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1960

FUELS PREPARATION DEPARTMENT

MONTHLY REPORT

SEPTEMBER

1960

Received 887

AUG 03 1992

HANFORD ATOMIC PRODUCTS OPERATION

GENERAL ELECTRIC

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RICHLAND, WASHINGTON

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FUELS PREPARATION DEPARTMENT

HANFORD

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By Authority of CG-PR-2

MONTHLY REPORT -- SEPT. 1960

Robert M. Iten 6-29-92

By J. Tang 7-1-92

PM Eick 7-2-92 Compiled by Fuels Preparation Department

October 7, 1960 Richland, Washington

Work performed under Contract No. AT(45-1) - 1350 between the Atomic
Energy Commission and General Electric Company.

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FUELS PREPARATION DEPARTMENT
MONTHLY SUMMARY REPORT
SEPTEMBER - 1960

PRODUCTION

Finished production for September was 593.8 tons -- 104% of forecast.

At month end the bare uranium inventory increased slightly to 1,341 over the August inventory of 1,305 tons. Finished inventory was 928 tons at month end as compared to 1,046 tons for the previous month.

ENGINEERING

Only three ruptures occurred during September. This is a significant improvement in the fuel performance trend.

Four columns of enriched (1.47%) bumper supported I & E fuel elements under irradiation in a run-to-rupture test were discharged. A 38-fold improvement in rupture rate was demonstrated in relation to control material.

A priority program is under way to provide oversize I & E fuel elements for charging into 20 over-bored reactor tubes. Recent physics and economic studies indicate appreciable incentive for this program because of improved conversion ratios and reduced unit costs.

Process steps for the ultrasonic welded bumper and self-support project have been defined. The ultrasonic welder is now ready for the scheduled development and production use. Solid lithium-aluminum alloy pieces are being produced for the E-N program using this equipment.

Produce specifications for Sylcor hot press elements (2000) have been issued. Aluminum components and uranium cores for du Pont-SRL fluid pressure bonded fuel elements are expected in October. Both types of fuel elements will be used for cut-of-reactor and in-reactor irradiation as part of the alternate process evaluation program.

Two orders for zirc NPR fuel element components have been approved. A third will be approved when legal and financial clarification has been completed.

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The pilot plant equipment for brazing NPR fuel element end closures was put into operation during the month. About 60 NPR outer closures have been made. Excellent results have been demonstrated, with only one instance of incomplete bonding. A number of very stringent tests, such as repetitive beta heat cycling, have been given with no evidence of bond breakage.

Uranium orders for I & E coextrusion startup have been placed and all equipment for the manual welder is on order. Zirc components will be ordered early in October. This program will provide standard size coextruded I & E fuel elements for evaluation in present reactors. The test data obtained should be applicable for the improvement of NPR fuel elements, and the further definition of development parameters.

Design criteria for salt bath heat treatment for NPR fuel elements is being obtained through the use of HLO equipment. Pilot plant development of an alternate heat treating process utilizing induction methods is continuing on schedule.

GENERAL

Manufacturing yield for 8" I&E was 88.2% compared to 83.2% for the previous month.

No autoclave failures have been experienced in September.

The September operating efficiency was 93.9% compared to 92.1% for August.

PERSONNEL STATISTICS

Number of employees - August 31, 1960 786
Number of employees - Sept. 30, 1960 800

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Total</u>
General	1	1	2
Manufacturing	60	316	376
Engineering	48	36	84
Financial	12	6	18
Plant Facilities	36	275	311
Relations Practices	5	4	9
T O T A L	162	638	800

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STAFF

General Manager, Fuels Preparation Department	R. L. Dickeman
Manager, Manufacturing Operation	W. M. Mathis
Manager, Engineering Operation	J. W. Talbott
Manager, Financial Operation	W. S. Roe
Manager, Plant Facilities Operation	E. Hilgeman
Manager, Relations Practices Operation	R. W. McCullugh

PATENT SUMMARY - SEPTEMBER, 1960

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during September 1960, except as listed below. Such persons further advise that for the period therein covered by this report notebook records, if any, in the course of their work have been examined for possible inventions or discoveries.

George R. Hanson	-	Improved Terminal Board and An Electric Control System for Automatically Varying an AC or DC Current According to a Pre-Set Program.
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RL Dickeman

General Manager
Fuels Preparation Department

RL Dickeman:mkm

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MANUFACTURING OPERATION

September, 1960

CURRENT OPERATIONS

Production and Productivity

Statistics

	8"	NORMAL				6" C Water Mix	6" O Water Mix	ENRICHED			Total
		8" I & E						6" I & E			
		CIIN	CIVN	KIIN	OIIN			CIIE	KIIE	OIIE	
<u>Current Month's Production</u>											
Acceptable Fuel Elements Produced (Tons)	0	37.2	1.5	239.7	234.8	0	0.3	17.5	43.1	19.7	593.8
As % of Forecast Production	-	95	7	113	139	-	-	97	94	30	104
Cum. % of Forecast for Current Qtrs.	82	157	9	100	111	93	91	97	97	66	99
As % of Past 3 Month's Average Production	-	78	75	113	102	-	10	159	116	42	91
As % of Past 12 Months Average Production	-	79	75	127	101	-	6	159	127	64	94
% of Forecast Achieved Last Fiscal Quarter	219	114	62	96	108	-	100	110	113	101	109
% of Forecast Achieved Last 4 Fiscal Qtrs.	110	110	60	102	100	127	105	93	104	96	102

Operating Efficiency

Current Month (%)	93.9
Forecast (%)	93.0
Previous Month (%)	92.1

Manufacturing Yield

Current Month (%)	-	86	-	89	88	-	-	91	86	84	
Forecast (%)	-	87	78	87	87	-	-	87	87	87	
Previous Month (%)	90	84	-	86	81	80	-	83	88	84	
Bare Uranium Available for Processing (Tons)	65	107	37	514	412	13	19	21	53	100	1341
Finished Products in Storage (Tons)	57	52	6	266	361	8	13	19	48	98	928
Special Products Finished (Pieces) Poison Uranium Utilization											199
											98.3

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ACTIVITIES

Production

Finished production for September was 593.8 tons, or 104 per cent of forecast. This production rate was achieved in spite of the fact that approximately 17 tons of material was removed from the production stream for nickel plating activities on production test IP-263-A-FP. Canning of a portion of the OIIN material for bumpers was deferred until October, at which time the prototype ultrasonic welder is scheduled for completion in the 306 AlSi Pilot Plant. A reduction in the number of canning line shifts devoted to 6-inch enriched production was made when word was received from IPD that the E-N loading in H reactor may be delayed an additional three to six months.

The first run of approximately 6,000 OIIN fuel elements was canned on September 8, 1960. No unusual production problems were experienced as a result of the changes in core and component dimensions. This material is now ready for attachment of bumper rails on the prototype ultrasonic welder in the 306 Pilot Plant. Initial runs on the ultrasonic welder are underway, and the unit is scheduled to be made available for production use by October 15.

A total of 4,676 good OIIN elements in C-64-F alloy was completed during September for use in nickel plating development activities. In addition, 2,254 OIIN finished elements were made available for use as controls during the irradiation testing portion of this program.

Production of 1,610 bismuth (pork) pieces, 199 poison pieces, and 827 six-inch enriched lithium-aluminum (boll) pieces was completed during September. Normal reprocessing of reclaimable elements has been kept on a current basis.

