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FUELS PREPARATION DEPARTMENT

MONTHLY REPORT - AUGUST 1960

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DECLASSIFICATION BUT LEFT
UNCHANGED

Compiled by Fuels Preparation Department

September 8, 1960 Richland, Washington

RAL Rusche

5/15/23
U.S. Atomic Energy Commission

Work performed under Contract No. AT(45-1) - 1350 between the Atomic
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FUELS PREPARATION DEPARTMENT
MONTHLY SUMMARY REPORT
AUGUST - 1960

PRODUCTION

Finished production for August was 697.1 tons -- 101% of forecast.

At month end the bare uranium inventory increased slightly to 1305 tons over the July inventory of 1077 tons. Finished inventory was 1046 tons at month end as compared to 916 tons for the previous month.

ENGINEERING

Eight fuel element ruptures occurred during August. The numbers and types are essentially unchanged from the previous month.

One column each of bumper elements and control elements under irradiation as part of a 20 tube test were discharged at 400 MWD/T for preliminary examination. Five hot spots were observed on the control pieces and none on the bumper supported pieces. Of the remaining columns, two will be discharged at 800 MWD/T and the rest at 1200 MWD/T.

Twenty-three partially untransformed cores were rejected by the UT-2 tester. Purchase orders totaling \$50,000 have been received from NLO and MCW for three UT-2 stations for use at their sites.

The first practical use of Lamb waves for thickness tests was accomplished. This test measured Inconel tubing of .010" wall thickness. These results support recently obtained theoretical curves relating phase velocity of Lamb wave modes (in brass) to frequency and thickness which have also been experimentally confirmed. The UT-2 Transplutonium fuel core station being produced for HLO was completed.

The feasibility of pressure quench has been demonstrated on production quantities of 8" fuel elements. Significant reductions in braze porosity rejects were made in comparison to the control pieces.

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DC welding has been found to be superior to AC welding both in the reduction of pin holes and improved braze mixing.

Chemical milling of end recesses for NPR fuel elements has been successfully accomplished, on a laboratory basis, to a depth of .250", with satisfactory tolerances.

Fabrication of the equipment for NPR fuel Zirconium-beryllium braze closure piloting is essentially complete.

Process criteria have been written for salt bath methods for beta heat treating of the NPR fuel element. Startup work for the pilot plant prototype induction scanner for beta heat treating was initiated during the month.

Design and project work for CAF-847, New Fuel Cladding Facility, is on schedule. The bid for the autoclaves has been let. Purchase orders have been issued for most of the chemical equipment -- exclusive of recovery and storage. Design criteria for the uranium recovery system for the New Fuel Cladding Facility have been submitted for Design and Project review.

GENERAL

Manufacturing yield for 8" I & E was 83.2% compared to 88.0% for July as the result, primarily, of the rejection of two lots of elements late in the month. The 8" solid fuel element yield returned to normal levels at 89.9% compared to the 77.9% experienced in July.

One autoclave failure was experienced in August, bringing the total for the year to fifteen.

The August operating efficiency was 92.1% compared to 88.7% for July.

PERSONNEL STATISTICS

Number of employees - July 31, 1960 779
Number of employees - Aug. 31, 1960 786

	<u>Exempt</u>	<u>Nonexempt</u>	<u>Total</u>
General	1	1	2
Manufacturing	58	312	370
Engineering	50	36	86
Financial	12	6	18
Plant Facilities	35	266	301
Relations Practices	5	4	9
TOTAL	161	625	786

STAFF

General Manager, Fuels Preparation Department
 Manager, Manufacturing Operation
 Manager, Engineering Operation
 Manager, Financial Operation
 Manager, Plant Facilities Operation
 Manager, Relations Practices Operation

R. L. Dickeman
 W. M. Mathis
 J. W. Talbot
 W. S. Roe
 E. Hilgeman
 R. W. McCullugh

PATENT SUMMARY - AUGUST, 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 August, 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.

T. B. Correy	)	Atmospheric T.I.G.
I. V. Nelson	)	Welding Chamber
D. E. DeWitt	)	

R L Dickeman

General Manager
 Fuels Preparation Department

RL Dickeman:nkm

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MANUFACTURING OPERATION

August, 1960

CURRENT OPERATIONS

Production and Productivity

Statistics

	NORMAL						ENRICHED				
	8"	8" I & E				6" C 6" O	6" I & E				
	Solid	CIIN	CIVN	KIIN	OIIN	Water	Water	CIIE	KIIE	OIIE	Total
						Mix	Mix				
Current Month's Production											
Acceptable Fuel Elements Produced (Tons)	75.1	58.3	-	179.3	263.7	3.9	-	17.4	46.5	52.9	697.1
As % of Forecast Production	77	-	-	73	126	-	-	97	101	80	101
Cum. % of Forecast for Current Qtr.	82	219	23	94	102	93	88	97	100	87	97
As % of Past 3 Month's Average Production	169	119	-	80	109	195	-	145	129	129	106
As % of Past 12 Months Average Production	110	121	-	100	117	195	-	158	141	203	113
% of Forecast Achieved Last Fiscal Quarter	219	114	62	96	108	0	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 (%)	
Forecast (%)	92.1
Previous Month (%)	93.0
	88.7

Manufacturing Yield

Current Month (%)	90	84	-	86	81	80	-	83	88	84		
Forecast (%)	87	87	78	87	87	80	80	87	87	87		
Previous Month (%)	78	80	-	90	86	85	80	-	87	86		
Bare Uranium Available for Processing (Tons)	62	105	35	482	415	22	13	19	34	42	76	1305
Finished Products in Storage (Tons)	104	98	11	214	422		10	20	18	43	106	1046
Special Products Finished (Pieces) Poison												0
Uranium Utilization												98.5

ACTIVITIES

Production

Finished production for August was 697.1 tons, or 101 per cent of forecast. The higher than forecast production was caused primarily by increased operating efficiency.

Ten canning lines per day were operated as scheduled, for a total of 230 canning lines operated for the month.

A total of 1714 bismuth (pork) pieces were completed and sent to storage.

Yield Control

The manufacturing yield of 83.2 per cent for 8-inch I & E for August reflects a reduction from the 88.0 per cent yield attained in July. The reduction in yield for this model was caused by the rejection of two lots of elements late in the month. The lots were rejected when a short stroke which was outside the process standards was noted on one of the agitators and temperature variances caused by a damaged thermocouple was experienced in one furnace.

The August yield of the 8-inch solid fuel elements returned to normal levels at 89.9 per cent. Increases in the thin wall and welding reject categories resulted in a reduction in yield to 85.5 per cent for the 6-inch I & E elements during August as compared to the 87.1 per cent attained during July.

One autoclave failure occurred this month. The failure mechanism was water entry at the point of arc strike on a thin cap. No other thin caps were detected in the lot during radiography.

