SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for July 1969

1. GENERAL

At the beginning of this report period the reactor was in a hot shutdown condition. On July 1, the primary system pressure was reduced to 400 psig in order to tighten the pressurizer heater flange. On July 2, system pressure and temperature were increased to 2000 psi and 500°F with no apparent pressurizer heater flange leakage. On July 8, the recirculation system piping and the safety injection system piping were leak tested at 2500 psig while maintaining the primary system pressure at 2560 psig. The recirculation system and the safety injection system were also operationally tested on July 8.

2. REACTOR OPERATIONS

The period from July 3 thru July 7 was spent measuring control rod scram circuit response times, control rod drop times, calibrating control rod number two position indication, and measuring primary coolant flow coastdown times on loss of the variable frequency generator. The period July 9 thru July 15 was spent setting the pressurizer safety valves lift pressure and testing the safety valve water seal piping.

On July 16, at 5:11 PM, initial criticality of Core III was established. The approach to criticality was made with essentially all rods out by diluting boron to 1052 ppm at a reactor coolant average temperature of 505°F. At 10:41 PM the reactor tripped due to a main coolant pump trip while reducing the frequency of variable frequency generator. Investigation revealed that the main coolant pump trip was caused by weak vacuum tubes in the VFG clutch control circuit. Criticality was re-established and low power physics measurements were made from July 17 thru July 19.

During the period July 20 thru July 25 the reactor was used to make training start-ups for SNEC trainees and Westinghouse customer trainees. A total of twenty-four full start-ups and thirty recoveries were made.

On July 25, following a routine training start-up, the reactor was manually tripped. Control rod #6 remained at 36.6", its position prior to the scram. The scram breakers were reclosed and the rod was driven in and out approximately one-half inch and the reactor manually tripped again. This time control rod #6 dropped to its normal scrammed position. The remainder of July 25 and July 26 was spent measuring rod drop times on rod #6 which were in agreement with previous data. A total of twenty drops were made from 40 inches and one each from 5", 10", 15', 20", 25", 30", and 36.6" with no rod hang-up. The On-Site Safety Committee reviewed the stuck rod incident and subsequent rod requalification and concluded that it was safe to continue operation of the reactor.

On July 28 and 29, two SNEC employees took the AEC administered reactor operator license examination and a Westinghouse employee took the AEC administered senior operator license examination.

On July 30, cooldown of the primary system was initiated in order to replace a leaking conoseal gasket on a reactor vessel head instrument port (N-7).

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5. MAINTENANCE

The principal items of mechanical maintenance during the month included replacing fan belts on the containment vessel exhaust fan; repacking number one cylinder on number two charging pump and number one and two cylinders on number one charging pump; installing new pre-filters on the control and auxiliary building inlet and exhaust air handlers and the waste plant exhaust air handler; installing new absolute filters on the chemistry laboratory hood exhaust and the waste plant exhaust air handlers; cleaning the wire mesh filters on the supply air handlers to the containment vessel, the RWDF and the control and auxiliary building; installing a drain line from the RWDF demister to the sump; repairing a leak in the RWDF heating steam condensate return line; installing a new body to bonnet gasket on the chem shim inlet valve, HIC-27V; reset the stationary sheave on number one charging pump variable speed pulley; repairing a steam tracing leak on the charging system piping; and cleaning the RWDF gas compressor seal water coolers; and replacing a gasket on the reactor vessel head instrument port.

The major items of electrical and instrumentation maintenance included stroking and setting the valve position switches on the purification inlet valve, HIC-25V, and the chem shim inlet valve, HIC-27V; cleaning brushes and commutator on the variable frequency generator and the VFG exciter; checking and replacing vacuum tubes in the VFG clutch control circuit; measuring primary coolant flow coastdown times; reinstalling the containment vessel number two sump pump; cleaning contacts in the control rod position indicator circuits; repairing a short in the containment vessel emergency lighting circuit; measuring control rod scram circuit response times; installing a new BF_3 in source range channel A and running discriminator and high voltage plateaus; repairing the site meteorological station southeast of the facility; replacing the vanes in site air monitor, RIC-8; and the RWDF alpha monitor vacuum pumps; repairing the count room single channel spectrometer; repairing the startup range recorder; replacing resistors in the health physics office radiation monitor; replacing the scintillation crystal on the photomultiplier tube in site air monitor, RIC-9; replacing the log diode and electrometer tube in intermediate range channel A logmicroammeter; setting the PRV position and steam flow scram unblock settings; and setting the zero on the process instrumentation d/p cells.

6. CHEMISTRY

The primary coolant system was maintained in a hot pressurized condition throughout most of the month. Boron concentration varied from 456 ppm to 1179 ppm during the low power physics measurements and control rod worth testing. Lithium hydroxide was added on July 17 and July 22 to maintain the lithium concentration at 0 ppm. A summary of the analyses performed on primary coolant is contained in the following table:

Primary Coolant	Minimum	Maximum
pH at 25°C	5.14	6.28
Conductivity, umhos	2.16	6.15
Boron, ppm	456	1179
Chlorides, ppm	<0.005	<0.005
Oxygen, ppm (not detectable)	0.00	0.00
Lithium, ppm	0.06	0.50
Gross Beta-Gamma (15 Min. Degassed) uc/cc	2.56×10^{-3}	2.24×10^{-2}
Tritium, uc/cc	6.64×10^{-3}	8.42×10^{-3}

6. CHEMISTRY (Cont'd)

Analysis of the component cooling water is as follows:

pH	Conductivity	CrO_4, ppm	Gross Beta-Gamma, uc/cc
8.90	914	387	$0.0 \pm 1.45 \times 10^{-5}$