Yield Control

A manufacturing yield of 88.2 per cent for 8-inch I & E elements reflects a return to the record-high levels experienced in April through July of this year. Yield gains were made during the month in the component cleaning, internal cladding, and welding areas, but these were offset by losses in the external cladding and marred surface areas. A gain of about two per cent in the 6-inch I & E product yield was largely due to reduced welding and external bond test rejects.

No autoclave failures have been experienced in September.

Other Activities

The following pieces were processed through Fuel Recovery facilities during September:

8" Solid	919
8" I & E	29,901
6" Water Mix	155

Total	30,975
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PLANT CONDITIONS, INCIDENTS, AND IMPROVEMENTS

General

The operating efficiency was 93.9 per cent during September as forecast, compared to 92.1 per cent efficiency experienced in August. Of the total outage time, approximately 53 per cent was due to operating problems and 47 per cent was for equipment failures. The high contributors for equipment downtime were the lathes, the horizontal agitators, and UT-2 testers. Safety meetings, housekeeping, and lathe tooling problems for a PWR were recorded as the major factors in the operational outage category.

A bare inventory of 1,341 tons is on hand at month end. This is a 2.2 month supply and represents a peak inventory of bare cores. A reduction in this inventory is planned, a portion of which should be noted next month when we are scheduled to receive 645 tons and expect to consume approximately 725 tons in production activities.

Finished product inventories at month end totaled 928 tons, which is 1.4 month supply based on scheduled reactor usage. This inventory is higher than was forecast because a block charge scheduled this month for H reactor was delayed until October. On a year-to-date basis reactor input is about five per cent below forecast.

The inventory of finished solid fuel elements is 75 tons at the present time. These are being used at a reduced rate; however, most of the remaining 65 tons of bare cores are scheduled to be canned next month.

Beginning September 26, 1960, the new lot suffix denoting the component vendor was stamped on all finished fuel elements as prescribed in HW-65058, Revision 1. Use of Alcoa and Harvey components on alternate days also began on this date in support of the new vendor evaluation program.

The initial canning of Harvey OIIN material for extended charging under the new vendor development program began during the month. It became necessary, however, to suspend the canning operation when an inclusion problem became evident in final inspection. Preliminary evaluation of the problem points to copper contamination of the components which caused approximately seven per cent of the processed material to show evidences of contamination in the final inspection operation. A detailed study and analysis of the problem is under way.

A total of 150,000 to 170,000 completed "O" reactor fuel elements will be required from each alternate vendor for vendor evaluation. An additional order was placed this month with Harvey for 100,000 OIIN component pairs, to supplement the 80,000 OIIN component pairs now in production. An outstanding order for 85,000 component pairs was released this month for production by Bridgeport Brass, the next vendor to be evaluated. These components will be delivered in the OIIN model.

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Over 18,000 contour-base cans were test-canned with contour-base sleeves in 313 Building during the month, as a further test for possible improvements in quality of the canned fuel element. The following results were obtained:

1. The porosity distribution of contour-base fuel elements, as measured by peak memory voltages, was not significantly different from the control material.
2. Total braze porosity of the test fuel elements, as measured by external bond count, was significantly improved over the control material.
3. Residual canwall thickness of the test material was not significantly different from the control material.
4. There were no statistically significant reductions in base weld void rejects, as measured by zerography.
5. No additional quality or operational difficulties were noticed.

A large order of contour-base OIIIN components has been placed for further testing, and all OIIIE components on order will be obtained in this configuration.

An emergency trip was made by a representative of the Manufacturing Operation to Charleston, West Virginia, Naval Ordnance Plant to inspect surplus Acme-Gridley Lathes. Inspection revealed there were Acme-Gridley Lathes available, in practically new condition, of the same type of model of those currently used in our operation. Requests have been made for two or these lathes, and it has been estimated the two lathes can be obtained and modified for less money than a new lathe would cost. The procurement of these lathes will eliminate one bottleneck in the operation and will, in addition, provide additional flexibility in scheduling the product mix.

It is understood some OIV and 4-inch material is expected in February, 1961. A trial run has shown this material cannot be tested in the UT-2 testers as they are presently designed. This is due primarily to design of the loaders, unloaders, and cut out positions in the rolls. Re-design of the testers will be required before the testing of OIV and 4-inch material can be accomplished.

Canning furnace 6D failed on August 29, 1960. It was charged in the 6D position in October, 1954, and has been in this position until failure. The lower hearth has been removed from the furnace and examination indicates only the lower hearth will have to be relined. The upper hearth is expected to last two or three more years, which is approximately three times as much usage as the vendor originally estimated from these furnaces.

New work in the HLO addition and in the FPD Engineering Operation of the 306 Building resulting from the recently accelerated pace in the self-support and the 333 Building programs, which is out of all proportion to

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that forecasted, has resulted in a large increase of work for maintenance forces. Largest backlog of work is for the electrical craft, although the instrument technician situation is crucial.

Because of the desirability of utilizing the xerography process concurrent with the bumper conversion project to minimize in-process storage on fuel elements after cap end radiography, a sensitivity test was conducted between the 25 degree trays using xerography plates and the standard 60 degree trays using film. Even though new xerography plates were used, the test results indicated there was a substantial loss in sensitivity to both cap voids and weld braze area voids with the 25 degree trays. It was recommended that the 25 degree tray not be used for production xerography of cap welds.

A leak in a valve on the spent pickle acid line early in the month caused contamination of about twenty square feet of floor area. The acid in the line contained 5.3 per cent uranium, which caused 4,000 c/m contamination of the area. The area has been cleaned and the valve replaced with a stainless steel spool. Uranium loss from the incident was negligible.

Peak inventories of SS material have required the storage of approximately three carloads of these materials in the work areas. An additional two carloads of fuel cores have been stored in the 303-C Building, which is currently assigned to the Engineering Operation. Removal of a partition in the materials storage area of the 313 Building has eliminated the need for one aisle and provided some additional storage space.

306 Pilot Plant

A total of eleven special tests were processed during this month. Production of bumper and self-support fuel elements continued on a one-shift basis.

The inventory of OIIN projection fuel elements is adequate to meeting the reactor testing requirements of this model. Production efforts will be directed toward the OIIIN B models for reactor testing use.

305 Test Reactor

Routine production testing continued to remain in a current status with a backlog of approximately three days reactor time. During September approximately twenty per cent of the reactor time was devoted to special testing.

OPERATING PLANS

E-N Demonstration Load

A decision to delay charging the E-N demonstration load from January until April, 1961, occurred on September 21, 1960. The enriched uranium portion of the load will be bumpered. Either the OIIE or OIIIE models may be used because finished dimensions of these sizes are essentially the same. Since the blanket portion of the load will be charged prior

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to April, 1961, the attachment of bumpers to some of the 6-inch enriched uranium pieces will be required by year end. A second shift on the prototype ultrasonic welder is indicated at an earlier date than previously planned. As soon as definite delivery requirements are known, firm plans for production and bumper attachments will be made. Since canned elements used for projection fuel element welding must be removed from the process stream ahead of autoclaves, enriched requirements must be scheduled accordingly. Approximately a four month supply of old pile enriched fuel elements are in storage due to the build-up for the E-N demonstration load, scheduled for October, 1960. These fuel elements were autoclaved since it was not contemplated that bumpers would be attached to them and will now be used in the old reactors. Future canning will be utilized for the demonstration load.

Projection Fuel Element Program

Alcoa was requested to stop work on the component order for the self-support program, which halted the phase-out of CIVN models in favor of the CVN. Prompt action in this situation has undoubtedly eliminated or reduced a high cancellation charge for this change. The schedule for uranium deliveries has also been adjusted. Actual production had been started, however, and 2,800 cores had been finished and are stored at NLO awaiting a final decision as to their use. In addition, 1,600 sleeves for this model have been received.