Other Activities

The following pieces were processed through the Fuel Recovery Operation during August:

8" Solid	1,638
8" I & E	24,098
6" Water Mix	425
6" Enriched I & E	<u>12,046</u>
Total	38,207

PLANT CONDITIONS, INCIDENTS, AND IMPROVEMENTS

General

Operating efficiency was 92.1 per cent as compared with a forecast of 93.0 per cent and an efficiency of 88.7 per cent reported last month. Of the total outage time, approximately 50 per cent was chargeable to operations and 50 per cent to equipment problems. The high contributors

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to equipment downtime were the horizontal agitators. Meetings and housekeeping accounted for the major portion of the operational outage time.

A bare uranium inventory of 1305 tons was on hand at month end. This is a 2.0 month supply of cores, which is slightly above the nominal 1.5 month supply considered to be adequate.

Finished product inventories total 1046 tons, or 1.6 month supply, based on scheduled reactor usage. Two block discharges, one at D and one at H reactor, are expected to reduce the finished inventory substantially during September.

One shipment of normal and enriched uranium scrap in the amounts of 59,345 pounds of normal uranium and 4,950 pounds of enriched uranium was made during August.

In line with a decision to phase-out C-64-F alloy jacketing components, all fuel elements produced this month utilized X-8001 components. There remain 28,000 pairs of CIIE and 17,500 pairs of OIIN components in the C-64-F alloy to be consumed, at which time total conversion to the nickel-aluminum alloy will be complete.

The first production run of contour base cans and corresponding sleeves was started on one line late in the month. The run was planned and scheduled to provide sufficient time for a comprehensive evaluation by Engineering and Quality Control personnel.

The consumption rate of virgin AlSi has increased from a monthly average of 14,000 pounds in the past, to 25,000 pounds per month during July and August. The reason for this increase is the effect that 100 per cent use of X-8001 alloy components is having on the nickel content in the canning furnaces. Previously, the lathe turnings from the C-64-F aluminum components were charged into the furnaces. This provided a longer period of time before the furnace contents reached the 0.5 per cent nickel allowable in the Process Standards, and equivalent amounts of virgin aluminum was saved. Recent changes in laboratory analysis methods also appears to have a bearing on AlSi consumption in the canning furnaces. More virgin metal is now required to keep the AlSi within process specifications than has been needed in the past.

During the first part of August, an increase in welding rejects was experienced. It was believed at first that the argon gas supply was contaminated. However, analysis of the gas showed 99.998 per cent purity. (The specification calls for 99.996 per cent purity.) The investigations regarding this incident proved fruitful as several small leaks were detected in the liquid argon supply lines. When the leaks were repaired, weld rejects were reduced to a normal level.

During the last quarter, component consumption has been one-half to one per cent above previous quarters. However, since the standard was exceeded only once during the same period, a component control program has been initiated in an effort to determine the cause of the increased consumption.

The installation of the automatic length gauges on all four facing lathes is now complete. Starting July 20, 1960, a new length control system utilizing the automatic length gauges was put into operation. This system eliminated the depth of cut measurements formerly required, and is designed to produce fuel elements with a high degree of uniformity in length, together with a guarantee of adequate cap thickness on all material. Use of the automatic gauging system has also resulted in a manpower reduction of two Metal Fabricators (one on each shift), who were formerly required for contour and length control on the lathes. The introduction of the new length control system has proceeded smoothly, and it is expected that significant quality gain will be achieved, both in uniformity of fuel element length and in reduction of "thin cap" incidents.

306 Pilot Plant

Two tests were conducted in the 306 Pilot Plant this month which are of considerable interest to Manufacturing.

After several small tests to determine the feasibility of pressure quench process and equipment, the first run of production proportion was completed. A total of 600 pieces were pressure quenched and accompanying these were 600 companion controls and 1200 alternate cycle controls which were quenched by the standard method. All pieces were faced, welded, and randomly tested for total internal and external bond count. From all appearances, substantial quality and yield gains in both internal and external bond categories can be achieved through this method of quenching. As verified by the following bond test data, the internal bond reject rate of pressure quench pieces ran 0.6 per cent while the control pieces ran 3.0 per cent. The external bond reject rate on the pressure quench pieces ran 0.0 per cent while the control pieces ran 0.5 per cent.

A 500 piece run using the single jack canning method was made to evaluate a new canning jack and new canning basket assembly. One of the baskets proved to be entirely inadequate and the second basket, after re-working was made operable. It is understood that this is only a test of prototype equipment using a cycle established during previous tests. It can be assumed that the equipment difficulties can and will be overcome. However, there are several obstacles encountered that seem worthy of mention. First, the fatigue factor. The capper and inserter have to reach out and down into the center of the canning furnace in awkward position causing fatigue in back, arm, and leg muscles. Secondly, the matter of skimming the duplex. The multiple activity chart indicates ample time for the inserter to skim the duplex each five cycles. However, the automatic loading equipment on the duplex makes skimming very difficult. On this cycle, time was not available for the operator to skim, remove the accumulated dross, and regasp his tongs in time to unload the duplex

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basket. These conditions were brought to the attention of the Process Engineering personnel connected with the development of this process.

305 Test Reactor

Routine production testing continued to remain in a current status with a backlog of approximately three days reactor time. This month approximately 20 per cent of the reactor time was devoted to special testing of graphite for the NPR reactor.

OPERATING PLANS

N Loading Activities

The first shipments of lithium-aluminum rod sections for the N loading were received this month. Canning of this material is scheduled to begin in September. Present specifications require lithium-aluminum alloy cores to conform with definite chemical properties. The total Li^6 received must be verified and factor weights established to facilitate accountability. To meet these requirements a sampling and analytical procedure has been prepared. In addition to chemical and mass spectrometer analysis, one target element from each heat will be tested at 305 for reactivity. Lots will not be released until all tests are complete and results analyzed.

Evaluation of Core Striations

A program of canning, for pile charging, uranium cores which contain certain types of surface imperfections was started this month. The background for this program dates back several years. During 1957, seventy-seven solid fuel elements failed in the reactors due to splitting of the uranium core. This splitting was caused primarily by high stresses within the core, resulting from thermal cycling. To preclude any possibility that surface imperfections in the core might be contributing to the split problem, a very rigid specification on all types of surface flaws was adopted. This specification was near the ultimate capability of the core fabrication process, and resulted in a large amount of uranium scrap generation. This specification was also extended to I & E fuel element cores when this program was initiated. However, the thermal characteristics of the I & E fuel element are such that the core stress problem is far less severe, and very little difficulty has been encountered from core splitting with this model fuel element. Quality cost studies during the past two years have brought into sharp focus the substantial cost resulting from the scrapping of large numbers of uranium cores due to the presence of surface imperfections. The great majority of these (about 90%) are rejected for shallow surface imperfections called "striations". Considerable experimental work has shown that not only are these striations shallow and unlikely to be stress risers, but are present (but masked) in a substantial percentage of acceptable virgin run cores. As a result of this work, a decision has been made to segregate I & E cores having this type

of defect and can and pile charge these in separate, identified lots. The first of these lots, ZR-800-D, containing about 4,000 pieces was canned this month. If the acceptability of this type of core defect is verified by pile testing, a major cost savings will be achieved through a reduction in the recycling of uranium scrap.

