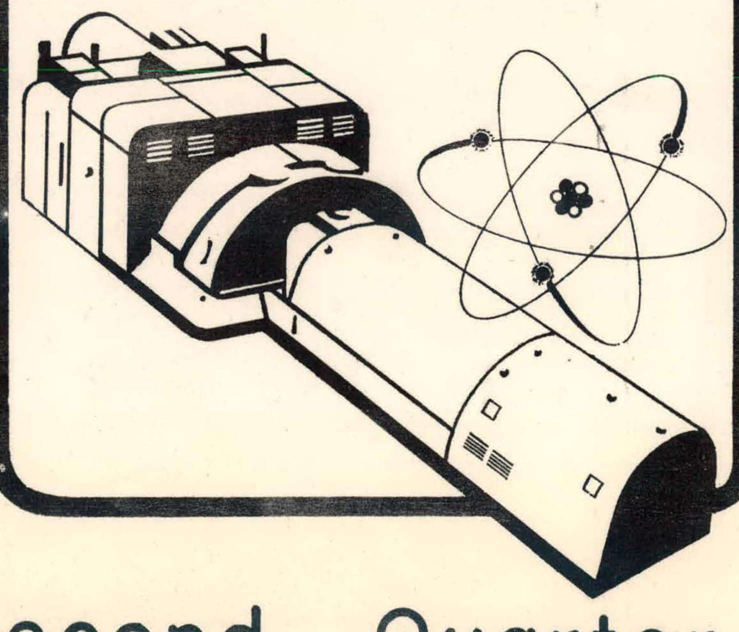
DLCS 5000270

DUQUESNE LIGHT COMPANY

Shippingport Atomic Power Station

Quarterly

OPERATING REPORT



Second Quarter 1970

Contract AT-11-1-292

United States Atomic Energy Commission

DISCLAIMER

Duquesne Light Company
Shippingport Atomic Power Station
Power Stations Department

QUARTERLY OPERATING REPORT
Second Quarter 1970
DLCS 5000270

Approved by ____________________
for F. J. Bissert
Superintendent

Contract AT-11-1-292
United States Atomic Energy Commission

TABLE OF CONTENTS

Preface		i
1.	SUMMARY OF OPERATIONS	1
2.	SUMMARY OF STATION PERFORMANCE	4
3.	CHEMISTRY	5
4.	MAINTENANCE	13
5.	TEST PROGRAM	16
6.	GLOSSARY	20

Preface

This Quarterly Report is prepared and issued by the Duquesne Light Company to disseminate information relative to all significant activities conducted at the Shippingport Atomic Power Station. Consistent with the premise that Shippingport was built to provide information and not power at competitive costs, this report makes no effort to analyze power production costs and makes no deductions regarding costs which might be achieved if Shippingport had been built and operated solely to produce power.

In preparation of these reports, it has been presumed that the reader has a working knowledge of nuclear reactors, reactor technology and/or electric utility generating station operations. The reader is reminded, however, that this is an operating report rather than a technical report. Anyone desirous of obtaining advice on recent technical progress related to the nuclear portion of the Shippingport Atomic Power Station is therefore referred to the United States Atomic Energy Commission, Office of Technical Information Extension at Oak Ridge, Tennessee, where this information is readily available.

1. SUMMARY OF OPERATIONS

During the second quarter of 1970, the Shippingport Atomic Power Station was operated as required for Duquesne Light Company system load demand, testing and maintenance. Two scheduled shutdowns and three power operation scrams occurred during the quarter. The 1D reactor coolant loop remained isolated and drained for heat exchanger tube leak repairs.

A scheduled shutdown occurred on April 10 for operating temperature reactor physics testing. Repairs were made to leaking valves in the main steam system and turbine at this time. The station was returned to service at 11:55 PM on April 12.

A shutdown and plant cooldown for maintenance and testing was undertaken on April 17. The reactor plant was cooled to 120°F with the 1AC Core Removal Cooling System in service from April 19 through April 28. During this shutdown, a small leak was discovered at one of the reactor core flow measurement instrumentation lines. The leak was successfully repaired. The Nuclear Protection System (NPS) Channel 1B Compensated Ion Chamber was replaced.

Modifications were made to the station switchyard during this plant outage. These modifications will permit interconnection of the existing Shippingport Atomic Power Station switchyard and the Beaver Valley Power Station switchyard, now under construction. During this work, it was necessary to disconnect the station from its normal AC power source. This provided the opportunity to conduct five loss of AC power casualty drills. Additional casualty drills relating to container radioactivity, circulating water interruption and control rod drop were also performed during the shutdown for operations group training.

