

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for September 1967

1. REACTOR OPERATIONS

The reactor was made critical and loaded to 23.5 MWt on September 1st to continue the plutonium program and to complete the final phase of the pre-fuel functional test program for the supercritical temperature and pressure (STP) test loop.

Operation at 23.5 MWt continued until 11:00 AM on September 6th when the reactor was manually unloaded and shut down. Cooldown of the main coolant system was initiated on September 7th to facilitate maintenance work on a simmering relief valve, V-373, on the pressurizer and on a shut-off valve, GX in the bleed line for reactor vessel head nozzle, N-4.

On September 8th and 9th the main coolant system was reheated to normal operating conditions. The main coolant pump and the pressurizer heaters were the sources of heat. During the following several days the reactor was maintained in a hot shutdown condition while the STP test loop was operated for training purposes. At 4:30 PM on September 15th cooldown of the main coolant system was initiated to commence a scheduled plant outage for the purpose of replacing the unfueled STP test loop pressure tube with one containing a fuel subassembly and to replace two 3x3 fuel subassemblies and the assembly containing the flux oscillator rod.

The reactor was maintained in a cold shutdown condition during the remainder of this report period.

2. EXPERIMENTAL PROGRAM

The pre-fuel functional test program and the operator training program for the STP test loop were completed during the first half of the month. The operation of the test loop during this period was intermittent because of problems encountered with seal leakage in the positive displacement loop pumps; leaking valves in the cooling system for the reactor vessel head nozzle containing the loop pressure tube; level control on the loop head tank; and simmering relief valves on the pressurizer for the reactor main coolant system. On September 15th the test loop was shut down to prepare for replacing the pressure tube containing a dummy assembly with one that contained a fuel subassembly.

On September 20th the following test units were received at the site for installation in the reactor vessel:

STP Test Loop Subassembly No. 1 (Change No. 16)
pH Test Subassembly No. 503-4-28 (Change No. 27)
Burnable Poison Subassembly No. 503-4-29 (Change No. 28)
Flux Oscillator Rod Assembly No. 3 (Change Report No. 13)

3. OPERATIONAL TESTS

On September 29th the radiation monitoring system circuits were tested.

The #2 turbine overspeed trip was tested on August 9th. The loop functioned at 1950 RPM.

4. MAINTENANCE

The principal items of mechanical maintenance for the month included lapping the seat and disc of pressurizer relief valve V-373; removing the component cooling system heat exchangers and cleaning the tube bundle of each; processing 10 drums of evaporator bottoms; fabricating and installing a seal on the reactor vessel head nozzle bleed valve, GX-1; replacing the rubber matting on walkways in the controlled area of the C&A building; installing a sump pump in the manway to the RWDF decontamination room liquid storage tank; replacing the fan belt on the chemistry laboratory hood air handler; replacing the pre-filters on all of the air handlers in the containment vessel; checking the stem of auxiliary system return valve HIC-27 for straightness; lapping the seat and replacing the stem packing in valve HIC-27; repairing a leak in a buried service water line; preparing the reactor vessel head for replacing subassemblies; and cleaning the drain line, the level column and the level sight glass on the RWDF evaporator.

The major items of electrical and instrument maintenance included calibrating the level controller on the RWDF evaporator; repairing a circuit board in the computer-indicator for the component cooling system radiation monitor, RIC-4; repairing the remotely operated latch on the door in the main entrance to the C&A building; repairing the air pump in the southwest site air particulate monitor RIC-9; replacing the manometer across the filters in the exhaust air handler for the RWDF building; repairing a cable termination in the pressurizer heater junction box in the containment vessel; calibrating the recorder for the main coolant system hot and cold leg temperatures; removing and checking the operation of the pneumatic operator on the auxiliary systems return valve, HIC-27; replacing the galvanometer in the resistance bridge in the instrument shop; cleaning the solenoid operated valves in the RWDF evaporator feed line and in the evaporator hotwell drain line; repairing the capacitance probe in the chlorinator control for the sewage plant; repairing the high voltage circuit in the charging room area radiation monitor, RIA-2; cleaning and calibrating the differential pressure cell in the valve and gasket leak-off system in the containment vessel; calibrating the secondary system steam flow recorder and the steam flow integrator; adjusting the ratio totalizer on the boiler feed pump control; and installing underground cable for two sump pumps in the yard area.

5. CHEMISTRY

The main coolant system chemistry was maintained for power operation during the period September 1st to September 7th. Boron was added and hydrogen was removed during system cooldown initiated on September 7th for maintenance purposes.

azine was added to the main coolant water on September 9th for oxygen control preparation for system heat-up. Hot shutdown conditions, with low hydrogen and oxygen concentrations, were established on September 10th and maintained until September 16th when the main coolant system was again cooled down to ambient. The hot shutdown condition was maintained for the remainder of the month.

