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 LOUIS A GUNTHER

State of New Jersey
County of Bergen

I, Louis A Gunther, Welding and Materials Engineer, Allens Creek Project, for Ebasco Services Incorporated, of lawful age, being first duly sworn, upon my oath certify that I have reviewed and am thoroughly familiar with the statements contained in the attached affidavit addressing intervenor John F Doherty's Contention 44 regarding IGSCC propagated by water hammer and that all statements contained therein are true and correct to the best of my knowledge and belief.

Louis A Gunther

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

CAROL A. OPITENOK
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES SEPT. 13, 1983

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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 WATER F MALEC

State of New Jersey
County of Bergen

I, Walter F Malec, Supervising Mechanical Nuclear Engineer, Allens Creek Project, for Ebasco Services Incorporated, of lawful age, being first duly sworn, upon my oath certify that I have reviewed and am thoroughly familiar with the statements contained in the attached affidavit addressing intervenor John F Doherty's Contention 44 regarding IGSCC propagated by water hammer and that all statements contained therein are true and correct to the best of my knowledge and belief.

Walter F Malec

Subscribed and sworn to before me this ______ day of ________________, 1980.

CAROL A. OPITENOK
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES SEPT. 18, 1983

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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 ADDRESSING JOHN F. DOHERTY'S CONTENTION NO. 44 ON INTERGRANULAR STRESS CORROSION CRACKING AND WATER HAMMER

My name is Louis A. Gunther. My business address is Two World Trade Center, New York, N. Y. I am the Welding and Materials Engineer for the Allens Creek Project employed by Ebasco Services Incorporated. The statement of my background and qualifications is attached as Exhibit I to this testimony.

My name is Walter F. Malec. My business address is 160 Chubb Avenue, Lyndhurst, N. J. I am the Supervising Mechanical Nuclear Engineer for the Allens Creek Project employed by Ebasco Services Incorporated. The statement of my background and qualifications is attached as Exhibit II to this testimony.

This affidavit addresses the facts raised in Doherty's Contention No. 44 which states that the ACNGS piping in the feedwater, steam supply, residual heat removal, ECCS, containment spray and service water systems are not adequately designed to prevent propagation of intergranular stress corrosion cracks (IGSCC) by water hammer forces. A list of these systems describing their function and materials is furnished below:

A. Feedwater System - This system returns the condensed reactor steam to the reactor vessel through six 12-inch lines. The lines are made of carbon steel, A106, Grade "B".

B. Main Steam System - This system transports the reactor steam through four 26-inch lines from the RPV to the turbine. The main steam pipes are made of carbon steel, A106, Grade "B" and carbon steel, A155, KC65, Class I.

C. Residual Heat Removal (RHR) System - This system provides a source of long-term reactor cooling after the reactor has been depressurized. The Low Pressure Core Injection portion of the RHR System and the Low Pressure Core Spray System comprise the low pressure systems of the Emergency Core Cooling System. The RHR system also contains the Containment Spray System. Piping for the RHR system is made of carbon steel, A106, Grade "B"/A155, KCF70 and stainless steel, A312 Grade Typ. 304.[1/]

1/ The stainless steel A312 piping in the ECCS systems is only used for piping in direct contact with the suppression pool. This was done as a corrosion prevention measure. This piping is open-ended and not subject to the same stress levels as in the pressurized piping in which IGSCC has been observed.

D. High Pressure Core Spray - This Emergency Core Cooling System provides a large source of high-pressure cooling water to maintain reactor water level. Piping for this system is made of carbon steel, A106, Grade "B"/and stainless steel, A312, Grade Typ. 304.

E. Essential Services Cooling Water System - This system provides secondary side cooling water to the RHR system, the HPCS, essential HVAC, and Fuel Pool Cooling and Cleanup System. Piping in this system is made of carbon steel, A106, Grade "B".

