UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

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

AFFIDAVIT OF JAMES D. HEIDT

State of California
County of Santa Clara

I, James D. Heidt, Program Manager-Licensing, 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.

James D. Heidt

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

Ruthe M. Kinnamon
NOTARY PUBLIC IN AND FOR SAID
COUNTY AND STATE

My commission expires March 28 of 1981.

OFFICIAL SEAL
RUTHE M. KINNAMON
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My comm. expires MAR 28, 1981
175 Curtner Ave., San Jose, CA 95125

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	§	

Affidavit of James D. Heidt

My name is James D. Heidt, I am employed at General Electric Company as Program Manager-Licensing, within the Safety and Licensing Operation. I have been so employed for one month. Prior to that I was Senior Project Engineer, assigned to the Allens Creek Project for 3.5 years. A statement of my experience is set out in Attachment 1.

This affidavit addresses TexPirg Contention 38 which states that the control rod drive system for ACNGS is defectively designed, because the float-type level switch in the scram discharge instrument volume tank (SDIV) will fail. Intervenor contends that the float in this switch will sink, and thus fail to open the drain valve on the SDIV (referred to by Intervenor as the SDVT), keeping it full of water. If the reactor were subsequently scrammed with the SDIV not drained, the control rods could not be fully inserted because water from the hydraulic drives for the control rods could not be vented to the SDIV. Intervenor relies on incidents that occurred at several plants from 1972 to 1974.

To more fully address Intervenor's contention, a discussion of the operation of the control rod drive (CRD) system and, in particular, the function of the SDIV during a reactor scram is helpful. The CRD is a hydraulicly operated unit with a piston connected to a control rod. The piston, and thus the control rod, are moved up or down by water pressure directed below or above the piston, respectively. During a scram, high pressure water is automatically directed below the piston. Simultaneously, the water above the piston is vented to the scram discharge volume. This creates a large differential pressure across the piston, which results in a rapid insertion of the control rods.

The scram discharge volume consists of header piping connected to each control rod drive and draining into an instrument volume tank (the SDIV). The header piping is sized to receive and contain all the water discharged by the drives during a scram, independent of the SDIV. During normal plant operation the scram discharge volume and the SDIV are empty and vented to the atmosphere through an open vent and drain valve. When a scram occurs, a signal from the safety grade Reactor Protection System (RPS) closes these vent and drain valves to conserve reactor water and minimize radiological releases to containment. Lights in the control room indicate the position of these valves.

During a scram, the scram discharge volume partially fills with the water discharged from above the drive pistons. While scrammed, the control rod drive seal leakage from the reactor continues to flow into the scram discharge volume until the discharge volume pressure equals the reactor vessel pressure. When the initial scram signal is cleared from the RPS, the scram discharge volume signal is overridden with a key lock override switch in the control room, and the scram discharge volume is drained and returned to atmospheric pressure.

The SDIV is designed to assure there is always adequate volume available to vent the water from above the piston of all the CRD's. In older designs, six float level switches, actuating at three different levels, were installed in the SDIV to monitor the water level and, hence, the available capacity to receive water from the drive pistons. A switch at the lowest level actuated an alarm in the control room to indicate that the SDIV was not completely empty during post-scram draining or to indicate that the SDIV was accumulating leakage at other times during reactor operation. When leakage accumulated to half the capacity of the instrument volume, a second-level switch actuated a rod withdrawal block to prevent further withdrawal of any control rod. The remaining four switches activated the four trip channels of the RPS and initiated a reactor scram before water filled the SDIV. This scram would occur as a safety measure while there was still sufficient scram discharge volume to receive all the water vented from the CRDs. Intervenor's contention concerns the reliability of these six level switches.

