UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

HOUSTON LIGHTING & POWER COMPANY (Allens Creek Nuclear Generating Station, Unit No. 1)	)	Docket No. 50-466

AFFIDAVIT OF JOSEPH FRAY

State of California
County of Santa Clara

I, Joseph Fray, Principal Licensing Engineer, within the Safety and Licensing Operation of the General Electric Company, of lawful age, being first duly sworn, upon my oath certify that the statements contained in the attached pages and accompanying exhibits are true and correct to the best of my knowledge and belief.

Executed at San Jose, California
July 29, 1980

J Fray

Subscribed and sworn to before me this 29 day of July, 1980.

OFFICIAL SEAL
KAREN S. VOGELHUBER
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires Dec. 5, 1980

Karen S. Vogelhuber
NOTARY PUBLIC IN AND FOR SAID
COUNTY AND STATE

My commission expires 12-5 19 80.

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Affidavit of Joseph Fray

My name is Joesph Fray, I am employed at General Electric Company as Principal Licensing Engineer. I served in this capacity for two years. A statement of my experience and qualifications is set out in Attachment 1.

This affidavit addresses Doherty Contention No. 38(b) which alleges that the ACNGS reactor cannot be brought to "cold shutdown" within 24 hours.1/ The phrase "cold shutdown" means that the reactor coolant temperature is below 212°F at atmospheric pressure and the reactor mode

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1/ Item 2.2.3 of NUREG-0578 recommended revisions to Technical Specifications which would require that "the reactor be placed in a hot shutdown condition within 8 hours and in a cold shutdown condition by licensee within 24 hours of any time that is found to be or to have been in operation with a complete loss of safety function. . . ." This recommendation in NUREG-0578 is a proposal for an administrative penalty upon loss of a safety system (NUREG-0578 at A-63). The only import of this as yet unadopted recommendation is whether or not the ACNGS design has the capacity to bring the reactor from the state of full operation (normal conditions) to a cold shutdown. As discussed infra, the ACNGS design has a cooldown capacity far in excess of this requirement.

switch is in the shutdown position.[2/] The initial phase of nuclear system cooldown for ACNGS is accomplished by dumping steam from the reactor vessel to the main condenser. When nuclear system pressure has decreased to a point where steam supply pressure is not sufficient to maintain the turbine shaft seals, vacuum in the main condenser cannot be maintained and the Residual Heat Removal (RHR) System is started to complete the task of placing the reactor in cold shutdown.

The RHR system has several modes of operation, but the mode of concern to achieve cold shutdown is the Shutdown Cooling and Reactor Vessel Head Spray mode. In this mode, reactor coolant is pumped from the recirculation loops by one of the RHR pumps and is discharged to one of the RHR heat exchangers where cooling occurs by transferring heat to the service water. The RHR heat exchangers are sized for operation in the RHR mode of Suppression Pool Cooling following a Loss of Coolant Accident (LOCA). Because the heat load is much greater for this mode than for Shutdown Cooling, the RHR system is considerably oversized for achieving a normal cold shutdown condition. To determine the effectiveness of the ACNGS design to achieve cold shutdown, decay heat load must be determined. The maximum decay heat load after

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2/ Cold shutdown is defined by NUREG-0123, "BWR Standard Technical Specifications," Table 1.2.

reactor shutdown calculated for ACNGS is derived from the 1971 American Nuclear Society formula as required by 10 CFR 50, Appendix K.[3/] Using this decay heat load, General Electric has determined that the main condenser will cool the system to a temperature of approximately 344°F at 110 psig in two hours. The system is maintained at this temperature and pressure for an additional two hours while the RHR system is flushed with reactor grade water. At this point, one loop of the RHR system is placed in service. At this time the heat load is 284.6×10^{6} BTU/hr and decreasing. With the temperature difference between reactor coolant and service water that exists at this time,[4/] one RHR heat exchanger is capable of removing approximately twice the amount of heat being generated. Based on analysis for comparable heat exchanger systems used on BWRs, the RHR system is fully capable of achieving a reactor coolant temperature of less than 212°F in seven hours with two hours conservatively allowed for flushing of the RHR system. Significantly, only one loop of the redundant RHR system is

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3/ As an extra measure of conservatism, Appendix K requires that an additional 20% heat load be added to the decay heat load determined by the ANS formula.

4/ Service water is assumed to be 95°F, thereby making the difference in reactor coolant and service water temperatures equal to 249°F.

needed to achieve this cooldown rate. Thus, even assuming any single failure in one of the RHR cooling loops, the ACNGS reactor can achieve cold shutdown in much less than 24 hours.

EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS

JOSEPH FRAY

PRINCIPAL LICENSING ENGINEER

NUCLEAR ENERGY EQUIPMENT DEPARTMENT

GENERAL ELECTRIC COMPANY

My name is Joseph Fray. My business address is General Electric Company, 175 Curtner Avenue, San Jose, California; and I am employed by General Electric Company. I am presently a Principal Licensing Engineer, a position held since June, 1978 and in this capacity I am responsible for all licensing activities associated with several projects.

I graduated from the Faculty of Technology, Manchester University (England) with the A.M.C.T. degree in Electrical Engineering in 1946. In 1963 I obtained a Higher National Certificate in Pure and Applied Physics at the Harris Technical College, Preston, England. In 1961 I completed the full-time reactor physics course held at the Royal Technical College, Salford. In the United Kingdom I am professionally qualified as an Electrical Engineer (C. Eng. M.I.E.E.) and a Physicist (M. Inst. P.). I am licensed as a Nuclear Engineer in the State of California.

Following work in a junior capacity with a utility engaged in electrical power distribution, I joined the Central Electricity Generating Board in 1948 as a General Assistant Engineer in the technical section at Manchester, England. During the subsequent ten-year period, I progressed from General Assistant Engineer to Regional Technical Engineer in a region comprising eight power stations and numerous EHV transmission substations. The work of the technical section consisted of preparing all test procedures and conducting the startup tests for all new generating plant and transmission equipment within the region.

In 1958 I joined the United Kingdom Atomic Energy Authority as the Works Electrical Engineer at the Chapelcross nuclear power site in Annan, Scotland. In this capacity I was responsible for the startup testing and routine maintenance of all electrical equipment associated with the four gas-cooled reactors at the site.

I transferred to the Industrial Power Branch of the Atomic Energy Authority at Risley, Warrington, England in 1960 to work on the design of power reactor control systems. From 1960 to 1968 I was engaged on the study of reactor core performance and analysis as related to control systems both for magnox reactors and the advanced gas-cooled reactor concept. During this period I spent nine months in 1963 on the startup physics testing of the prototype Advanced Gas-Cooled Reactor at Windscale.

I have served as a part-time lecturer in Electrical Engineering at the Blackpool Technical College and also as a lecturer on reactor control at the Calder Hall Operations School at Windscale.

I joined the General Electric Company at San Jose in 1968 in the Field Engineering Section. I was temporarily assigned to the Licensing and Safeguards Unit where I was employed in the preparation of Technical Specifications for the Tarapur and Brown's Ferry plants. Subsequently, I worked on the preparation of the startup test procedures for the Dresden 2 plant, later going to that site as Lead Engineer responsible for implementing the startup test program. On return from the Dresden site I compiled the startup test report for that plant and worked on the preparation of several sections of the General Electric Nuclear Engineers Manual.

I returned to the Safety and Licensing Operation in 1971 where I undertook responsibility for the licensing of the Hatch 1 and 2 plants. In addition, I was responsible for the initial development of the BWR Standard Technical Specification Review Group in 1975, and represented GE in all the associated review activities. Subsequently, I have been responsible for all licensing, development and preparation work related to technical specifications for GE domestic and overseas projects.

J. Fray

J. Fray
July, 1980