Projection Fuel Elements

The most important quality problem with projection fuel elements is the potential for excessive penetration of the support welds into the can wall. To assure that weld penetration is satisfactory, samples are taken routinely and destructively tested for penetration into the can wall. Weld penetration has been greater than desired, and usually runs close to the maximum limit of 20 mils. Statistical analysis of sampling data is the basis for material acceptance, but this is not fully satisfactory for several reasons. In the first place, process control by statistical sampling and analysis assumes that no adjustments which may affect the variable are made between sample selections. However, the nature of the resistance welding process requires very frequent changes to keep it performing satisfactorily, and it is not practical to sample on such a frequent time interval. Also, since the evaluation method is destructive, it is desirable from a practical standpoint to measure a relatively large number of welds from a few pieces rather than just one or two welds from a large number of pieces. However, this greatly increases the chance for statistical error in predicting the over-all quality. Because of these problems, every effort should, and is being made to convert to ultrasonic welding of projection fuel elements as soon as possible.

Vapor Honing

Occasionally during the autoclaving operation, fuel elements acquire excessive water stains and mineral deposits which cannot be removed by re-etching through nitric acid. In the past, such pieces have been rejected and sent to Fuel Recovery. A test was conducted to determine the feasibility of cleaning stained fuel elements with a blast of abrasive slurry of Al_2O_3 . This process, known as "vapor honing", was successful in removing all traces of the stains from the fuel elements with a 20 - 30 second treatment and with no measurable loss of the aluminum jacketing. After the stains had been removed, the fuel elements were etched in nitric acid, autoclaved, and re-inspected. Out of 393 pieces, there were no stain rejects. The surface condition appeared normal and comparable to that on regular production fuel elements. As a final check on unusual corrosion conditions which might have been induced by the cleaning operation, a number of these "vapor honed" pieces will be charged in the reactors and the surface conditions examined after irradiation. Based on favorable results from this check, it appears economically feasible to procure a small vapor honing unit for cleaning fuel elements which cannot be recovered by processing through the regular nitric acid bath.

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EMPLOYEE RELATIONS

Safety Performance

Members of the Manufacturing Operation were treated for 24 medical treatment injuries during August, a frequency rate of 3.82.

During August the Manufacturing Maintenance Sub-Section achieved a record of 1,589 days without a lost-time injury, which is approximately 700,000 manhours of exposure.

Radiation Control

For the four week badge period ending July 15, Manufacturing Operation personnel received a combined total of 8,474 mrad. Five individual exposures in excess of 300 mrad were recorded. This represents a significant increase over recent experience, and is directly related to the training of new personnel on the UT-2 testers. Radiation control procedures have been reviewed with all personnel, and job rotation to minimize exposure will continue on a planned basis.

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 August.

for HC Money
Manager - Manufacturing

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STATISTICS

1959-60

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ENGINEERING OPERATION
August, 1960

VISITORS

	<u>Company</u>	<u>Contact</u>	<u>Date</u>	<u>Reason</u>
J Preston	Allegheny-Ludlum	R Brown, Jr. GW Riedeman	8/4	Discuss nondestructive testing & demonstration of coextrusion & consultation on Zr technology.
H Sawyer	Nuclear Metals	WK Alexander	8/1-2 8/3-4	Discuss NPR Fuel Process.
O Hull	Ajax Magnethermic	AE Guay	8/1-2-3 8/4-5	Scanning Equipment.
A Smith S McCaskey	Allegheny-Ludlum	GW Riedeman WK Alexander	8/3	Negotiating NPR contracts.
P Loewenstein	Nuclear Metals	JW Nickolaus	8/22-23 8/24	NPR fuels development.
L Hayward	Airco	TB Correy	8/11	Ref. Machine welding torches.
L Becker	Bridgeport Brass	GW Riedeman	8/15-16	Negotiations for Zr cladding shells.
R Quadt	Reactive Metals	GW Riedeman	8/17-18	Negotiations for Zr cladding shells.
D Atkins	U.S. Chemical Milling	CH Shaw JW Nickolaus	8/31	Negotiation of chemical milling off-site development work.

TRIPS

	<u>Company Visited</u>			
R Brown, Jr.	Magnaflux	M Rogers	8/22	Observe testing process which may be applicable to testing of self-supported fuel element welds.
CH Shaw	U.S. Chemical Milling	LB Stearns	8/11-12	Discuss possible development contract on end recessing of NPR fuels.

<u>Trips</u>	<u>Company Visited</u>	<u>Contact</u>	<u>Date</u>	<u>Reason</u>
CH Shaw	Turco Products	R Self	8/11-12	Discuss possible development contract on end re-cessing of NPR fuels.
GW Riedeman	National Lead of Ohio	JF Schiltz	8/29-30	Conference on NPR billet quality and fabrication schedule.
GF Jacky	Industrial Plating Heath Plating	JK Werner F Bradford	8/17	Discuss possible future plating requirements.
EN Wells	Noble & Westbrook	Mr. Noble	8/21 to	Discuss design for automatic stamping machine.
	Engineered Ceramics	RH Gunther	8/26	"
	E. W. Bliss	WM Meid		"
		Mr. Haur		"
		T. Adams		"
	Coors Porcelain	A Pedigo		"
		W Everett		

PERSONNEL

<u>Name</u>	<u>Title</u>	<u>Operation</u>	<u>Nature of Change</u>	<u>Date</u>
DC Harland	Engr. Assistant	4360	Trans. to 4440	8/8
LF Kusler	Engineer	4430	Trans. to 4440	8/31
WB Anderson	Engineer	7231	Trans. to 4450	8/29
WH Hamilton	Engineer	4420	Trans. to 8174	8/1

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 August, 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.

Thos. B. Correy, I. V. Nelson
and D. E. DeWitt

Atmospheric T.I.G. Welding
Chamber

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PROCESS ENGINEERING

Fuel Performance and Requirements

Four natural uranium fuel element ruptures (two I & E and two solid) and four enriched I & E fuel element ruptures occurred in the reactors during August. These ruptures are summarized as follows:

<u>Fuel Element Type</u>	<u>Reactor</u>	<u>Exposure (MWD/T)</u>	<u>Rupture Classification</u>	<u>Jacket Alloy</u>
I & E Natural	H	547	*Unknown	X-8001
	KE	542	*Unknown	X-8001
Solid Natural	KE	658	Core Split	C-64
	KE	683	Core Split	C-64
I & E Enriched	C	769	Hot Spot	C-64
	D	463	Mech. Damage	X-8001
	KE	790	*Unknown	X-8001
	KW	423	Hot Spot	X-8001

* Ruptures classified as unknown include those ruptures which were either stuck in the process tube or lost in discharge, preventing examination and classification. These failures were previously shown in the unclassified category.

No significant trends in fuel element performance were apparent during this period. Numbers and types of ruptures were essentially unchanged from the previous month.

