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 50-444 OL-1
	)	
(Seabrook Station, Units 1 and 2)	)	(On-site Emergency Planning Issues)

AFFIDAVIT OF THOMAS W. GLOWACKY

I, THOMAS W. GLOWACKY, being on oath, depose and say as follows:

1. I am employed by Yankee Atomic Electric Company as a Senior Engineer in the Seabrook Project Electrical Engineering Group. A statement of my professional qualifications is attached and marked as "A".

2. I performed an evaluation of all the applications of ITT Surprenant RG-58 coaxial cable at Seabrook Station. The purpose of this evaluation was to assure that the failure of these nonsafety-related cables under postulated environmental conditions will not prevent satisfactory accomplishment of safety functions by safety-related equipment during low power testing. This evaluation is necessary because RG-58 cables are routed by design with other safety-related and nonsafety-related cables in Train A instrumentation ("V") level raceways.

3. Due to postulated environmental conditions, the RG-58 cables are assumed to fail worst case such that the center conductor and outer shield short together. Assuming a failure of this nature, the potential for overheating and ignition of the RG-58 cable and potential thermal degradation

of adjacent safety-related cables were evaluated taking into consideration the available fault energy (current levels).

4. This evaluation addressed all 126 (Reference Affidavit of Richard Bergeron dated June 16, 1988 at ¶ 3) RG-58 cables. It should be noted that 12 of these cables, (all of those which were routed in a harsh environment within the nuclear island), have since been replaced with qualified RG-59 coaxial cable.

5. The 126 RG-58 cables can be grouped into the following categories by application:

	Category	No. of Cables
(1)	Main Plant Computer System data link between Intelligent Remote Termination Unit (IRTU) and computer	40
(2)	Main Plant Computer System output to CRT Monitors, for color	39
(3)	Keyboard Logic output to Main Plant Computer System	11
(4)	Spare cables for Category (1) above and 1 miscellaneous spare cable	21
(5)	Ultrasonic Level Detectors for the Waste Processing, Chemical and Volume Control, and Boron Recovery Systems	14
(6)	Core Monitor for the Turbine Generator	1
		126

The functions of all of the above applications are nonsafety-related. This was determined based on my review of the electrical schematic drawing packages wherein the safety designation of each circuit is identified. Also, the cable code (TA6Y) assigned to RG-58 coaxial cable indicates that the cable color is black with a red tracer, which indicates a nonsafety-related Train A application routed in Train A, Channel I instrumentation ("V" level) raceways. See FSAR Sections 8.3.1.3 and 8.3.1.4 and FSAR Figure 8.3-57.

6. A review of the circuits for each of these applications was performed. This included review of plant drawings, discussions with plant staff and equipment manufacturers, and review of manufacturer's data sheets for various electronic devices.

7. Based on this review, the device used to drive the output in each circuit application utilizing RG-58 cable was identified. In each of these applications the output devices were found to be either Integrated Circuits (IC) or discrete transistor circuits. Of all the devices identified, the device with the highest output current was rated at 400 milliamperes (400×10^{-3} amperes) on a non-continuous basis (50 milliseconds on/1 second off). This should be compared with normal operating currents of 100 milliamperes or less. All of these devices by nature of their construction are low energy devices and are inherently current limiting. When subjected to short circuit failures, such as those postulated, some devices enter a current limit mode due to internal protection, while others will try to supply greater than rated current. Operation of these devices in excess of their rated currents and power dissipation levels will lead to failure of the devices. Typical failure modes are melting of the substrate material and the internal bonding connections associated with the ICs and transistors which subsequently leads to interruption of the circuit. Since, as discussed in Paragraph 8, the equivalent rated ampacity of an RG-58 cable is 8-10 amperes, failure of the device and circuit interruption will occur long before there would be any affect on the cable.

8. Coaxial cable is not typically assigned a rated ampacity. The cable impedance, capacitance, attenuation, and velocity of propagation are the properties normally considered when applying coaxial cables. These properties and the construction of coaxial cable, i.e., center conductor with a shield, make it unique from cables used in power and control applications. Coaxial cable by nature of these unique properties is generally used in low level signal (voltage & current) instrumentation and data transmission applications. In the Seabrook Station design, RG-58 cable is only used for these applications. To evaluate the effects of the current levels identified for the specific applications at Seabrook on the RG-58 cable and adjacent cables, a comparison must be made with an equivalent rated ampacity for the RG-58 cable. The RG-58 center conductor size is #21 AWG. Based on standard ampacity tables, a single conductor cable of this size has an ampacity in the range of 8-10 amperes. This ampacity is dependent on the conductor insulation temperature rating. Comparison of this typical ampacity rating with the maximum current available (i.e., 4' milliamperes) for the various RG-58 cable applications shows that the cables are applied well within their ampacity rating, such that the cables will not overheat.

9. In addition, a test (Reference Affidavit of Randy C. Jamison at ¶ 2-7) was performed to evaluate the temperature rise of the RG-58 cable when subjected to the 400 milliamperes maximum credible current. For conservatism, a test current of 1 ampere was utilized for the test. The test results demonstrated that the RG-58 cable is capable of carrying this current without causing degradation of adjacent cables.

10. In conclusion, the evaluation that was performed indicates that sufficient fault energy does not exist in the circuits evaluated

to cause overheating of the RG-58 cables and subsequent thermal degradation of adjacent cables. The failure (i.e., short to ground) of any nonsafety-related RG-58 coaxial cables, addressed by this evalatuion, due to postulated environmental conditions does not pose any challenge to any safety-related circuits, and, therefore, the ability for safe plant shutdown under postulated design base accident conditions during low power testing has not been jeopardized.

Thomas W. Glowacky

Thomas W. Glowacky

STATE OF NEW HAMPSHIRE

Rockingham, ss. July 22, 1988

The above-subscribed Thomas W. Glowacky 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,

Beverly E. Silloway

Beverly E. Silloway, Notary Public
My Commission Expires: March 6, 1990

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THOMAS W. GLOWACKY

SENIOR ENGINEER

EDUCATION

BS Electrical Engineering, New Jersey Institute of Technology (formerly Newark College of Engineering), 1978

In 1978, he joined W. R. Grace Company, Polyfibron Division, as a Systems Engineer, supervising field installations. He later transferred within W. R. Grace Company to their Daramic Battery Separator Plant, as a Process Engineer.

In 1982, he joined the Electrical Engineering Group of Yankee Atomic Electric Company as an Engineer. In this capacity he has performed engineering studies, design changes and reviews for the Yankee Plant, Vermont Yankee, Maine Yankee and Seabrook Station.

In his present position as Senior Engineer, he is responsible for performing various activites within the electrical engineering discipline on Seabrook Project. These activities include preparation of design changes, calculations, and technical evaluations.