SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Operations Report for September 1965

1. GENERAL

The plant outage which was begun on August 22nd was continued throughout this report period.

At the beginning of the month work was underway on leveling and supporting the fuel storage rack in a fixed position, and in preparing the reactor vessel head for removal. Eight fuel assemblies and eleven removable fuel rods for the U-235 enriched region for core II were received and stored in the fuel storage rack.

On September 7th the water level in the storage well was raised to the refueling level and on September 8th three fuel subassemblies, the nine-thimble assembly containing the flux oscillator rod, the supercritical dummy assembly and an irradiation capsule assembly were removed from the reactor vessel through the head ports. On September 9th the reactor vessel head was removed and stored on the operating floor. The upper core barrel with instrument frame was removed from the reactor vessel on September 10th and was placed on a new storage platform that had just been installed for it.

The irradiated fuel shipping cask was received at the site on September 15th and was lowered into the storage well on September 16th. During the transfer of a non fuel material irradiation capsule assembly from the reactor vessel to the shipping cask, the capsule assembly dropped from the handling tool, landed upright on a ledge adjacent to the top of the core, and then rolled over on the top of the core. There was no damage done to either the core or the capsule assembly. Special tools were fabricated and used to retrieve the capsule assembly and to complete its transfer to the shipping cask.

The loading of the irradiated fuel shipping cask was completed on September 20th. The load consisted of the following: seven irradiation capsule assemblies; two single fuel rods, having serial numbers 7 and E1, which were irradiated in the 2x2 subassembly, 503-9-1; and subassembly 503-4-25 containing five fixed fuel rods with serial numbers 753, 755, 756, 757, and 762 and four removable fuel rods having serial numbers 102, 123, 701 and 702. The cask was shipped from the site on September 21st.

On September 23rd control rod number 2 was interchanged with control rod number 1 and control rod number 5 was interchanged with control rod number 6. Each control rod was inspected with the aid of the underwater periscope. All rods appeared to be in good condition.

Two shipments of plutonium dioxide enriched fuel were received at the site and stored in the storage well on September 29th. The shipments consisted of four fuel assemblies and nine removable fuel rods. A shipment of one plutonium dioxide enriched fuel assembly was received on September 30th.

2. EXPERIMENTAL PROGRAM

A fuel rod that was removed from the 2x2 subassembly 503-9-1 was inspected with the aid of the underwater periscope. The rod was found to have no mechanical defects and was clean except for some small specks of crud in the region of maximum heat flux.

An alpha monitoring system was received, installed and calibrated.

Experimental Program (Continued)

Two neutron detecting channels with scalers were received, checked out and installed in the containment vessel to be used for the loading of Core II.

3. OPERATIONAL TESTS

The radiation monitoring system circuits were tested on September 16th.

The #2 turbine overspeed trip was tested on September 17th. The trip functioned at 1925 RPM.

On September 21st the response times from initiation of scram signal to scram breaker opening was measured for all scram circuits. The manual scram response time was 0.025 seconds. The minimum automatic scram response time was 0.150 seconds and the maximum was 0.240 seconds.

4. MAINTENANCE

The principal items of mechanical maintenance for the month included preparing for and removing the reactor vessel head for refueling; leveling and supporting the fuel storage rack in a fixed position; installing new springs in the fuel handling scales; repairing the 9x9 fuel assembly handling tool; painting the reactor vessel head bolt can and the reactor vessel head; cleaning the reactor vessel head bolts; shearing the support tube from an irradiation capsule assembly; receiving, loading and shipping the irradiated fuel shipping cask; interchanging the two center control rods with two outer control rods; replacing the storage well filters; replacing the storage well demineralizer resin; lapping the seating surfaces of five sample panel valves; replacing the absolute filters in the air handler for the hoods in the chemistry laboratory; repairing the condensate line in RWDF; repairing gasket surface on the river water strainer located in the pipe tunnel; replacing the check valve in the condensate line in the containment vessel; installing a new section of pipe and a larger valve in the drain line for the RWDF caustic mix tank; lapping the seats and discs of both pressurizer relief valves; rotating the rotor of the main coolant pump; painting the outside doors of the control and auxiliary building and the RWDF building; and receiving and storing Core II fuel.