In addition to the regular production fuel element ruptures, four failures were sustained in production test material. Two zircaloy clad natural uranium test pieces in mixed charges failed in the KER Loops at exposures of about 5 MWD/T and 142 MWD/T, respectively. Neither of these ruptures have been classified. Two control pieces failed in a run-to-rupture test on four tubes each, of enriched (1.47% U-235) "bumper" supported and control I & E fuel elements in D Reactor at exposures of 340 MWD/T and 379 MWD/T, respectively. As a result of these ruptures, all control columns were discharged. Irradiation of the "bumper" columns has continued without incident to an exposure approximating 700 MWD/T. An exposure of about 925 MWD/T must be reached without ruptures to show a 30-fold improvement over the control material at the 95 percent confidence level.

One column each of the 20 tubes of collapsible bridge-rail bumper supported natural uranium I & E fuel elements and 20 tubes of control elements being irradiated in D Reactor was discharged at 400 MWD/T for preliminary examination. No hot spots were observed on the "bumper" supported pieces. Five hot spots were evident on the control pieces. Of the remaining columns, two are scheduled to be discharged at 800 MWD/T and the remainder at 1200 MWD/T.

Reactor charging of 100 tubes of OIIN I & E fuel elements prepared with solid "bumper" rails has been deferred until the September outage at D Reactor, pending further modifications of charging equipment and the development of suitable nozzle reaming and testing techniques. No further charging of "bumper" fuel elements is planned before December. OIIN fuel elements, which are about five mils smaller in diameter, will be prepared for future "bumper" element loadings.

The present program for the production scale evaluation of aluminum components supplied by new vendors is being reviewed in an attempt to accelerate irradiation testing. An IFD proposal to test two vendor's components simultaneously by loading 1/3 of four old reactors with each new vendor's product and the remaining 1/3 with control material, appears to be acceptable. Under this program it would be feasible to qualify two vendors in about twelve months, providing component performance proves satisfactory.

Because of increasing process tube distortion in the upper fringes of the older reactors, particularly B and F, IFD has requested that four-inch I & E elements be provided at a rate of about five tons per month, beginning early in CY 1961. A program has been initiated to make necessary equipment modifications, revise process specifications, and provide component drawings for procurement and preparation of this material. In order to minimize equipment changes, it is planned to can and finish the fuel elements in the pilot plant.

Uranium Technology

Approximately 140 tons of dingot uranium are currently being irradiated; about 40 tons have been discharged to date. There were no dingot failures this month. About 16, 20, and 11 tons of regular virgin, vacuum-outgassed virgin, and recovered dingot cores, respectively, were canned this month. Although the vacuum outgassed dingot cores have less total hydrogen than regular dingot cores, the porosity reject rate (3.6%) is not appreciably lower than for regular dingot (4.8%) and is slightly higher than for ingot cores (3.1%). This high porosity reject rate for vacuum outgassed cores is believed due to surface hydrogen picked up after outgassing during salt bath heat treating.

Twenty-three (23) partially untransformed cores were rejected by the UT-2 testers this month from a production lot of vacuum outgassed dingot cores heat treated by MCW. The partially untransformed areas varied from about one-half the core length to a small untransformed area on one end that was completely covered by transformed grains. This latter core was rejected by the difference and large grain circuits. The other 22 cores were all rejected by the small grain (peak) and difference circuits and all but two cores were also rejected by the large grain circuit. MCW does not know what happened in the heat treating conditions to produce these partially untransformed cores.

The evaluation of 525 oil-quenched ingot cores (OIIN) has been completed. These cores were oil quenched under four different conditions: (1) solid core blanks quenched in 90 and 150 F oil and (2) hollow core blanks quenched in 90 and 150 F

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oil. All four of the different conditions produced average grain sizes larger than normal 130 F water-quenched solid core blank ingot cores. The solid core blank oil-quenched pieces had larger average grains and smaller SORT ratio values than the hollow core blank pieces. The hydrogen content, x-ray diffraction results, braze porosity, and core warp after canning were comparable with normal ingot cores.

The 3X visual grain size standard kits for chloride salt bath water quenched heat treated HAPO cores and for bronze-tin bath heat treated SRP cores have been completed. These visual standards were selected by the Working Committee of the Fuel Element Development Committee as the preferred manner of reporting the grain size of uranium fuel cores.

Process Development

Two of the ten charges of nickel-plated fuel elements being irradiation tested under IP-263-FP were discharged for examination, at exposures of 500 MWD/T. Critical visual examination before cleaning revealed no evidence of nickel cracking, blistering, or sloughing. At the time of this writing, the fuel elements have been cleaned, and "profilometer" examination of 50 percent of the nickel-plated fuel elements revealed no nickel sloughing. Irradiation testing of the remaining eight charges continues without incident. An additional 64 nickel-plated fuel elements were charged in 105-KW under the IPD Mechanical Development poison column displacement test. These are X-8001 alloy jacketed with a one-mil thick chemical plate. The initial test column was discharged without incident after seven weeks in-reactor time. The fuel elements have not yet been examined.

A small-scale test of canning in nickel-plated components (all inside surfaces plated) indicated that braze-layer porosity is reduced to acceptably low levels employing canning bath temperatures of 605-610 C, and 40-60 seconds total submerge time with vibration during the entire submerge period. Stud-pulling results indicated satisfactory jacket core bond strengths with the Al-Si - uranium bond the weak link. A confirming test is underway. Salt bath outgassing of the cans at 500 C resulted in gross non-wetting. Preliminary tests with components and sleeves specifically designed for nickel plating revealed only minor assembly difficulties.

Assembly and installation of the prototype ultrasonic welder for self-support and bumper fuel elements is about 98 percent complete. Preliminary testing and mechanical operation shows the need for some minor modifications to improve operation.

The feasibility of pressurized quench has been demonstrated on production quantities of eight-inch fuel elements using regular components. A test involving 1825 control elements and 599 test elements resulted in no external and 0.66 percent internal bond test rejects, compared to 2.19 percent external and 0.98 percent internal rejects for the control elements. The average external and internal bond

counts for the test elements were 6.5 and 7.5, respectively. These are compared to 27.3 and 26.2 for the controls. These data show a very significant reduction in braze layer porosity. Further testing will continue when the prototypical automatic quench machine is fabricated and installed in the Pilot Plant.

A program to evaluate fuel elements prepared by solid state diffusion bonding processes has been initiated. A proposal was received from Sylvania Corning to prepare 2000 HAP0 size I & E hot press fuel elements for \$41,000 and is being reviewed. Concurrently, plans are underway to actuate the HAP0 hot press process for the production of test pieces early in calendar year 1961. Also, negotiations are in progress with SRP to obtain 2000 fluid pressure bonded fuel elements for evaluation.

Process Technology

Preliminary testing of prototypic equipment for single-jack canning was started in the pilot plant. The canning reject rate was low (3.5%), and the equipment performed very well. Only minor modifications will be required for large-scale testing of single-jack canning techniques. The primary advantage of single-jack canning over dual jack canning is the added uniformity in assembly conditions resulting from the use of single positions in the canning furnace for preheating components and fuel assembly.

A large scale evaluation of contoured base cans and steel sleeves was initiated on the production canning lines with favorable results. The reduced aluminum in the can base increases the heating rate during the can-sleeve preheat cycle, and assures that the Al-Si inside the base end of the can reaches the bath temperature prior to core insertion.