Following the removal from service of the 1AC Core Removal Cooling System on April 28, cold and hot plant reactor physics testing was undertaken. Two reactor scrams occurred during the testing phase. The first, on April 29, was caused by a defective 24-volt power supply in the Nuclear Protection System channel 1A bistable circuitry. This module was replaced and testing resumed. On May 4, a second scram occurred, due to a high intermediate range power level of 1×10^{-7} amperes during hot plant testing conditions. The high level was attributed to an insertion of positive reactivity from a 6°F plant cooldown initiated when filling the boiler steam drums with the reactor initially critical at 1×10^{-10} amperes.

On May 5, high radiation and contamination levels were detected in the 1BD purification demineralizer cubicle area. The source of these levels was leakage from the container used to collect the reactor coolant and crud which were back-flushed from the demineralizer vent line during the filling of the demineralizer on April 25. Entry into the reactor plant containers was restricted until decontamination of the area was completed on May 8.

Testing of reactor and turbine plant relief valves was performed May 7 through 9. The station was returned to service at 3:56 PM on May 10.

A full reactor scram occurred on May 12 with the cause a malfunction of the pressurizer pressure wide range indicator-controller. Following the scram, attempts to duplicate the malfunction were unsuccessful. During this shutdown, the NPS detector for channel 1D was replaced. The station was placed in service at 1:38 AM on May 13 and new base values for the NPS channels were determined.

A partial scram on May 21 was attributed to a malfunction in the NPS channel 1A circuitry. Since no defective components could be detected at the time, the channel's solid-state modules were replaced and power operation restored at 3:34 AM on May 22. Channel 1A was removed from service for observation of further malfunctions. None were detected and the channel was returned to service on June 6.

A partial scram occurred on June 17 when the detector coil for the 1A reactor outlet valve malfunctioned, initiating a signal which shut down the 1A reactor coolant pump. The valve position detector was replaced and the station returned to power at 7:24 PM.

On June 22, work was undertaken to prepare the Heat Dissipation System for operation in anticipation of the return of the 1D reactor coolant loop to service and operation of the reactor at 100 percent power.

There was one shipment of solid radioactive waste for off-site disposal during the second quarter. This shipment of 532.3 millicuries of radioactivity was contained in 134 drums weighing 29,940 pounds.

