

# SAXTON NUCLEAR EXPERIMENTAL CORPORATION

## Operations Report for January 1966

### 1. REACTOR OPERATIONS

At the beginning of this report period the reactor was being operated at a power level of 17 MWt in continuation of the test program to determine the basic physics parameters and to demonstrate the safe and stable operation of the partial plutonium core (Core II) at power conditions.

The basic rod configuration used during the month was control rods nos. 1, 3, 4 and 6 at 40 inches (fully withdrawn); control rod no. 2 at 0 inches and control rod 5 controlling between 27 inches and 40 inches.

The power level was increased to 20 MWt on January 7th and after an on site analysis of a flux map made at 20 MWt the power level was increased to 21.5 MWt.

On January 10th, at the request of the GPU Load Dispatcher, the reactor power level was reduced to essentially zero and the No. 2 turbine-generator was turned over to Penelec for operation on boiler steam. The reactor was used to follow Xenon from 5:00 AM on January 10th to 7:00 AM on January 13th at which time it was manually scrammed so that the containment vessel could be entered for minor maintenance.

Power operation at 17 MWt was resumed at 4:10 PM on January 13th. On January 15th the reactor power level was increased to 22 MWt and was maintained at that level until January 26th. The power level was reduced to 17 MWt on January 26th to obtain flux maps with control rod nos. 2 & 5 at 0 inches and then with control rod no. 2 at 0 inches and rod no. 5 at 17.2 inches. On January 27th it was determined that a leak had developed in the main coolant purification system inside the containment vessel in the low pressure part of the system. The leak was estimated to be about 2 gallons per minute. Since the leak could be isolated operation was continued. The reactor power level was returned to 22 MWt on January 28th.

Operation at 22 MWt was continued until the last day of the month when the power level was again reduced to 17 MWt to obtain a flux map with control rod no. 5 at 40 inches and control rod no. 2 at 26 inches.

### 2. EXPERIMENTAL PROGRAM

Measurements to determine temperature coefficient, power coefficient and rod worths were made during the month.

Xenon was followed for a period of 72 hours after a reduction of power from 21.5 MWt to 0 MWt. The total defect due to Xenon was determined to be 1.73 percent delta K/K.

Several flux maps were made and thermal and hydraulic data were obtained at a power level of 17 MWt, for various positions of control rods nos. 2 & 5, to obtain information for use in raising power to 23.5 MWt.

### 3. OPERATIONAL TESTS

The radiation monitoring system circuits were tested on January 14th.

On January 15th a normal test of the safety injection system was conducted.

#### 4. MAINTENANCE

The principal items of mechanical maintenance for the month included installing a new mechanical seal on the RWDF evaporator hotwell pump; repairing the shut-off valve on the hydrogen manifold; changing the oil in and cleaning the sample room vacuum pump; repacking the No. 2 plunger on No. 1 charging pump; installing a new sample line on the RWDF evaporator demister; repacking the steam generator saline addition pump; installing a new service water line to the magnetic clutch on the variable frequency motor generator set; cleaning the relief valve on the suction line of No. 1 charging pump; making a new bolt for a stuffing box on No. 2 charging pump; cleaning the diaphragm sealed valves on the inlets to the three RWDF gas decay tanks; replacing the sight glass on the RWDF evaporator; cleaning the check valve in the chlorine pump located in the sewage plant; disassembling and cleaning the vacuum pump in radiation monitoring system channel RIC-9; installing new vanes in the vacuum pump in the sample room alpha monitor; and repairing the ground water seal between the containment vessel and the pipe tunnel floor.

The major items of electrical and instrument maintenance included cleaning the air regulator on the containment vessel inlet purge valve; replacing batteries in and calibrating the water treatment pH meter; replacing the filter paper in the containment vessel particulate sampler of radiation monitoring system channel RIC-1; repairing the computer-indicator for the steam generator blowdown radiation monitor, channel RIC-5; replacing the G-M tube on the beta-gamma portable survey meter; calibrating the main static flow integrator; installing a G-M tube in the charging room area monitor, channel RIA-2; installing a 20 point printer on the radiation monitoring system recorder; repairing the RWDF bell alarm circuitry; cleaning the contacts in the chemistry laboratory pH meter; repairing the computer-indicator for the component cooling system radiation monitor, channel RIC-4; and repositioning the detectors for the three power range nuclear instrumentation channels.

#### 5. CHEMISTRY

The main coolant system chemistry was maintained for power operating conditions throughout the month. Lithium-7 was used for pH control. The boron concentration was varied over the range 1600 ppm maximum down to 636 ppm minimum for physics tests at power. 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	6.01	6.25
Conductivity, umhos	6.50	11.53
Boron, ppm	636	1600
Chlorides, ppm	<.005	<.005
Lithium, ppm	0.40	0.74
Potassium, ppm	<.01	<.01
Sodium, ppm	<.01	<.01
Oxygen, ppm	<.005	<.005
Hydrogen, cc/kg H <sub>2</sub> O	25	52.5
Crud, ppb	17	50
Gross Beta-Gamma (15 Min. degassed) uc/cc	0.169	2.8
Gross Iodine, uc/cc	0.083	0.129

The steam generator chlorides were maintained at less than 0.130 ppm throughout the month. The average activity of the blowdown continued to be less than  $1 \times 10^{-8}$  uc/cc.

## 6. RADIATION AND WASTE DISPOSAL

Radiation surveying consisted of routine plant surveys including C&A Building, RWDF and yard areas. The following maximum radiation readings were taken:

<u>Location</u>	<u>Radiation Reading</u>
<u>C&amp;A Building</u>	
Waste Drum (baling machine)	40.0 mrem/hr beta-gamma
Charging Pump (contact with chamber)	3.0 mrem/hr beta-gamma
Sample Room (door of sample panel)	2.5 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	16.5 mrem/hr beta-gamma
Teleflex Cable Shipmen* (contact)	6.0 mrem/hr beta-gamma
<u>RWDF</u>	
Evaporator (under bottom)	210 mrem/hr beta-gamma
Evaporator (contact outside)	90 mrem/hr beta-gamma

Contamination surveying consisted of routine plant site surveys in the C&A Building, RWDF, shipping containers, tools and equipment. 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 clean area limits. The exclusion area were cleaned periodically to minimize the amount of smearable contamination. The following maximum contamination levels were observed:

<u>Location</u>	<u>Contamination Reading</u>
<u>C&amp;A Building</u>	
Charging Pump Chamber	31005 d/m/smear beta-gamma
Charging Room Floor	18250 d/m/smear beta-gamma
Sample Room Sink	1570 d/m/smear beta-gamma
Sample Room Floor	1670 d/m/smear beta-gamma
Chemical Lab Hot Sink	544700 d/m/smear beta-gamma
<u>RWDF</u>	
Pump Room	300 d/m/smear beta-gamma
Shipping Room	420 d/m/smear beta-gamma

Liquid and gaseous effluents from the SNEC site for the month of January 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>
Liquid	0.001522	0.001522	0.009880
Air, Xe	0.007171	0.007171	27.704281
Air, I-131	0.000056	0.000056	0.001640
Air, M.F.P.	0.000072	0.000072	0.277044

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One barrel of waste was drummed for temporary storage. No drums were shipped from the site.

Radiation exposure for all SNEC personnel as measured by film badges for the month of December 1965 were a maximum of 480 mrem with an average of 45.2 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of December 1965 were a maximum of 90 mrem with an average of 5.5 mrem.

The average radiation exposure for all personnel as measured by film badges for the month of December 1965 was 25.4 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

OPERATING STATISTICS

<u>NUCLEAR</u>	<u>UNIT</u>	<u>MONTH</u>	<u>YEAR</u>	<u>TO DATE</u>
TIMES CRITICAL	NO.	1	1	456
HOURS CRITICAL	HRS.	737	737	13,619.13
TIMES SCRAMMED (MANUAL)	NO.	1	1	263
* TIMES SCRAMMED (INADVERTANT)	NO.	0	0	29
THERMAL POWER GENERATION	MWH	13,029.75	13,029.75	222,274.58
AVERAGE BURNUP (Pu Region)	MWD/MTU	1,063.6	1,063.6	1,125.3
CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF <u>16.87</u> Mw				
MAIN COOLANT BORON <u>1598</u> PPM				

RODS OUT - INCHES

NO. 1 <u>40</u>	NO. 2 <u>25.67</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	2,197.00	2,197.00	36,479.00
STATION SERVICE	MWH	236.48	236.48	8,428.77
STATION SERVICE	%	10.76	10.76	23.12
AVG. PLANT EFFICIENCY - MWH(=) W(t)	%	16.86	16.86	16.42
AVG. GENERATION RUNNING (6 00 00)	KW	3,375.33	3,375.33	2,945.20
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	75.33	75.33	22.75

AUXILIARY STEAM SUPPLY - NUCLEAR

STEAM SUPPLIED BY REACTOR	HRS.	681.50	681.50	10,380.47
RWDF EVAPORATOR OPERATION	HRS.	218.25	218.25	2,279.50

\* REMARKS: \_\_\_\_\_

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# SAXTON NUCLEAR EXPERIMENTAL CORPORATION

DAILY AVERAGE POWER LEVELS FOR JANUARY 1966

-- INTERMITTENT OPERATION

— CONTINUOUS OPERATION