As covered in the affidavit of Dr. Gerald M. Gordon, carbon steel such as the steel used in the ACNGS is not susceptible to IGSCC. Hence, ACNGS will be designed to preclude cracks caused by IGSCC. This eliminates from consideration intergranular stress corrosion cracking of all the systems identified by Mr. Doherty. Moreover, even disregarding the measures instituted for preventing cracks, the suggested water hammer force for propagating these nonexistent cracks has been minimized and the unavoidable reduced effects accounted for in all the referenced systems.

Water hammer occurs when forces are imparted to piping from the acceleration of contained fluids. ACNGS utilizes standard industry practice in designing for water hammer (e.g., WHAM code, valve design parameters, vent and drainage provisions, administrative controls, fill provisions, etc.). Additionally, applicable guidance will be incorporated into the fluid system designs as it becomes available (e.g., portions of NUREG-0582). The NRC Staff, in NUREG-0582, "Water Hammer in Nuclear Power Plants," has reviewed water hammer events in light-water reactor fluid systems and has classified water hammer problems under nine separate categories. This NUREG is the first of several reports scheduled to be issued by the NRC in seeking generic resolution of Task Action Plan A-1, "Water Hammer." NUREG-0582 is not a final design guidance document and, in fact, the Staff has indicated in several instances that no remedial action is required for operating plants at present due either to the limited number of damaging events reported or the acceptable nature of design solutions incorporated in operating plant systems.

The ACNGS fluid systems are designed to eliminate water hammer wherever possible. Systems having a potential for water hammer will be designed to accommodate the associated loadings. Examples of these commitments, which address various aspects of problems identified in NUREG-0582, are as follows:

a. The ECC and RCIC systems utilize water leg seal pumps as detailed in PSAR Section 6.3.2.2.5. The use of the discharge line fill system, administrative controls, filling and venting procedures and the proper location of vents should effectively eliminate water hammer due to pump startup with discharge lines containing voids.

b. ACNGS systems are designed to withstand the dynamic loads arising from the expected transient flow into empty or partially empty lines.

c. Valve operating times (open to close, close to open) will be provided for all active valves. This data will be used to ascertain if any water hammer is possible. If it is determined that water hammer can occur, the piping will be designed to accommodate these loadings.

d. Control valves will be sized such that they will be stable through their entire control range. This subsequently will avoid water hammer phenomena as a result of control valve instability.

e. Check valves in which pipe ruptures are postulated upstream of the valve, and the associated piping, will be designed to accommodate the loadings resulting from valve closure. For the case of flowing lines, check valves will be designed to assure that the valve obturator will remain in a stable condition such that oscillation or intermittent opening and closing will not occur. Check valves, other than tilting disc check valves, will either be installed in horizontal pipe runs or in vertical runs where flow is upward. Tilting disc check valves will be installed in horizontal lines only. Active check valves will be periodically tested in accordance with ASME

Boiler and Pressure Vessel Code to assure that they will not stick in the closed or open position (as applicable to safety function).

f. The ACNGS has incorporated the traditional design approach for preventing water entrainments or carry-over (and/or condensation) in steam lines. The basic design mechanisms to prevent this event are (a) sloping of horizontal lines downwards in the direction of the steam flow to promote drainage, and (b) provision of drainage features at all low points (automatic or local) where water can accumulate. This drainage feature incorporates steam traps/automatic level control valve stations, which operate on receipt of level signal from drain pots located upstream of the level control valves.

g. In addition to the above, ACNGS design also includes vacuum breaker valves in lines that exhaust steam below suppression pool water level. This will prevent water being drawn up into the lines due to development of low pressure in the line following steam condensation.

h. All "solid water" piping systems will have strict administrative controls to satisfy the requirements of venting, and filling and venting. Hence, all pumping systems will be normally started against filled lines which will not lead to significant dynamic loads. Moreover, all centrifugal pumps will be gradually started and will slowly coast down to zero speed due to pump-motor set inertia. We consider that the loads occurring due to gradual starting/stopping to be insignificant.