Bond strength measurements have been included in the "Quality Certification Program" as an added means of characterizing fuel element lot quality. Stud-pulling techniques previously developed are being used for this purpose.

The first lot (ZR-800) of recovered I & E cores having slight surface imperfections was canned during the month. Rejection rates were normal. All such material is being segregated and identified as "Z" lots to permit close scrutiny of irradiation performance and fabrication history.

Installation of the Lithium exhaust system in Special Products room to permit machining E-N material is complete. Installation of the cut-off saw and bar feed attachment is also complete. Finishes obtained with the cut-off saw are excellent, eliminating the necessity for further finishing operations other than machining to length on one end and chamfering. Fabrication of the E-N welder has been completed and is scheduled to start this week.

The comparison of direct-current with alternating-current welding has been completed and a document issued on this work (HW-66354). DC welding was found to be

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superior to AC for welding aluminum-clad elements. Three comparison tests were made involving 1700 fuel elements, and it was found that with DC there was a 77 percent decrease in weld voids (pinholes), a 34 percent decrease in weld cracking, and a 44 percent increase in braze mixing. It was also found that DC welding solved many of the present operating problems such as obliteration of stamping, oxides due to poor arc starts, melting of the contour, and oxide problems resulting from a deformed electrode. In addition, the weld height was found to be much more uniform than the height of the present AC welds. Some revisions to the present weld standards will be required since the DC weld had a thin film of oxide at the edges of the weld. There was a 19 percent decrease in total weld rejects with DC, and thus an increase in production reject rates is not expected.

A series of tests were completed this month on component cleaning and Al-Si wetting. This series demonstrated the following:

- a. Oakite 33 (Phosphoric acid) is not a suitable replacement for Diversey 514.
- b. Solventol Al-3074 is an alkaline cleaner employing a two-phase system. This proprietary compound was being reviewed for a possible replacement of Altrex. The alkaline action was not sufficiently inhibited and etching of the aluminum took place. A filming problem was present that lowered the Al-Si wettability below that of Altrex. No further consideration will be given to Al-3074.
- c. A test to vary the pH of the Diversey solution was made. The results of this test are statistically significant. The desirable pH of the deoxidizing solution must be held below 0.3. Further testing is planned in order to establish a positive recommendation for pH control.

306 Pilot Plant Activities

Approximately 5100 uranium cores were Al-Si dip brazed in the Pilot Plant for process development purposes. Twenty-four hundred (2400) of the fuel elements are for reactor use. The major items of process development were:

1. Aluminum component cleaning and wettability tests in molten Al-Si to:
 - a. Evaluate pH control on Diversey 514 deoxidizer solution.
 - b. Evaluate Solventol Al-3074 as a replacement for Altrex cleaner.
 - c. Evaluate wettability of Harvey cans.
2. Evaluate pressurized quench on production quantities of fuel elements.
3. Evaluate caustic etch as a replacement for penetration etch.
4. Evaluate single-jack canning method equipment.
5. Study effect of hydrogen control on ingot metal.
6. Study effect of increased sleeve length on cap end brittle bonding.
7. Evaluate bottomless sleeves.
8. Evaluate improved nickel-plated components for Al-Si dip brazing.
9. Evaluate use of contoured base sleeves and cans.
10. Fabrication of thick-walled Doe elements for IPD testing.
11. Provide elements for DC welding studies.

12. Evaluate effect of can-sleeve assembly clamping on braze layer porosity.
13. Evaluate effectiveness of Diversey 514 and cold nitric acid as a smut remover.

During the month, 1900 OIIN bumper fuel elements were produced on the electrical resistance spot welder at a yield of 83.4 percent. The production of the 90 tube charges required for the production test is complete.

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MATERIALS ENGINEERING

NPR Fuel Development

Material Procurement

Three contracts for four hundred and fifty pairs total (two hundred and twenty-five of each size) of zircaloy components were negotiated. One contract (fixed price) has been let. Two others are pending minor legal and financial clarifications.

Six silicon alloy 11-inch castings have been cast and extruded and are currently being machined at NLO. No fabrication problems were encountered.

Four as-cast 7 inch ingots were received at HAPO. Two billets were machined and heat treated. Both billets cracked severely.

Two enriched (1.6) KER single tube billets were received and extruded.

I & E Feasibility Study

A feasibility study has been completed for coextruding zircaloy clad I & E fuel elements which have the same I.D. and approximately the same O.D. as the N reactor inner tube fuel element. Initial quantities would be processed in December with expectations of delivering acceptable fuel elements to the reactor in January. Fabrication experience gained in this program will be invaluable during startup of the 333 Building, and also be the first indication of the quality of fuel element which can be coextruded on a repetitive basis.

Extrusion

The following extrusions were made during the month:

1. 5" Tooling

5 KER-OT composites, T-41, 42, 43, 44 and 45
4 KER-OT size copper billets

2. 7½" Tooling

2 NPR-OT composites (drop test), T-46 and 47
1 NPR-OT size copper billet

3. 6" Tooling

1 Zircaloy billet for NPR-IT braze end caps
3 KER-ST size copper billets
2 KER-ST composites (1.6 enriched), T-48 and 49

Training of one more engineering assistant on extrusion press operation (C. B. Ruhter) was completed during the month.

Chemical Milling

Chemical milling of end recesses to a depth of 250 mils is now being successfully accomplished on a pilot plant basis. The chemical milling solution characteristics have not been defined sufficiently to maintain control of the solution without 100% inspection of material during milling operation.

Braze Closure

Fabrication and installation of the equipment for the Braze Closure Pilot Plant is essentially complete. Testing and calibration of the instruments and equipment will be under way at month's end, and brazing of set-up pieces should begin within the first week of September.

A small quantity of Zr-Be alloy has been received from NMI and machined into rings as required for the brazing operation. Zircaloy caps and six inch NPR outer set-up pieces have been prepared.

Chemical Processing

A production test of KER size coextruded fuel elements was processed through chemical processes and vapor blasting during the month. Evidence of incomplete copper removal was observed on a number of elements after they had been bright etched. Additional processing with nitric and hydrochloric acids was performed which removed all but microscopic surface contamination. The copper removal processes are being further developed to correct this condition.

Experimental work was performed to determine oxide removal rates for induction heat treated coextruded fuel elements. Removal rates were slightly faster than for salt bath heat treated material. More detailed information on all types of heat treating processes was determined on removal rates for internal and external fuel surfaces for design criteria and equipment requirements for the NCF in the 333 Building. A design criteria report was issued containing the current data with suggestions on design improvements on vapor blast machines to be installed in the production facility.

Design criteria was prepared and submitted to Design and Projects for the recovery system in the New Fuel Cladding Facility. This system was based on a solvent extraction process to extract uranium from the various processing solutions and solutions from the dissolution of chips and abrasive cutoff sludge. The massive scraps consisting of extrusion end defects and reject fuel elements will be accumulated and returned to the producer's site in the zircaloy-2 clad form.

More recent thinking on the subject of recovery entertains the proposal of absolute minimum in the recovery equipment and processing to the point of pumping the spent uranium containing process solutions to a tank car

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storage which may be shipped directly to the producer's recovery site. All chips and fines would be barreled and periodically returned to the supplier. Economics of these systems are being evaluated.

Beta Heat Treating

General

Process criteria for the salt bath method of heating have been written. The most important detail of these criteria was expressed as the need to minimize warp resulting from heating and quenching. Inasmuch as warp is a detriment of the heat treating process, whose aim is to effect "beta-quenched" characteristics in reactor fuels, the concept of straightening cannot be considered beneficial. Straightening (either hot or cold working) of material of unique crystallographic, grain size and residual stress cannot be considered desirable in effecting subsequent in-reactor stability.

Start-up Of The Induction Scanner

Heating was started on August 18, 1960. Work has been directed exclusively at the NPR-OT geometry. The first tube heated was visually uniform in temperature, although a recorder connected to eleven thermocouples in the piece did not confirm the uniformity because of a fault in the recorder. When a new temperature recorder was connected, three consecutive runs were made in which the mean temperature was closely duplicated (751.4, 750.3 and 754.2°C). The standard deviation for these three runs were respectively 4.95, 5.33, and 4.83°C. These results are within the requirements specified for the process and they represent three of the best runs ever made by induction heating of uranium fuels.

Results on other tubes have not been good. In part, difficulties have been attributed to the voltage regulator; the reference voltage (output) unit failed and was replaced. More serious difficulty has been shown to be bent guide columns. This damage has caused a progressive wiping-out of the Oilite bearings in the main workpiece support carriage. The relation of this damage and the variables of coil:piece alignment, rotation of the workpiece and calibration of a radiometer are the main goals of current testing.

Ultrasonic and Eddy Current Testers

HAPO coextrusions 34, 36 and 39 (NPR inner tubes) were tested for HLO. Outer and inner clad thickness standard were made for NPR inner tube. Clad thickness of standard is now within $\pm 1/2$ mil.

Variation in grain size of billets for HAPO coextrusions 41-45 was measured. Sections from these extrusions will be examined to determine if the variation

in grain size results in a variation in the interface roughness.

Two testers will be developed for checking the braze end closure. One test will check the cap-core bond, and the other the clad-cap bond. Development work has just started on these tests.

Projection Seam Welded Closure

An examination of the two specimens submitted by Sciaky shows five cladding penetrations by molten uranium; virtually all of the inner projection rings on both pieces were unbonded, had large voids between the insert ring and cladding, and had cracks in all of the insert rings at the projection and in the uranium between the projection ring on both outer and inner cladding. The work is being discontinued on the basis that it does not appear to be a satisfactory closure method.

Ultrasonic Welding

Phase I is essentially completed, with approximately \$4,500 remaining. Part of the tooling for Phase II has been purchased with Phase I funds. The cost of Phase II will be approximately \$6,000 more than estimated because of additional tooling required. It is planned to visit AeroProjects the first part of September and evaluate their progress. If the development appears feasible, it is planned to authorize Phase II.

Diffusion Bonding

All work is stopped, pending procurement of gloves for the chamber that will not outgas enough to contaminate the argon atmosphere. Polyethylene and Propyethylene appear to be satisfactory materials for gloves. Purchasing is attempting to find a fabricator or supplier.

Brazed Closure Welding

Some work has been done on end contour development with the KER-O material available.

Induction Billet Heating

Layout and mechanical design is complete. Fabrication is 50% complete. Installation is to be completed during September.

Reactor Charges

Ten KER tube-in-tube fuel elements are needed by September 15 for a reactor test. Eighteen of the inner tubes are through support welding. However, they have traces of copper on the clad surface. If this copper can be removed, these pieces should be satisfactory for reactor charging. The first group of outer tubes intended for this reactor charge was rejected after

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heat treating and end closure welding because of defects in the clad surface.

Another group of sixteen pieces has been processed through heat treating and should be finished by September 9, 1960.

Equipment

Two boxes for shipping KER size fuel elements have been fabricated.

The Warner-Swasey turret lathe has been installed and is now being used for facing of pilot plant material. Tool development for braze closure facing is now in progress.

The following appropriation requests have been issued for the NPR development.

1. Installation of two chemical milling tanks, a uranium etch tank, and a rinse tank in the pilot plant chemical area. Purchase of material and fabrication of tanks is now in progress.
2. A strip chart recorder with 1/4 second full-scale response.
3. A 15 KW, 3000 cycle induction generator for braze bonding.
4. Two borescopes with 360" viewing heads.

TESTING METHODS

Process Fuel Element Testing

Bare Core Stations

Twenty-two pieces which had been only partially transformed by prior heat treatment were removed from the process stream by the UT-2 testers. One of the pieces was rejected by the "difference" circuit, which responds variations of average grain size along the core length.

Continuing trouble is being encountered with the programming circuit. Modifications have been made in an attempt to relieve these difficulties.

Purchase orders in the sum of approximately \$50,000 have been received from National Lead Operation and Mallinckrodt Chemical Works for three UT-2 stations for operation at their sites. NLO has requested one automatic and one manual test station, MCW desires one automatic station. This equipment is scheduled for delivery about February 1, 1961.

NPR Fuel Element Inspection

Preliminary tests in which cladding thickness instruments were operated at center-of-curvature balance rather than null-balance have shown a two-to-one improvement in signal to noise ratio. It thus appears that the new method of operation may significantly reduce unfavorable surface roughness effects.

Shop fabrication of four units for the new production facility has been initiated. With this equipment each fuel tube will be tested at two test stations: one for inspection of cladding thickness, integrity and bonding; the other for inspection of integrity and grain structure of the fuel core, plus an ultrasonic inspection of the closure.

New Methods Development

Closure Inspection

The UT-4 closure inspection test has been moved to the 313 Building for further evaluation.

Self-Support Weld Inspection

Experiments performed in Magnaflux Corporation's Los Angeles plant to evaluate a "bond-check" method of examining the welds of self-support rails were only marginally successful. The method, which sprays a heat sensitive liquid on the part and then heats it by Infra-red lamps, produced a slight discoloration on samples of extremely weak welds. All defective welds on several samples were not distinguished. Further tests will be made under

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more controlled conditions.

Various means of applying Lamb waves to this problem are also under investigation.

Lamb Wave Testing

A laboratory test set up to test the thickness of Inconel tubing with nominal 0.010 inch thick wall has proven successful. This test, which is believed to be the first practical utilization of Lamb waves for thickness measurements, draws on a strip chart thickness variation to an accuracy of about 0.0001 inches. The test reveal eccentricity which had not been previously suspected.

Recently obtained theoretical curves relating the phase velocity of Lamb waves modes in brass to frequency and thickness have been experimentally confirmed.

Customer Work

Quartz, Lithium Sulphate and Barium Titanate ultrasonic transducers irradiated to 5×10^9 R in a gamma field show serious impairment of the transducer assembly. Indications are that the deleterious changes occur in the plastic mounting fixtures and that the piezo-electric elements may not have been damaged.

The UT-6 Transp utonium fuel core station being produced for Hanford Laboratories has been completed.

DESIGN AND PROJECTS

CAF-847 - New Fuel Cladding Facility

Low bidder on the autoclave installation was Autoclave Engineers, Erie, Pennsylvania, at \$272,860. Bid invitations for building finishing were issued August 10, 1960, with opening scheduled for September 7, 1960.

Purchase requisitions have been issued for major equipment for:

- Billet Assembly
- Billet Evacuation and Seal
- Leak Detectors
- Chemical Tanks and Coils
- Chemical Exhaust System
- Chemical Degreasers, Deionizers, etc.
- End Machining Lathes

The above chemical equipment does not include that for recovery and storage.

Foundation walls and footings have been poured for the heating and ventilating facility, and most of the steel has been erected.

It has been established that chips and fines from the 333 building operation will be barreled in oil, stored on a concrete slab, and shipped by rail as a carload is accumulated. This procedure is considerably simpler than those previously considered.

CAF-894 - Increased Compressed Air Capacity

Detail design is in progress and on schedule.

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

A preliminary layout of the portion of the 313 building affected by projection fuel elements has been made in model form. Approximately 3000 square feet of existing storage and maintenance space are required on the basis of this layout.

ADVANCED ENGINEERING

Hanford Test Reactor

Routine testing continued without incident. Several special tests were conducted.

Asymmetrical Power Measurements

Fabrication of the prototype for 105-C basin is underway.

Control Studies

Additional writing and documentation was done for Hanford Laboratories' handbook on the control on uranium flows in metallic fuel processing.

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DRAFTING AND FILES

Major Jobs in Drafting

313 Building:

Component Revisions
Pressurized Quench Machine
Ultrasonic Welding Machine

333 Building:

Zr-2 End Cap Welding Machine
Fume Exhaust Systems
Chemical Piping and Tanks
Stack Support
Press Equipment and Tooling
Automatic Abrasive Cutoff Saw
Heat Treating Arrangement

384 Building:

Breeching Modifications

3717 Building:

Addition

Drawings Produced

New	63
Revised	51
Small Charts	17
Large Charts	7
Miscellaneous	20

SM. Gill

Acting Manager-Engineering

SM Gill:pl

FINANCIAL OPERATION
AUGUST, 1960

AEC Directive HW-515 giving general electric management responsibility and authority to incur costs in the amount of \$700,000 for Project CGF 903, Projection Fuel Element Modification - 313 Building (Phase I), has been received. General Electric will perform Title I, II and III services, related management services, procurement of equipment and tie in work that may affect operating continuity.

Unitization of Project CGF 810, 306 Building Pilot Plant Modification, has been completed. Total costs amounted to \$750,121 and underran authorized funds \$4,879. Identification of specific costs appears on the unitization report as follows:

Material	\$570 930
Labor	98 147
Indirect or Distributives	<u>81 044</u>
	<u>\$750 121</u>

The project was physically complete and transferred to Plant and Equipment in Service on March 15, 1960, the directive completion date.

The tentative FPD equipment allocation for FY 1961 appears inadequate based on current plans. Although the allocation is 13% higher than last year's expenditures, only \$70,000 remains unobligated and available for new items not in process at this date. A more precise evaluation of this picture will be possible during the next few months.

A schedule of General Plant Project work planned for FY 1961 has been submitted to Contract Accounting Operation. Two projects, requiring funds totaling \$179,500, are planned. We received an interim authorization of \$10,500 on Project CAF 894 during FY 1960. The balance of \$69,500 is expected to come from FY 1961 funds. The other project, 303 Area Storage Space, requiring \$110,000, is a replacement for Project Proposal CGF 876 which was returned by the AEC. Twelve capital work order jobs, requiring \$130,000, are also planned. To date, work orders in amount of \$106,000, covering ten of the planned jobs have been issued.

Travel costs recorded in July and August aggregated approximately \$5,000, the same amount incurred during this period last year. September business will amount to \$5,000 based on outstanding travel orders. Included in outstanding orders are two technical courses aggregating some \$1,000; the balance is in the area of general business and vendor contacts.

The budget allocation for Offsite Courses has been increased from \$2,400 to \$3,000. This amount is only 50% of funds requested and should finance nine courses.

Work orders have been issued to the Testing Methods group to cover fabrication of two UT-2 Fuel Core Testers. One order is for a manual tester for National Lead Company of Ohio. The other is for an automatic tester for Mallinckrodt Chemical Works. Procedures for controlling cost on these jobs are being coordinated with the Technical Shops and Cost Accounting group of Hanford Laboratories Operation.

The annual recruitment report was submitted to Prime Contract Administration on schedule.

A summary of reimbursable costs incident to the movement of employees to Hanford is being prepared for management use. This summary reflects the new provision of Modification 5 to Appendix B as approved by HOO-AEC on August 19, 1960.

Comments were furnished Contract and Accounting regarding the basis for billing HAPO's customers for services. Internal procedures and practices were reviewed in detail and several revisions were proposed for incorporation into the final procedure.

The HAPO-AEC audit schedule for the audit year ending July 31, 1961 has been received. Ten audits are required in FPD, nine of which are scheduled for the period January through July, 1961. The one remaining audit, covering 300 Area Printing and Duplicating, is scheduled for September. As part of this audit, a service questionnaire will be distributed to FPD and HLO subsection management early in September.

Work is continuing on the system of forms control. It is anticipated this work will be completed by the end of September, at which time all requests for printing or duplicating of forms will require the prior approval of the Specialist, Audits and Procedures.

A study of copy distribution on printed material produced by FPD Printing and Duplicating is currently underway. The purpose of this study is to determine whether copy distribution can be significantly reduced thereby decreasing the work load of Printing and Duplicating with consequent cost reductions.

A Cost Improvement board is on display in the area. Performance through August will be reported and the board updated as soon as information is available. Plans call for reporting on a monthly basis.

Procedures have been established for segregating FPD's incremental costs incurred in the evaluation of the quality of aluminum components purchased from vendors other than Alcoa. Test results will provide a basis for future decisions concerning source of supply. The procedure became effective with August reporting.

A meeting was held with CPD Cost Accounting representatives to exchange information on the various methods currently employed in accumulating and reporting maintenance costs for CPD and FPD. CPD is particularly interested in establishing a maintenance reporting system similar to the one presently used in FPD Manufacturing Maintenance. In view of this, all procedures, reports, and code structures related to this system were furnished for their review.

Applicable operating cost reports were reviewed with Manufacturing Maintenance administrative personnel to determine adequacy of the reports.

An estimate of Research and Development costs for Fiscal Year 1961 has been completed. A schedule of costs and related analysis are being transmitted to interested individuals.

Manager - Finance

WS Roe:mh

PLANT FACILITIES OPERATION

AUGUST 1960

I. RESPONSIBILITY CHANGES

None.

