QUARTERLY OPERATING REPORT
First Quarter 1977
DLCS 5000177

Approved by:

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Superintendent

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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 information on recent technical progress related to the nuclear portion of the Shippingport Atomic Power Station is therefore referred to the United States Energy Research and Development Administration, Division of Technical Information Extension at Oak Ridge, Tennessee, where this information is readily available.

1. SUMMARY OF OPERATIONS

During the first quarter of 1977, the Shippingport Atomic Power Station remained shutdown for PWR/LWBR (Pressurized Water Reactor/Light Water Breeder Reactor) core conversion. The PWR Core remains in storage in the deep pit of the Fuel Handling Canal. The LWBR core barrel has been installed in the reactor vessel.

At the beginning of the quarter the 1A, 1B, 1C and 1D reactor coolant loops were drained with a nitrogen purge established. The 1B, 1C and 1D steam generators were in wet lay-up condition and recirculating on the reactor plant cooldown and temperature control heat exchanger. The 1A steam generator was in a partial drain condition with a nitrogen purge established. The pressurizer was drained and isolated from the reactor vessel.

The reactor vessel water level was maintained at 685'6" for the entire quarter to allow for dry fuel installation.

The installation of the LWBR fuel continued and was completed on March 10, 1977 when the last reflector element was installed in the reactor vessel. The reactor vessel head was installed on March 16, 1977.

The 1A main coolant pump thrust bearing shoe and thrust runner repairs were completed and the coolant pump reinstalled on February 2, 1977.

Beginning on January 14 and continuing on a weekly schedule, the main unit turbine operational performance was initiated. This includes operating the turbine-generator lubrication systems and rotating the turbine on turning gear for approximately eight hours per week. The main unit lay-up procedure continued which includes a constant individual dry air purge through the main unit turbine and the generator to preclude any moisture entry.

Recertification training for nuclear control operators and supervisors continued throughout the first quarter.

Five year hydrostatic testing and upgraded equipment system acceptance tests were performed. System flushes were conducted and support was provided for other system and equipment tests.

During the first quarter of 1977, 1143 cubic feet of radioactive solid waste was shipped off-site for burial. These shipments contained about 0.04 curie of radioactivity.

2. CHEMISTRY

During the first quarter of 1977, the Chemistry section maintained specifications in various plant systems and fulfilled station manual requirements.

Reactor Plant

The 1A, 1B, 1C and 1D reactor coolant loops remained in a drained dry lay-up condition during the entire first quarter. The only out-of-specification condition in the Reactor Plant Auxiliary Systems was low pH in the canal waters as a result of insufficient recirculation and the absorption of carbon dioxide. Continued recirculation through the canal water demineralizer is expected to remove the carbon dioxide and raise the pH to within specifications. Refer to Table I.

Turbine Plant

The Station has been shutdown for the entire quarter. The four heat exchangers, 1A, 1B, 1C and 1D, remained in a cold wet lay-up condition. The only out-of-specification condition which occurred was that of a high hydrazine concentration in the 1A heat exchanger. The high hydrazine concentration in the 1A heat exchanger was possibly due to the hydrazine contained in the Cooldown Heat Exchanger which may have been flushed in with the 1A heat exchanger make-up water. Addition of water to the 1A heat exchanger corrected the out-of-specification condition. Refer to Table II.

Radioactive Waste Disposal System

The total radioactivity, exclusive of tritium, discharged from Shippingport during the quarter was 0.000017 curie which is 0.001% of the allowable limit. There was no discharge of tritium from Shippingport during this quarter. These radioactivity releases from Shippingport are far too small to have any measurable effect on the general background environmental activity outside the plant.

TABLE I
REACTOR PLANT AUXILIARY SYSTEMS

WATER CONDITIONS

SYSTEM	Conductivity μmhos/cm	pH at 25° C	CONC. - ppm			Gross Gamma Activity μCi/ml
			CrO ₄ ^{- -}	Cl ⁻	Dis. O ₂	
Component Cooling Spec.	N.P.	N.P.	500 - 1000	1 max.	N.P.	N.S.
Observed	N.P.	N.P.	543 - 724	0.44	N.P.	1.71 x 10 ⁻⁷ - 8.80 x 10 ⁻⁷
Coolant Charging Water Specifications	2.5 max.	6.0 - 8.0	N.P.	0.1 max.	NOTE*	N.P.
Observed	1.50	6.10 - 6.77	N.P.	<0.10	1.5 - 7.7	N.P.
Canal Water Specifications	5.0 max.	5.8 - 8.0	N.P.	N.P.	N.P.	NOTE*
Observed	1.8	** 5.56 - 6.16	N.P.	N.P.	N.P.	6.89 x 10 ⁻⁷ - 1.50 x 10 ⁻⁵

* There is no specification for current plant conditions.

