

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
TEXAS UTILITIES GENERATING)	Docket Nos. 50-445 and
COMPANY, <u>et al.</u>)	50-446
(Comanche Peak Steam Electric)	(Application for
Station, Units 1 and 2))	Operating Licenses)

AFFIDAVIT OF ARTHUR C. SPENCER
REGARDING CONTENTION 2
(VERIFICATION OF COMPUTER CODES)

Arthur C. Spencer, being first duly sworn, deposes and states:

I am employed by Westinghouse Electric Corporation (Westinghouse) in the position of Manager of Thermal-Hydraulic Methods, and Acting Manager of Methods Development. As such I am responsible for the control, preservation and standardization of computer codes used by Westinghouse personnel in safety analyses and engineering analyses of nuclear steam supply systems. A statement of my education and professional qualifications is attached to this affidavit, and is incorporated herein by reference.

The purpose of this affidavit is to establish that the computer codes used in the Comanche Peak Final Safety Analysis Report ("FSAR") that are integral for analyzing the safety features of the Nuclear Steam Supply System ("NSSS") have been verified by appropriate means to assure their validity in conservatively estimating NSSS response to specific sequences of events.

It is standard practice of the Westinghouse Water Reactor Divisions (WRD) to perform verification of each Westinghouse computer program used for safety-related engineering analysis and design. Re-verification is also performed following any modification or change to the computer program.

Verification is the process of providing assurance that a computer program will produce accurate or conservative results consistent with problem assumptions, the numerical technique or algorithm chosen, and the defined boundaries, limits, and/or range of variables, parameters and constants employed.

To the best of my knowledge, one or more of the following methods is employed to verify Westinghouse computer programs:

1. Review of the computer program logic by personnel competent in computer programming technology.
2. Formal review of program objectives, mathematical models and techniques, and input/output variable ranges by personnel competent in engineering analysis, design and safety analysis.
3. Comparison of program results with one or more of the following:
 - a. A sufficient number of hand calculations.
 - b. Alternate verified calculational methods.

- c. Results obtained in experiments and tests.
- d. Results of other verified computer programs.
- e. Known solutions for similar or standard problems.
- f. Measured and documented plant data.
- g. Confirmed published data and correlations.
- h. Results of standard programs and benchmarks.
- i. Parametric sensitivity analysis.

For those computer programs in the public domain no further verification is required at Westinghouse if it can be justified by virtue of its sufficient history of use.

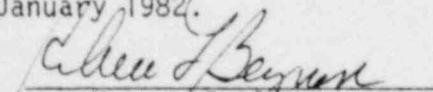
Prior to initiation of work on the Comanche Peak FSAR, procedures were established at Westinghouse to implement these computer program (code) verification practices. The procedures and the adherence to procedures are subject to review and audit by Westinghouse, Westinghouse customers, and the Nuclear Regulatory Commission (NRC).

The established procedures are followed in verifying computer programs and, therefore, provide adequate assurance that the computer codes used in the safety analyses for the Comanche Peak FSAR have been verified.

Further the affiant sayeth not.


Arthur C. Spencer

Subscribed and sworn to before me this 19th day
of January 1982.


Notary Public

PROFESSIONAL QUALIFICATIONS
ARTHUR C. SPENCER
NUCLEAR TECHNOLOGY DIVISION, WATER REACTOR DIVISIONS
WESTINGHOUSE ELECTRIC CORPORATION

My name is Arthur C. Spencer. My business address is Westinghouse Nuclear Energy Systems, P. O. Box 355, Pittsburgh, Pennsylvania 15230. I am employed as Manager, Thermal-Hydraulic Methods, Nuclear Technology Division, Westinghouse Electric Corporation, and I have served in this capacity since 1976. In addition, I have been Acting Manager, Methods Development since January 1982. In my present position, I am responsible for the development of physical and mathematical methods, numerical techniques and computer programs. I am also responsible for the control, protection, preservation and standardization of computer programs used in safety analysis and design of reactors and reactor systems. As Manager of Thermal-Hydraulic Methods, I am responsible for the development, improvement and verification of computer programs and analytical methods used for safety analysis.

In 1961, I graduated with a B.S. Degree in Mathematics from Allegheny College in Meadville, Pennsylvania, and I earned a M.S. