SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for May 1967

1. GENERAL

The scheduled plant outage which was begun on February 1st was continued through the first two weeks of this report period.

On May 9th a pressure tube for the supercritical technology test loop was inserted in the core through reactor bessel head port N-4. A dummy assembly was installed in the pressure tube on May 10th.

The filling and venting of the main coolant loop in preparation for reactor startup was begun on May 13th and was completed on May 14th.

Heat-up of the main coolant system was commenced on the evening of May 16th. A "bubble" was formed in the pressurizer when the main coolant temperature reached 250°F. The temperature was held at 250°F in preparation for supercritical loop operation and reactor operator training.

During the execution of the procedures for filling, venting, main coolant system heat-up and reactor scram circuit checks, control rod Nos. 2 and 5 were withdrawn to the 10 inch position and dropped many times without incident. Shortly after noon on May 17th withdrawal of control rod Nos. 2 and 5 to the 10 inch position was again initiated. Control rod No. 2 moved in the normal manner, but control rod No. 5 could not be raised more than 0.4 inches from the zero position. This was the first indication of any kind that control rod No. 5 was not functioning properly. In the days that followed many attempts were made to raise the control rod using the drive mechanism. All were unsuccessful. After thoroughly testing and checking the drive mechanism for electrical trouble it was concluded that the problem was internal to the rod drive mechanism and/or the rod, and on May 23rd the decision was made to remove the reactor vessel head for further investigation.

The remainder of the month was spent in preparing the reactor vessel head for removal.

2. EXPERIMENTAL PROGRAM

The supercritical technology test loop was operated for a period of 24 hours at supercritical temperature and pressure on May 4th and 5th. A short section of pipe substituted for the pressure tube for this operation.

On May 9th a pressure tube for the supercritical test loop was installed in the reactor vessel. The loop was then operated at low temperature and pressure for operator training and functional testing.

3. OPERATIONAL TESTS

The #2 turbine overspeed trip was tested on April 14, 1967. The trip functioned at 1920 RPM.

On May 11, 1967 the response time from initiation to scram breaker opening was measured for all scram circuits. The manual scram response time was 0.036 seconds. The minimum automatic scram response time was 0.095 seconds and the maximum was 0.259 seconds.

The radiation monitoring system circuits were also tested on May 11th.

4. MAINTENANCE

The principal items of mechanical maintenance during the month included cleaning and painting four instrument cabinets in the containment vessel; installing a supercritical loop pressure tube in the reactor vessel; restoring the reactor vessel head to operating conditions; flushing the control rod room air handler; replacing the shaft coupling and repairing an oil leak on storage well system pump No. 1; lapping the seating surfaces on two auxiliary steam system valves, V-1008 and V-1007; testing and setting the popping pressure for relief valve V-217 on the charging pumps; testing and setting the popping pressure for relief valve V-53 on the regenerative heat exchanger; processing three drums of evaporator bottoms; repairing a valve in the service air line in the containment vessel; disassembling the magnetic clutch for the variable frequency motor generator set and preparing the internal surfaces of the clutch for painting; and preparing the reactor vessel for head removal to investigate the cause for control rod No. 5 being stuck.

The major items of electrical and instrument maintenance included installing a new sight glass in a flowmeter in the make-up water treating system; checking the specific gravity of the station service batteries; repairing the pressure gauge in the steam generator inlet manway gasket leak-off system; repairing the paging switch and installing a new hand set at the auxiliary compartment station in the containment vessel; measuring the response times for all reactor scram circuits; replacing a current to air converter in the steam generator level controller; replacing the pressure gauge on the decontamination room liquid storage tank in RWDF; installing a neutron counting channel in the containment vessel storage well in preparation for fuel handling; repairing the hydrogen analyzer in RWDF; replacing the pressure gauge in the discharge line of No. 2 compressor in RWDF; checking the electrical circuits of the drive mechanism for control rod No. 5; repairing the battery board on a CP-3 radiation survey meter; cleaning the capacitance probe in the control circuit for the sewage plant chlorine pump; repairing the waste treatment radioactive liquid effluent monitoring channel, RIC-6; repairing the area beta-gamma radiation monitor in the health physics office and in the monitor room; installing a new potentiometer in the main coolant system pressure transmitter, PIC-5T; installing and calibrating a pH electrode in the sampling system of the make-up water treatment plant.