OIVN Fuel Elements

Alcoa has experienced tooling problems in fabrication of both caps and cans for the new OIVN model fuel element. The OD of the cans is about 20 mils larger than present models, which accounts for some of the difficulties. The delivery schedule has been delayed about 30 days, which will delay the Pilot Plant run for these pieces which was scheduled to be completed near the first of October.

Pickle Inspection Standards

Graded physical standards for pickle inspection are now being developed. These standards will provide visual examples of cracks, seams, striations, machining defects, and other surface irregularities. To prevent uranium oxide from obscuring the defects, the cores will be nickel plated. This plating provides surface stability without detracting from the defect. In addition, an optical colorimeter is being procured for operator use in controlling the pickle process. The instrument is expected to provide an objective measure of core oxidation.

EMPLOYEE RELATIONS

Safety Performance

Members of the Manufacturing Operation were treated for 25 medical treatment injuries during September, a frequency rate of 4.28.

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Through September, 1960, the Manufacturing Operation has attained 1,160,000 manhours exposure during a period of 633 days since the last disabling injury, which occurred on January 6, 1959.

Radiation Control

For the four week period ending August 12, 1960, Manufacturing personnel received a total of 8,459 mrad of radiation exposure. Three individual badges in excess of 300 mrad were reported during the period, which reflects the same level as that experienced to date for the current year.

Security Violations

None

Reports of Invention

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during September.

H. E. Berg

Acting Manager - Manufacturing

HE Berg: HFT:gl

STATISTICS

1959-60

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ENGINEERING OPERATION

September, 1960

VISITORS

	<u>Company</u>	<u>Contact</u>	<u>Date</u>	<u>Reason</u>
VI Montehyohl	SRP	JT Stringer	9/20-23	FEDC Working Comm.
GW Chittenden	SRP	"	"	" " "
JF MacNeill	NLO	"	"	" " "
CE Polson	NLO	"	"	" " "
RF Hartman	MCW	"	"	" " "
NF Neumann	MCW	"	"	" " "
W Raymont	APED	TB Correy	9/14	Discuss TIG welding
RJ Stuligross	GEMP	GW Riedeman	9/14	Technical conference
J Stevenson	GEMP	"	"	" "

TRIPS

	<u>Company Visited</u>			
TB Correy	Aeroprojects	W Tarpley	9/12	Contract review
GW Riedeman	Airline Wldg., L.A.	HL Meredith	9/1-2	Scheduling for NPR component fabrication
AJ Karnie	Hevi-Duty Electric	NC Bloyd	9/6-10	Design and fabrication of billet heating, extrusion handling, cut-off, heat treating, and billet tube equipment
"	Allison Campbell, Bridgeport, Conn	Mr. Vogel	"	
"	Pacific Scientific, Los Angeles	W Hyer	"	
JT Stringer	Washington, DC		9/5-9	FEDC annual meeting and attend feed material scheduling meeting
LA Conner	National Acme, Cleveland	R Beacom	9/1	Discuss lathe problems
CJ Denton	Ohio St. Univ.		9/9-23	Course in nondestructive testing

PERSONNEL

<u>Name</u>	<u>Title</u>	<u>Operation</u>	<u>Nature of Change</u>	<u>Date</u>
LD Turner	Engineer	4440	Trans. to HLO	9/1/60

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INVENTIONS

All Engineering Operation personnel engaged in work that might reasonably be expected to result in inventions or discoveries advised that to the best of their knowledge and belief no inventions or discoveries were made in the course of their work during September, 1960 except as listed below. Such persons further advise that for the period therein covered by this report, notebook records, if any, in the course of their work have been examined for possible inventions or discoveries.

George R. Hanson

Improved Terminal Board and An Electric Control System for Automatically Varying an AC or DC Current According to a Pre-set Program

PROCESS ENGINEERINGFuel Performance and Requirements

Three I & E fuel element ruptures (two natural and one enriched uranium) occurred in the reactors during September. A summary of these ruptures is as follows:

<u>Fuel Element Type</u>	<u>Reactor</u>	<u>Exposure (MWD/T)</u>	<u>Rupture Classification</u>	<u>Canning Date</u>	<u>Jacket Alloy</u>
I & E Natural	C	567	Side Hot Spot	6/10/60	X-8001
I & E Natural*	D	640	Side Hot Spot	5/27/60	X-8001
I & E Enriched	DR	118	Mechanical Damage	8/26/60	X-8001

* Alloyed dingot uranium

A more favorable fuel performance trend was indicated this period. Although the third natural alloyed dingot I & E fuel rupture was sustained, there is no evidence that this rupture or any of the previous dingot ruptures were associated with uranium quality and stability. The recent dingot rupture is scheduled for a more thorough examination in C Basin.

Four columns of enriched (1.47% U-235) solid "bumper" supported I & E fuel elements, being irradiated in D Reactor under a run-to-rupture test at specific powers ranging from 90-130 KW/ft., were discharged at an exposure of approximately 960 MWD/T without incident. A 38-fold improvement in rupture rate was demonstrated over the control material at the 95% confidence level. The control columns were previously discharged because of two ruptures experienced at exposures of 340 and 379 MWD/T, respectively. cursory examination of the 72 "bumper" supported test pieces showed 3 pieces had developed light hot spot film patterns and 12 pieces had hot area patterns on the surface. Corrosion appeared to be minor; however, the degree of attack will be more precisely determined in C Basin.

Only 20 columns of a 100-tube D Reactor demonstration loading of natural uranium I & E fuel elements having solid "bumper" rails were charged during September. Difficulties experienced by IPD with charging equipment and excessive process tube distortion in the upper part of the reactor prevented completion of this loading during the scheduled outage.

Because of an increased incidence (factor greater than 3) of enriched I & E fuel element jacket corrosion ruptures in reactor fringe loadings during the past 6 months, consideration is being given to postponing the E-N demonstration loading until next spring in order to attach "bumper" supports to a major part or all of the "E" metal used in this loading.

Eight columns of alternately charged heat-treated, nickel-plated and X-8001 alloy clad control OIIN I & E fuel elements were discharged at goal exposure (800 MWD/T)

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from DR Reactor without incident. Examination of these fuel elements will be expedited in C Basin. Two columns previously examined after being exposed to 400 MWD/T showed no evidence of nickel sloughing from the plated pieces, and only minor evidence of nickel plate pitting and surface corrosion.

IPD has requested that FPD initiate an immediate program to provide oversize (1.991" OD and 0.339" ID) natural uranium I & E fuel elements on a high priority basis for charging into 20 overbored (500-mil) process channels in C Reactor. Recent physics and economics studies have indicated appreciable incentives exist in terms of higher conversion ratios and reduced unit product costs for overboring all reactors under the proposed reactor plant improvement program. Because of a need for early replacement of the process tubes in C Reactor, a demonstration of overboring in this reactor must be accomplished as quickly as feasible. For this reason, an all-out effort is being made within FPD to procure the necessary components and cores, modify pilot plant equipment, and prepare the required fuel elements for delivery to the reactor on or about January 1, 1960.

A program for the production evaluation of aluminum components obtained from potential new vendors was started on September 26 with the processing of Harvey and standard control OIIN components on alternate days. An abnormal surface inclusion reject rate (greater than 5%) experienced in the Harvey material after autoclave testing has necessitated discontinuance of the program until the source of the inclusions has been determined and alleviated.

