL FABRICATION STUDY - CAST RODS -
FEBRUARY SHIPMENT. C. P. Kidder.
March 11, 1946.

Authorization
HW-7-3625

Objective: To evaluate the February shipment of
cast rods in the 300 Area operations.

CAST RODS - FEBRUARY SHIPMENT. R. J. Schier. Final Report
May 27, 1946. HW-3-3513

Cast rods from the National Bureau of Standards
from the February shipment were essentially
equivalent in "as received" physical condition
to that of the August shipment. Both shipments of
NBS material were inferior to the Ames cast
material as regards gas content and diameter
variance. (See P.T. 314-32-M) Canning yields
of NBS slugs were also inferior to the Ames material.

DECLASSIFIED

HW-47000 DEL

Page: 4038-1

PRODUCTION TEST 314-38-M

METAL FABRICATION STUDY - UM MATERIAL -
MERCURY IMPURITY. R. J. Schier..
April 26, 1946.

Authorization
HW-3-3498

Objective: To determine the effect of mercury contamination in UM type: billets on 300 Area operations. (UM designates uranium supplied by the Engineer Corps.)

UM MATERIAL-MERCURY IMPURITY.
R. J. Schier. August 13, 1946.

Final Report
HW-3-3615

Five type UM billets received in April contained 99-100 ppm of mercury and 1600-4000 ppm of molybdenum. The impurities were not homogeneously distributed and affected adversely only the pickling operation where 17.4 per cent of the slugs were rejected as compared to the normal 2 per cent. Low test pile results were attributed to some other impurity of high absorption cross section since failures were found in pieces containing neither mercury nor molybdenum.

DECLASSIFIED

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Page: 4039-1

PRODUCTION TEST 314-39-M

METAL FABRICATION STUDY - UM MATERIAL -
ABNORMAL SILICON AND HYDROGEN IMPURITIES. Authorization
R. J. Schier. May 23, 1946. HW-3-3508

Objective: To fabricate three abnormal UM billets (uranium rod ends from the Engineers Corps) in extrusion and hold the rods for any technical work, including processing the rods in machining and canning, thought necessary to completely evaluate this material.

UM MATERIAL - ABNORMAL SILICON AND
HYDROGEN IMPURITIES. R. D. McGreal.
December 31, 1946.

Final Report
HW-3-5198

Three billets of UM material, which were reported to have excessive amounts of silicon and hydrogen, were processed. Standard operating procedures were followed through extrusion, machining and canning. The standard inspection procedure, followed by chemical and spectrochemical analyses, showed no abnormal results in any operation. The slugs were accepted for normal pile loading.

DECLASSIFIED

HW-47000

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Page: 4040-1

PRODUCTION TEST 314-40-M

METAL FABRICATION STUDY - INVESTIGATION
OF LOW 305 TEST RESULTS. R. J. Schier.
June 20, 1946.

Authorization
HW-3-3544

Objective: To determine the cause for low 305
Building test pile results from type F material
(virgin uranium from Mallinckrodt).

INVESTIGATION OF LOW BUILDING 305 TEST
RESULTS. W. T. Kattner. February 14, 1947.

Final Report
HW-3-5303

After work was initiated on this test, it was
determined that 305 test pile results were subject
to considerable error. Study of these errors was
pursued in Production Tests 314-42-M, 314-43-M,
and 314-44-M. Work was therefore discontinued
on this test.

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HW-47000

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Page: 4041-1

PRODUCTION TEST 314-41-M

This production test, EXTRUSION WITHOUT LUBRICATION,
was not issued.

3-1-57

DECLASSIFIED

HW-47000

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Page: 4042-1

PRODUCTION TEST 314-42-M

EVALUATION OF METAL IMPURITIES - TX
MATERIAL. T. S. Jones. October 22, 1946.

Authorization
HW-7-5273

Objective: To determine the fabrication behavior and quality of slugs which have been classified into 7 lots based on their density, and silicon, iron, and boron content.

EVALUATION OF METAL IMPURITIES - TX
MATERIAL. E. A. Smith. November 6, 1946.

