SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for August 1968

1. REACTOR OPERATIONS

At the beginning of this report period the reactor was in a cold shutdown condition for test subassembly inspections. Subassembly inspections were completed on August 6. Filling and venting of the main coolant system commenced on August 7 and was completed on August 8. The reactor was taken critical on August 9 and loaded to 22.4 MWt. This power was maintained until August 11 when the reactor tripped due to an accidental contact with the manual scram button. The reactor was maintained in hot shutdown until August 13 when it was taken critical and loaded to 22.6 MWt. On August 19 the reactor power was increased to 25.6 MWt. The reactor power was maintained at 25.6 MWt until shutdown on August 23. During the period August 24 to August 31 the reactor was maintained in a hot shutdown condition for training start-ups and AEC operator examinations. Two SNEC employees and ten Westinghouse customer trainees were examined by the AEC for operator licenses and certification. During the month ten operator training start-ups were conducted.

2. EXPERIMENTAL PROGRAM

Phase B of the overpower test on the test subassembly installed under change request #31 was completed. This phase of the test was conducted in two steps. In the first step, the reactor was operated for six days at 22.6 MWt to simulate full power steady state conditions in the subassembly. In the second step, a 12.5% step increase in reactor power to 25.6 MWt was made to simulate overpower conditions in the subassembly. The subassembly operated for five days under these conditions. The peak linear power measured in the subassembly was 28.7 kw/ft. Reactor coolant was monitored for fuel failure during the test using the experimental failed fuel detection systems and chemical analyses. None were detected.

Two direct readout continuous boron analyzers were installed and calibrated during the month. One boron analyzer operates on the neutron absorption principle and the other on the conductivity of boric acid using mannitol as a complexing agent.

The core subassembly status as of August remains the same as the June report.

3. OPERATIONAL TESTS

The radiation monitoring system circuits were tested on August 2.

A normal test of the safety injection system was conducted on August 15.

Operational Tests (continued)

The SMEC fire and evacuation alarms were tested on August 2, 9, 16, 23 and 30.

Control rod scram circuit response time and rod drop time tests were completed on August 29. The minimum rod drop time was .762 seconds and the maximum was .910 seconds. The minimum automatic scram circuit response time was .040 seconds and the maximum was .246 seconds.

A test of the pressurizer safety valve anti-simmer devices was conducted on August 28.

The number two turbine overspeed trip was tested on August 8. The trip was actuated at a turbine speed of 1925 RPM.

4. MAINTENANCE

The principal items of mechanical maintenance for the month included replacing the stuffing box on number one charging pump, number 3 cylinder; welding the universal joint to the drive shaft on the containment vessel rotary crane; installing a new gasket on the containment vessel equipment access door; replacing the resin in the storage well system demineralizer; removing the temperature control valve on the control rod room air handler for repairs; installing a yard area sump pump and piping to the sewer for rain water; installing new rupture discs on the caustic pump and spent resin storage tank number three; connecting the drain lines for the experimental boron analyzers to the waste disposal plant; replacing a saran lined tee in the dilute acid line in the make-up purification system; painting the chemistry laboratory; preparing the reactor vessel head for operation; and welding a fitting on the overpower test subassembly pitot tube.

The major items of electrical and instrument maintenance included repairing the chemistry laboratory spectrophotometer; calibrating the staplex air samplers; installing a 120V receptacle in site particulate monitor, RIC-8, cabinet; replacing cables and seals on power range channel B nuclear detector; installing a new pressure gauge on the storage well pump discharge; replacing the strip heater in the instrument air dryer tower; calibration of the main steam and feedwater flow to 140,000 lbs. per hour; replacing a controller in the letdown flow control circuit; replacing a transformer in the control circuit for the pressurizer heater fan; installing new potentiometers in the intermediate range channel A log microammeter; replacing the intermediate range channel B nuclear detector; replacing power range channel B nuclear detector; installing filter paper in site particulate monitor, RIC-9; replacing the transformer in the control circuit for the RWDF exhaust fan; installing a new flood light near the discharge tunnel; installing new G-M tubes in the instrument shop and RWDF labitrons; installing a new fan motor in the office air conditioner; installing a

Maintenance (continued)

new gear train on the start-up range recorder; replacing the charging pump discharge pressure gauges; cleaning and repairing the R.D.F hotwell solenoid valve; repairing the R.D.F sump pump controller; installing new vanes in site particulate monitor, RIC-8, vacuum pump and the chemistry laboratory alpha monitor vacuum pump; installing a new air conditioner in the counting room; repairing the gamma spectrometer; measuring the control rod drop times and process instrumentation scram response times; and testing the containment vessel vacuum breakers.

