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YANKEE NUCLEAR POWER STATION

OPERATION REPORT NO. 3

for the month of

MARCH 1961

Submitted by

YANKEE ATOMIC ELECTRIC COMPANY
Boston Massachusetts

April 7, 1961

The following report covers the operation of the Yankee Atomic Electric Company plant at Rowe, Massachusetts, for the month of March, 1961.

The plant operated continuously during the month, with the exception of two shutdown periods whose outage times totalled 4 hours and 42 minutes. Operation at 120 MW gross electrical power level was maintained for approximately 70% of the period. Re-evaluation of secondary plant calorimetrics indicated that an increased electrical plant loading was possible, within the limits of the presently licensed full power rating of 392 MW thermal. A load increase to 125 MW gross electrical was made on March 23rd. Operation of the plant at the increased load level continued for the remainder of the month.

As indicated above, there were two plant shutdowns during the month. Following is a listing and description of activities during each outage.

Shutdown No. 25 3/8/61 - A 1 hour 52 minute outage for inspection of stem leak-off valves inside the vapor container. In particular, it was desired that inspection be made of the four primary loop by-pass valves, four safety injection valves and two shutdown cooling valves which had previously undergone leak-off line capping. Leak tightness of these valves had been dependent upon the above-leak-off packing since Shutdown No. 23 on February 19th.

Inspection revealed that No. 4 loop by-pass valve and No. 2 loop safety valve were leaking slightly. The packing on these two valves was re-tightened.

Shutdown No. 26 3/22/61 - A 2 hour 50 minute outage for another inspection of the stem leak-off valves and for a control rod interchange. Inspection showed very slight leakage on three of the ten valves which had had their leak-off lines capped off. Packing adjustments were made on Nos. 1, 3 and 4 loop by-pass valves, charging valve CH-MOV-524 and pressurizer relief valve PR-MOV-512.

Plant Maintenance and Modifications

As mentioned in the above description of activities during shutdowns, primary stem leak-off valves were inspected twice during the month. Packing adjustment was performed on five of the ten capped stem leak-off valves. Discussions, in regard to repacking procedures and a permanent solution to the problem, were held with the manufacturer's representatives. Valve stem leak-off, from the remaining stem leak-off connected valves, averaged less than 5 gallons per hour throughout the month.

Relocation of the steam generator blowdown radiation monitors from the high background level primary system sample room to a new location outside of this room was completed during the month.

Reneweal of Nos. 1 and 2 Charging Pumps packing was also accomplished. A slightly revised repacking procedure was employed including omission of the teflon separation rings. It is hoped that this will improve the relatively short packing life experienced to date.

The Service Air Compressor crosshead and crosshead guides failed during the month. Although the cause of the failure is not certain, the most probable explanation lies with failure of the lubrication system. New parts were installed and the unit returned to service. Inspections are now scheduled after short periods of operation.

Installation of a number of new pipe hangers and adjustment of existing ones continued throughout the month. Representatives of Stone & Webster Engineering Corp. and Westinghouse Electric Corp. visited the plant to investigate and make recommendations for correction of main steam line vibration and feedwater heater performance.

In addition to the above, normal plant and instrumentation maintenance procedures were carried out during the month. An instrumentation preventive maintenance schedule was also established.

Plant Chemistry

Difficulties with carryover from the waste disposal evaporator continued throughout March, resulting in the make-up feed to the primary system being primarily demineralized water. The volume of liquid waste, also continued to be higher than normal, since the evaporator effluent was of a purity not desirable for reuse in the primary system. Evaporator filter and tray sections were washed in an effort to reduce the carryover effect. Results showed, however, that cleaning did not improve conditions. Tests were also performed using an anti-foaming additive but results showed no noticeable change in operation. Testing of the evaporator-stripper equipment continues with intermittent waste disposal system operation.

A total of 96,680 gallons of liquid were processed through the waste disposal evaporator during the month. Twenty-two, 55 gallon drums of evaporator bottoms, with a total activity of 105 millicuries, were stored. No drums were shipped.

The primary water system continued to operate within design specifications, with purification bleed being placed on a 12 hour on--12 hour off schedule at 30 gpm. Ion exchange decontamination factors averaged 600 to 700 for the month, with latest values showing approximately 850. No difficulty was encountered in maintaining the secondary system within design specifications. The Low Pressure Surge Tank hydrogen overpressure was returned to the 15 psig design value with establishment of the new purification bleed schedule.

Routine primary and secondary system chemical analysis and treatment were carried out during the month. Primary system specific activity ranged from 3.5×10^{-2} μc/ml to 6.9×10^{-2} μc/ml with an average value of 4.5×10^{-2} μc/ml.