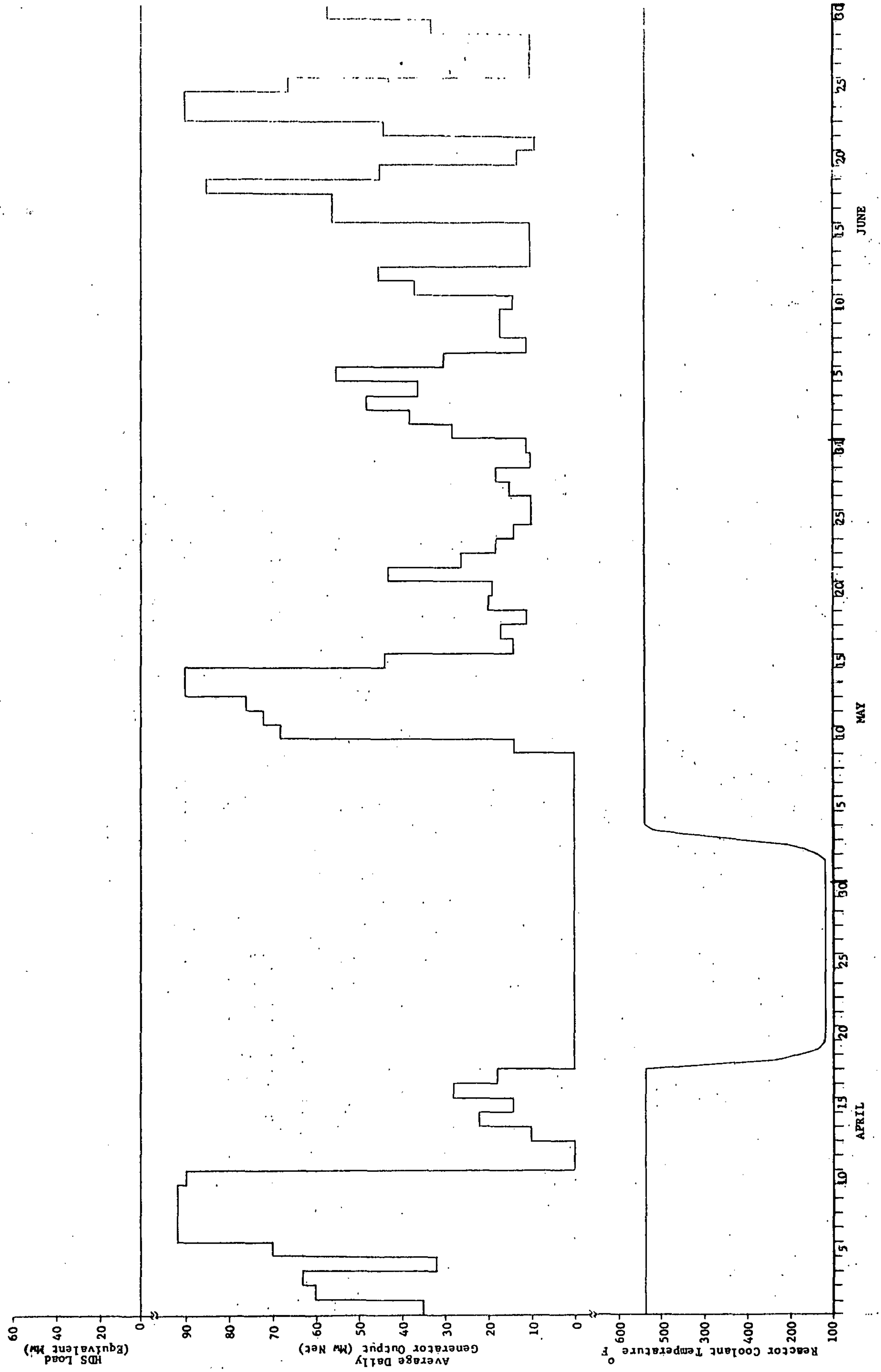


FIGURE 1

Generator Output, HDS Load and Reactor Coolant Temperature During Second Quarter Period 1970

2. SUMMARY OF CORE 2 STATION PERFORMANCE

Electrical output (Gross) to date.	kwhr	2,446,859,700
EFPH to date (Blanket operating time).	hr	16,965.9
EFPH to date (Seed 2 operating time).	hr	3,313.9
EFPH for the quarterly period.	hr	492.2
Hours reactor critical to date	hr	36,555.1
Hours reactor critical for the quarterly period. . .	hr	1,695.2
No. 1 main unit service hours (quarterly period) .	hr	1,525.9
Net Station output (quarterly Period)	kwhr	57,314,000
No. of forced outages*		3

* Interruption of electrical output due to protective relay action and/or operator action as required to protect the Station.

3. CHEMISTRY

In the second quarter of 1970, the chemistry section maintained the various plant systems in accordance with chemical specifications. Portions of the following tests were performed in conjunction with the test program:

DLCS 58001 - Reactor Coolant Fission Product Activity

DLCS 59201 - Reactor Coolant Crud Study (Periodic Sampling)

DLCS 59203 - Reactor Coolant Crud Study (Crud Fractionation)

Reactor Plant

The 1D reactor coolant loop and the 1BD purification demineralizer remained out of service the entire quarter. Water conditions of the 1A, 1B and 1C reactor coolant loops were maintained in accordance with the station manual. The operating water conditions observed during power operation are summarized in Table I. No out of specification primary coolant conditions were observed while at power during the quarter. Table II summarizes reactor coolant conditions while the station was shutdown. On May 7 and again on May 9, hydrogen additions to the primary coolant were required due to low, out of specification primary coolant hydrogen concentrations which occurred during plant heat up and testing. All other required chemical conditions were maintained while shutdown.

The Component Cooling Water System met required chemical specifications throughout the report period. Exhaustion of the 1B Canal Water Demineralizer resin in June resulted in the canal water slightly exceeding the specified maximum conductivity of 5.0 micromhos. The 1B Canal Water Demineralizer was isolated and its resin discharged. On June 30, a satisfactory effluent was obtained from the outlet of the 1A Canal Water Demineralizer. The primary charging water remained out of pH and conductivity specifications due to the unresolved problem of the presence of ammonium hydroxide in it. The chloride content of the charging water remained below 0.05 ppm. Chemical conditions of Reactor Plant Auxiliary Systems are summarized in Table III.

The Cs^{138} activities of the reactor coolant remained relatively constant during this quarter. All values are corrected to a standard base of 67 percent reactor power, four reactor coolant loops, two purification demineralizer loops in service at 33,000 pounds/hr flow through the demineralizers and 536°F Tavg operation.

Average Cesium - 138 Activity

Month	dpm/ml	uc/ml	No. of Observations
April	496	2.26×10^{-4}	10
May	543	2.47×10^{-4}	2
June	527	2.40×10^{-4}	7

On June 27, 1970, at 3292 EFPH, the reactor tritium activity was 1.4 uc/liter. This value is slightly lower than previous Core 2 Seed 2 tritium activities.

During the second quarter, several tests were performed in conjunction with the test program. DLCS 58001, Reactor Coolant Fission Product Activity, was performed April 12 and 13 at 2946 EFPH. Iodine 131 and 133 analysis did not show any evidence of fuel failure. Samples for DLCS 59201, Reactor Coolant Crud Study (Periodic Sampling), were collected each month during the quarter. Collections obtained in May and June were discarded due to loss of portions of the samples. Analysis of samples obtained April 5 remains in progress. Two sample collections were obtained for DLCS 59203 Reactor Coolant Crud Study (Crud Fractionation). Analysis of these samples remains in progress.