** See Reactor Plant Section of QOR.

N.S.: No limit needed; therefore, no limit has been specified.

N.P.: Analysis is not required and not performed.

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TABLE II

Non-Operating Heat Exchangers

Cold Lay-up

Water Chemistry

Water Conditions	Specifications	Non-Operating Heat Exchangers			
		1A	1B	1C	1D
1. Conductivity Max. $\mu\text{mhos/cm}$	30	21	22	22	23
2. pH @ 25°C Min. Max.	9.50 10.50	9.52 9.76	9.52 9.79	9.53 9.82	9.52 9.82
3. Chloride ppm Max.	0.5	0.21	0.21	0.21	0.21
4. Hydrazine ppm Min. Max.	50 100	75 102*	51 100	51 97	52 100
5. Chemicals used in pounds:					
N_2H_4		6.22	20.63	20.63	20.63
$\text{C}_4\text{H}_2\text{NO}$		0	0	0	0

*See Turbine Plant Section of QOR.

3. MAINTENANCE

Repairs of major components, as well as routine maintenance on equipment, instruments, controls and preventative maintenance were performed during this period. Major work items completed or in progress during this period are summarized as follows:

Main Unit Turbine

Work has been completed on the Main Unit Turbine which is presently in lay-up. The lay-up procedure includes purging the Turbine with control air and applying heat to the Turbine blading.

Main Unit Generator

Work has been completed on the main unit generator with the exception of a few deficiencies involving the exciter. The generator is presently being purged with control air.

Pressurized Water Reactor Components

The pressurized water reactor core barrel and fuel assemblies remain in the fuel handling canal.

Preconditioning

In the Fourth Quarter Report of 1976, the reactor vessel filter was erroneously reported to have been shipped, but instead still remains in temporary storage at Shippingport.

"1A" Loop Main Coolant Pump

The "1A" MCP has been repaired and installed in the 1A coolant loop.

Plant Maintenance

All plant maintenance has been completed to support initial fill of the reactor plant.

Plant Modification and Improvements

With the exception of a few open items, general upgrading of plant systems, including a diesel generator system, an auxiliary control room and additions to the Safety Injection System, has been completed and is presently going through a testing program.

Refueling

All the stationary and movable fuel assemblies have been installed in the reactor vessel. In addition, the closure head has been lowered into position, and installation of the motor tubes has been initiated. The trial fit program on the LWBR head components has been completed.

4. TEST PROGRAM

During the first quarter, the following test procedures were performed or were in progress to support plant recovery:

1. 50001 Seismic Scram System Installation Checkout
2. 50101 Containment Isolation Control System Installation Checkout
3. 50201 Safety Injection Control System Installation Checkout
4. 50301 Auxiliary DC Power System Installation Checkout
5. 50401 On-Site Emergency Power Sytem Installation Checkout
6. 50601 Safety Injection System Components Test
7. 53201 Chemical Shutdown System Test
8. 56801 Reactor Plant Container Integrity (Container Penetration) Test
9. 60201 Movable Fuel Control System Precritical Test
10. 60301 Initial Checkout of LWBR Nuclear Protection System Modification
11. 60402 Data Acquisition System Checkout
12. 60801 Nuclear Protection System (Checkout of High T_h , Low Loop Pressure and High P/F Circuitry)
13. 60901 Periodic Intercalibration of Temperature Sensing Elements
14. 61001 Periodic Calibration of Pressure Instrumentation
15. 61101 Calibration of Core Flow and Pressure Drop Instrumentation
16. 61201 Periodic Calibration of Pressurizer Level Instrumentation
17. 61301 Periodic Calibration of Reactor Plant Flow Instrumentation
18. 61801 Periodic Calibration of Total Feedwater Flow and Temperature Instrumentation
19. 62401 Safety Injection Instrumentation Calibration
20. 62501 Auxiliary Controls Installation Checkout
21. 65801 Initial Checkout and Calibration of the LWBR Axial Flux Measurement System
22. 72524 Operational Checks of the new solenoid and motor operated valves installed in the SIS and CIS Systems.
23. 72528 Flush of Condensate Demineralizer Tie-In Line to the Charging System
24. 73217 RWDS Hydrogen Burner After-Cooler Leak Test
25. 73224 Inspection of RWPS Vent Gas Surge Drum (Pneumatic Test)
26. 73243 Hydrostatic Test of the Static Water Jacket Cooling Water Supply and Return Copper Tubes (Bench Test)
27. 73246 Hydrostatic Test of RWPS Water Reuse Modification for Evaporator Concentrate Pumpout Line and Hose Connection