The major items of electrical and instrument maintenance included cleaning and setting the relief valves on the leak-off system in the containment vessel; repairing a decade unit on the energy spectrometer in the count room; repairing the storage well heat exchanger flow controller; cleaning the air regulators on controllers TIC-21 and TIC-22; installing a manual scram circuit in the containment vessel for use during refueling; rewiring a decade unit on a scaler in the count room; measuring the response time for all scram circuits; adjusting the magnetrol on the hydrazine chemical addition tank; replacing a relay on the fuel handling crane; installing two special neutron detecting channels in the containment vessel for fuel loading; adjusting the vacuum regulating valves on the RWDF gas compressor; replacing the G-M tube in the temporary area radiation monitor in the containment vessel; cleaning the contacts and adjusting the set points of the control rod drop alarms; calibrating the level controller, LIC-21, on the discharge tank in the containment vessel; and repairing the high level alarm on a monitor tank.

5. PLANT CHANGES

The elevator feature of the fuel storage rack has been discontinued. The rack is now permanently supported in a position two feet below the former fully raised position. Supports were installed on the east and west ends of the rack to supplement the cable support at the center.

New equipment for monitoring the radioactive particulate matter in the containment vessel air has been installed and placed in operation. The new equipment incorporates two monitoring channels. The detector of one channel monitors a moving filter paper for beta radioactivity. This detector has a sensitivity range of $1x10^{-11}$ to $1x10^{-6}$ uc/cc. The detector of the second channel monitors alpha radioactivity. It is mechanically located so that it monitors the moving filter paper six hours after sampling time (1 hour). This feature greatly reduces the radon-thoron background. The minimum sensitivity of the alpha monitoring channel is $2.5x10^{-12}$ uc/cc. The controls, read-out instruments and alarms for the two monitoring channels are located in the control room. The original channel (RIC-1) for monitoring the containment vessel for radioactive particulate has been removed from service.

Two new shelf mounted area monitors have been installed in the control and auxiliary building. These monitors continuously sample the air in the charging room and in the sampling room for alpha radioactivity.

6. CHEMISTRY

The main coolant system was in a cold shutdown condition throughout this report period. The boron concentration of the water in the refueling water storage tank, the storage well and the main coolant system was increased to 1630 PPM. The shutdown cooling system was operated to remove residual core heat. A summary of the analyses of samples taken from the shutdown cooling system during the month are:

Shutdown Cooling System	Minimum	Maximum
pH	5.60	6.08
Conductivity, umhos	8.40	12.2
Boron, ppm	748	1637
Chlorides, ppm	< 0.005	0.010
Potassium, ppm	0.24	0.35
Lithium, ppb	12	20
Sodium, ppm	1.97	2.60
Crud, ppm	0.4	1.75
Gross Beta-Gamma (15 Min. Degassed) uc/cc	$1.37x10^{-3}$	0.181

7. RADIATION AND WASTE DISPOSAL

Radiation surveying consisted of routine plant site surveys, C.V. during shutdown, receiving new fuel and shipment of irradiated fuel and non-fuel material capsules. The following maximum radiation readings were taken:

Location	Radiation Reading
C&A Building	
Waste Drum (baling machine)	1.3 mrem/hr beta-gamma
Charging Pump (contact with chamber)	12 mrem/hr beta-gamma

Radiation and Waste Disposal (Continued)

Location	Radiation Reading
Sample Room (door of sample panel)	1 mrem/hr beta-gamma
Chemical Lab Hot Sink (1" from drain)	0.15 mrem/hr beta-gamma
Fuel Shipment (contact)	2.5 mrem/hr beta-gamma
Fuel Shipment (meter)	0.25 mrem/hr beta-gamma
RWDF	
Evaporator (under bottom)	260 mrem/hr beta-gamma
Evaporator (contact - outside)	60 mrem/hr beta-gamma
C.V.	
Primary Compartment (general upper level)	8 mrem/hr beta-gamma
Primary Compartment (contact - MC pump volute)	40 mrem/hr beta-gamma
Filter Vault (contact with purification system post filter)	2300 mrem/hr beta-gamma
Reactor Deck (head removed - water level at grating)	1000 mrem/hr beta-gamma
Reactor Deck (approx. 3' from inst. rack - water level at grating)	1000 mrem/hr beta-gamma
Operating Deck (at safety line with head removed - water level at grating)	180 mrem/hr beta-gamma
Bridge (with head removed - water level at grating)	300 mrem/hr beta-gamma