In summary, the extensive use of carbon steel, which has demonstrated a very high resistance to IGSCC, should alone be sufficient to render the intervenor's allegations groundless. However, the Applicant takes into account that while IGSCC can be resolved primarily on a metallurgical basis, potential water hammer problems can exist in any fluid system. The Applicant is aware of these potential problems and has taken engineering steps to assure that they will not adversely affect plant safety. Consequently, there is virtually no possibility that propagation of intergranular stress corrosion cracks due to water hammer forces will occur.

RESUME - LOUIS A GUNTHER

Senior Engineer - Materials Applications

SUMMARY OF EXPERIENCE (Since 1968)

Total Experience - More than 12 years engineering experience in metallurgical and welding engineering in the areas of welding design and material selection, pressure vessel fabrication and advanced welding process development for utility, naval nuclear, deep sea submergence and aerospace projects.

Professional Affiliations - Professional Engineer in the State of New York.

Patents - Method of Welding a Tube to a Tube Sheet, Patent No. 3,824,663.

Honors and Awards - Tau Beta Pi
Noah A Kahn Memorial Award - ASTM

Professional Society Memberships - American Society for Metals
American Welding Society
Welding Research Council

Education - BS Metallurgical Engineering (magna cum laude)

Polytechnic Institute of Brooklyn - 1968

MS Metallurgy - New York University 1970

MBA Management Systems - New York University 1975

Specialized Training - Completed the following courses:

(a) TT-4 Practical Nuclear Power Plant Technology Course/sponsored by Ebasco-1977.

(b) B&W Basic Steam Generating Technology Course/ sponsored by Ebasco-1976.

(c) GE-BWR Course/sponsored by Ebasco-1975.

(d) Titanium and Its Alloys/sponsored by the American Society for Metals-1968.

LOUIS A GUNTHER

REPRESENTATIVE EBASCO PROJECT EXPERIENCE

(As Senior Engineer)

Nuclear

Louisiana Power & Light Company	Waterford Unit 3
Houston Lighting & Power Company	Allens Creek Unit 1

Fossil

New York State Electric & Gas Company	Homer City Unit 3
Pennsylvania Electric Company	
Iowa Public Service Company	Neal Unit 4
Public Service Company of Colorado	Pawnee Unit 1
Houston Lighting & Power Company	Limestone Units 1 and 2

EBASCO EXPERIENCE (Since 1974)

Senior Engineer - (6 years), New York Office

Responsible for all matters concerning New York Office welding fabrication and materials selection during design and construction phases on assigned projects and for providing technical support for project site support engineers. Assigned to special projects for development of automatic fixed position pipe welding procedures.

PRIOR EXPERIENCE (6 Years)

Curtiss Wright Corporation
Wood-Ridge, New Jersey
Senior Engineer (3 years)

Assigned to the Welding Technology Department, Nuclear Division. Responsible for development, implementation and surveillance of specialized welding procedures employed in the manufacture of Naval Nuclear Components to NAVSHIPS-250-1500-1 requirements. These procedures included specialized seal welding, automatic tube-to-tube sheet welding, and automatic orbital pipe welding processes. Additional responsibilities included metallurgical studies for development projects and production support, manpower and schedule estimating for new welding projects, capital equipment selection, and vendor auditing.

RESUME - LOUIS A GUNTHER

PRIOR EXPERIENCE (6 Years) (Continued)

Curtiss Wright Corporation
Wood Ridge, New Jersey
Engineer (2 years)

Assigned to the Process Metallurgy Department, Aerospace Division. Responsible for development projects concerned with repair welding and heat treatment of turbine blades, plasma arc welding, inertia welding, and production welding of D6AC steel assemblies for the Grumman F14 Program.

