QUARTERLY OPERATING REPORT
Fourth Quarter 1975
DLCS 5000475

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Approved by:

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ABSTRACT

During the Fourth Quarter 1975 report period, Shippingport was shutdown for preconditioning preparation and plant modification required for the Light Water Breeder Reactor Program. The Station efforts were directed toward plant maintenance and the preparations for the preconditioning of the new steam generator primary coolant surfaces. The report presents a summary of events which occurred in operations, chemistry, maintenance and testing.

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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 fourth quarter of 1975, the Shippingport Atomic Power Station remained shutdown for PWR/LWBR (Pressurized Water Reactor/Light Water Breeder Reactor) core conversion. The PWR core has been removed from the reactor vessel and remained in storage in the Deep Pit of the Fuel Handling Canal. At the beginning of the third quarter the 1A, 1B, 1C and 1D primary side loops were isolated from the reactor vessel, drained and under a nitrogen purge. On October 9, the 1C primary side loop was filled and on November 14 the 1B primary side loop was filled. The 1A and 1D loop secondary sides remained drained and under a nitrogen purge. The 1B and 1C loop secondary sides were filled in a cold wet layup condition at the beginning of the fourth quarter. The 1B and 1C loop secondary sides were placed in a temporary partial drain condition during the fourth quarter for stopcheck valve replacement. Work on installation of the 1A and 1D heat exchangers continued during the fourth quarter. Installation of the main turbine also continued throughout the fourth quarter.

The 1B and 1C primary side loops and AC and BD purification were successfully hydrostatically tested during the fourth quarter. The 1B and 1C boilers were also successfully hydrostatically tested during the fourth quarter. The Coolant Charging System hydrostatic test was completed on December 11. The reactor vessel filter and cover were installed on December 5 in preparation for vessel fill (without core installed) for preconditioning operation.

During the fourth quarter of 1975, 2983 cubic feet of radioactive solid waste were shipped off-site for burial. These shipments contained about 0.4 curie of radioactivity.

2. CHEMISTRY

During the fourth quarter of 1975, the Chemistry section maintained specifications in the various plant systems and fulfilled station manual requirements.

Reactor Plant

Since the reactor was shutdown the entire quarter, all four reactor coolant loops and the AC and BD purification demineralizers remained out of service. The only out-of-specifications of the reactor coolant chemistry conditions this quarter were that of low pH and high dissolved oxygen due to addition of primary make-up water. See Table I. The only out-of-specification conditions in the Reactor Plant Auxiliary Systems were low pH levels in the canal water and high dissolved oxygen levels for the coolant charging water. The low pH levels for the canal water were a result of insufficient recirculation through the canal water demineralizer. The high dissolved oxygen levels for the coolant charging water were attributed to the loss of the steam blanket in the Primary Water Storage Tank during service boiler outages. See Table III. The activity value reported for the canal water has been continually reduced since the transfer of the core barrel assembly to the canal water deep pit. The activity was reduced by recirculating the canal waters through the canal water filters and demineralizers. See Table III.

Turbine Plant

The station has been shutdown the entire quarter. The 1B and 1C Heat Exchangers have been in cold lay-up the entire quarter. During this quarter, work continued on the installation of the 1A and 1D Heat Exchangers.

The only out-of-specifications on the Heat Exchangers were that of low pH and low hydrazine due to addition of makeup water after an inadvertent drain down of the Heat Exchanger while in wet layup.

Radioactive Waste Disposal System

The total radioactivity, exclusive of tritium, discharged from Shippingport during the quarter was 0.000053 curie, which is only 0.004% of the allowable limit. The quantity of 0.007 curie of tritium was an insignificant 0.0007% of the allowable limit. These radioactivity releases from Shippingport are far too small to have any measureable effect on the general background environmental activity outside the plant.

TABLE I

Reactor Coolant System
Water Conditions and Chemical Adjustments
Cold Lay-up (<200°F)

Chemical Conditions	Specifications	Analytical Results		N ₂ H ₄ (lbs)	NH ₄ OH (liters)
		Min.	Max.		
Oxygen - ppm max.	0.14	<0.005	0.60**		
Conductivity		7.9	52		
pH	10.1 - 10.3	9.15**	10.25		
Chloride Max.	0.10	<0.05	0.07		
Chemicals Used				3.15	3.12

** See Reactor Plant Section QOR.

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. μ mho/cm	30	--	18	19	--
2. pH@25°C Min.	9.50	--	7.22*	9.50	--
Max.	10.50	--	9.92	9.92	--
3. Chloride ppm Max.	0.50	--	0.06	<0.05	--
4. Hydrazine ppm Max.	50	--	0*	51	
Min.	100	--	100	96	
5. Chemicals Used in pounds: N ₂ H ₄			60.35	33.80	
C ₄ H ₂ N ₀	--	--	--	--	--

*See Turbine Plant Section QOR.