Interim Report
HW-3-5074

The procedure to be followed to evaluate slugs fabricated from Metal Hydride billets is given and tests for determining the effect of density and impurities on reactivity are outlined in this report.

EVALUATION OF METAL IMPURITIES - TX
MATERIAL. B. F. Butler. November 9, 1946.

Interim Report
HW-3-5102

Statistical analyses were made on slugs fabricated for this test from Metal Hydride (TX) billets.

EVALUATION OF METAL IMPURITIES - TX
MATERIAL. A. T. Strand. December 10, 1946.

Supplement A
HW-3-5155

Objective: To confirm indication of possibility of improving yields and quality of rods through reverse extrusion of billets.

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HW-47000

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Page: 4042-2

PRODUCTION TEST 314-42-M (contd)

EVALUATION OF METAL IMPURITIES - TX
MATERIAL. E. A. Smith. June 22, 1948.

Final Report
HW-10173

The slugs prepared in this test were loaded into the 100 Area Test piles and results indicated that (1) the metal impurities encountered did not affect the 300 Area processes, (2) the quality of metal, from the standpoint of its effect on pile operation could most effectively be measured by reactivity measurements in the Test Pile, (3) individual slug weight is the most simply measured characteristic having reasonably good correlation with other quality measurements and (4) reduction in the amount of recast metal to be processed is a more economical approach to quality improvement than is scrapping a low quality material after its receipt at Hanford.

(For pile irradiation see P. T. 105-90-P.)

DECLASSIFIED

HW-47000

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Page: 4043-1

PRODUCTION TEST 314-43-M

STUDY OF ROLLED MATERIAL. T. S. Jones.
December 23, 1946.

Authorization
HW-3-5199

Objective: To provide information concerning the effect of rolling upon impurity distribution and correlation of slug density with position in the rolled rod.

STUDY OF ROLLED MATERIAL. T. S. Jones.
July 22, 1947.

Final Report
HW-39254 RD

Slugs were identified as to position and samples were taken at specified points during the machining of rolled rods. Chemical analyses of the samples showed no significant difference in impurity levels between the ends of rolled rods. Density and reactivity measurements on slugs cut from various positions showed extraordinary uniformity. These results were in contrast to those obtained on a study of extruded metal (P. T. 314-42-M).

(For pile irradiation see P. T. 105-91-P.)

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PRODUCTION TEST 314-44-M

STUDY OF HIGH T.D.S. URANIUM - UM
MATERIAL. E. A. Smith. January 2, 1947.

Authorization
HW-3-5207

Objective: To determine whether lots numbered 36 and 38 of UM material (billets from Engineer Corps), reported to have an abnormally high T.D. S. (total danger sum) value, will be partially or wholly acceptable for charging into the 105 piles.

(For pile irradiation see P. T. 105-115-P.)

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PRODUCTION TEST 314-45-M

DIMENSIONAL STABILITY OF SLUGS AT PILE TEMPERATURE. W. T. Kattner. January 15, 1947. Authorization HW-3-5251

Objective: To determine whether dimensional changes of slugs (such as warpage, blistering, and swelling) may be a function of long-continued holding at temperatures approximating those existing in metal in the piles.

DIAMETER MEASUREMENTS OF SLUGS BEFORE AND AFTER PROLONGED HEAT TREATMENT. J. J. Lane. October 10, 1947. Final Report HW-7769

Data obtained were analyzed to test differences in diameter measurements of slugs before and after prolonged heat treatment. By an analysis of variance a questionable difference was found between the diameter measurements.

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PRODUCTION TEST 314-46-M

EXTRUSION CONTAINER LUBRICATION.
W. T. Kattner. January 21, 1947.

Authorization
HW-3-5263

Objective: To develop satisfactory equipment
and technique for cleaning and lubricating the
extrusion press billet container.

EXTRUSION CONTAINER LUBRICATION.
W. T. Kattner. June 27, 1947.

Final Report
M-3901

A motor driven, manually operated brush to
clean and lubricate the extrusion container from
the ram end was developed.