The boron concentration in the main coolant was varied during the month from a minimum of 566 ppm during power operation to a maximum of 731 ppm for cold shutdown. The gross beta-gamma activity in the main coolant attained a maximum of 0.089 uc/cc. A summary of the analyses performed 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	5.32	6.45
Conductivity, umhos	2.73	9.02
Boron, ppm	566	731
Chlorides, ppm	< 0.005	0.005
Oxygen, ppm	< 0.005	0.010
Hydrogen, cc/kg H ₂ O at STP	4	26
Gross Beta-Gamma (15 Min. degassed) uc/cc	0.036	3.58
Gamma, uc/cc	0.055	0.089

Except for a short period after the start-up of the secondary system on September 1st the chlorides in the steam generator remained below 0.235 ppm. The average activity of the steam generator blowdown during the month was less than 1×10^{-8} uc/cc.

6. RADIATION AND WASTE DISPOSAL

Radiation surveying consisted of routine plant surveys, J.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	1.2 mrem/hr beta-gamma
Charging Pump (contact with chamber)	25 mrem/hr beta-gamma
Sample Room (door of sample panel)	6.0 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	0.5 mrem/hr beta-gamma
<u>RWDF</u>	
Evaporator (under reactor)	36 mrem/hr beta-gamma
Evaporator (contact with upper level)	25 mrem/hr beta-gamma
Drum Storage Area (at fence)	5.0 mrem/hr beta-gamma

Location

Radiation Reading

C.V.

Primary Compartment (general upper level)	60 mrem/hr beta-gamma
Primary Compartment (contact M.C. pump volute)	2') mrem/hr beta-gamma
Primary Compartment (S.G. bottom)	110 mrem/hr beta-gamma
Primary Compartment (pressurizer bottom)	100 mrem/hr beta-gamma
Primary Compartment (general lower level)	50 mrem/hr beta-gamma
Primary Compartment (Regen. HX)	170 mrem/hr beta-gamma
Primary Compartment (Non-Regen. HX)	75 mrem/hr beta-gamma
Auxiliary Equip. Compartment (S.C.H.X.)	18 mrem/hr beta-gamma
Auxiliary Equip. Compartment (D.T. top)	15 mrem/hr beta-gamma
Auxiliary Equip. Compartment (D.T. bottom)	38 mrem/hr beta-gamma
Auxiliary Equip. Comp. (general lower level)	5 mrem/hr beta-gamma
React. Deck (water level at grating)	18 mrem/hr beta-gamma
Reactor Deck (instrument ports)	90 mrem/hr beta-gamma
Reactor Deck (waist level)	20 mrem/hr beta-gamma
Reactor Deck (storage well railing)	18 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 area was 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	30400 d/m/smear bet. gamma
Charging Pump Chamber	< 10 d/m/smear alpha
Charging Room Floor	1495 d/m/smear beta-gamma
Sample Room Sink	155000 d/m/smear beta-gamma
Sample Room Sink	< 10 d/m/smear alpha
Sample Room Floor	470 d/m/smear beta-gamma
Chemical Lab Hot Sink	4360 d/m/smear beta-gamma
Chemical Lab Hot Sink	< 10 d/m/smear alpha

RWDF

Pump Room Floor	1205 d/m/smear beta-gamma
Shipping Room Floor	179 d/m/smear beta-gamma

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Location

Contamination Reading

C.V.

Operating Deck	1660 d/m/smear beta-gamma
Operating Deck	< 10 d/m/smear alpha
Reactor Deck (head)	11300 d/m/smear beta-gamma
Reactor Deck (head)	< 10 d/m/smear alpha
Reactor Deck (grating)	66000 d/m/smear beta-gamma
Reactor Deck (grating)	< 10 d/m/smear alpha
Primary Compartment (grating)	6800 d/m/smear beta-gamma
Primary Compartment (grating)	< 10 d/m/smear alpha

Liquid and gaseous effluents from the SNEC site for the month of September 1967 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	0.843736	5.645050	13.205532
Liquid	0.001199	0.017744	0.020385
Air, Xe	4.447667	16.526356	32.342069
Air, I-131	0.000000	0.000853	0.049720
Air, M.F.P.	0.044477	0.165243	0.323421

Thirteen (13) barrels of waste were drummed for temporary storage. Twenty-nine (29) drums were shipped from the site.

Radiation exposure for all SNEC personnel as measured by film badges for the month of August 1967 were a maximum of 260 mrem with an average of 32.4 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of August 1967 were a maximum of 200 mrem with an average of 5.5 mrem.

The average radiation exposure for all personnel as measured by film badges for the month of August 1967 was 24.1 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

OPERATING STATISTICS

MONTH September YEAR 1967

<u>NUCLEAR</u>	<u>UNIT</u>	<u>MONTH</u>	<u>YEAR</u>	<u>TO DATE</u>
TIMES CRITICAL	NO.	1	40	535
HOURS CRITICAL	HRS.	123.06	955.34	19,818.29
TIMES SCRAMMED (MANUAL)	NO.	1	31	322
* TIMES SCRAMMED (INADVERTANT)	NO.	0	0	31
THERMAL POWER GENERATION	MWH	2,782.7	21,177.42	361,262.29
AVERAGE BURNUP (Pu Region)	MBD/MTU	227.14	1,728.65	12,470.44
CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF <u>0</u> MWt				
MAIN COOLANT BORON <u>730</u> PPM				

RODS OUT - INCHES

NO. 1 <u>0</u>	NO. 2 <u>0</u>	NO. 3 <u>0</u>
NO. 4 <u>0</u>	NO. 5 <u>0</u>	NO. 6 <u>0</u>

<u>ELECTRICAL</u>	<u>UNIT</u>	<u>MONTH</u>	<u>YEAR</u>	<u>TO DATE</u>
GROSS GENERATION	MWH	507	4,008.00	61,483.00
STATION SERVICE	MWH	181.24	1,273.71	11,992.90
STATION SERVICE	%	35.74	31.78	19.51
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	18.22	18.93	17.02
AVG. GENERATION RUNNING (<u>119.1</u> HRS)	KW	4,256.93	4,371.49	3,404.22
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	1.61	13.47	28.27

AUXILIARY STEAM SUPPLY - NUCLEAR

STEAM SUPPLIED BY REACTOR	HRS.	122.4	929.80	16,420.05
RWDF EVAPORATOR OPERATION	HRS.	228.9	1,251.57	5,167.15

* REMARKS: _____

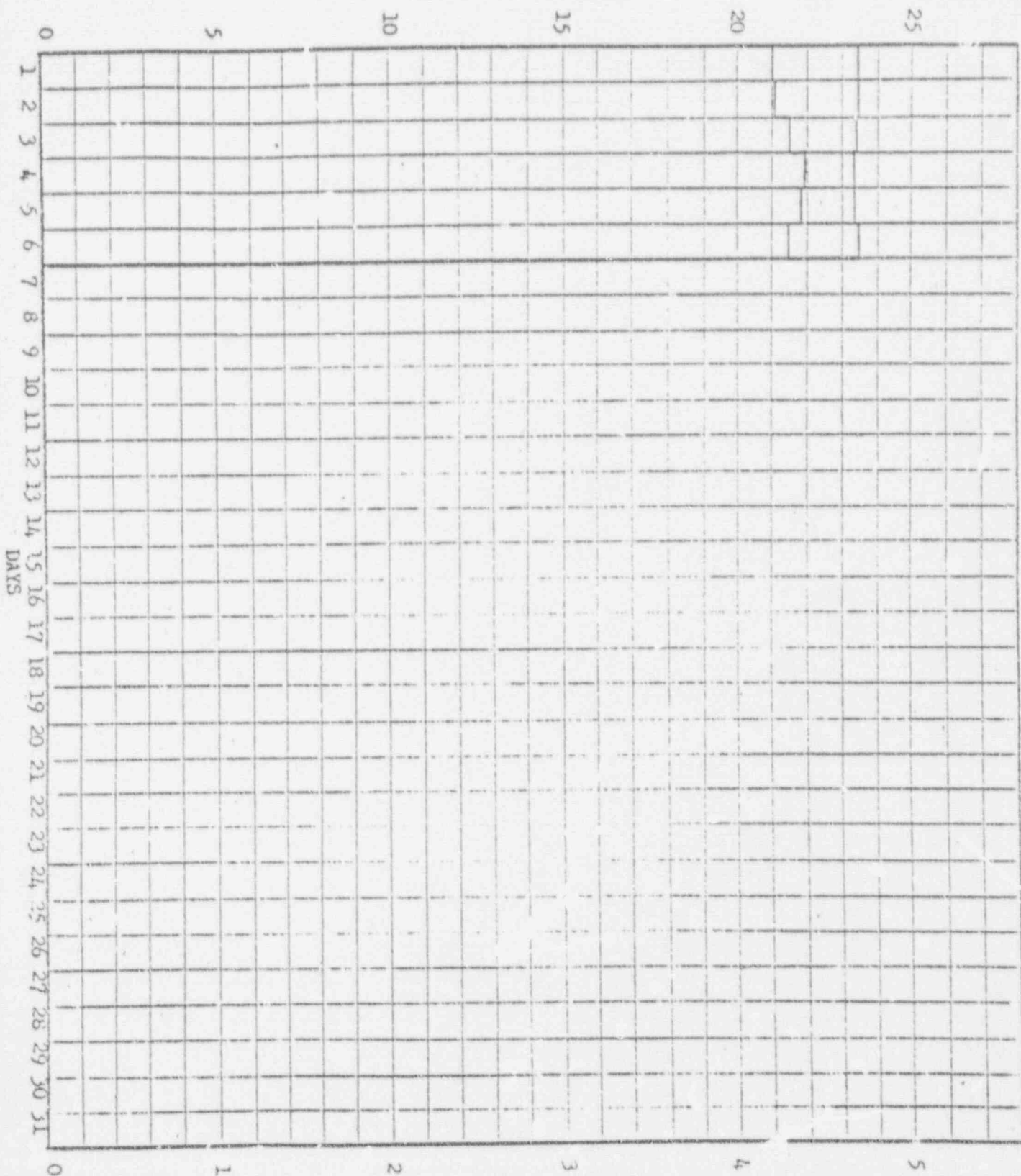
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DAILY AVERAGE POWER LEVELS FOR SEPTEMBER 1967

INTERMITTENT OPERATION

CONTINUOUS OPERATION



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