UNITED STATES OF AMERICA
UNITED STATES NUCLEAR REGULATORY COMMISSION

before the

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
PUBLIC SERVICE COMPANY NEW HAMPSHIRE, et al.	)	Docket Nos. 50-443 OL-1 No. 50-444 OL-1
(Seabrook Station, Units 1 and 2)	)	(On-site Emergency Planning Issues)

AFFIDAVIT OF WINTHROPE B. LELAND

I, Winthrope B. Leland, being on oath, depose and say as follows:

1. I am the Chemistry and Health Physics Manager at Seabrook Station. A statement on my professional qualifications is attached hereto and marked as Attachment "A".

2. The operation of the Seabrook Station Circulating and Service Water Systems (CW and SW) started on August 25, 1985. Concomitant with this was the initiation of the Chlorination System operation. The Seabrook Station Chemistry Program Manual, Chapter 4.2, is the implementing document for the Chlorine Management Program (CMP) which bases the long term scheme for chlorine regime on biopanel inspections. The Seabrook Station Chemistry Department inspects CW and SW system components, monitors effectiveness of biofouling control as well as ensuring compliance with NPDES restrictions.

3. The chronology appended to this document lists the inspections performed on the CW and SW system and plant components using seawater, since operation in 1985. During the first five months of the circulating water system operation, the system was chlorinated. Biopanels in the intake and discharge transition structures showed no signs of any bio-settlement. During January 1986, preparations for epoxy coating of the main condensers tube sheets allowed access to main condensers water

boxes. This inspection showed no biofouling or settlement on the neoprene lining or the tube sheets. Inspection of the tidal interface line in the CW pump bay at this time also showed no signs of any biological activity. Between January and June, 1986 operation of CW and SW was intermittent, and for short periods. Biopanel inspections were performed during the first six months of 1986 with no fouling observed. Full CW operation and chlorination resumed in June 1986. Additional biopanels were deployed in May 1986 to provide added assessment capabilities. No settlements of mussels were noted until late July 1986 when the numbers increased from approximately 3 to about 200 per panel in two weeks. Chlorination was maintained through December 1986, and all but three specimens detached by January 1987. The detached specimens did not cause any blockage. During this period the dosing line to the SW pump bay was utilized to maintain chlorine levels in the SW system. December 1986 inspection of SW pump house at the tidal interface showed no biosettlement other than green algae.

4. Starting in June of 1987, the following seawater components or heat exchangers were examined: SCCW, PCCW "A" and "B", DGJCW "A" and "B", Main condensers, intake transition structure and CW pump bay. No biofouling was seen in any of these components. Limited barnacle settlement was observed in the condenser water boxes and the circulating water pump house. However, none of these barnacles were alive.

5. In May, 1987 a particularly heavy barnacle settlement was noted on the biopanels followed later in June 1987 by a heavy mussel settlement. Chlorination was maintained, and by the end of July 1987, the mussel settlement had diminished by 50%. There was 100% barnacle mortality with 90% of the dead barnacle shells detached. The detached specimens did not cause any blockage. By November, 1987 the mussel settlement also diminished to only a few specimens. Similar observations were made on inspection of the CW pump bay walls in September 1987; i.e. dead barnacles detached but no mussel settlement. Normandeau Associates, a biological consultant, also inspected the biopanels. Their conclusion was that the settlement observed on the biopanels was insignificant when compared with the open-ocean biopanels that they deploy in the vicinity and outside the intake structures. Open-ocean biopanels were considerably fouled.

6. Thus far, no integrated growth measurements nor integrated mass measurement for mussels have been made on the biopanels because there have been no permanent settlements. Although the barnacle set showed growth during the first two months (May-June 1987), these specimens died and the residual shells detached, diminishing the fouling effect. No biofouling of any kind has been observed in any component using seawater. Some small shell fragments have been found in several tubes; however, these

shells were not blocking flow. Finally, biopanel measurements have been confirmed by visual observation within the pump bays. These facts support our position that no biofouling exists in the SW system.

