

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operation Report for May 1966

1. REACTOR OPERATIONS

The reactor was operated at full power, 23.5 MWt, during the entire month of May in continuation of the test program to develop information concerning the utilization of plutonium enriched fuels in pressurized water reactors. The main coolant boron concentration was decreased from 1222 ppm to 1148 ppm during the month to compensate for fuel depletion.

2. EXPERIMENTAL PROGRAM

The primary objective during the month was to continue the burn-up of the plutonium fuel.

Main coolant pH versus reactivity tests were conducted during the month. The hot pH was reduced from 7.07 to 5.38 by decreasing the lithium concentration from 1.27 ppm to below 0.015 ppm by demineralization. The main coolant temperature decrease associated with the pH change was 9.80°F. The lithium concentration was then allowed to increase from 0.011 ppm to 0.054 ppm by natural build-in. The build-in rate was determined to be 22 ppb of lithium per day. The temperature change associated with the lithium change of 0.043 ppm was 5°F.

On May 26th an all rods out boron concentration at 510°F was determined to be 1215 ppm.

3. OPERATIONAL TESTS

On May 5th the radiation monitoring system circuits were tested.

A normal test of the safety injection system was conducted on May 16th.

4. MAINTENANCE

The principal items of mechanical maintenance during the month included replacing the carbon vanes and the bearings in the air pump for the sample room alpha monitor; replacing the pistons and bearings in the air pump of the stack particulate monitor; replacing the diaphragm in the drain valve of RWDF gas decay tank No. 2; cleaning the RWDF liquid discharge tanks; installing a manual shut-off valve in the nitrogen purge line to the containment vessel discharge tank; installing unions in the RWDF evaporator feed line to facilitate removing the feed eductor for cleaning; sealing cracks in the pipe tunnel roof; replacing the pre-filters in the containment vessel exhaust air handler; disassembling and removing tanks and connecting piping used for the crud experiments; processing four drums of RWDF evaporator bottoms; installing a steam shut-off valve in the steam tracing line on the charging system piping; fabricating a shield for and drumming a depleted polonium-beryllium source for shipment; and installing a ring of packing on No. 1 plunger of No. 1 charging pump.

The major items of electrical and instrument maintenance included replacing a solenoid in the pressure protect assembly for radiation monitoring channel RIC-1, RIC-2 and RIC-11; replacing an air regulator in, and cleaning the pneumatic control system for the safety injection system; cleaning the air regulators and the pneumatic controller for pressurizer heater group No. 3; replacing the high voltage power supply

in radiation monitoring channel A; calibrating the main coolant system Heise pressure test gauge; sampling and testing the oil in the 1000 KVA main feed transformer; repairing the printer on the automatic sample changer in the count room; replacing the G-M tubes in the labitrons located in the health physics office and in the chemistry laboratory; installing a new conductivity probe on the caustic regenerant tank in the make-up water treating system; replacing the filter paper in the containment vessel radioactive particulate monitoring channels RIC-1 & RIC-11; and repairing and calibrating pressure gauges in the sampling system.

5. CHEMISTRY

The main coolant system chemistry was maintained for power operating conditions throughout the month. The lithium concentration was varied in the range 0.011 ppm to 1.27 ppm for pH versus reactivity tests. The boron concentration was varied over the range 1135 ppm minimum up to 1225 ppm maximum. A summary of the analyses made on main coolant samples taken during the month is contained in the following table:

<u>Main Coolant System</u>	<u>Minimum</u>	<u>Maximum</u>
pH at 25°C	5.15	6.45
Conductivity, umhos	3.56	21.0
Boron, ppm	1135	1225
Chlorides, ppm	<.005	<.005
Lithium, ppm	<.01	1.27
Potassium, ppm	<.01	<.01
Sodium, ppm	<.01	<.01
Oxygen, ppm	<.00	<.005
Hydrogen, cc/kg H ₂ O	28	54.3
Crud, ppb	52.7	291
Gross Beta-Gamma (15 Min. Degassed) uc/cc	1.04	4.89
Gross Iodine, uc/cc	0.563	1.75
Tritium, uc/cc	0.18	0.23

The chlorides in the steam generator were maintained below 0.05 ppm. The average activity of the steam generator during the month was less than 1×10^{-8} uc/cc.