5. CHEMISTRY

The main coolant system chemistry was being maintained for cold shutdown conditions at the beginning of the month. Hydrazine was added on August 6 to reduce the oxygen concentration in preparation for heat-up. On August 8, hydrogen was added and the boron diluted in preparation for start-up of the secondary system. Lithium was added to raise the pH as part of the pH versus the gaseous diffusion test and to operate at a high pH during the overpower transient test. Chemistry specifications were maintained for power operation until shutdown of the secondary system on August 23. Hot shutdown conditions were maintained for the remainder of the month during the operator training. Iodine analysis were made daily from August 14 to August 23 for the detection of failed fuel during the overpower test. Iodine 131 levels ranged from 5.76×10^{-2} to 1.13×10^{-1} uc/cc and I-133 from 3.24×10^{-2} to 5.95×10^{-2} uc/cc.

A summary of analysis performed on the main coolant samples is contained in the following table:

Main Coolant System	Minimum	Maximum
pH at 25°C	5.52	7.17
Conductivity, umhos	3.49	23.7
Boron, ppm	345	1756
Chlorides, ppm	< 0.005	< 0.005
Oxygen, ppm	0.010	0.050
Hydrogen, cc/kg H_2O at STP	12.	28
Gross Beta-Gamma (15 Min. Degassed) uc/cc	1.13×10^{-2}	8.12×10^{-1}
Tritium, uc/cc	1.63×10^{-2}	7.13×10^{-2}
Crud (one determination), ppb	115	
I-131, uc/cc	5.76×10^{-2}	1.13×10^{-1}
I-133, uc/cc	3.24×10^{-2}	5.95×10^{-2}
Lithium, ppm	0.05	1.47

Chemistry (continued)

Analyses performed on primary make-up water on August 5 showed chlorides to be less than 0.005 ppm, dissolved oxygen to be less than 0.005 ppm and silica to be 0.004 ppm.

New resins were installed in the storage well demineralizer on August 6.

Steam generator chlorides remained well within specifications except for brief periods after start-up of the secondary system on August 9 and August 13. The average activity of the steam generator remained less than $1x10^{-8}$ 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
G&A Building	
Waste Drum (baling machine)	0.75 mrem/hr beta-gamma
Charging Pump (contact with chamber)	1.6 mrem/hr beta-gamma
Sample Room (door of sample panel)	1.0 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	5.0 mrem/hr beta-gamma
RWDF	
Evaporator (under bottom)	26 mrem/hr beta-gamma
Evaporator (contact outside upper level)	10 mrem/hr beta-gamma
Drum Storage Area (at HRA fence)	7.0 mrem/hr beta-gamma
C.V.	
Primary Compartment (general upper level)	50 mrem/hr beta-gamma
Primary Compartment (contact M.C. pump volute)	440 mrem/hr beta-gamma
Primary Compartment (S.G. bottom)	190 mrem/hr beta-gamma
Primary Compartment (pressurizer bottom)	130 mrem/hr beta-gamma
Primary Compartment (general lower level)	70 mrem/hr beta-gamma
Primary Compartment (Regen. HX)	500 mrem/hr beta-gamma
Primary Compartment (Non-Regen. HX)	60 mrem/hr beta-gamma
Auxiliary Equipment Compt. (S.C.H.X.)	8 mrem/hr beta-gamma
Auxiliary Equipment Compt. (D.T. top)	110 mrem/hr beta-gamma
Auxiliary Equipment Compt. (D.T. bottom)	8 mrem/hr beta-gamma

Radiation and Waste Disposal (continued)