Uranium Technology

Approximately 186 tons of dingot uranium are currently being irradiated; about 112 tons have been discharged to date. One side hot spot failure occurred this month in dingot uranium at 640 MWD/T, making a total of 3 dingot failures to date. About 25, 78, and 5 tons of regular virgin, vacuum outgassed virgin, and recovered dingot cores, respectively, were canned this month.

Although the total hydrogen content of vacuum outgassed dingot cores is only 0.8 ppm, as compared to 2.1 ppm and 1.7 ppm for regular dingot and ingot, the bond test reject rate is higher than for regular dingot and ingot: 6.1, 5.9, and 2.6% bond reject for vacuum outgassed, regular dingot and normal ingot, respectively. This high bond reject rate for vacuum outgassed uranium is believed due to surface hydrogen picked up during beta heat treating.

Test quantities of dingot cores vacuum outgassed in final core form by MCW to produce low surface hydrogen have been ordered to determine the effect of vacuum outgassing after beta heat treating on grain structure, x-ray diffraction, warp, and braze porosity after canning. It has been calculated that if the core surface hydrogen content is less than 0.4 ppm, outgassing from the cores should be no problem.

Ingot test material (about 5600 cores) cast by NLO at re-melt furnace pressures of 350, 30, 3 and less than 0.03 mm of Hg, which gave average total hydrogen values of 3.0, 2.3, 1.4, and 0.9, respectively, was canned to determine the effect of total hydrogen content on braze porosity after canning. No significant difference was found between the four groups of material when comparing porosity rejects rates or total internal and external bond counts.

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Forty-three completely untransformed cores were rejected by the UT-2 testers this month from a production lot of vacuum outgassed dingot cores supposedly heat treated by NLO. How these cores by-passed the beta heat treating step at Fernald is unknown.

Process Development

The remaining 8 charges of chemical-nickel plated fuel elements being irradiation tested under IP-263-FP were discharged from 105-DR September 25 at the intended goal exposure of approximately 800 MWD/T. The fuel elements have not been examined. No unusual incidents during irradiation were reported. Examination of the two charges discharged at approximately 500 MWD/T established that the nickel plate adhesion was significantly improved compared to fuel elements discharged in April 1959. The present examination revealed:

1. Essentially no sloughing or blistering of the nickel plate.
2. Maximum weight loss of 2.7 gm for the X-8001 (unplated) compared to 0.5 gm for the nickel-plated fuel element.
3. Some pitting attack of the aluminum. It appeared this might have been due to mechanical damage and resultant corrosion in the basin water.
4. Hot spots occurred on both the nickel-plated and the X-8001 clad unplated elements.

Ex-reactor corrosion tests of chemical-nickel plated fuel elements in process water flow tubes continued. Fuel elements were examined after 92 days at 120 C and after 91 days at 165 C. Examination indicated normal corrosion of the aluminum at discontinuities in the plate, with no evidence of nickel sloughing or undercutting, or of accelerated aluminum corrosion. In addition, the pieces appear to have much less film than would be present in aluminum. The film can best be described as a slime, with tarnished nickel underneath.

Anticipating the startup of the HAPQ hot press facility in January to produce test quantities of fuel elements for alternate process evaluation, die and punch design modifications have been made and new plating racks designed. Product specifications for Sylcor hot press fuel elements have been issued and an order for 2000 completed fuel elements for out-of-reactor evaluation and possible irradiation will be placed with Sylcor in early October. Aluminum components and uranium cores for assembly at HAPQ and subsequent fluid pressure bonding at Savannah River are expected in early October.

Process Technology

Processing of approximately 20,000 OREN contour base aluminum cans in contour base sleeves was completed by Manufacturing to demonstrate fuel element quality improvements associated with this design. Quality control data confirmed the expected reduction in fuel element base braze and closure porosity resulting from the increased rate of preheating of the can base to bath temperature. An improvement in internal bond porosity by a factor of 1.6 and in external porosity by a factor of 1.5 was shown at the 95% confidence level.

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All current and future production component orders are being converted to the contoured base design.

An investigation of canning rejects caused by Al-Si passing below the groove cut near the upper end of aluminum cans has shown there is insufficient upset aluminum around the grooves to form a tight seal between the cans and sleeves during the fuel assembly operation. This was found to be particularly true for 6" enriched I & E cans, which have contributed to the highest incidence of Al-Si canning rejects. Although the upset metal around the grooves cut in these cans fell within the specified height range of 0.001" to 0.003", the degree of upsetting consistently approached the minimum. In order to correct this problem the specifications for upset metal around the grooves was increased to a range of 0.002" to 0.004".

Beginning September 8 and 15, respectively, the base contour angle on enriched and natural uranium I & E fuel elements was changed from 6 degrees to 12 degrees. This revision was made to prevent normal variations in cap weld height from causing improper mating of fuel element end contours and possible misalignment in reactor process tubes.

A recent test in which the air pressure to the can-sleeve vibrolators was varied from 65 to 125 psig has confirmed previous data indicating fuel element braze porosity is reduced as the vibrolator air pressure is increased. Based on the results of this test, it has been recommended that the air pressure to the vibrolators be increased from 90 to 125 psig.

Thermocouple cans for 4" I & E and 8" I & E contour base cans have been fabricated. Heating curves are being developed to evaluate vendor produced contoured sleeves versus the prototypes used in development, and to establish the proper canning cycle for these models.

A "bumper" rail feed for the ultrasonic rail welder has been designed, fabricated, and installed and the welder is ready for production and development use as scheduled. Operator training has begun. Design, fabrication, and procurement of parts for conversion of the welder to produce the 3-row style "bumper" element is in progress. Other design modifications to increase production and improve operation have been accomplished.

The process steps required for the ultrasonic welded "bumper" and self-support project have been defined. Before attaching supports, the fuel elements will be dipped in a 1.5 to 2.0 weight percent soap solution at 90 ± 5 C. Handling after soap application must be held to a minimum. The presence of soap on the element going to the autoclave has no apparent affect on the ability of the autoclaves to produce a standard autoclave film. However, the soap will be removed by a hot water rinse in the autoclave baskets prior to autoclaving to prevent operating problems in the autoclave system. The welding parameters for the prototypical production ultrasonic welder have been established and test elements welded and evaluated. All welds have passed the 180-pound shear load test. The shear load test and the Instron peel test are the only methods, at present, to determine weld strength and quality. Weld quality control will be maintained by statistical sampling when sufficient data is available.

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Solid lithium-aluminum alloy pieces are now being produced using the equipment and process developed under the E-N program. Fabrication of an identification stamping press is complete and sizing equipment for the I & E pieces is to be complete Monday, October 3. Fabrication and assembly of the E-N welder, which was specially designed to provide water cooling during welding of the I & E pieces has been completed.

A discussion was held with National Acme engineers to consider rebuilding the production Acme Gridley lathes to accommodate proposed 2" diameter fuel elements. Itemized proposals were submitted to compare the cost of this with the cost of new machines of larger capacity.

Approximately 100 6" "Doe" elements have been Al-Si brazed. The elements are required by IPD for corrosion testing of X-8001 alloy in C Reactor ribless tubes.

A proposed finishing line flowsheet has been issued incorporating the recommended process to attach self-supports to all fuel elements, to replace the hot nitric acid etch machine, and to improve weld inspection. Major changes include a caustic etch before and after base and cap welding, a soap dip prior to rail welding, and the rail welder.