The 1BD purification loop remained out of service the entire quarter. The plant was operated with the 1A, 1B, and 1C reactor coolant loops and the 1AC purification demineralizer in service with flow at 33,000 pounds per hour. A fresh charge of ammonium hydroxide resin was installed in the 1AC purification demineralizer on April 30. Gross non-volatile gamma activities after 15 minutes decay ranged from 11,103 cpm/ml at 11 percent reactor power to 71,236 cpm/ml at 67 percent reactor power.

During the report period, the 1AC purification demineralizer produced decontamination factors of 137 to 725 as counted after a 15 minute decay period. Of the eight routine weekly crud samples obtained, specific activities ranged from 2.06×10^7 cpm/mg to 4.49×10^7 cpm/mg after a 120 hour decay. The crud concentration ranged from 2.77 ppb to 4.37 ppb.

Turbine Plant

The 1D reactor coolant loop heat exchanger remained out of service during the entire quarter. The 1A, 1B, and 1C reactor coolant loop heat exchangers were utilized for all power operations. There were several lay-ups during this period. Hot lay-ups occurred during the following time periods: April 10 to 12, April 18 and May 3 to 10. No evidence of primary to secondary leakage was detected in the heat exchangers. No problems were encountered with the chloride build-up rate in the secondary water due to circulating water to secondary water leakage. Chemical specifications were maintained for the heat exchangers during operation without exception. On May 12, 1B and 1C heat exchangers did not meet the minimum specified pH for lay-up following an inadvertent reactor scram. One instance of the hydrazine residual falling below the specified minimum occurred during cold lay-up. No further difficulty was encountered following corrective treatment.

Radioactive Waste Disposal System

The radioactive waste disposal ion exchange system was used to process liquid waste from four surge tanks. Radioactive liquid waste from eight chemical waste tanks was processed through the evaporator. The effluents of these two processing systems were combined at the test tanks. This method of operation (mixed process effluent) was initiated in the forth quarter of 1969. The difficulty encountered with this method is that the evaporator effluent is not as uniform in quality as that of the ion exchangers. Three test tanks were returned to a surge tank. The Xe^{133} activity of the vent gas system ranged from background to 3.32 dpm/cc (1.4 x 10^{-6} uc/cc) during the quarter.

TABLE I

Reactor Coolant System

Water Conditions and Chemical Adjustments

Operating Conditions

Chemical Condition	Specifications	Analytical Results Min.	Analytical Results Max.	NH_4OH Additions Liters	Degassification Hours
1. pH @ 25° C	10.20 ± 0.10	10.10	10.30	121.9	76.75
2. Specific Conductivity umhos	----	30	57		
3. Ammonia - ppm	----	16	26		
4. Total Gas - cc/kg	125 Maximum	52	112		
5. Hydrogen - cc/kg	10 - 60	27	53		

TABLE II

Reactor Coolant System

Water Conditions and Chemical Adjustments

<u>Shutdown Conditions</u>

Chemical Conditions	Temp.	Specifications	Analytical Results Min.	Analytical Results Max.	NH_4OH Additions Liters	H_2 Addition cu. ft.
1. pH @ 25° C	> 200°F	10.10 - 10.30	10.10	10.27	17.6	80
	< 200°F	6.0 - 10.50	9.45	10.16	6.0	0
2. Total Gas - cc/kg	> 200°F	80 Max	17	79		
	< 200°F	25 Max*	16	16		
3. Hydrogen - cc/kg	> 200°F	10 - 60	6	41		
	< 200°F		10	10		
4. Oxygen - ppm	> 200°F	< 0.14	0.005	0.010		
	< 200°F	< 0.3	0.005	0.015		
5. Chloride - ppm	> 200°F	< 0.1	N.D.	N.D.		
	< 200°F	< 0.1	N.D.	N.D.		

Shutdown periods: April 10-12, April 17 - May 10, 1970 (< 200°F April 18-May 3), May 12, May 21-22 and June 17 (Due to Reactor Scram).

* Degassification to 25 cc/kg must be accomplished prior to reducing reactor coolant pressure below the minmum required for reactor coolant pump operation.

TABLE III

Reactor Plant Auxiliary Systems

Water Conditions

System	Specified Conductivity umhos	pH at 25° C	Cond. - ppm			Gross Gamma* Activity-dpm/ml
			CrO_4	Cl	Dis. O_2	
Component Cooling						
Specifications	none	8.30-10.50	500-1000	1 ppm max.	none	none
Observed	1300-1575	8.99- 9.17	534-813	0.5	-	Bkgd.
Coolant Charging Water						
Specifications	2.50 max.	6.00- 8.00	none	0.1 ppm max.	none**	none
Observed	3.5-6.9	8.43- 9.40	-	<.05	-	-
Canal Water						
Specifications	5.00 max.	6.00- 8.00	none	none	none	none***
Observed	2.8-6.3	6.57- 6.89	-	-	-	Bkgd-13 ± 9