7. RADIATION AND WASTE DISPOSAL

Radiation surveying consisted of routine plant surveys, the containment vessel and materials shipments. The following maximum radiation readings were taken:

Location	Radiation Reading
C&A Building	
Waste Drum (baling machine)	2.1 mrem/hr beta-gamma
Charging Pump (contact with chamber)	31 mrem/hr beta-gamma
Sample Room (door of sample panel)	1.75 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	6.5 mrem/hr beta-gamma
RWDF	
Evaporator (under bottom)	27 mrem/hr beta-gamma
Evaporator (contact outside upper level)	16 mrem/hr beta-gamma
Drum Storage Area (at HRA fence)	0.13 mrem/hr beta-gamma
C.V.	
Primary Compartment (general upper level)	150 mrem/hr beta-gamma
Primary Compartment (contact M.C. pump volute)	210 mrem/hr beta-gamma
Primary Compartment (S.G. bottom)	230 mrem/hr beta-gamma
Primary Compartment (pressurizer bottom)	160 mrem/hr beta-gamma
Primary Compartment (general lower level)	55 mrem/hr beta-gamma
Primary Compartment (Regen. HX)	250 mrem/hr beta-gamma
Primary Compartment (Non-Regen. HX)	20 mrem/hr beta-gamma
Auxiliary Equipment Compartment (S.C.H.X.)	2 mrem/hr beta-gamma
Auxiliary Equipment Compartment (D.T. top)	3.5 mrem/hr beta-gamma
Auxiliary Equipment Compartment (D.T. bottom)	27 mrem/hr beta-gamma
Auxiliary Equipment Compartment (General lower level)	4 mrem/hr beta-gamma
Reactor Deck (water level at grating)	38 mrem/hr beta-gamma
Reactor Deck (instrument ports)	260 mrem/hr beta-gamma
Reactor Deck (waist level)	100 mrem/hr beta-gamma
Reactor Deck (storage well railing)	46 mrem/hr beta-gamma

7. RADIATION AND WASTE DISPOSAL (Cont'd)

Contamination surveying consisted of routine plant site surveys, surveys of materials shipped, tools, equipment and the containment vessel. 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	59700 d/m/smear beta-gamma
Charging Pump Chamber	<10 d/m/smear alpha
Charging Room Floor	1790 d/m/smear beta-gamma
Sample Room Sink	1280 d/m/smear beta-gamma
Sample Room Sink	<10 d/m/smear alpha
Sample Room Floor	<100 d/m/smear beta-gamma
Chemical Lab Hot Sink	4810 d/m/smear beta-gamma
Chemical Lab Hot Sink	<10 d/m/smear alpha
RWDF	
Pump Room Floor	2180 d/m/smear beta-gamma
Shipping Room Floor	<100 d/m/smear beta-gamma
C.V.	
Operating Deck	4900 d/m/smear beta-gamma
Operating Deck	<10 d/m/smear alpha
Reactor Deck (head)	28300 d/m/smear beta-gamma
Reactor Deck (head)	<10 d/m/smear alpha
Reactor Deck (grating)	26350 d/m/smear beta-gamma
Reactor Deck (grating)	<10 d/m/smear alpha
Primary Compartment (grating)	12000 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 July 1969 were as follows:

Effluent Type	(Curie) Activity This Month	(Curie) Activity Year to Date	(Curie) Activity Last Twelve Months
Liquid	0.001036	0.004425	0.008678
Tritium	0.183410	0.644451	3.255772
Air, Xe	0.229850	0.270046	2.811646
Air, I-131	0.000000	0.000000	0.000143
Air, M.F.P.	0.002298	0.002700	0.028116

7. RADIATION AND WASTE DISPOSAL (Cont'd)

No barrels of waste were 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 June, 1969, were a maximum of 460 mrem with an average of 46.9 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of June, 1969, 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 June, 1969, was 38.9 mrem.

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OPERATING STATISTICS

MONTH July YEAR 1959

NUCLEAR	UNIT	MONTH	YEAR	TO DATE
TIMES CRITICAL	NO.	71	71	894
HOURS CRITICAL	HRS.	93.58	93.58	23,042.07
TIMES SCRAMMED (MANUAL)	NO.	29	29	478
* TIMES SCRAMMED (INADVERTANT)	NO.	1	1	43
THERMAL POWER GENERATION	MWH	0	0	429,077.53
AVERAGE BURNUP (Pu Region)	MWD/MTU	0	0	18,029.03

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

MAIN COOLANT BORON 472 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	0	73,529.3
STATION SERVICE	MWH	312.52	881.97	16,055.37
STATION SERVICE	%	0	0	21.84
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	0	0	17.14
AVG. GENERATION RUNNING (0 HRS)	KW	0	0	3,461.11
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	0	0	18.24

AUXILIARY STEAM SUPPLY - NUCLEAR

STEAM SUPPLIED BY REACTOR	HRS.	0	0	19,259.74
RWDF EVAPORATOR OPERATION	HRS.	294.96	985.93	8,400.79

* REMARKS: Reactor scram on July 16 was due to a main coolant pump trip (27 hertz loss of clutch current). Following scram the reactor was taken critical with the pump on 440 V bus 2. Investigation later revealed weak tubes in clutch control unit which were replaced.

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DAILY AVERAGE POWER LEVEL FOR JULY, 1969

— — — INTERMITTENT OPERATION

——— CONTINUOUS OPERATION