306 Pilot Plant Activities

1. Aluminum component cleaning and wettability tests in molten Al-Si to:
 - a. Evaluate pH control on Diversey 514 decoxidizer solution.
 - b. Evaluate wettability of contoured base cans.
2. Determine effect of agitation in the Al-Si layer of the duplex bath upon bond strength.
3. Evaluate the quality of fuel elements using contoured base sleeves and cans.
4. Evaluate open bottom cans.
5. Determine reproducibility of present canning cycle for nickel-plated aluminum components.
6. Determine cycle for 0.1 to 0.2 mils thick nickel plate to eliminate Al-Si penetration.
7. Fabricate "Doe" elements for IPD testing.
8. Provide fuel elements for K Reactor "bumper" test.
9. Provide fuel elements for DC welding studies.
10. Determine effect of fuel element cleaning on ultrasonic weld quality.
11. Determine concentration limits of soap solution for ultrasonic weld preparation.
12. Evaluate pre-autoclave cleaning of ultrasonically welded projection elements.
13. Determine effectiveness of Diversey 514 and nitric acid as a smut remover following caustic etch.

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In addition to the process development items above, the following service work was provided by the Pilot Plant work force:

1. Clean, etch, and inspect 5000 fuel elements preparatory to nickel plating.
2. Weld 700 fuel elements for AC-DC weld evaluation.
3. Prepare elements for ultrasonic weld studies.
4. Fabricate 4" I & E aluminum cans from 8" components.

During the month, 870 CIV self-supported fuel elements were produced on the electrical resistance spot welder at a yield of 89.9%. The quantity of elements produced was low due to considerable downtime of the welder. Electrical component failure of the welder counting circuit was found to be the trouble.

During the month the Pilot Plant non-destructive bond and penetration tester was taken out of service for a major overhaul. The component vapor degreaser was shut down for cleaning and re-charged with fresh solvent.

MATERIALS ENGINEERING

NPR Fuel Development

Fuel Element Fabrication

Ten "K" size tube and tube elements were completed. They are scheduled for depressurization tests in the K reactor loops during November.

Material Procurement

Two orders for zircaloy components have been signed. They are (1) Allegheny Ludlum, fixed price, and (2) Harvey Aluminum, price redetermination. The Bridgeport Brass Company contract is being held up pending legal and financial clarification.

Uranium orders for I & E startup have been placed. Zircaloy component orders will be initiated by 10-5-60.

Extrusion

The following extrusions were made during the month:

1. 6 Inch Tooling

Four NPR-IT composites, T-57, 58, 59 and 60. T-57 and 58 were extruded to old size with 22 mil inner and outer clad. T-59 and 60 were extruded to new size with 40 mil outer clad and 35 mil inner clad.

Three I & E ("C" size) composites, T-50, 51 and 52 were extruded. The uranium used for all three tubes was as-cast 1250 ppm silicon alloy.

One I & E size copper billet was extruded.

Three NPR-IT size copper billets were extruded.

2. 7.6 Inch Tooling

Four NPR-OT (new size) composites, T-53, 54, 55 and 56 were extruded. The uranium used for these tubes was coextruded in the as-extruded condition.

One 2 3/8 inch OD uranium rod using 30 mil copper clad on the billet was extruded.

One zircaloy tube for NPR-OT end caps (Zr #13) was extruded.

One zircaloy tube (2.400 OD) was extruded for HLO. (Zr #18).

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Four zircaloy tubes (4.385 OD) were extruded for HLO. (Zr #14, 15, 16 and 17).

Five copper billets, one for each of the above sizes, were extruded.

3. 4 Inch Tooling

One KER inner tube copper was extruded.

On the second extrusion with this tooling, the follower block caught on the container due to improper timing of the billet support actuation; this resulted in a bent stem. A new stem has been ordered.

Chemical Milling

The various parameters of the etchant solution are being investigated to determine their importance. The pieces are milled in a vertical position, one end at a time. The main problem in this method is undercutting on the bottom side. We are trying other methods to find a geometry which would enable milling both ends simultaneously.

Several samples were prepared and sent to the laboratory for hydrogen analysis to determine the hydrogen pickup during this operation. All samples analyzed to date reveal no significant pickup.

End Closure Brazing

The brazing pilot equipment was put into operation during the month. About sixty NPR outer closures have been made. Approximately one-half of these have been cut open to inspect for completeness of bond. Only one instance of incomplete bonding was found. Twelve closures have been checked by Testing Methods for lack of bond with no negative results (did not include piece found by destructive examination). Three pieces (six closures) were autoclaved 40 hours at 300°C water with good results. One closure was beta cycled ten times and showed no bond breakage. Also, one closure was cycled 50 times between 320 and 520°C with no ill effect.

Several closures were made on NPR inner and KER single set-up pieces. These were sectioned and found to be sound.

Brazing alloy for NPR outer, NPR inner and KER single is on hand. All equipment is ready for brazing these three sizes as required.

End Closure Welding

Ultrasonic Welding

The status of the ultrasonically bonded closure was reviewed with Aeroprojects on 9-12-60. The work required under Phase I is from 60

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to 75 per cent complete, with approximately \$5,000 of Phase I funds remaining. A review of the work performed and items purchased and fabricated indicate that no funds have been spent on any Phase II work as reported last month. A report of the work on Phase I has been written in rough draft form and is approximately 75 per cent complete. To be added are data that is available and data on tests to be run.

Diffusion Bonding

Gloves that appear to be suitable have been fabricated by CPD in 234-J Building plastics shop. The material has been tested for out-gassing and appears to be satisfactory. Leaks occurring in the finger seams of the gloves have made it difficult to determine if the material or the leaks are the cause of the gas contamination.

Brazed Closure Welding

Some work has been done on end contour development of the NPR outer tube. A step cut was made 0.020 inch along the axis of the tube and 0.060 across the axis of the tube. Externally the welds appear to be good. As soon as the specimens have been heat treated, the welds will be sectioned and examined. The weld over the narrow braze has a much better surface quality than that over the wide braze.

Unbonded Closure Welding

Work has progressed to the point that it can be stated for process quality extrusions an adequate weld quality can be attained using a grooved insert. Considerable work remains to be done to optimize the dimensions of the groove and welding parameters.

Horizontal Welding

Horizontal welding has progressed to the point that it is satisfactory for both bonded and unbonded closure welds on the NPR inner and outer tubes.

I & E Welding Equipment

All materials for fabricating an I & E manual welder are on order. Detailed design and fabrication are being held up pending progress on local fabrication of the NPR production unit.

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Side Support Attachments

Two types of side supports and the parameters for attaching them have been worked out. A design for the interlock has been worked out and test quantities ordered. Tooling for attaching the interlock is being fabricated. Final design for all items is promised for 11-1-60.

Pulsed Welder

Funds have been obtained for the completion of Phase I, and work is to start by 10-15-60. A progress report giving the details of the work has been written and will be mailed on 9-30-60. Development of solid state controlled rectifiers in 150 and 300 ampere sizes are scheduled for the next year, making the feasibility of commercially useful and competitive unit possible.

Beta Heat Treating

Salt Bath Heat Treating - Design Criteria

Design criteria for a salt bath beta heat treating method for the NPR process are being obtained through use of HLO equipment. A portable salt bath, oil quench and water quench have been put in place in the new 306 Pilot Plant area. Coupled with the air-blast quench facility that is used on the induction scanner, a complete test facility is available.

The main design criteria sought are (1) the cooling rate necessary to affect dimensionally stable uranium (i.e. a study of crystallographic quench textures and grain size), and (2) the quench medium (i.e. the nature of the quench facility).