* Multiply tabular value by 4.55 x 10^{-7} to obtain uc/ml
** Should be <0.14 ppm for reactor plant cold shutdown
*** Normally near background

TABLE XV

Operating Heat Exchanger Chemistry

Water Chemistry

Water Conditions	Specifications	Operating Heat Exchangers			
		1A	1B	1C	1D
1. Dis. Salts - ppm	Min. --- Max. 1000	58 178	41 195	45 192	
2. Phosphate - ppm	Min. 5 Max. 100	32 100	28 100	28 100	
3. Chloride - ppm	Min. 0 Max. 0.5	0.15 0.49	0.15 0.49	0.15 0.49	
4. Hydrazine - ppm	Min. (residual) Max.	0.003 0.094	0.021 0.089	0.027 0.090	
5. Silica - ppm	Min. 0 Max. 25	0.80 2.60	1.00 2.60	1.00 2.90	
6. pH at 25° C	Min. 9.50 Max. 11.00	9.90 10.70	9.55 10.70	9.57 10.63	
7. Chemicals Used, lbs.					
Na_3PO_4		18	18 1/2	17 1/2	
Na_2HPO_4		5 3/4	5 3/4	5 3/4	
NaH_2PO_4					

TABLE V

Non-Operating Heat Exchangers

Water Chemistry

April 1 - June 30, 1970

Water Conditions	Specifications	Non-Operating Heat Exchangers 1A***	1B***	1C***	1D
1. Dis. Salts - ppm	Min. ---	83	50	57	
	Max. 1000	184	188	192	
2. Phosphate - ppm					
(Hot Lay-up)	Min. 5	48	22	26	
	Max. 100	100	100	97	
(Cold Lay-up)	Min. ---	48	52	48	
	Max. ---	110	110	120	
3. Chloride - ppm	Min. ---	0.10	0.10	0.10	
	Max. 0.50	0.45	0.45	0.45	
4. pH @ 25°C	Min. 10.00	10.10	9.90*	9.99*	
	Max. 11.00	10.80	10.81	10.80	
5. Hydrazine - ppm					
(Hot Lay-up)	Min. Residual	0.002	0.002	0.002	
	Max. ---	2.6	1.4	3.1	
(Cold Lay-up)	Min. 50	22**	22**	22**	
	Max. 100	56	66	79	
6. Chemicals Used (Pounds)					
Na_3PO_4		18 1/2	13	13	
Na_2HPO_4		9	8	8	
N_2H_4		18	19 1/2	14 1/2	

* Out of Specifications due to Reactor Scram
** Out of Specification April 29, 1970, N_2H_4 treatment corrected the out of specs condition.
*** 1A, 1B, 1C under hot lay-up from May 3-10, May 12, May 21-22 and June 17, 1970.

4. MAINTENANCE

Routine repairs of major components, instruments, controls and preventive maintenance were performed during the quarterly report period. Major components which were repaired or replaced during the report period are summarized as follows:

1-D Heat Exchanger

Repair of the 1D reactor coolant loop heat exchanger, which had been undertaken during the last quarter of 1969, continued throughout this quarter. Tube removal work and tube plugging were completed. The removal of all equipment, lead shielding, identification plugs and index sheets was in progress prior to flushing all tubes in the unit when the quarter ended.

Laundry Service

The 1-B industrial laundry machine (50 pound capacity) was removed from service completely and in turn was replaced by a new laundry machine of 140 pound capacity. The old machine was worn out and no longer useable.

Circulating Water Intake

The river channel area adjacent to the circulating water intake was dredged on May 4 through 8, 1970, to remove a sand bar which had formed at the intake of the Screen House.

Main Unit Turbine

Upon observing a steam leak inside the enclosure of the main unit turbine, the steam chest cover was removed and inspected. It was discovered that steam was leaking around the gasket and had eroded a number of areas on the steam chest face. It was then necessary to replace the gasket, weld three areas on the steam chest face, weld one area on the steam chest cover, clean and repack the throttle pressure isolation valves and clean the gib sliding surfaces. After repair and assembly, the insulation was replaced and the turbine was returned to service.

River Water Booster Pump

The river water booster pump was removed from service due to failure of the pump thrust bearing. It was found necessary to replace the main shaft, impeller, wear rings, shaft sleeves and bearings. The pump was then re-assembled and returned to service.

Air Cooling System

There were two components of the Air Cooling System repaired during this quarter. During the April 17 thru May 10 station shutdown, the 1-A and 1-B outlet butterfly valves were overhauled because of excessive leakage at the seats when the valves were pressure tested. The hub seals and seats on both valves were replaced. Following re-assembly, a leak check was conducted and results proved the overhaul to be satisfactory. Also the 1-A Reactor Plant Container supply fan motor was repaired. It was necessary to clean the motor and install new bearings.