Typical primary system radioactive gas analysis and crud analysis indicated the following:

A-41	- 8.5×10^{-2} μc/cc gas	Fe-59	- 1.7×10^{6} dpm/mg
Kr-85m	- 2.6×10^{-3} μc/cc gas	Co-60	- 9.3×10^{5} dpm/mg
Xe-133	- 1.5×10^{-3} μc/cc gas	Co-58	- 2.9×10^{6} dpm/mg
Xe-135	- 5.6×10^{-3} μc/cc gas	Cr-51	- 2.1×10^{6} dpm/mg
		Mn-54	- 2.7×10^{5} dpm/mg

Crud Level = 0.014 ppm
I-131 present in primary water = 1.1×10^{-4} μc/ml

Health and Safety

March saw the discharge of liquid wastes with a total activity of 1312 μc. At all times, the concentration was well below the maximum permissible.

A radiation survey, performed immediately after one of the reactor shutdowns, indicated a maximum radiation level of 500 mr/hour at the main coolant piping. Another radiation survey at the licensed full power level of 392 MW thermal was performed in order to gather additional shielding data for future designs.

The relocated steam generator radiation monitors were re-calibrated in their newly installed positions. Two gamma survey meters with a range of 0.01 mr/hr to 10,000 r/hour were received and made ready for use.

The regular monthly station safety meeting was held and the First-Air course commenced in February was completed. A total of 22 employees received Red Cross First-Aid certificates.

Reactor Plant Performance

Performance of flux wire irradiations and analysis continued at an accelerated rate throughout the month. Collection of data and preparation of material for an amendment to the facility license, for increased full power rating, caused considerable effort to be placed on reactor performance. Total main coolant loop flow was analyzed by using secondary calorimetrics with primary system ΔT's and steam generator ΔP's, while core flow was analyzed by using in-core flux wire and exit thermocouple data. Results reveal that flows are approximately 10% greater than design values.

Collection of in-core data continued although control rods moved little (approximately 10 inches) during the month now that equilibrium Xenon and Samarium conditions have been established. Hot channel factors from previous data were recalculated using revised local peaking factors and improved calculational techniques. Calculation of power coefficients were also made whenever scheduled load changes occurred. Values of power coefficient are in good agreement with those obtained at the start of life. A control rod interchange was performed during Shutdown No. 26 in order to equalize fuel burnup throughout the core.

Turbine Plant Performance

Upon a re-evaluation of Secondary Plant calorimetrics, plant loading was increased to 125 MW gross electrical on March 23rd at 8:20 A.M. Use of corrected feedwater flow for mass flow instead of an average of steam and feedwater flows showed a nominal reactor power of 376 MW thermal at 120 MW gross electrical. Increasing reactor power to the nominal 392 MW thermal value corresponded to raising electric load to 125 MW gross electrical. Power level scrams were reset at 115% of steady state power corresponding to a maximum power level of 470 MW thermal. (Equivalent to the license value of 392 x 120%).

Discussion of high terminal difference values on Nos. 2 and 3 feedwater heaters was held with Stone & Webster Engineering Corp. and Westinghouse Electric Corp. representatives. Conclusions are that the 5° to 8° F high terminal differences are a result of heater flooding of non-condensable gas vents. Solutions to this difficulty are now under consideration.

Performance of the circulating water system was abnormal a number of days during the month due to discharge line vacuum difficulties. No system leaks could be located, but testing at the circulating water pump discharge pipe, during low pond elevations, showed a collection of air at this point. Entrance of air into this system occurs at pump suctions due to vortexing action at low pond elevations. Various solutions to this difficulty are being considered. Circulating water pump capacity and power consumption tests were also performed during the month.

Design Changes

The following minor changes were made in plant designs during the month:

1. Installation of a high temperature alarm on the Primary Drain Collecting Tank.
2. Installation of a flow intergrator on the waste disposal system stripper feed flow.
3. Installation of a temperature indicator on the Demineralized Water Storage Tank.

In-Plant Training

The training course for plant personnel preparing for A.E.C. operator licensing examinations continued through March with approximately 22 classroom hours of reactor theory and plant operation study.