X-ray diffraction data of the crystallographic orientation of samples quenched in air blasts, hot water sprays and cold water sprays show a relation of quench rate vs predicted in-reactor dimensional stability. However, the data show that the predicted stability varies not only with quench rate but also is a function of what surface(s) of the fuels are quenched. Generally, it has been concluded that optimum properties result when both surfaces (inner and outer) are simultaneously quenched at a rate of $300^{\circ}/\text{sec}$ ($1800^{\circ}/\text{min.}$). By comparison, the same rate affected by cooling either the outer or inner surface alone resulted in very poor predicted stability. In fact, quench rates resulting from quenching of both surfaces could be increased as high as $80^{\circ}/\text{Sec}$ ($4800^{\circ}/\text{Min.}$) before comparable instability is attained.

To affect a quench rate of $30^{\circ}/\text{sec.}$ in the average wall thickness of NPR fuels, a choice could be made between either a hot water bath (80°C) or an oil bath. A hot water bath is notorious for variable

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quench rate because of non-uniform boiling of the water on the hot metal surfaces. (Inconsistent quench rates have been confirmed in recent samples quenched in hot water). Thus, the oil-bath quench favored by HLO is seen to have the optimum application after salt bath heat treating of NPR fuels.

Salt Bath Heat Treating - Application

Samples of braze closed pieces have been salt bath heat treated and air-blast quenched on their outer surfaces only. Here the intent was not to affect dimensional stability but rather determine the insulating properties of the adhering salt. Using quench fixtures suited to quenching after induction heating, the quench rate was not materially affected. However, air blasts cannot be adopted in production of NPR fuels unless both surfaces are quenched. Quenching of both surfaces becomes a problem if conventional racks, hooks, etc. are used as holding fixtures.

Oil quenching of braze closed pieces was done to affect dimensionally stable samples and to provide design criteria.

Induction Heat Treating Development

Three main problems were cited as a result of the preliminary test work on the scanner. These were:

1. Voltage Regulation

The designer and builder, Clark Controller, have made recommendations that have resulted in much improved regulation. This problem is thought to be solved.

2. Centering of the Piece in Coil

Recent work has shown that the piece must be carefully centered. Inasmuch as the piece must be positively centered and yet not be axially compressed by top and bottom holding fixtures, the problem is mechanical in nature and several solutions are under way.

3. Damage to the guide columns. Until pieces are centered, the role of the bent columns cannot be assessed.

The main problems facing this application are to minimize warp in as-received stock and assure that the variability in outer clad:uranium adhesion does not play a part. Of the two, warp is the larger problem.

Having attained good voltage regulation, the other problems play no part in static heating tests. Consequently, braze closed samples are

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being thermal-cycled to assess strength of the braze. One sample was given 50 alpha cycles (310 to 510°C) on one end and the other end was given two alpha cycles and eight beta cycles (310 to 730°C). Neither treatment was shown to crack the braze.

Chemical Processing

KER Inner and Outer Fuel Tubes

Seventeen KER inner and outer fuel tubes were processed through chemical finishing processes, vapor blasting and autoclave. Process improvements are needed in copper removal and vapor blasting. These were evaluated and problems of incomplete copper removal and heat treat scale removal are mainly due to deviations from optimum process control conditions. These are being formally prepared and will specify future fuel processing. Final bright etching and autoclaving produced black corrosion films acceptable for reactor service on all elements processed.

A prototype basket for processing I & E elements through zircaloy-2 stripping and weld recess etch is presently being fabricated. Basket capacity is designed for six elements. This design will be applicable to NPR elements with necessary dimensional changes incorporated.

Vapor Blast

A new internal nozzle for vapor blasting the inner surfaces of I & E coextruded fuel elements is being designed and fabricated by the vapor blast manufacturing company.

Recovery

The method to be used for the recovery of uranium from solution wastes generated in the production of coextruded fuel elements will be caustic neutralization and cake recovery by filter pressing. The bulk of the uranium solution losses will be in chemical milling of end closure recesses. Chemical analysis has been performed to establish the adaptability of this solution to this recovery method. Results indicate that the uranium concentrations and cake characteristics are very near to cake residues presently recovered in the AlSi fuel fabrication shop. Facilities similar to those presently existing will be satisfactory for the recovery of the chemical milling solution and the billet pickle solution.

Testing and Evaluation

Ultrasonic and Eddy Current Testers

Fuel element sections from two enriched KERST coextrusions were tested for bond integrity and clad thickness for HLO. The bond and clad

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thickness tests have been giving satisfactory results. A small unbonded area was found by the tester on one of the KERIT being prepared for reactor charging.

Two fuel element sections with defective brazed end closures were prepared for Testing Methods. They will be used to develop an ultrasonic test for brazed end closures.

A section of each of the uranium extrusions used for HAPO coextrusions, 53 through 56, has been machined to NPROT billet diameters. These sections will be tested to see if one or more of them could be used for a standard for the billet grain size tester.

Destructive Testing

Routine evaluation of HAPO coextrusions 41 through 45 has been completed. Evaluation has started on 48, 49, 53, 54, 55 and 56. Coextrusions 46 and 47 (drop test) and 50, 51 and 52 (C size I & E) will not be evaluated.

Several types of surface defects in the zircaloy clad of coextruded tubes have been sectioned and examined. These and additional defects will be used to set up visual inspection standards.

Reactor Charge

Ten KER tube-in-tube fuel elements have been fabricated by MEO and are ready for shipment for IPD. These pieces will be used for a depressurization test.

Equipment

1. A new instrument control panel for control of tool heating for the extrusion press is being installed.
2. Small tooling for the 11 inch liner has been received.
3. A new 4 inch stem is on order.
4. A new 6 inch liner is being ordered.
5. Five hand trucks for fuel element handling are on order.
6. Extrusion pressure and ram speed recorders are being installed.
7. New tanks are being installed in the chemical bay to accommodate billet etching and extended chemical milling development.

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TESTING METHODS

Process Fuel Element Testing

Bare Core Stations

Premature contact burning and malfunctions of the stepping switch in the UT-2 programming circuitry have recently been the cause of excessive instrument down-time. The cause of the troubles has been isolated and corrective action taken which it is believed will eliminate these troubles. A program to increase the throughput of the testers by periodic cleaning of the conveyor rolls has been recommended.

Efforts to put the surface inspection test into operation are continuing.

NPR Fuel Element Inspection

An internal unbond on a KER inner tube intended for reactor charging was detected by the prototype equipment and confirmed by destructive examination. Also six thin wall tubes were rejected out of one-hundred tested.

All components for the first two test consoles have been ordered. Laboratory tests indicate an improved method for bond testing which is not as sensitive to surface condition or tubing thickness. The possibility of the same test being used for core grain size, integrity, external and internal bond is being investigated. Billet grain size and integrity tests are being performed and in the laboratory to determine optimum methods. Laboratory tests show good results in detecting cap-core unbonds and outer wall-cap unbonding but the inner wall-cap bonding appears more difficult to detect.

New Methods Development

Closure Inspection

Over fifteen-hundred fuel elements were tested in 313 Building for end defects using the prototype UT-4 equipment. Correlation tests are still underway to confirm the results. Less than two percent of the pieces tested have apparent rejectable defects.

Self-Support Weld Inspection

Ultrasonic through transmission and Lamb wave tests indicate very little difference between good and poor welds. Infrared temperature measurements did provide discernible differences but poor reproducibility. An inductive thermometry method is being developed which will measure the heat transfer properties of the welds.

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Zirconium Hydride Tests

Sonic and ultrasonic tests were performed to detect differences between zirconium and hydrided zirconium (1000 ppm). No change could be observed in the elastic constants, velocities, or attenuation. Improved eddy-current and very high frequency ultrasonic attenuation tests are planned.