Water Treating Clarifier

The clarifier was removed from service for a complete overhaul. It was necessary to replace inner and outer shafts, support bearings and agitator paddles. Also at this time, the sludge scraper was thoroughly cleaned and inspected. The clarifier was then re-assembled and returned to service.

1-B Cool-Down Heat Exchanger Pump

Under preventive maintenance, the 1-B cool-down heat exchanger pump was disassembled, cleaned and inspected. A new mechanical seal was installed. The pump was then re-assembled and returned to service.

Reactor Vessel

During a station shutdown, a primary coolant leak was discovered at a seal weld on the reactor vessel at a flow measuring instrumentation connection. The seal weld was repaired.

Blow-off Tank

A previous inspection of the blow-off tank revealed that the ejector discharge pipe had a broken mounting bracket. During a station shutdown a new bracket was installed.

Heat Dissipation System Steam Stop Valve

Excessive leakage past the H.D.S. steam stop valve had been determined to be in the external bypass line. Since the stop valve had an internal bypass, the external piping was isolated to correct the problem.

Sample Train

Four stop valves in the Reactor Coolant Sampling System were replaced with new valves during the April shutdown.

5. TEST PROGRAM

The primary objective of the test program during the quarterly report period was to continue reactivity depletion of Core 2 Seed 2 in order to determine irradiation and reactivity lifetime properties and core power distribution as a function of lifetime. Other objectives for this period were to perform periodic calibrations of primary plant temperature, pressure, and flow instrumentation. Tests were also performed to check the operation of the FEDAL System, Axial Flux Measurement System, Nuclear Protection System and control rod drive mechanisms. During the scheduled station shutdowns of April 10 through 12 and April 17 through May 10, reactor physics tests were performed. Radiation surveys were taken on the reactor vessel head and reactor coolant loops and purification demineralizers. The reactor plant container integrity was checked at the butterfly valves.

Twenty-eight tests were performed during the report period. Twenty-five tests were completed and three remained in progress at the end of the quarter. Table VI lists these tests and Figure 2 displays the performance dates. Information pertaining to chemistry tests may be found in the Chemistry section of this report.

The Reactivity Loss Rate Coefficient Test (DLCS 64001) was performed April 7 through 9. A Temperature Coefficient of Reactivity at Power (DLCS 63401) of approximately $-3.2 \times 10^{-4} \Delta\rho/^{o}F$ was determined on April 10 with the reactor operating at 67 percent power and 2943 EFPH accumulated on Core 2 Seed 2. At 1850 hours on this date, with 2946.7 EFPH accumulated, the reactor was rapidly shut down from 67 percent power and the resulting Xenon Transient (DLCS 63301) was followed. Peak xenon accurred at approximately six hours following shutdown and the Group II control rods returned to the critical height recorded at shutdown approximately 20 hours, 20 minutes following shutdown.

The core axial flux was measured for power range, equilibrium xenon conditions (DLCS 63502) on April 10. Iron-manganese wires were irradiated for five minutes at 67 percent reactor power. On April 11, zircaloy wires were irradiated for 20 minutes at both peak xenon and the return time for measurement of the axial flux during the Xenon Transient (DLCS 63503).

A series of reactor physics tests was performed during the April 17 through May 10 station shutdown. The Nuclear Protection System checkouts (DLCS 60801 and 60802) were performed April 20 and 21 and May 7 and 8. Critical control rod heights at ambient temperature were determined for selected sets of one control rod fully withdrawn and an adjacent rod withdrawn to some intermediate height (DLCS 63601) from April 29 through May 2. Critical bank heights at ambient temperature were also obtained on May 2 for all possible combinations of control rod groups withdrawn to uniform heights (DLCS 63603) except that criticality could not be attained for the Group III rods, even when withdrawn to their full height. The temperature coefficient of reactivity at zero power was determined in the range from $135^{o}F$ to $180^{o}F$ on May 2 (DLCS 63201). The reactor coolant temperature was then increased to $450^{o}F$ on May 3 using mechanical heat input from the reactor coolant pumps and the pressure coefficient of reactivity at zero power obtained from 1400 to 2000 psig. The temperature was again allowed to increase and the temperature coefficient determined from $450^{o}F$ to $538^{o}F$ on May 4. A reactor scram occurred at this point and the determination of the temperature coefficient from $538^{o}F$

was postponed until May 10. The control rod drive mechanisms were successfully tested at operating temperature (DLCS 66101) on May 5. Control Rod Positions for Criticality at Operating Temperature (Critical Bank Height and Bank Worth Measurements) (DLCS 63701) was performed on May 10 prior to the station start-up.