The incidents cited by Intervenor occurred at facilities using self-equalizing float type level switches. The problem was that the float could sink when incoming water entered the self-equalizing hole in the top of the float. The hole was designed to equalize pressures inside and outside of the hollow float so that the float would not collapse when the tank pressurized. The entry of water through the top of the float after a scram was unexpected. When the float sank, the level switches automatically reset and the rod block function was removed. As a result, the RPS could then be reset by an operator who might begin pulling rods without realizing that he had failed to drain the scram discharge volume. Although such an occurrence was highly unlikely, if for some reason the tank was not drained, the necessary volume to accommodate the water from a subsequent scram might not have been available.

As a fix for this problem, a new-design, spherical, seal-welded float switch was selected to replace the self-equalizing float switch. The new switch could not sink due to water intake because the vent hole was eliminated.

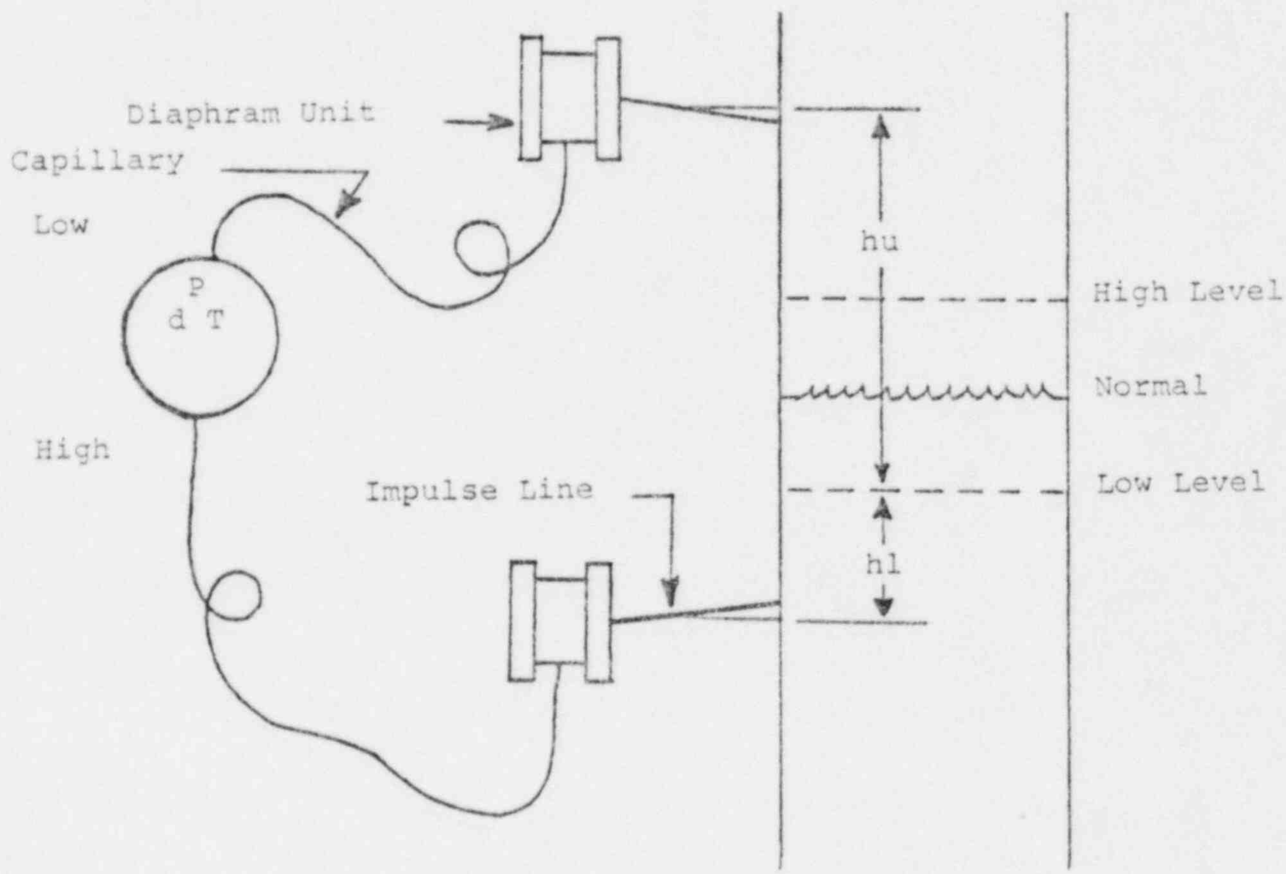
Applicant has chosen, however, to use a differential pressure level transmitter system and thus completely eliminate the float used in the other designs. The principal objective of this system is to improve sensor intelligence and reliability, and to make the system compatible with the solid state concept of the RPS. This system consists of two diaphram units connected by instrument tubing to the SDIV and by oil-filled capillary tubing to a differential transmitter, as shown on Exhibit A.