6. RADIATION AND WASTE DISPOSAL

Radiation surveying consisted of routine plant surveys, C.V. during shutdown and materials shipments. The following maximum radiation readings were taken:

<u>Location</u>	<u>Radiation Reading</u>
<u>C&A Building</u>	
Waste Drum (baling machine)	5.0 mrem/hr beta-gamma
Charging Pump (contact with chamber)	48 mrem/hr beta-gamma
Sample Room (door of sample panel)	10 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	3.0 mrem/hr beta-gamma

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Location

Radiation Reading

RWDF

Evaporator (under bottom)	130 mrem/hr beta-gamma
Evaporator (contact outside upper level)	38 mrem/hr beta-gamma
Drum Storage Area (at HRA fence)	3.5 mrem/hr beta-gamma

Miscellaneous

Shipment of Samples, at contact - Shipment #1	80 mrem/hr beta-gamma
Shipment of Samples, at contact - Shipment #2	110 mrem/hr beta-gamma
Seven Drums for Shipment (max. for any one drum)	80 mrem/hr beta-gamma

Contamination surveying consisted of routine plant site surveys, surveys of materials shipped, tools, equipment and C.V. during shutdown. The clean areas were within the "Clean Area" limits. The controlled areas were generally within the "Clean Area" limits. The controlled areas were cleaned frequently to keep and/or to return to the "Clean Area" limits. The exclusion areas were cleaned periodically to minimize the amount of smearable contamination. The following contamination levels were observed:

Location

Contamination Reading

C&A Building

Charging Pump Chamber	62500 d/m/smear beta-gamma
Charging Room Floor	1490 d/m/smear beta-gamma
Sample Room Floor	413 d/m/smear beta-gamma
Chemical Lab Hot Sink	234000 d/m/smear beta-gamma

RWDF

Pump Room Floor	1410 d/m/smear beta-gamma
Shipping Room Floor	< 100 d/m/smear beta-gamma

Liquid and gaseous effluents from the SNEC site for the month of May 1966 were as follows:

<u>Effluent Type</u>	<u>(Curie) Activity This Month</u>	<u>(Curie) Activity Year to Date</u>	<u>(Curie) Activity Last Twelve Months</u>
Tritium	3.932000	5.188000	8.962000
Liquid	0.001368	0.007799	0.012478
Air, Xe	0.299563	20.431312	45.912539
Air, I-131	0.000000	0.005363	0.006893
Air, M.F.P.	0.002996	0.204315	0.459128

Thirteen (13) barrels of waste were drummed for temporary storage. Seven (7) were shipped from the site.

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Radiation exposure for all SNELC personnel as measured by film badges for the month of April 1966 were a maximum of 265 mrem with an average of 24.1 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of April 1966 were a maximum of 0 mrem with an average of 0 mrem.

The average radiation exposure for all personnel as measured by film badges for the month of April 1966 was 13.7 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATIONOPERATING STATISTICSMONTH May YEAR 1966

<u>NUCLEAR</u>	<u>UNIT</u>	<u>MONTH</u>	<u>YEAR</u>	<u>TO DATE</u>
TIMES CRITICAL	NO.	0	12	467
HOURS CRITICAL	HRS.	744.0	2,929.99	15,811.12
TIMES SCRAMMED (MANUAL)	NO.	0	11	273
* TIMES SCRAMMED (INADVERTANT)	NO.	0	1	30
THERMAL POWER GENERATION	MWH	17,420.16	62,267.86	271,517.69
AVERAGE BURNUP Core II Pu Region	MWD/MTU	1,421.96	5,082.74	5,144.46
CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF <u>23.41</u> Mwt				
MAIN COOLANT BORON <u>1148</u> 7PM				

RODS OUT - INCHES

NO. 1 <u>40</u>	NO. 2 <u>26.60</u>	NO. 3 <u>40</u>
NO. 4 <u>40</u>	NO. 5 <u>40</u>	NO. 6 <u>40</u>