The Periodic Intercalibration of Temperature Sensing Elements (DLCS 60901) was performed April 12 and May 5 through 7. The platinum resistance bulbs were calibrated. They were then installed in the 1A, 1B and 1C reactor coolant loops and pressurizer on April 29. A comparison of the reactor plant pressure instrumentation was made on April 12 at operating temperature and pressure (DLCS 61002) in order to determine what pressure instrumentation required calibration during performance of the Periodic Calibration of Pressure Instrumentation. The pressurizer wide and narrow range pressure and 1C reactor coolant loop pressure instrumentation was calibrated from April 20 through 27. The 1D reactor coolant loop pressure instrument was calibrated on June 19. Pressurizer level wide and narrow range indicators (DLCS 61201) and 1A, 1B and 1C reactor coolant loop flow instruments (DLCS 61301) were calibrated on June 16, All of the above calibrations were performed in conjunction with the calibration of the Data Acquisition System (DLCS 60401).

The seed fuel assembly at core location E-10 was monitored by the FEDAL System on April 12 and May 10 during station start-up (DLCS 58301). The tests yielded normal results indicating no cladding failures in this assembly.

The FEDAL System Checkout Test (DLCS 58201) was performed from June 22 thru June 24, followed by the FEDAL System Operational Test (DLCS 58401) on June 24. Because the FEDAL System could not be placed in the normal system arrangement (a valve was stuck in the closed position), the operational test was terminated with no data obtained.

Radiation surveys were performed on the reactor coolant system piping and components (DLCS 58501) on April 20. The reactor vessel head was surveyed (DLCS 58601) on April 21 and a radiation survey of the 1AC purification demineralizer (DLCS 58502) was performed on June 10.

The Reactor Plant Container integrity was checked at the butterfly valves (DLCS 56802) April 25 thru April 28. This test was performed following extensive repair of the exhaust butterfly valves. An acceptable leak rate was obtained for both the supply and exhaust valves.

TABLE VI

Tests Performed During Second Quarter of 1970

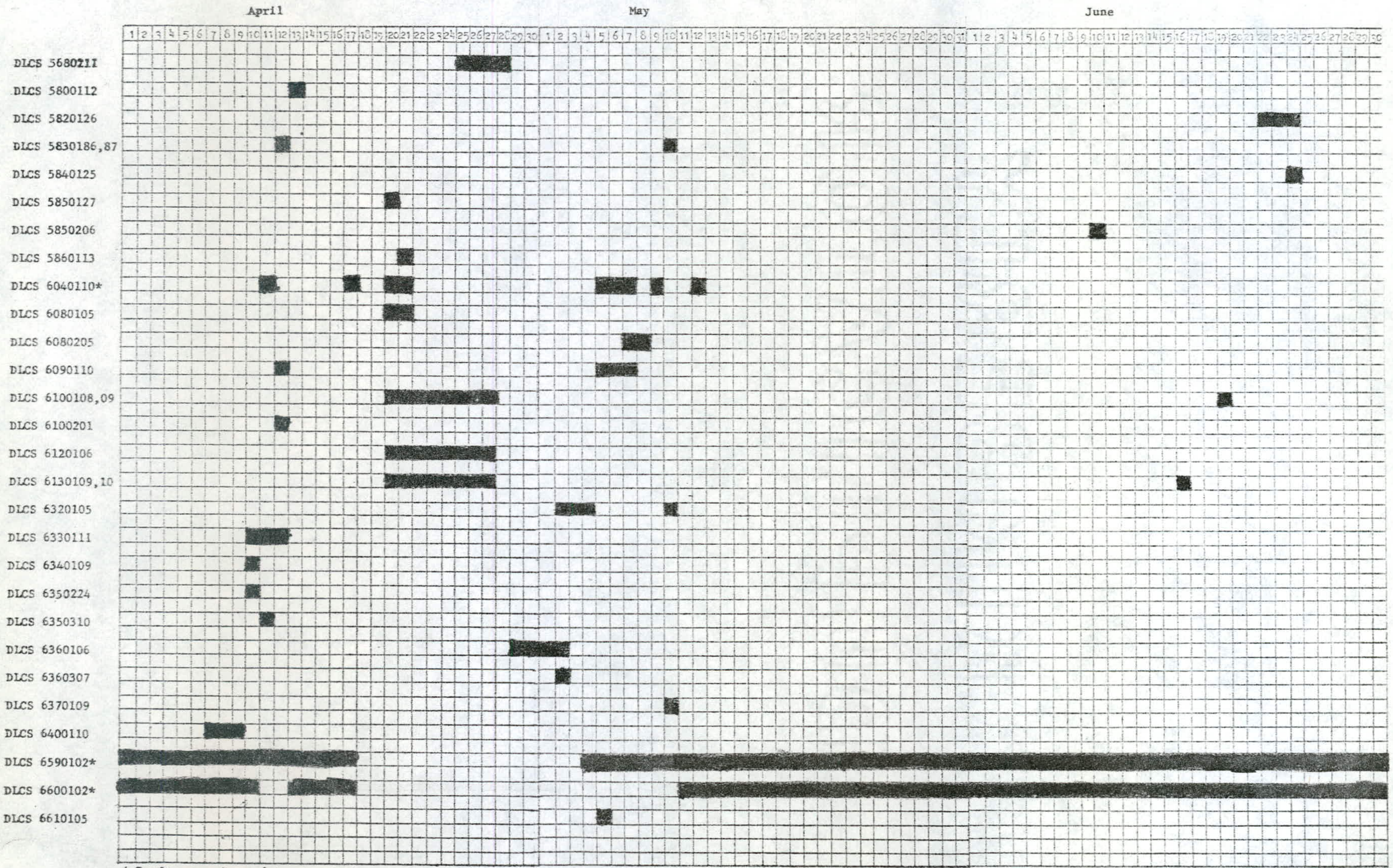
DLCS 5680211	Reactor Plant Container Integrity Test (Butterfly Valve Test)
DLCS 5800112	Reactor Coolant Fission Product Activity
DLCS 5820126	FEDAL System (Checkout Test)
DLCS 5830186, 87	FEDAL System (Operation During Station Start-Up)
DLCS 5840125	FEDAL System Operational Test
DLCS 5850127	External Radiation Levels of Reactor Coolant System Piping and Components and Purification System Demineralizers and Heat Exchangers
DLCS 5850206	Radiation Survey of Demineralizers
DLCS 5860113	Periodic Radiation Survey of the Reactor Vessel Head
DLCS 6080105	Nuclear Protection System (Checkout High Th and P/F Circuitry)
DLCS 6080205	Nuclear Protection System (Checkout Pump Power, SLOFA and CLOFA Circuitry)
DLCS 6090110	Periodic Intercalibration of Temperature Sensing Elements
DLCS 6100108, 09	Periodic Calibration of Pressure Instrumentation
DLCS 6100201	Comparison of Reactor Plant Pressure Instrumentation at Operating Pressure and Temperature
DLCS 6120106	Periodic Calibration of Pressurizer Level Instrumentation
DLCS 6130109, 10	Periodic Calibration of Reactor Plant Flow Instrumentation
DLCS 6320105	Measurement of Coefficients of Reactivity (Zero Power)
DLCS 6330111	Xenon Transient Test
DLCS 6340109	Temperature Coefficient of Reactivity at Power
DLCS 6350225	Axial Flux Measurement Test (Power Range - Equilibrium Xenon)
DLCS 6350310	Axial Flux Measurement Test (Xenon Transient)
DLCS 6360106	Control Rod Position for Criticality at Ambient Temperature (One Rod Withdrawn)
DLCS 6360307	Control Rod Position for Criticality at Ambient Temperature (Critical Bank Height and Bank Worth Measurements)
DLCS 6370109	Control Rod Position for Criticality at Operating Temperature (Critical Bank Height and Bank Worth Measurements)
DLCS 6400110	Reactivity Loss Rate Coefficient
DLCS 6610105	Control Rod Drive Mechanism Periodic Test