TABLE III

Reactor Plant Auxiliary Systems

Water Conditions

System	Conductivity $\mu\text{mhos/cm}$	pH at 25°C	Conc. - ppm			Gross Gamma * Activity - dpm/ml
			CrO_4^{--}	Cl^-	Dis. O_2	
Component Cooling Specifications	N.S.	8.30 - 10.50	500-1000	1 ppm max.	N.S.	N.S.
Observed	1200 - 1850	8.30 - 9.37	503-774	0.09 - 0.31	N.P.	1.5 - 2.8
Coolant Charging Water Specifications	2.50 max.	6.00 - 8.00	N.S.	0.1 ppm max	Note **	N.S.
Observed	0.84 - 1.50	6.15 - 7.86	N.P.	<0.05	0.005-0.68**	N.P.
Canal Water Specifications	5.00 max.	6.00 - 8.00	N.S.	N.S.	N.S.	N.S.
Observed	0.44 - 2.4	5.80*** - 7.63	N.P.	N.P.	N.P.	<MDA* - 315

* Multiply tabular value by 4.50×10^{-7} to obtain $\mu\text{Ci/ml}$; MDA - 0.41 dpm/ml.

** Should be <0.14 ppm for reactor plant cold shutdown. See Reactor Plant Section of QOR.

*** See Reactor Plant Section of QOR.

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

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

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3. MAINTENANCE

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

Main Unit Turbine

As a result of the turbine failure on February 4, 1974, internal and external components of the Main Unit Turbine were overhauled at the Westinghouse Electric Corporation Turbine Repair Center at Lester, Pennsylvania and shipped back to the Shippingport Atomic Power Station. All major internal and external components have been reassembled.

Main Unit Generator

Defects found during nondestructive testing of the Main Unit Generator Rotor were repaired at the Westinghouse Electric Corporation, East Pittsburgh Plant and the Rotor was returned to the Shippingport Atomic Power Station site. The Main Unit Exciter remained at Duquesne Light Company's Phillips Power Station.

Feedwater Stopcheck Valves

Installation of the refurbished 1A and 1D Loop Feedwater Stopcheck Valves began during this period.

Plant Security

The Shippingport Atomic Power Station Plant Security was upgraded to meet United States Energy Research and Development Administration requirements for the security of atomic power facilities.

Pressurized Water Reactor Defueling

Pressurized Water Reactor Defueling was completed during this period. The Pressurized Water Reactor Vessel Head remains at the Shippingport Atomic Power Station Site awaiting shipment for disposal. The Pressurized Water Reactor Core Barrel and Fuel Assemblies remain in the Shippingport Atomic Power Station Fuel Handling Canal.

Maintenance

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Preconditioning

Preparation for Reactor Plant Preconditioning began during this period. The Preconditioning Test Head arrived, was placed on the Reactor Vessel and bolting the Head to the Reactor Vessel began.

Light Water Breeder Reactor Core Barrel

Assembly of the Upper and Lower Core Barrel continued during this period.

"A" Loop Steam Generator

Installation of the spare 1A Loop Heat Exchanger continued during this period.

"D" Loop Steam Generator

Installation of the spare 1D Loop Heat Exchanger continued during this period.

Station Clean-up

General station clean-up continued during this period.

4. TEST PROGRAM

During the fourth quarter the following test procedures were performed or were in progress to support plant recovery and preconditioning:

1. LWBR-DLCS 61001 Periodic Calibration of Pressure Instrumentation
2. LWBR-DLCS 61201 Periodic Calibration of Pressurizer Level Instrumentation
3. LWBR-DLCS 61301 Periodic Calibration of Reactor Plant Flow Instrumentation
4. LWBR-DLCS 61401 Calibration of Reactor Plant Differential Pressure Instrumentation
5. LWBR-DLCS 70601 Reprocessing Test Tank Water Via a Temporary Pipe Installation
6. LWBR-DLCS 70801 Transferring Test Tank Water to a Canal Pit
7. LWBR-DLCS 71001 Isolated Loop Fill Procedure
8. LWBR-DLCS 71501 Reactor Coolant Pump Circuitry Test
9. LWBR-DLCS 71601 Reactor Coolant Pump Static Circuitry Test
10. LWBR-DLCS 71603 Main Control Console, Auxiliary Control Panel, Main Instrument Panel, Pre-activation Control Circuit Check-out
11. LWBR-DLCS 71604 Tie Breaker Static Circuitry Test
12. LWBR-DLCS 71701 Hydrostatic Test of an Isolated Reactor Coolant Loop and Its Associated Purification Loop and Relief Valve Testing
13. LWBR-DLCS 71801 Hydrostatic Test of an Isolated Boiler
14. LWBR-DLCS 71802 Coolant Charging System Hydrostatic Test
15. LWBR-DLCS 71901 RWDS Spray Recycle Tank Cooling Coils and Replaced Valves Hydrostatic Test
16. LWBR-DLCS 72201 Running a Reactor Coolant Pump in an Isolated Loop
17. LWBR-DLCS 72301 Reactor Vessel Level Control

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
FEDAL	Failed Element Detection and Location System
Hc	critical height
HDS	Heat Dissipation System
magamp	magnetic amplifier
MDA	Minimum Detectable Activity
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
QOR	Quarterly Operating Report

Glossary

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R	roentgen
RC	resistance capacitance
μ Ci	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 inlet coolant temperature
Th	reactor outlet coolant temperature
Ts	time of sample isolation
v/o	percent by volume
VOS	Valve Operating System