Contamination surveying consisted of routine plant site surveys, surveys of fuel shipping containers, fuel cask, new fuel, tools and C.V. during shutdown. 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 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	69800 d/m/smear beta-gamma
Charging Room Floor	796 d/m/smear beta-gamma
Sample Room Panel Tray	1952 d/m/smear beta-gamma
Sample Room Sink	648 d/m/smear beta-gamma
Sample Room Floor	less than 100 d/m/smear beta-gamma
Chemical Lab Hot Sink	416 d/m/smear beta-gamma
RWDF	
Pump Room	400 d/m/smear beta-gamma
Shipping Room	400 d/m/smear beta-gamma

Radiation and Waste Disposal (Continued)

Location	Contamination Reading
C.V.	
Bridge	5930 d/m/smear beta-gamma
Operating Deck (South of storage well)	1401 d/m/smear beta-gamma
Door Handle (inside)	295 d/m/smear beta-gamma
Fuel Cask	Within limits of B.E. Permit
New Fuel	Less than minimum detectable alpha, beta, gamma

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

Effluent Type	(Curie) Activity This Month	(Curie) Activity Year to Date	(Curie) Activity Last Twelve Months
Liquid	0.000605	0.006830	0.008516
Air, Xe	0.115645	36.305651	73.231751
Air, I-131	0.000057	0.001846	0.002380
Air, M.F.P.	0.001156	0.363057	0.836144

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 August 1965 were a maximum of 200 mrem with an average of 23 mrem.

Radiation exposure for all visiting personnel as measured by film badges for the month of August 1965 were a maximum of 75 mrem with an average of 2 mrem.

The radiation exposure for all personnel as measured by film badges for the month of August 1965 was 13 mrem.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

OPERATING STATISTICS

MONTH September YEAR 1965

NUCLEAR	UNIT	MONTH	YEAR	TO DATE
TIMES CRITICAL	NO.	0	32	409
HOURS CRITICAL	HRS.	0	1,727.88	12,671.11
TIMES SCRAMMED (MANUAL)	NO.	0	24	240
* TIMES SCRAMMED (INADVERTANT)	NO.	0	2	27
THERMAL POWER GENERATION	MWH	0	30,222.93	208,488.75
AVERAGE BURNUP	MWD/MTU	0	1,448.82	9,381.13

CONTROL ROD POSITIONS AT END OF MONTH AT EQUILIBRIUM POWER OF - MWt **

MAIN COOLANT BORON 1631 PPM

RODS OUT - INCHES

NO. 1 - NO. 2 - NO. 3 -

NO. 4 - NO. 5 - NO. 6 -

** Reactor shutdown in preparation for Core II refueling

ELECTRICAL	UNIT	MONTH	YEAR	TO DATE
GROSS GENERATION	MWH	0	4,536.00	34,182.00
STATION SERVICE	MWH	0	1,255.33	7,786.89
STATION SERVICE	%	-	27.45	22.66
AVG. PLANT EFFICIENCY - MWH(e)/MWH(t)	%	-	15.01	16.40
AVG. GENERATION RUNNING (- HRS)	KW	-	2,694.49	2,925.01
PLANT LOAD FACTOR - (AVG. GEN. FOR MONTH/MAX. LOAD)	%	-	18.46	22.84
AUXILIARY STEAM SUPPLY - NUCLEAR				
STEAM SUPPLIED BY REACTOR	HRS.	0	1,587.57	9,643.39
RWDF EVAPORATOR OPERATION	HRS.	0	251.83	15,839.83

* REMARKS: _____