Plant Operations

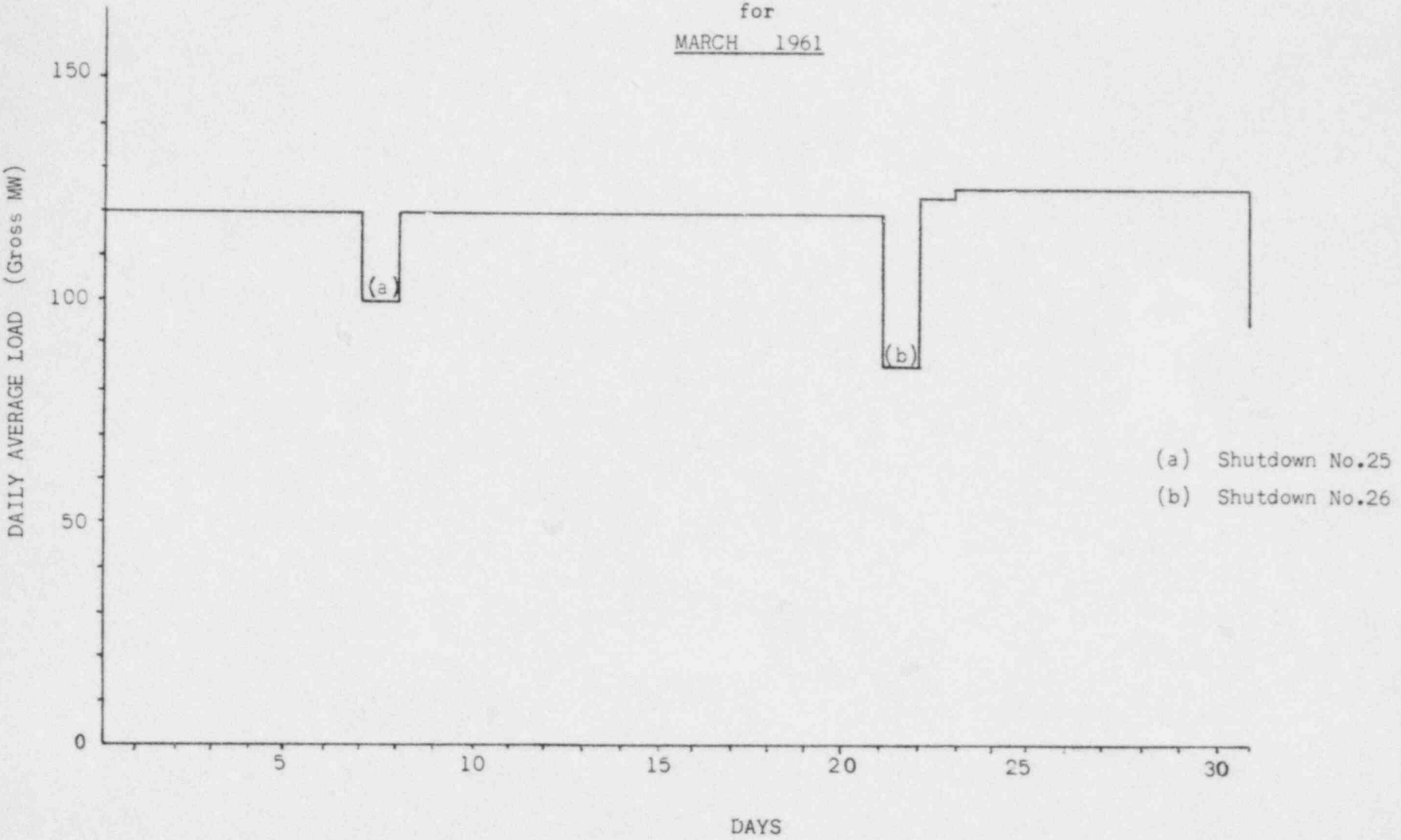
Attached is a graph of daily average plant load as well as the plant operating summary sheet for the month of March.

YANKEE ATOMIC ELECTRIC COMPANY

DAILY AVERAGE LOAD

for

MARCH 1961



YANKEE ATOMIC ELECTRIC COMPANY

OPERATING SUMMARY

MONTH: MARCH, 1961

		Month	to Date
Gross Generation	KWH	88,762,200	235,258,000
Station Service (While Gen. inc. Losses)	KWH	7,297,291	21,804,591
Net Generation	KWH	81,464,909	213,453,409
Station Service -- Percent	%	8.2	9.3
Station Service (While Not Gen. inc. Losses)	KWH	29,200	5,301,746
Ave. Gen. -- For Month (744 Hrs.)	Net KW	109,496	
Ave. Gen. -- Running (737.8 Hrs.)	Net KW	110,416	
Equivalent Reactors Hours at 392 MWT	HRS	709.08	1,953.24
Use Factor -- Percent	%	98	57
Circulating Water Temperature -- °F	Max. °F	58	
	Min. °F	33	

Control Rod Position at Month End --
Equilibrium and Full Power (at 125 MWE Gross)

Group 1 -- Rod Out Inches	-------	90"
Group 2 -- "	-------	"
Group 3 -- "	-------	90"
Group 4 -- "	------	31-1/8"
Group 5 -- "	-------	0
Group 6 -- "	-------	90"

Times Critical	0	211
Hours Critical	744	3514.63
Times Scrammed	0	116

Net Plant Efficiency -- Percent	29.5	
Steam Flow - Lbs.	981,174,000	
Lbs. Steam/Net KWH	12.0	