7. As part of the ongoing surveillance test program required by Technical Specification 4.0.5 and implemented in accordance with the requirements of the ASME code, Chapter XI, subsection IWP, and Seabrook Safety Evaluation Report (SSER) 6, all six of the Service Water system pumps (41A, B, C, and D and 110A and B) are tested quarterly as a minimum. The test consists of establishing a known system flow condition (flow path and flow rate) and recording data indicative of pump and system performance. Because the differential pressure across the pump is verified to remain within an acceptable band for the required flow rate, not only is pump performance being monitored but the condition of the overall system is also tested. Should fouling or any other phenomenon occur which would restrict system flow, it would be detected during the quarterly pump surveillance test as an unsatisfactory increase in the required pump differential pressure to attain the required flow rate or an inability to achieve the required flow. All service water heat exchangers are on line and therefore monitored during each pump surveillance test. Because the six service water pumps are tested quarterly, the system flow resistance is checked and verified to be satisfactory a total of 24 separate times each year, 12 times for each train of Service Water.

8. Furthermore, the Operations Department performs the following tasks to ensure that blockage or reduced flow does not occur:

* SW pump flow capacities are measured quarterly. This is performed in accordance with Operations Procedure OX1416.04.

* The SW strainer immediately upstream of PCCW and DGJCW heat exchangers are cleaned after reaching a 6 psi differential pressure (normal psid is about 5 lbs.). This is performed in accordance with Operations Procedures VAS D.5500 and VAS D.5502.

* Service water flow is checked by an auxiliary operator routinely during each shift, at a minimum.

9. Service and circulating water are open-loop, seawater systems. Biofouling control and monitoring for these systems is described above. The function of these open-loop systems is to cool closed-loop systems, i.e., PCCW and DGJCW. These

closed-loop systems, in turn, are used to cool equipment, e.g., ECCS. The only water used in the closed-loop systems is demineralized water which is produced on-site from well water. Thus, seawater cannot enter these closed-loop cooling systems and hence seawater originated macrofouling cannot occur. No biofouling has been observed within any of the plant's closed-loop cooling systems. The source of water for these systems is deep (artesian-type) wells from the town of Seabrook. Such wells do not contain macrofouling organisms. The water is first chlorinated when it is brought into the site. Next it is filtered through activated carbon beds which remove particulates, suspended solids, organic matter and residual chlorine. This water is then demineralized and passed through an ultra-violet light sterilization unit prior to distribution into plant systems. No other water source is used to supply make-up water to plant closed-loop cooling systems. This process eliminates, for all practical purposes, microfouling organisms from entering plant systems through the make-up water.

10. The chemistry department performs quarterly surveillances for biological activity in the plants closed-loop cooling systems. In addition, when the water treatment plant runs as described in paragraph 9, biological activity of the output is performed at least monthly. Annually, a microbiological analysis of these systems is performed to identify any specific bacterial species present and whether they are alive, viable or dead.

11. The chemistry department performs inspections of closed-loop cooling systems components when they are opened for maintenance activities. These inspections are performed in accordance with chemistry procedure CN0944.01.

12. Controls established at the Seabrook Station ensure that the cooling water system will be effectively monitored for biofouling control.

Winthrope B. Leland

STATE OF NEW HAMPSHIRE

Rockingham ss. April 28, 1988

The above-subscribed Winthrope B. Leland appeared before me and made oath that he had read the foregoing affidavit and that the statements set forth therein are true to the best of his knowledge.

Before me,

Notary Public
My Commission Expires: March 6, 1990

CHRONOLOGY

08-12-85	Inspection of cooling tower SW check valves no biofouling noted.
8-25-85 to 12-24-85	Start-up of CW and SW Systems and chlorination starts. Chlorine demand study.
12-24-85	Shutdown of SW and CW Systems.
01-21-86	Inspection of CW pumphouse, center bay. No biofouling noted.
01-23-86	Inspection of condenser air removal heat exchangers. No biofoulding noted.
01-27-86	Inspection of main condenser; no biofouling noted. Inspection of Water Box Priming pump heat exchangers; no biofouling noted.
01-86	CW/SW flow only for seven days.
02-86	SW flow only on 23 days.
03-86	SW flow only on 27 days.
04-86	CW and SW flow for 14 days.
05-86	CW or SW for 19 days.
06-86	CW and SW flow for 24 days. Chlorination System in operation with CW/SW flow.
07-86 to 12-86	Chlorination System operation and CW flow. Dosing direct to SW system during observation of increased biological activity.
07-86	Extra bio-panels added to CW and SW pumphouse.
12-23-86	Inspection of SW pumphouse. No biofouling noted.
06-04-87	Inspection of "A" PCCW heat exchanger. No biofouling observed.
06-05-87	Diesel Generator Jacket Cooling Water heat exchanger inspection. No biofouling noted.
07-06-87	Barnacles noted in intake transition structure and on bio-panels. Chlorination of CW underway.