5. CHEMISTRY

The main coolant system was maintained for cold shutdown conditions until May 13th when hydrazine was added to reduce the oxygen concentration in preparation for system heat-up. The main coolant system was heated to 250°F on May 17th and was cooled down to ambient again on May 19th after trouble developed with control rod No. 5. The boron concentration was varied from a maximum of 1089 ppm to a minimum of 697 ppm during the month. A summary of the analyses made on main coolant samples taken during the month is contained in the following table:

Main Coolant Samples	Minimum	Maximum
pH at 25°C	5.63	6.81
Conductivity, umhos	5.38	31.0
Boron, ppm	697	1089
Chlorides, ppm	< 0.005	< 0.005
Lithium, ppm (one determination)	< 0.01	< 0.01
Oxygen, ppm	< 0.005	> 0.100
Gross Beta-Gamma (15 Min. degassed) uc/cc	0.0748	0.655
Tritium, uc/cc	0.041	0.053

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)	4.0 mrem/hr beta-gamma
Charging Pump (contact with chamber)	18.0 mrem/hr beta-gamma
Sample Room (door of sample panel)	2.0 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	0.3 mrem/hr beta-gamma
RWDF	
Evaporator (under bottom)	420 mrem/hr beta-gamma
Evaporator (contact outside upper level)	10 mrem/hr beta-gamma
Drum Storage Area (at HRA fence)	1.6 mrem/hr beta-gamma
C.V.	
Primary Compartment (general upper level)	35 mrem/hr beta-gamma
Primary Compartment (contact M.C. pump volute)	125 mrem/hr beta-gamma
Primary Compartment (S.G. bottom)	60 mrem/hr beta-gamma
Primary Compartment (pressurizer bottom)	30 mrem/hr beta-gamma
Primary Compartment (general lower level)	30 mrem/hr beta-gamma
Primary Compartment (Regen. HX)	110 mrem/hr beta-gamma
Primary Compartment (Non-Regen. HX)	35 mrem/hr beta-gamma

C.V. (Continued)	Radiation Reading
Auxiliary Equip. Compartment (S.C.H.X.)	21 mrem/hr beta-gamma
Auxiliary Equip. Compartment (D.T. top)	17 mrem/hr beta-gamma
Auxiliary Equip. Compartment (D.T. bottom)	130 mrem/hr beta-gamma
Auxiliary Equip. Compartment (general lower level)	9.5 mrem/hr beta-gamma
Reactor Deck (instrument ports)	220 mrem/hr beta-gamma
Reactor Deck (waist level)	50 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	20200 d/m/smear beta-gamma
Charging Pump Chamber	<10 d/m/smear alpha
Charging Room Floor	1615 d/m/smear beta-gamma
Sample Room Sink	47500 d/m/smear beta-gamma
Sample Room Sink	<10 d/m/smear alpha
Sample Room Floor	150 d/m/smear beta-gamma
Chemical Lab Hot Sink	19950 d/m/smear beta-gamma
Chemical Lab Hot Sink	<10 d/m/smear alpha
WDF	
Pump Room Floor	3555 d/m/smear beta-gamma
Shipping Room Floor	366 d/m/smear beta-gamma
C.V.	
Operating Deck	2550 d/m/smear beta-gamma
Operating Deck	<10 d/m/smear alpha
Reactor Deck (head)	22100 d/m/smear beta-gamma
Reactor Deck (head)	<10 d/m/smear alpha
Reactor Deck (grating)	33000 d/m/smear beta-gamma
Reactor Deck (grating)	<10 d/m/smear alpha
Primary Compartment (grating)	3001 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 May 1967 were as follows:

Effluent Type	(Curie) Activity This Month	(Curie) Activity Year to Date	(Curie) Activity Last Twelve Months
Tritium	0.091016	4.594372	22.583987
Liquid	0.001505	0.014186	0.019453
Air, Xe	0.000190	11.053901	101.258462
Air, I-131	0.000000	0.000850	0.147797
Air, M.F.P.	0.000002	0.110539	1.012585

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 April 1967 were a maximum of 655 mrem with an average of 91.25 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of April 1967 were a maximum of 160 mrem with an average of 10.00 mrem.

The average radiation exposure for all personnel as measured by film badges for the month of April 1967 was 77.71 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

OPERATING STATISTICS

MONTH May YEAR 1967

NUCLEAR	UNIT	MONTH	YEAR	TO DATE
TIMES CRITICAL	NO.	0	0	495
HOURS CRITICAL	HRS.	0	754.70	19,617.65
TIMES SCRAMMED (MANUAL)	NO.	0	1	292
* TIMES SCRAMMED (INADVERTANT)	NO.	0	0	31
THERMAL POWER GENERATION	MWH	0	17,665.02	357,749.89
AVERAGE BURNUP (Pu Region)	MWD/MTU	0	1,441.94	12,183.74

CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF 0 MWt

MAIN COOLANT BORON _____ PPM

RODS OUT - INCHES

NO. 1 0 NO. 2 0 NO. 3 0

NO. 4 0 NO. 5 0 NO. 6 0

ELECTRICAL	UNIT	MONTH	YEAR	TO DATE
GROSS GENERATION	MWH	0	3,367.00	60,842.00
STATION SERVICE	MWH	113.62	644.14	11,363.33
STATION SERVICE	%	-	19.72	18.67
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	0	19.06	17.01
AVG. GENERATION RUNNING (0 HRS)	KW	0	4,462.85	3,398.53
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	0	20.46	29.80
AUXILIARY STEAM SUPPLY - NUCLEAR				
STEAM SUPPLIED BY REACTOR	HRS.	0	754.50	16,244.75
RWDF EVAPORATOR OPERATION	HRS.	101.25	894.67	4,810.25

* REMARKS: _____