Location	Radiation Reading
C.V. (continued)	
Auxiliary Equipment Compt. (general lower level)	3 mrem/hr beta-gamma
Reactor Deck (water level at grating)	10 mrem/hr beta-gamma
Reactor Deck (instrument ports)	170 mrem/hr beta-gamma
Reactor Deck (waist level)	10 mrem/hr beta-gamma
Reactor Deck (storage well railing)	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 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	3610 d/m/smear beta-gamma
Charging Pump Chamber	< 10 d/m/smear alpha
Charging Room Floor	4340 d/m/smear beta-gamma
Sample Room Sink	12330 d/m/smear beta-gamma
Sample Room Sink	< 10 d/m/smear alpha
Sample Room Floor	130 d/m/smear beta-gamma
Chemical Lab Hot Sink	5930 d/m/smear beta-gamma
Chemical Lab Hot Sink	< 10 d/m/smear alpha
R.D.F.	
Pump Room Floor	351 d/m/smear beta-gamma
Shipping Room Floor	248 d/m/smear beta-gamma
C.V.	
Operating Deck	6980 d/m/smear beta-gamma
Operating Deck	< 10 d/m/smear alpha
Reactor Deck (head)	21820 d/m/smear beta-gamma
Reactor Deck (head)	< 10 d/m/smear alpha
Reactor Deck (grating)	36000 d/m/smear beta-gamma
Reactor Deck (grating)	< 10 d/m/smear alpha
Primary Compartment (grating)	1910 d/m/smear beta-gamma
Primary Compartment (grating)	< 10 d/m/smear alpha

Radiation and Waste Disposal (continued)

Liquid and gaseous effluents from the SNEC site for the month of August 1968 were as follows:

Effluent Type	(Curie) Activity This Month	(Curie) Activity Year to Date	(Curie) Activity Last Twelve Months
Liquid	0.001828	0.006218	0.013434
Tritium	0.253500	5.481087	6.936611
Air, Xe	0.253420	16.310721	26.124466
Air, I-131	0.000000	0.000351	0.001999
Air, M.F.P.	0.002534	0.163107	0.261244

Ten (10) 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 July, 1968, were a maximum of 280 mrem with an average of 24.4 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of July, 1968, were a maximum of 230 mrem with an average of 4.5 mrem.

The average radiation exposure for all personnel as measured by film badges for the month of July, 1968, was 16.18 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

OPERATING STATISTICS

MONTH AUGUST YEAR 1968

NUCLEAR	UNIT	MONTH	YEAR	TO DATE
TIMES CRITICAL	NO.	25	201	743
HOURS CRITICAL	HRS.	312.11	1,699.19	22,272.19
TIMES SCRAMMED (MANUAL)	NO.	7	91	418
* TIMES SCRAMMED (INADVERTANT)	NO.	1	8	39
THERMAL POWER GENERATION	MWH	6,797.67	38,033.80	416,003.73
AVERAGE BURNUP (Pu Region)	MWD/MTU	554.87	3,104.58	16,938.81

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

MAIN COOLANT BORON 397 PPM

Peak Nov

RODS OUT - INCHES

NO. 1 0 NO. 2 10 NO. 3 0

NO. 4 0 NO. 5 10 NO. 6 0

ELECTRICAL	UNIT	MONTH	YEAR	TO DATE
GROSS GENERATION	MWH	1,117.0	6,785.0	70,061.5
STATION SERVICE	MWH	271.75	2,209.40	14,425.30
STATION SERVICE	%	24.43	32.56	20.59
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	16.43	17.84	16.84
AVG. GENERATION RUNNING (281.6 HRS)	KW	3,966.6	4,445.5	3,449.6
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	33.36	18.39	19.87
AUXILIARY STEAM SUPPLY - NUCLEAR				
STEAM SUPPLIED BY REACTOR	HRS.	283.4	1,570.02	18.721.11
RWDF EVAPORATOR OPERATION	HRS.	185.6	541.61	7,100.01

* REMARKS: August 11 - Reactor scram due to operator accidentally bumping scram button while cleaning console

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DAILY AVERAGE POWER LEVELS FOR AUGUST 19 68