07-10-87 to 07-24-87	Heavy mussel set on all biopanels.
07-30-87	50% reduction in mussel set. 100% barnacle mortality; 90% of barnacle shells detach from panels.
08-12-87	Inspection of main condenser. No biofouling noted.
09-11-87	Inspection of non-safety related "A" SCCW heat exchanger. No biofouling noted.
09-11-87	Inspection of CW pumphouse (dewatered). Barnacle detached from walls just as on panels. No mussel settlement also paralleled on panels. No biofouling or significant level of debris.
09-25-87	Inspection of "B" PCCW heat exchanger. No biofouling noted. Inspection of "B" DGJCW heat exchanger. No biofouling noted.
09-28-87	Inspection of SW pipe downstream of SW-V5. A few dead barnacles; no biofouling.
12-22-87	Inspection of the drain SW line supplying the non-safety related SCCW heat exchanger showed small (<1") pieces of what resembled Tubuleria Larynx (hydroids). These were found in areas of the pipe which still had stagnant water in them.
01-06-88	Inspection of vacuum breaker for service water pump SW-P-41A showed no deposits nor biosettlement of any kind.
02-02-88	Inspection of a 24" SW pipe in the cooling tower (1-SW-1820-9-153-24") showed no biofouling of any kind.
04-06-88	Inspection of intake and discharge transition structure from water level to the bottom (-260'); by a contract diver verified no fouling. Some dead barnacle shells were observed only in the Intake Transition Structure.

STATEMENT OF PROFESSIONAL QUALIFICATIONS

Winthrope B. Leland

QUALIFICATIONS: Sixteen years of experience in Chemistry and Health Physics disciplines. Experience ranged from six years at the SIC Naval Reactors Prototype, 1 year at Argonne National Laboratory and 4 years at Connecticut Yankee Atomic Power Company.

EXPERIENCE:

Nov 1979
to present

Public Service Company of New Hampshire.
Seabrook Station.
Job Title: Chemistry and Health Physics Manager - February to present

Responsible for the coordination and direction of the Chemistry and Health Physics Departments. Advise Station Manager of plant radiological conditions and radiation protection program status.
Job Title: Chemistry Department Supervisor - May 1981 to February 1986

Responsibilities: Manage the Chemistry Department in planning, developing and implementing programs of chemistry and radiochemistry which result in the safe and efficient operation of the nuclear generating station.

Job Title: Chemist - November 1977 to May 1981.

Responsibilities: Supply technical and supervisory support to the Chemistry Supervisor. Implement current techniques, concepts and analytical methods necessary to support the efficient operation of the nuclear generating supervise chemistry and radiochemistry functions of the station.

Nov 1975 to
Nov 1979

Connecticut Yankee Atomic Power Company, Haddam, CT
Job Title: Chemistry and Health Physics Technician

Responsibilities: Perform Chemical and Radiochemistry functions required for all phases of operation of a pressurized water nuclear plant. Provide Health Physics support during maintenance and operation of the plant.

Oct 1974 to
Oct 1975

Argone National Laboratory, INEL, Idaho Falls, Idaho
Job Title: Senior Health Physics Technician

Responsibilities: Write procedures for Laboratory Health Physics Manual, administer radiation worker training course, introduce and train radiation worker in concepts of total containment devices, perform safety audits, provide radiation protection for EBR-II reactor maintenance, operate multi channel analyzer for detection of reactor fission breaks.

Jan 1971 to
Oct 1974

General Electric Company, Knolls Atomic power Laboratory. SIC Prototype, Windsor, CT
Job Title: Radiological Controls Technician

Responsibilities: Maintain Qualification as Radiological Controls and Engineering Laboratory Technician (ELT) as specified by Naval Reactors. Performed and encountered technical aspects of: monitoring radiation exposure, shield planning, liquid and solid waste disposal, thermoluminescent dosimetry, environmental monitoring, perform plant chemical and radiochemical analysis, operate and calibrate instrumentation, radiation and contamination surveys, first aid, audit radiological operations

of Navy personnel and submit written reports of audits.

Jan 1969 to Jan 1971

Combustion Engineering - Naval Reactors Division, Windsor, CT (S1C Prototype, same facility as above)
Job Title: Radiological Controls Technician

Responsibilities: Same as above under General Electric

EDUCATION: Bachelor of Science in Chemistry from the University of Hartford - August 1980

MISCELLANEOUS: Held "L" clearance with the Energy Research and Development Administration. Member of the Health Physics Society.