II. ACHIEVEMENTS

A. Statistics

1. Duplicating

<u>Process</u>	<u>No. of Impressions</u>
Multilith	703,159
Verifax	6,854
Ozalid	14,135
Total	<u>724,148</u>

2. Utilities

	<u>August</u>	<u>July</u>
Average steam generated (M lbs/hr)	32	28
Maximum steam generated (M lbs/hr)	47	36
Total steam generated (M lbs)	24,160	20,637
Coal consumed (tons)	1,150.77	989.95
Evaporation rate (steam/#coal)	10.50	10.42
Efficiency - Actual	67.2%	70.0%
Efficiency - Theoretical	71.5%	70.3%
No. of boilers on: 1		
Date of change : -		
Sanitary water from 3000 Area (M Gals.)	101.23	91.80
Total water from 3000 Area (Avg. Rate GPM)	2,268	2,057
Total water from #3 and #4 wells (M Gals.)	17.98	15.40
Total water from #2 well (M Gals.)	.30	.30
Peak water consumption for 24 hrs. (M Gals.)	3.6	4.1

B. Operating Experience

On August 5, low plant air pressure caused by a power failure in the 384 Building, resulted in a water-in-air lines incident. The 306 Building was particularly affected. Investigation of the incident indicated that the probable source of the water was condensate, which had collected in the distribution mains. When the air pressure was restored, the increased velocity most likely picked up several pockets of condensate and moved them along to the point of air usage. The corrective action recommended in the investigation report is being made.

B. Operating Experience (Continued)

A momentary electrical outage occurred at approximately 2:30 p.m., on August 31, when a truck struck a pole guy wire -- whipping the conductors together. Very little effect was noted in the 382 and 384 Buildings, although the boiler feed pump motor, grate drive motors, and sanitary water pumps in the 382 Building had to be restarted. Emergency equipment in the 306, 308, 309, 326 and 327 Buildings was on for one and a half hours.

Compressed air demand continued to be heavy. On several occasions the air pressure dropped from the normal 100 psi to 80 psi, with all four compressors in service. The possible utilization of auxiliary compressors located in several of the buildings is being considered.

C. Equipment Experience

The Navy standby 600 KW diesel generator was positioned for the PRTR switchgear tie-in outage scheduled for September 19. The outside overhead tie-in of the generator was completed during the month. Relocation of the battery charger and instruments was also accomplished.

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 work during August 1960.

E. Costs and Savings

Cost improvements submitted during August totaled \$15,149. Calendar year-to-date cost improvements total \$64,443.

F. Status of Projects and Major Jobs

ESR-100, 300 Area Grounds Improvement - Plans and specifications are complete and have been forwarded to the Construction Engineering and Utilities Operation for a cost estimate.

ESR-102, 384 Building Personnel Facility - Construction drawings and specifications were submitted to the AEC for their comments and assembly of a bid package.

F. Status of Projects and Major Jobs (Continued)

ESR-219, Breeching Modification - Fabrication of the new breeching and fly ash hoppers has proceeded under contract to the J. A. Jones Company.

ESR-222, North Ground Storage Tank and Piping Modification - Construction drawings and specifications were sent to the AEC for their comments and assembly of a bid package.

ESR-510, 384 Building Railroad Siding - The job, under contract to the J. A. Jones Company, is now 60 per cent complete.

G. Special Reports Issued

"Take The High Cost Out of Janitorial Jobs" (article submitted for publication) by T. H. Whatley.

"Fuels Preparation Department Space Requirements" by R. S. Quarles.

"Investigation of August 5, 1960 Unscheduled Compressed Air Outage" (3 reports) by T. D. Gibbs, R. G. James and H. L. Crose.

III. PERSONNEL

A. Safety, Security and Radiation Experience

Medical Treatment Injuries	25
Frequency Rate	4.86
Disabling Injuries	0
Serious Accidents	0

There were no security violations or radiation incidents reported.

B. Meetings

Round Table-Staff	22
Safety and Security	17
Information	6

Manager
Plant Facilities Operation

E Hilgeman:GSS:mkm

RELATIONS PRACTICES OPERATION
AUGUST, 1960

STATISTICS

EMPLOYMENT

	<u>August</u>	<u>July</u>
Additions: Exempt	<u>2</u>	<u>1</u>
Nonexempt	<u>22</u>	<u>13</u>
Total	24	14
Reductions: Exempt	3	0
Nonexempt	<u>13</u>	<u>14</u>
Total	16	14

HEALTH AND SAFETY

Disabling Injuries	0	0
Serious Accidents	1	0
Medical Treatment Injuries	53	49
Medical Treatment Frequency	3.90	4.07

SECURITY

Violations - FPD	0	0
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SUGGESTION PLAN PARTICIPATION

Eligible employees	625	617
FPD suggestions received	38	27
Annualized rate per 1000 eligible employees	730	525
No. of suggestions adopted	33	19
Net annual saving	\$3,295	\$8,933
Amount of awards	\$ 690	\$1,265
Percent of total awards to savings	20.9	14.2
Average amount of awards	\$ 20.91	\$ 66.58

GENERAL

A Bloodmobile visit to 300 Area was sponsored by the Department. One hundred eleven pints of blood were donated for the most part by employees in FPD and HLO, although a few employees from the outer areas also participated. Donations this year were down from 156 pints donated during a similar Bloodmobile visit in 1959. Forty-six employees donated for the first time.

The Department's off-the-job safety promotion campaign that has been carried on since last April was continued this month. Home safety was featured in the Department-wide office personnel safety meeting and also was the safety topic of the month. Water safety was featured in a pamphlet distributed to employees also this month.

Fuels Preparation Department was awarded the National Safety Council Award of Merit this month for having achieved an injury free exposure period in excess of 1,000,000 hours. The dates involved extended from November 11, 1959 through July 18, 1960. GE News publicity is being arranged. This is the third NSC award attained by the Department during the past four years. An Award of Merit was granted in 1957 for similar performance, and an Award of Honor was presented in 1958 for completing more than 3,000,000 hours.

Plans for the Department's 1960 Fire Prevention Program to be conducted during the month of October got underway. Representatives of each of the Sections have been assigned individual and team projects.

A meeting was held this month to discuss the hazards of using beryllium and/or beryllium alloys in the NPR fuel cladding plant. Interested parties within the Department as well as representatives from Industrial Medicine and Industrial Hygiene participated. Discussions during the meeting brought out several problems that require attention including the need for careful selection of employees to work in the plant, waste disposal, ventilation, and personal protection. Investigation of these problems is in progress.

The Department participated in a plant-wide reconciliation of certain exempt maintenance positions. Reconciliation of all Department positions involved was completed.

Case history information was provided to the Relations Operation regarding the administration of personal business and personal illness absences. Department experiences in these areas are being compiled with that of other HAPO components and will be used by the Relations Operation as a basis for the preparation of supplemental information. The supplement will be made available to Department management as an aid in improving the administration of Company policy.

A schedule of Department training courses to be presented during the fall and winter was issued. Scheduled courses include Interviewing Techniques and Business Operations in our Changing Environment.

Manager - Relations Practices

RW McCullugh:mb

END

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9 / 24 / 92