U S Naval Applied Science Laboratory
New York, New York
Physical Metallurgist (1 year)

Assigned to the Titanium Development Program, responsible for carrying out welding development studies and welder training programs on heavy section titanium alloys in support of U S Navy deep submergence vehicle programs.

Ebasco Services Incorporated
Materials Laboratory Technician (Summer Employment)

Responsible for specimen preparation, metallographic work on failure analyses, and brazing and machining operations performed during laboratory studies for the power industry.

WALTER F MALEC
Supervising Engineer
4 Years With EBASCO

Born	Philadelphia, Pennsylvania
Education	Polytechnic Institute of Technology, degree of Engineer in Nuclear Engineering - 1978 Massachusetts Institute of Technology, MS in Nuclear Engineering - 1970 U.S. Coast Guard Academy, BS - 1968
Member	American Nuclear Society
Licensed	Registered Professional Engineer in the State of New York (No. 56673)

Experience:

1980 — Ebasco Services Incorporated, Lyndhurst (NJ) Office; Supervising Engineer, Mechanical-Nuclear Engineering Department:

Houston Lighting & Power Co - Allens Creek NGS - Unit No. 1 - 1200 MW(e) BWR

Technical and administrative responsibility for mechanical, fire protection, plumbing, HVAC, stress analysis, hangers and supports, and inservice inspection activities. Includes schedules, budgets, and client relations.

1978-1980 — Ebasco Services Incorporated, Lyndhurst (NJ) Office; Principal Engineer, Mechanical-Nuclear Engineering Department

Houston Lighting & Power Co - Allens Creek NGS - Unit No. 1 - 1200 MW(e) BWR, Lead NSSS Engineer

Responsible for preparation and maintenance of ECCS and BOP flow diagrams, piping layouts, system design descriptions, inservice inspection provisions, Nuclear Island building general arrangements, PSAR and FSAR preparation, equipment sizing and specification, NSSS vendor interface for correspondence, drawing review, and contract administration.

1976-1978 — Ebasco Services Incorporated, New York Office; Senior Engineer, Mechanical-Nuclear Engineering Department including:

Houston Lighting & Power Co - Allens Creek NGS - Unit No. 1 - 1200 MW(e) BWR, Lead NSSS Engineer

Louisiana Power & Light Co - Waterford SES Unit No. 3 - 1165 MW(e) PWR. Lead NSSS Engineer

(Same responsibilities as listed for 1978-1980 above.)

1976-1978 (Cont'd)	Responsible for preparation and maintenance of ECCS and BOP flow diagrams, piping layouts, system design descriptions, inservice inspection provisions, Nuclear Island building general arrangements, PSAR and FSAR preparation, equipment sizing and specification, NSSS vendor interface for correspondence, drawing review, and contract administration.

* * * * *

1974-1976	United States Coast Guard, Marine Inspection Office, New York; Lieutenant - Supervisory Boiler Inspector. Responsibility for supervision, assignment and training of Marine Inspectors in largest Marine Inspection Office in country. Inspection of hull and machinery material condition of U.S. flag and foreign merchant vessels, and pressure vessels under construction. Application of various laws and regulations of the United States, ASME Code, ANSI, TEMA, NEC and NFPA Standards. Review of engineering plans and alterations, reports from field and resident inspectors.
1973-1974	United States Coast Guard, USCGC Spencer (WHEC-36), Lieutenant - Chief Engineer. Responsibility for operation, maintenance and repair of hull and engineering plant of 6200 slip twinscrew steamship. Direct supervision of 40 officers and men. Duties included preparation of repair specifications and maintenance of vessel records. Received Coast Guard Achievement Medal for superior performance of duty.
1970-1973	United States Coast Guard, Marine Inspection Office, New York, Lt and Ltjg - Marine Inspector. Inspection of hull and machinery of U.S. and foreign flag merchant vessels.
1968-1969	United States Coast Guard, USCGC Mellon (WHEC-717), Ensign, Assistant Engineer Officer.