Changes in water level in the SDIV will cause a pressure change on the diaphram which will act on the oil in the capillary tube. The oil will transmit the pressure change to the differential pressure transmitter. The differential pressure transmitter is calibrated so that a pressure change corresponds to a specified change in water level. The water level signal is sent as an electrical signal to an electronic switch. The range of current in the electronic signal varies in proportion to the water level in the SDIV. The electronic switches are calibrated to actuate as previously described for the float switches.

The use of this differential pressure level transmitter system has, therefore, completely eliminated the possibility of level switch failure due to float sinking. The redesign assures that the rod block function cannot automatically be reset without actually draining the scram discharge volume. Therefore, startup could not proceed without the operator resetting the RPS and draining the scram discharge volume. This operational interlock assures that adequate volume will always be available to accommodate the water from a subsequent scram.

EXHIBIT A

LEVEL TRANSMITTERS



Professional Qualifications of James D. Heidt

My name is James D. Heidt. I graduated from Arizona State University in 1964 with a Bachelor of Science degree in Mechanical Engineering, with a Nuclear Option.

From February 1964 until July 1967, I was employed by Douglas Aircraft Co., in Long Beach, California as an Associate Engineer responsible for design and analysis of aircraft environmental control systems. From July 1967 to December 1968 I was employed as a Senior Engineer by Brown Engineering, in Huntsville, Alabama. At Brown Engineering I was responsible for the initial design of the electromechanical ground support equipment for the NERVA test rocket. At Brown Engineering I also analyzed and evaluated various electromechanical subsystems used on the Saturn rocket. From December 1968 until October 1972, I was employed by General Electric in the Apollo Systems Department. I had various assignments in the Apollo Systems Department including evaluation of contractors, system and subsystem testing software and the evaluation of test data. While in the Apollo Systems Department I was also responsible for providing technical direction, guidance and supervision to engineers and technicians engaged in modifying, testing, troubleshooting and operating various electrical, pneumatic and hydraulic launch support equipment, used at the Saturn V. Systems Development Facility.

From December 1972 until January 1977, I had various assignments in the Safety and Licensing Operation of General Electric's Nuclear Energy Group in San Jose, California. As a Senior Licensing Engineer I represented the General Electric Company in the coordinating, planning, interfacing and scheduling functions required in support of the licensing of light-water reactors. Typical activities engaged in were the preparation and review of SAR input material, participation in meetings with the customer, architect engineer or NRC and responding to customer, architect engineer or NRC licensing inquiries.

From January 1977 until July 1980, I was in the General Electric BWR Domestic Projects Department employed as a Senior Project Engineer on the Allens Creek Project. My principal job responsibilities as a Senior Project Engineer included, defining and transmitting to the various GE engineering groups, the technical and schedular contract requirements for the Allens Creek Nuclear Steam Supply System (NSSS), assuring that GE design documents were in accordance with the contractual requirements and, upon request that architect engineer documents were compatible with General Electric NSSS requirements.

In July 1980, I accepted my present position as a Program-Manager, Licensing in the Safety and Licensing Operation of General Electrics Nuclear Energy Group. My primary responsibilities include, providing direction and leadership to personnel assigned to work in my generic areas of responsibility.