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PRODUCTION TEST 314-47-M

STUDY OF ABNORMAL URANIUM. T. S. Jones.
March 27, 1947.

Authorization
HW-3-5434

Objective: To study the behavior of uranium,
containing impurities not commonly encountered
(chromium), during fabrication in the 300 Area.

STUDY OF ABNORMAL URANIUM. T. S. Jones.
January 26, 1948.

Final Report
HW-8661

Spectrographic analyses of the pyrophoric rods being
tested indicated that the rods contained 1000 ppm of
nitrogen, 2000 ppm of magnesium and 2030 ppm of
carbon as impurities versus normal expected amounts
of 100 ppm for carbon. The rods contained 50 ppm
of chromium instead of the reported 200 ppm. Since
this chromium content was within the expected range,
the rods were released for normal processing.

DECLASSIFIED

HW-47000

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PRODUCTION TEST 314-48-M

ROUGH DRAFT COPY COVERING PROPOSED
PRODUCTION TESTS ON "RED BAND" MATERIAL. E. A. Smith. June 8, 1951.

Authorization
HW-21305

Objective : To fabricate 58 "Red Band" billets
(billets containing more than 299 ppm iron) now
on hand and to obtain the maximum amount of
information concerning behavior and ultimate
quality of such material.

RED BAND MATERIAL. R. J. Schier.
February 9, 1948.

Final Report
HW-8804

This test was cancelled and the "Red Band"
billets were processed under P.T. 313-100-M.

3-1-57

[REDACTED] **DECLASSIFIED**

HW-47000

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PRODUCTION TEST 314-49-M

OBTAINING OPTIMUM STRUCTURE IN URANIUM
METAL. R. J. Schier. February 9, 1948.

Final Report
HW-8805

This test was never issued.

3-1-57

[REDACTED]

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HW-47000

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Page: 4050-1

PRODUCTION TEST 314-50-M

EXTRUSION WITHOUT CONTAINER LUBRICATION.
E. A. Smith. July 1, 1947.

Authorization
HW-7004

Objective: To test the feasibility of operating the extrusion press without lubricating the container, and to try variations in methods of dummy block lubrication.

EXTRUSION WITHOUT CONTAINER LUBRICATION.
R. J. Schier. February 9, 1948.

Final Report
HW-8806

This test was cancelled since P. T. 314-51-M and P. T. 314-52-M are concerned with the same problem. Results from this test are incorporated in these reports.

DECLASSIFIED

HW-47000

DEL

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PRODUCTION TEST 314-51-M

ALPHA PHASE EXTRUSION . E. A. Smith.
August 22, 1947.

Authorization
HW-7368

Objective: To determine the feasibility and structural effect of extruding uranium rods in the alpha temperature range.

ALPHA PHASE EXTRUSION. E. A. Smith.
November 20, 1947.

Supplement A
HW-8069

Objective: To extrude five uranium billets in the alpha phase under conditions indicated desirable by recent experiments conducted by M.I.T. in Detroit, Michigan on the alpha extrusion of uranium.

ALPHA PHASE EXTRUSION. R. J. Schier.
December 15, 1947.

Supplement B
HW-8306

Objective: To determine the effect of lead on the alpha extrusion of bare and copper jacketed billets.

ALPHA PHASE EXTRUSION. R. J. Schier.
December 31, 1947.

Procedure Report
Supplement B
HW-8402

The test procedure to be followed is given in this report.

ALPHA PHASE EXTRUSION. R. J. Schier.
February 21, 1949.

Final Report
HW-12501

Successful extrusions were made on alpha phase uranium using a preheat temperature of 609 C, the full capacity of the 1000 ton press, and a 1.525 inch diameter die. Both bare and copper jacketed slugs were successfully extruded.

3-1-57

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HW-47000

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PRODUCTION TEST 314-52-M

COMPLETE EXTRUSION USING GRAPHITE
INSERTS: R. J. Schier. December 29, 1947.

Authorization
HW-8382

Objective: To determine the feasibility of gamma-phase extruding uranium billets completely using graphite inserts to eliminate extrusion butt scrap.