Lamb Wave Testing

Optical measurements were performed on the thin wall tubing and correlated very well with the Lamb wave test results. Tubing tests indicate that for maximum usefulness the tester should have a wide range which can be covered in small increments for increased accuracy. It is planned to incorporate this in the design.

Customer Work

The UT-7 Plutonium tester was received from the shop and is now in the checking out process.

Samples of graphite were sonically tested to determine elastic constants and confirmed the results obtained by tensile tests.

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DESIGN AND PROJECTS

CAF-847 - New Fuel Cladding Facility

The contract for finishing the interior of the 333 building was awarded to Teller Construction Company, Idaho Falls, Idaho on September 12, 1960. Teller started work on September 27, 1960.

Most of the engineered equipment for the heating and ventilating facility has been installed.

Requisitions were issued during the month for major equipment for:

Support attachment welders
Vapor blast equipment
Non-destructive test equipment

Design of the chemical equipment for this project has been completed for comments.

CAF-894 - Increased Compressed Air Capacity - 300 Area

Detail design has been completed and the bid package is being assembled.

CGF-903 - Projection Fuel Element Modifications - 313 Bldg. - Phase I

Preliminary layout work has been completed. Final layout will be completed after process criteria are complete. Engineering on building modification has been started.

Additional Storage Space - 303 Area

Preparation of the project proposal is complete.

DRAFTING AND FILES

Major Jobs in Drafting

306 Building:

Weld Bead Tester - UT2
UE2 Circuits

313 Building:

Quality Control Reporting System - As-Builts
Component Revisions
Manual Stamper
Ultrasonic Welding Machine

333 Building:

Automatic Cutoff Saw
Miscellaneous Tooling for Press
Zr-2 End Cap Welding Machine
Miscellaneous Electrical
Chemical Piping and Tanks

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Drawings Produced

New
Revised
Small Charts
Large Charts
Miscellaneous

74
137
29
10
24

S. M. Gile

Acting Manager - Engineering

FINANCIAL OPERATION
SEPTEMBER, 1960

Project CAF 820, Storage Space 300 Area, was unitized during the month. The project, which consisted of relocating an Army building to its present location north of the 306 Building, was completed and placed in service on September 30, 1959. Total cost of the project, including \$1,200 for the building, amounted to \$23,601. Cost breakdown on the unitization report is as follows: Material \$8,700, Labor \$11,070, Indirect and Distributives \$3,831.

A project proposal for increased storage space 303 Area has received departmental approval and is ready for transmittal to the HOO-AEC. The proposal requests authorization for G. E. to incur costs in the amount of \$80,000 to provide a 96' x 100' modular steel warehouse east of the 313 Building. If approved, the project will be funded from the Plant Acquisition and Construction Budget, Item 61-J, General Plant Projects FY 1961.

As of the end of September, 1960, costs totalling \$594,043 have been incurred on Project CAF 847, New Fuel Cladding Facility. Of this amount, the AEC has incurred \$406,574 while G. E. costs total \$187,469. In addition, commitments in the amounts of \$958,351 and \$381,572, for AEC and G. E. respectively, are outstanding.

In an effort to obtain maximum utilization of equipment funds, a complete review of equipment requirements for the balance of FY 1961 was made and a priority listing established. It is evident that the present allocation of \$834,000, which is presently 101% obligated, will be inadequate. This information and a request for additional funds have been submitted to Contract Accounting Operation for consideration.

Three spot audits of uninstalled equipment records and control procedures were conducted during the month. With the exception of minor discrepancies in building location and document references of transferred equipment, the records and controls were complete and adequate. The findings and appropriate recommendations were reported in each case to respective Managers.

As result of a review of eight months cash disbursements, the local working fund was increased \$500, bringing the new balance to \$2,000. This action was taken to eliminate the necessity of multiple replenishments during the month.

A transfer of \$300 for Professional and Trade Society travel was made between Engineering and Manufacturing Sections to cover personnel transferred between these sections. No change is being made in the Offsite Course budget since none of the employees affected were scheduled for attendance.

A meeting of General Accounting Specialists has been scheduled for October 6 to discuss problems of general interest to all departments. The primary purpose of this meeting is to insure that a reasonably uniform travel policy is being maintained throughout HAPO. Similar meetings will be scheduled later to discuss other selected areas within General Accounting.

We have been advised by Traffic Operation that effective October 1, jet coach flights will show a rate increase of about 10%.

Audit of FPD Printing and Duplicating conducted during September, 1960, has been completed. Report of findings is being prepared and will be issued early in October. Response to the service questionnaire, distributed to HLO and FPD sub-section management as part of the audit of 300 Area Printing and Duplicating, indicates a high degree of customer satisfaction with work performed by that group. A detailed breakdown of responses to the questionnaire will be contained in the audit report.

Notification of completion of audit of HAPO business through June 30, 1957 has been received from the General Accounting Office. Records retained pending this notification may now be disposed of providing they are otherwise eligible for disposal in accordance with prescribed retention periods.

Assistance was furnished the task force assigned to study HAPO printing facilities.

As a result of findings of the July, 1960 audit of Special Requests and Back-charges, and subsequent investigation by the Manufacturing Section, Department functions relative to burial of waste nuclear material received from AEC off-site contractors have been transferred to CPD. These functions have no relationship to normal FPD operating responsibilities and had been performed only as an additional service. CPD agreed to accept the work as it is compatible with other waste disposal activities performed by that group.

The quarterly physical inventory of precious metals and special materials was taken this month. Quantities on hand were recorded and verified by a member of the department Financial Section in conjunction with a representative from C & AO Inventories Operation. Reconciliations and reports will be completed and issued by C & AO in October.

A new procedure has been established for billing all customer-requested overtime at the rate of \$4.00 per premium hour. Prior to July 1, 1960, the amount of overtime worked at the specific request of a customer was not enough to justify the time required to make special billings; however, in the past three months customer-requested overtime has increased to the point where special billing will be required.

A review was made of the adequacy of funds allocated for FY 1961 in view of new and accelerated programs which are currently being considered, but which were not included in the budget. These programs include the following:

1. 4" I & E load.
2. Co-extrusion of I & E cores.
3. Vendor evaluation.

In addition, personnel increases are forecast for the Engineering Section in support of the above programs and expanded services which will be provided in line with the recent organizational changes. Current estimates, not including equipment, indicate that \$250,000, addition to the \$11,855,000 allocated, will be required for FY 1961.

Information for FY 1961 Midyear Budget Review is being gathered. Because of early due dates it may be possible to use quarterly personnel forecast of September 30, 1960, for the Midyear Review.

Preparation has been made for new procedures and cost codes for accumulating and distributing cost after October 1, 1960. New products and the change in organization have been taken into consideration. Work remaining includes:

1. Change cost codes on source documents in process. (Purchase orders, work orders.)
2. Precode all necessary exempt and nonexempt.
3. Change cost codes on equipment assignments. (Vehicles, office equipment, telephone.)
4. Establish new IME rates where necessary.
5. Recast First Quarter FY 1961 actual to conform with the new organization.

Accounting procedures have been established for accumulating and reporting the increased incremental cost incurred for the Vendor Evaluation Program. Components from Harvey Aluminum are now being evaluated, and components from Bridgeport Brass and Cliff Manufacturing will be evaluated in the near future.

A visit was made to the AEC Feed Material Center at Fernald, Ohio during the month to review their accounting system and method of feed material billings. For further details, see report dated September 27, 1960.

Manager - Finance

WS Roe:mfj

PLANT FACILITIES OPERATION

SEPTEMBER 1960

I. RESPONSIBILITY CHANGES

None.