4. TEST PROGRAM (Continued)

- 28. 73301 Plant Conditions for Core Barrel Installation
- 29. 74202 Flush of the New Safety Injection System Line 453-14"-151-4010
- 30. 74214 Flushing of Cooling Sampling System Container Isolation Valves
- 31. 74301 Hydrostatic Test of Boiler Feed Pump Discharge Line and Recirculation Lines
- 32. 74302 Hydrostatic Test of Boiler Feed and Booster Pump Supply Lines
- 33. 74303 Hydrostatic Test of the Chemical Shutdown System Tie-In of the Charging System
- 34. 74311 Pneumatic Test of the Flash Tank Flush Gas Inlet Line Modification
- 35. 74320 Pneumatic Test of Service Air Modification to Butterfly Valve Innerspace
- 36. 74322 Pneumatic Test of the Service Air System Modification in Relay Room
- 37. 74401 Checkout of 2400 Volt Breakers after EIC Modification

5. HEALTH PHYSICS

External Radiation Exposure

Table III provides information on radiation exposure experience of Duquesne Light Company personnel at the Shippingport Station. Table III is based on a standard form used for radiation exposure experience at central station nuclear power plants.

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Table III

Work & Job Function	Number of Personnel (>100 mrem)		Total Man-Rem	
	Station Emp.	Other Emp.*	Station Emp.	Other Emp.
Reactor Operations & Surveillance				
Maintenance Personnel	0		0	
Operating Personnel	36		20	
Health Physics Personnel	2		3	
Supervisory Personnel	14		4	
Engineering Personnel	3		2	
Routine Maintenance				
Maintenance Personnel	24		34	
Operating Personnel	2		1	
Health Physics Personnel	4		6	
Supervisory Personnel	9		5	
Engineering Personnel	4		4	
Inservice Inspection				
Maintenance Personnel	51		72	
Operating Personnel	0		0	
Health Physics Personnel	6		10	
Supervisory Personnel	10		5	
Engineering Personnel	7		11	
Special Maintenance				
Maintenance Personnel	50		69	
Operating Personnel	2		1	
Health Physics Personnel	8		13	
Supervisory Personnel	13		10	
Engineering Personnel	9		11	
Waste Processing				
Maintenance Personnel	7		9	
Operating Personnel	1		1	
Health Physics Personnel	1		1	
Supervisory Personnel	1		1	
Engineering Personnel	1		1	
Refueling				
Maintenance Personnel	2		3	
Operating Personnel	0		0	
Health Physics Personnel	1		1	
Supervisory Personnel	1		1	
Engineering Personnel	0		0	
TOTAL				
Maintenance Personnel	134		108	
Operating Personnel	41		23	
Health Physics Personnel	22		35	
Supervisory Personnel	48		26	
Engineering Personnel	24		28	
GRAND TOTAL	269	0	300**	0

* Duquesne Light Company employees not regularly assigned to Shippingport Station.

* Total is different from sum of individual numbers due to rounding to nearest man-rem.

6. GLOSSARY

AIX	after ion exchanger (outlet)
a/o	atomic percent
BAPL	Bettis Atomic Power Laboratory
BIX	before ion exchanger (inlet)
CIC	compensated ionization chamber
DAS	Data Acquisition System
DE	demineralizer effluent
DF	decontamination factor
EFPH	equivalent full power hour
ERDA	Energy Research and Development Administration
Hc	critical height
HDS	Heat Dissipation System
LWBR	Light Water Breeder Reactor
magamp	magnetic amplifier
MDA	Minimum Detectable Activity
mR	milliroentgen
mrem	milliroentgen equivalent man
NPS	Nuclear Protection System
ORMS	Operational Radiation Monitoring System
PWR	Pressurized Water Reactor
QOR	Quarterly Operating Report
R	roentgen

6. GLOSSARY (Cont'd)

RC	resistance capacitance
RCS	Reactor Coolant System
rem	roentgen equivalent man
RPC	Reactor Plant Container
RWPS	Radioactive Waste Processing System
STP	standard temperature and pressure
su	smear unit (100 sq. cm)
Tavg	average reactor coolant temperature
Tc	reactor inlet coolant temperature
Th	reactor outlet coolant temperature
Ts	time of sample isolation
μ Ci	microcuries
v/o	percent by volume
VOS	Valve Operating System