COMPLETE EXTRUSION USING GRAPHITE
INSERTS. R. J. Schier. January 20, 1948.

Procedure Report
HW-8623

The test procedure to be followed in this test is given in this report.

COMPLETE EXTRUSION USING GRAPHITE
INSERTS. R. J. Schier. February 21, 1949.

Final Report
HW-12502

In six gamma phase extrusion trials, the use of graphite inserts between the billet and the dummy block failed to eliminate the extrusion butt even though the insert was completely extruded. Inclusion of graphite into the butt ends of the rods lowered the billet to rod yield about 10 per cent due to increased rod scrap.

DECLASSIFIED

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PRODUCTION TEST 314-53-M

PREPARATION OF ALPHA EXTRUDED URANIUM Authorization
FOR PILE TESTING. R. J. Schier. January 29, 1948. HW-8689

Objective: To prepare approximately 200 eight-inch MZ size (1.353 inches nominal diameter), alpha phase extruded, and lead dip canned slugs for pile testing.

PREPARATION OF ALPHA EXTRUDED URANIUM Procedure Sheet
FOR PILE TESTING. R. J. Schier. February 2, 1948. HW-8720

Procedure is given for alpha and gamma extrusion, machining and canning.

PREPARATION OF ALPHA EXTRUDED URANIUM Supplement A
FOR PILE TESTING. E. A. Smith. March 26, 1948. HW-9293

Objective: To prepare a group of eight-inch MZ diameter alpha extruded slugs and a similar number of alpha rolled slugs for control purposes, all to be canned by the lead-dip process.

PREPARATION OF ALPHA EXTRUDED URANIUM Final Report
FOR PILE TESTING. R. J. Schier. March 21, 1949. HW-12787

Three hundred and ninety-two MZ slugs were prepared without incident for pile irradiation by lead-dip canning. Details on the preparation are included in the report.

(For pile irradiation see P.T. 105-191-P.)

3-1-57

DECLASSIFIED

HW-47000

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Page: 4054-1

PRODUCTION TEST 314-54-M

This production test, to evaluate helium as a substitute for argon as an inert protective atmosphere for preheating billets in the rotary furnace, was not run because of the difficulty of procuring helium at that time.

3-1-57

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HW-47000

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PRODUCTION TEST 314-55-M

URANIUM ROD FABRICATION BY DUPLEXING.
R. J. Schier. May 28, 1948.

Authorization
HW-9746

Objective: To evaluate the feasibility of fabricating uranium rods by duplexing. Duplexing consists of rolling oversize gamma extruded rod in the alpha phase to finished size.

ANALYSIS OF PICKLING AND INSPECTION
REJECTS OF SLUGS CANNED IN P. T. 314-55-M.
C. A. Bennett. September 23, 1948.

Statistical Report
HW-11086

URANIUM ROD FABRICATION BY DUPLEXING.
R. J. Schier. February 23, 1949.

Final Report
HW-12527

Slugs were prepared for pile irradiation by the duplexing method after this method was proved feasible. The slugs had a fine grained structure but preferred orientation was not known. The orientation was to be determined in the pile irradiation.

(For pile irradiation results see P. T. 105-216-P.)

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PRODUCTION TEST 314-56-M

EFFECT OF EXTRUSION TEMPERATURE AND
RATE OF COOLING ON THE STRUCTURE OF
GAMMA EXTRUDED URANIUM: R. J. Schier.
July 19, 1948.

Authorization
HW-10466

Objective: To determine the effect of the extrusion
temperature and the rate of cooling on the structure
of gamma extruded uranium rods.

This production test was cancelled.

3-1-57

DECLASSIFIED

HW-47000

DEL

Page: 4057-1

PRODUCTION TEST 314-57-M

EFFECT OF NICKEL IMPURITY IN URANIUM
BILLETS. R. J. Schier. August 16, 1948.

Authorization
HW-10751

Objective: To evaluate the effect of 25-200 ppm
nickel as an impurity in uranium billets on the
fabrication and pile behavior of canned slugs.