II. ACHIEVEMENTS

A. Statistics

1. Duplicating

<u>Process</u>	<u>No. of Impressions</u>
Multilith	718,395
Verifax	7,017
Ozalid	11,776
Total	737,188

2. Utilities

	<u>Sept.</u>	<u>Aug.</u>
Average steam generated (M lbs/hr)	35.	32.
Maximum steam generated (M lbs/hr)	50	47
Total steam generated (M lbs)	24,899	24,160
Coal consumed (tons)	1,161.70	1,150.77
Evaporation rate (steam/coal)	10.71	10.50
Efficiency-Actual	74.2	67.2
Efficiency-Theoretical	71.0	71.5
No. of boilers on: 1 3 2 3 1		
Date of change : 0 13 14 26 27		
Sanitary water from 3000 Area (M Gals.)	108.42	101.23
Total water from 3000 Area (Avg. Rate GPM)	2,510	2,268
Total water from #3 & #4 wells (M Gals.)	16.10	17.98
Total water from #2 well (M Gals.)	.30	.30
Peak water consumption for 24 hrs. (M Gals.)	5.1	3.6

B. Operating Experience

The PRTR switchgear tie-in to the Emergency Electric bus at the 384 Building was performed on September 19 and 20. The portable Navy Department diesel emergency generator was utilized to provide emergency power to all customers except the 384 and 382 Buildings.

Change out of the 16" Sparling water meter on the sanitary water supply line was accomplished during the first two days of September. During this period the entire import flow was carried by the 12" import line. Large quantities of sand were observed due to the increased velocity through this line; however, the sand separators performed very well and no sand was observed in the distribution system or at points of usage throughout the Area.

The 12" import sanitary water line was taken out of service on September 28, to permit re-routing a section of the line in the vicinity of the 309 Building. Restoration to service is expected in mid or late October. Increased sand quantities were observed with the attendant flow increase through the 16" line, but no sand appeared to be reaching the distribution system.

C. Equipment Experience

Repairs to the steam distribution system were accomplished on September 17 and 24 with extensive scheduled outages. The seasonal orifice plate change was also made on the east export line steam flow meter.

D. Inventions and Improved Methods

All personnel in the Operation engaged in work which might lead to inventions and/or discoveries, advised that to the best of their knowledge none were made in the course of their work during September 1960.

E. Costs and Savings

Eighteen Model II CPs Portable Radiation Instruments were removed from the pool for excess. These 18 were selected as a result of high repair costs on the IBM listing, indicating a greater than average maintenance cost over a period of months. The remaining Model IIs will be excessed when maintenance costs indicate the necessity.

Total cost improvements submitted in September were \$4,141. Cost improvements submitted for calendar year-to-date total \$72,031.

F. Status of Projects and Major Jobs

ESR-102, 384 Building Personnel Facility - A request for bids has been made by AEC with bid openings set for October 4, 1960.

ESR-103, Renovation of 303-J Building - Design drawings have been completed and a request for J. A. Jones Construction Company has been made for them to supply a cost estimate. J. A. Jones Company will do the construction work because the building will have to be in service before a bid package could be prepared through AEC.

ESR-130, 3717 Building Sheetmetal Shop Addition - A small contract with J. A. Jones Company relative to site preparation, slab sawing and street grading is 75% complete; a small contract with J. A. Jones Company relative to conversion of shop space to two offices is 90% complete; a fixed price contract for the Building addition in process through AEC is scheduled for bid opening October 10, 1960.

ESR-203, Compressed Air Study - Comments were submitted to Design and Projects on the drawings and specifications for the new compressed air facility at the 384 Building.

ESR-209, Sanitary Water Study - A report on the comparison of Richland well water and Columbia river filtered water was circulated in 300 Area. The purpose of the report was to determine if a need exists for better quality water. A follow-up meeting on this report indicated that, although river water would be desirable, there is no justification for having it at this time.

ESR-219, Breeching Modification - The installation of the breeching modifications is under way and is about 10% complete to date.

ESR-222, North Ground Storage Tank Piping Modification - A request for bids has been made by AEC, with bid openings set for October 4, 1960.

ESR-226, Modification of Ash Sluice Area, 384 Building - A Construction Contract has been made with the J. A. Jones Construction Company to do the work. Demolition work began on September 27, 1960.

ESR-510, 384 Building Railroad Siding - This job has been contracted with J. A. Jones Construction Company and is now 60% complete. The work has been substantially delayed by the fact that J. A. Jones Company hauling equipment has been occupied with high priority work in the 100 Areas. They promise to be back on the job October 4, 1960.

ESR-514, Work Sampling, 1960 - The use of Data Processing Equipment is being considered. Contract and Accounting Operation has been authorized to develop techniques to mechanize work sampling. The procedure to be developed is to lay the ground work for computer analyzing of Indirect Labor Standards as well as the Work Sampling Programs. Technical Data Processing Development has been authorized \$500 for programming and debugging cost of the program. Personnel requested for the 1960 Work Sampling Survey Task Force has not yet been approved.

G. Special Reports Issued

None.

III. PERSONNEL

A. Safety, Security and Radiation Experience

Medical Treatment Injuries	25
Frequency Rate	5.15
Disabling Injuries	0
Serious Accidents	0

B. Meetings

Round Table-Staff	17
Safety and Security	13
Information	9

Manager
Plant Facilities Operation

E. Hilgeman:GSS:sd

RELATIONS PRACTICES OPERATION
SEPTEMBER, 1960

STATISTICS

<u>EMPLOYMENT</u>		<u>September</u>	<u>August</u>
Additions:	Exempt	1	2
	Nonexempt	<u>26</u>	<u>22</u>
Total		27	24
Reductions:	Exempt	2	0
	Nonexempt	<u>12</u>	<u>14</u>
Total		14	14

HEALTH AND SAFETY

Disabling Injuries	0	0
Serious Accidents	0	1
Medical Treatment Injuries	51	53
Medical Treatment Frequency	4.04	3.90

SECURITY

Violations - FPD	0	0
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SUGGESTION PLAN PARTICIPATION

Eligible employees	625
FPD suggestions received	38
Annualized rate per 1000 eligible employees	730
No. of suggestions adopted	33
Net annual saving	\$3,295
Amount of awards	\$ 690
Percent of total awards to savings	20.9
Average amount of awards	\$ 20.91

GENERAL

Department safety performance during the last several months has been outstanding. About 1,325,000 exposure hours without a disabling injury have been accumulated.

Plans for a Fire Prevention Program to be conducted during the month of October were completed. The program will include a slogan contest, special safety meetings devoted to fire prevention, and a suitable area display.

Salary progress charts for each monthly salaried employee in the Department were prepared and provided to each section.

A list of services provided by the Relations Practices Operation and the Financial Operation to the Department was completed and provided to all monthly salaried employees in the Department. The appropriate contacts for consultation on each of the service topics were indicated.

The Specialist, Employee Compensation participated in a HAPO-wide reconciliation of several exempt positions. A number of FPD positions were included in the review.

An analysis of certain jobs within the new fuel cladding plant was completed. It was concluded that existing classifications are adequate.

A survey was conducted to determine whether Department employees are familiar with all phases of the Company's Insurance Plan. The survey revealed that some employees were not fully aware of the Weekly Sickness and Accident provisions of the Plan. Appropriate action was initiated to correct the situation.

Employment activity particularly regarding vacancies in nonexempt positions continued at an accelerated rate this month. The increased hiring rate is due to staffing requirements for both the new fuel cladding facility and due to greater service support for the Plutonium Recycle Program.

RW McCullugh
Manager - Relations Practices

RW McCullugh:mb

END

**DATE
FILMED**

8 / 24 / 92