SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for September 1966

1. REACTOR OPERATIONS

The reactor was operated at full licensed power, 23.5 MWt, during the entire month of September in continuation of the test program to develop information concerning the utilization of plutonium enriched fuels in pressurized water reactors.

2. EXPERIMENTAL PROGRAM

During the month tests were conducted to study the change in the moderator temperature coefficient with high and low main coolant pH at constant reactor power conditions. In addition data was accumulated on the measured "at power" temperature coefficient, rod worth, boron worth, flux distribution and the magnitude of reactivity changes due to pH swings. To obtain the desired data temperature swings of approximately 10°F were made at five different positions on control rod #2 (all other rods fully withdrawn) at both high and low pH. Four small boron dilutions of approximately 85 ppm were required at low pH and four identical boron dilutions were made at high pH. Flux maps were made at maximum and minimum rod positions at both high and low pH to monitor flux distributions. The results of the series of tests made at high pH were identical to those for the series made at low pH. Therefore it is concluded that temperature coefficient, boron worth and rod worth are pH independent.

On September 21st the average burn-up on the reactor core was 5200 MWD per MTF. An all rods out main coolant boron concentration was determined on September 23rd at a reactor power level of 23.5 MWt, a main coolant temperature of 510°F and at equilibrium Xenon. The boron concentration for these conditions was 904 ppm.

3. OPERATIONAL TESTS

On September 9th the radiation monitoring system circuits were tested.

A normal test of the safety injection system was conducted on September 20th.

4. MAINTENANCE

The principal items of mechanical maintenance during the month included repairing the insulation in the containment vessel inlet air handler; replacing the belts and steam cleaning the filters on the inlet air handlers for the radioactive waste treatment building; repacking the No. 3 plunger on No. 2 charging pump; checking and cleaning the mechanical seal on No. 1 plunger of No. 2 charging pump; installing a shut-off valve in the steam line to the RWDF evaporator feed eductor; installing a valve in the condensate return line from the demister to the evaporator in RWDF; cleaning the drain line for the RWDF drum storage area; cleaning the control and auxiliary building roof drains and repairing a leak in the roof; processing ten drums of RWDF evaporator bottoms; and acid cleaning the RWDF evaporator hotwell.

The major items of electrical maintenance for the month included checking the specific gravity of the station batteries; replacing the coil on the evaporator hotwell solenoid dump valve in RWDF; repairing a nitrogen regulator used in the chemistry laboratory, repairing the chemistry laboratory spectrophotometer power supply;

repairing the spindle on the filter holder for the stack radioactive particulate monitor, repairing the gamma spectrometer in the count room; checking and calibrating the auxiliary systems temperature recorder in the control room; installing a sight glass on the R&DF evaporator demister; calibrating the R&DF evaporator level proportional controller; replacing the meter in the computer-indicator for the radiation monitor on the R&DF evaporator hotwell; repairing the controller for the regenerative heat exchanger by-pass valve, TIC-24; checking the power supply for the portable neutron survey meter; removing and cleaning the stack radioactive gas detector; repairing the acid flow meter in the water treating system; installing a new snubber and indicating pointer on the No. 1 charging pump discharge pressure gage; adjusting the zero, proportional band, and the reset time on the pressurizer spray valve controller; repairing the computer-indicator for site radiation monitoring channel, RIC-8; and repairing the decade unit of a count room scaler.

5. CHEMISTRY

The main coolant system chemistry was maintained for power operating conditions throughout the month. The lithium concentration was varied in the range < .01 ppm to 1.40 ppm for temperature coefficient measurements at both high and low pH. The boron concentration was varied over the range 614 ppm minimum to 906 ppm maximum. A summary of the analyses made on main coolant samples taken during the month is contained in the following table:

Main Coolant System	Minimum	Maximum
pH at 25°C	5.10	6.69
Conductivity, umhos	2.39	18.4
Boron, ppm	614	906
Chlorides, ppm	< 0.005	< 0.005
Lithium, ppm	< 0.01	1.40
Oxygen, ppm	0.00	0.00
Hydrogen, cc/kg H_2O	38	59
Crud, ppb (one determination)	19.1	19.1
Gross Beta-Gamma (15 Min. Degassed) uc/cc	1.30	5.11
Tritium, uc/cc	2.59×10^{-2}	1.16×10^{-1}
Gross Iodine, uc/cc (one determination)	0.446	0.446