EFFECTS OF NICKEL IMPURITY IN URANIUM
BILLETS. R. Teats. December 27, 1948.

Final Report
HW-11958

Nothing unusual occurred during the fabrication of
this material to distinguish it from nickel-free
uranium. Test pile results indicated that the rolled
metal had greater reactivity than the gamma
extruded metal, but this difference could not be
correlated with the nickel content.

(For pile irradiation see P. T. 105-224-P.)

3-1-57

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PRODUCTION TEST 314-58-M

FABRICATION OF SLUGS FROM FORGED
URANIUM. R. J. Schier. December 9, 1948.

Authorization
HW-11932

Objective: To fabricate canned slugs from uranium rods produced by a combination forging and rolling process, as required for pile behavior evaluation.

FABRICATION OF SLUGS FROM FORGED
URANIUM. R. Teats. April 29, 1949.

Final Report
HW-13182

Slugs 1.350 inches in diameter and 4.000 inches long were fabricated by a forging and rolling process and canned for pile irradiation.

(For pile irradiation see P. T. 105-238-P.)

3-1-57

DECLASSIFIED

HW-47000

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PRODUCTION TEST 314-59-M

EFFECT OF FURNACE PRESSURE ON QUALITY
OF REMELTED URANIUM. R. J. Schier.
December 6, 1948.

Authorization
HW-11767

Objective: To determine the effect of furnace
pressure in the range of 0 to 500 microns on the
quality of billets cast from remelted uranium.

EFFECT OF FURNACE PRESSURE ON QUALITY
OF REMELTED URANIUM. W. T. Kattner.
December 14, 1949.

Interim Report
HW-18633

Operational problems made it impossible to
obtain sufficient data to describe accurately
changes in the furnace pressure during the melting
and casting cycle.

STATISTICAL ANALYSIS OF DATA ON EFFECT OF
FURNACE PRESSURE ON QUALITY OF REMELTED
URANIUM: L. G. Waters. January 2, 1951.

Statistical Report
HW-19812

EFFECT OF FURNACE PRESSURES ON QUALITY
OF REMELTED URANIUM. W. T. Kattner.
February 15, 1951.

Final Report
HW-20598

The effect of melt-plant casting pressure upon
metal quality was evaluated using castings poured
from charges containing either pickled or unpickled
briquettes. The billets from the charges containing
pickled briquettes were superior with respect to
melt-plant yield, reactivity, nitrogen content and
frequency of tears occurring in the rods during
rolling. The fact that no other evidence of significant
difference in metal quality accompanied variations in
casting pressure indicated that either the casting
pressure is of negligible importance or that the
amount of oxides and nitrides present in the charges
initially varied so greatly that the effect of pressures
was lost. The latter view seemed more reasonable
in view of the evidence obtained.

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PRODUCTION TEST 314-60-M

FABRICATION OF SLUGS FROM URANIUM
ROLLED AT DIFFERENT FINISHING TEMPERA-
TURES. R. J. Schier. December 23, 1948.

Authorization
HW-12005

Objective: To fabricate canned slugs from uranium rolled at different finishing temperatures, as required to determine the effect of rolling conditions on the dimensional stability of this metal during triple-dip canning and in the piles.

FABRICATION OF SLUGS FROM URANIUM
ROLLED AT DIFFERENT FINISHING TEMPERA-
TURES. R. Teats. March 30, 1949.

Final Report
HW-12888

The results indicated that variation in the finishing temperature between 950 F - 1250 F during rolling resulted in the dimensional change of slugs during triple-dip canning. The maximum dimensional change expected from the rolling conditions was provided for during triple-dip canning so that finishing at other than normal temperatures could only result in a lesser dimensional change which would probably not affect canned slug quality.

(For pile irradiation see P. T. 105-255-P.)

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PRODUCTION TEST 314-61-M

This production test, EFFECT OF EXTRUSION
CONDITIONS AND BETA QUENCHING ON STRUCTURE
OF GAMMA EXTRUDED URANIUM, was never issued.

3-1-57

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* See HW-37110 for irradiation test results.

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END