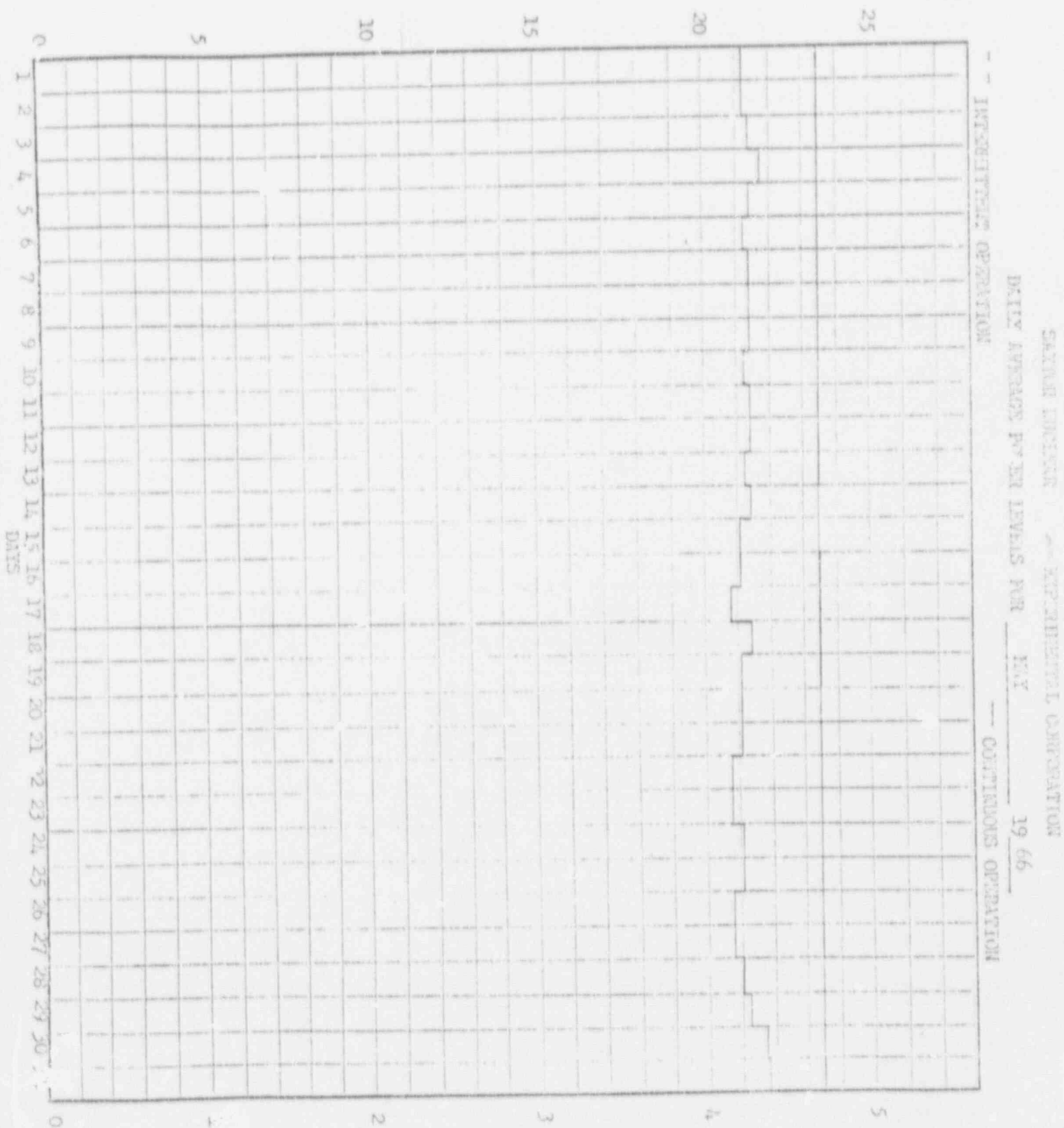
<u>ELECTRICAL</u>	<u>UNIT</u>	<u>MONTH</u>	<u>YEAR</u>	<u>TO DATE</u>
GROSS GENERATION	MWH	3,160.0	11,049.00	45,331.00
STATION SERVICE	MWH	244.05	1,092.91	9,295.20
STATION SERVICE	%	7.72	9.89	20.51
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	18.14	17.75	16.70
AVG. GENERATION RUNNING (<u>744.0</u> HRS)	KW	4,247.31	3,941.29	3,190.95
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	97.86	69.77	28.45

AUXILIARY STEAM SUPPLY - NUCLEAR

STEAM SUPPLIED BY REACTOR	HRS.	744.0	2,847.36	12,546.33
RWDF EVAPORATOR OPERATION	HRS.	35.34	869.34	2,930.59

* REMARKS: _____

AVERAGE REACTOR POWER - MW
(UPPER CURVE)



AVERAGE ELECTRICAL POWER (GROSS) - MW
(LOWER CURVE)