Tests Remaining In Progress At End of Report Period

DLCS 6040110	Data Acquisition System
DLCS 6590102	Reactor Pressure Drop and Coolant Flow Characteristics
DLCS 6600102	Reactivity Lifetime Test

FIGURE 2

PERFORMANCE DATES
OF
TESTS PERFORMED DURING SECOND QUARTER OF, 1970



* Performance incomplete at end of report period.

6. GLOSSARY

AEC . . . . .United States Atomic Energy Commission

AIX . . . . .after ion exchanger (outlet)

a/o . . . . .atomic percent

BAPL. . . . . Bettis Atomic Power Laboratory

BIX. . . . . before ion exchanger (inlet)

bkgd. . . . . background

CIC . . . . compensated ionization chamber

DAS . . . . Data Acquisition System

DE. . . . . demineralizer effluent

DF. . . . . decontamination factor

EFPH. . . . . .equivalent full power hour

FEDAL . . . . Failed Element Detection and Location System

FMI . . . . flow measurement instrumentation

Hc. . . . . .critical height

HDS . . . . .Heat Dissipation System

magamp. . . . . magnetic amplifier

MELBA . . . . .Multipurpose Extended Life Blanket Assembly

mr. . . . . .milliroentgen

mrem. . . . . milliroentgen equivalent man

NPS . . . . .Nuclear Protection System

ORMS. . . . . .Operational Radiation Monitoring System

PWR. . . . . .Pressurized Water Reactor

R . . . . roentgen

RC. . . . . .resistance capacitance

uc. . . . . .microcuries

RCS . . . . Reactor Coolant System

rem . . . . .roentgen equivalent man

RPC . . . . .Reactor Plant Container

RWDS. . . . . .Radioactive Waste Disposal System

STP . . . . .standard temperature and pressure

su. . . . . smear unit (100 sq. cm.)

Tavg. . . . . .average reactor coolant temperature

Tc. . . . . reactor coolant inlet temperature

Th. . . . . .reactor coolant outlet temperature

Ts. . . . . .time of sample isolation

v/o . . . . percent by volume

VOS . . . . Valve Operating System