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:

Location	Radiation Reading
C&A Building	
Waste Drum (baling machine)	18 mrem/hr beta-gamma
Charging Pump (contact with chamber)	70 mrem/hr beta-gamma
Sample Room (door of sample panel)	7 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	2.5 mrem/hr beta-gamma

Location	Radiation Reading
HWDF	
Evaporator (under bottom)	120 mrem/hr beta-gamma
Evaporator (contact outside upper level)	20 mrem/hr beta-gamma
Drum Storage Area (at HRA fence)	2.5 mrem/hr beta-gamma
Miscellaneous	
Waste Shipment to N.E.C., at contact with sides of vehicle	200 mrem/hr beta-gamma
At 6 feet from sides	10 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 area was cleaned frequently to keep and/or to return it 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	592000 d/m/smear beta-gamma
Charging Pump Chamber	100 d/m/smear alpha
Charging Room Floor	5360 d/m/smear beta-gamma
Sample Room Sink	1820 d/m/smear beta-gamma
Sample Room Sink	100 d/m/smear alpha
Sample Room Floor	537 d/m/smear beta-gamma
Chemical Lab Hot Sink	12150 d/m/smear beta-gamma
Chemical Lab Hot Sink	100 d/m/smear alpha
HWDF	
Pump Room Floor	11830 d/m/smear beta-gamma
Shipping Room Floor	1135 d/m/smear beta-gamma

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

Effluent Type	(Curie) Activity This Month	(Curie) Activity Year to Date	(Curie) Activity Last Twelve Months
Tritium	2.957817	15.617083	21.524530
Liquid	0.001005	0.010419	0.012636
Air, Xe	11.743709	94.236451	94.821971
Air, I-131	0.054501	0.104045	0.110010
Air, M.F.P.	0.117437	0.942364	0.948219

Seven (7) barrels of waste were drummed for temporary storage. Forty-five (45*) drums were shipped from the site.

Radiation exposure for all SNEC personnel as measured by film badges for the month of August 1966 were a maximum of 950 mrem with an average of 87.7 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of August 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 August 1966 was 46.3 mrem.

* Includes 22 drums of Westinghouse waste

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OPERATING STATISTICS

MONTH SEPTEMBER YEAR 1966

NUCLEAR	UNIT	MONTH	YEAR	TO DATE
TIMES CRITICAL	NO.	[illegible]	21	476
HOURS CRITICAL	HRS.	720	4,959.48	17,840.61
TIMES SCRAMMED (MANUAL)	NO.	0	20	282
* TIMES SCRAMMED (INADVERTANT)	NO.	0	1	30
THERMAL POWER GENERATION	MWH	16,872.48	108,298.62	527,548.44
AVERAGE BURNUP (Pu Region)	MWD/MTU	1,377.25	8,840.99	8,901.81

CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF 23.5 MWt

MAIN COOLANT BORON 711 PPM

RODS OUT - INCHES

NO. 1 40 NO. 2 18.9 NO. 3 40

NO. 4 40 NO. 5 40 NO. 6 40

ELECTRICAL	UNIT	MONTH	YEAR	TO DATE
GROSS GENERATION	MWH	3,022.00	18,974.00	53,256.00
STATION SERVICE	MWH	241.69	1,947.96	10,150.25
STATION SERVICE	%	8.00	10.27	19.06
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	17.91	17.53	16.77
AVG. GENERATION RUNNING (720 HRS)	KW	4,197.22	3,977.78	3,292.80
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	94 11	64.93	30.50

AUXILIARY STEAM SUPPLY - NUCLEAR

STEAM SUPPLIED BY REACTOR	HRS.	720.00	4,818.28	14,517.25
RWDF EVAPORATOR OPERATION	HRS.	362.06	1,523.58	3,584.83

* REMARKS: _____

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DAILY AVERAGE POWER LEVELS FOR SEPTEMBER 1966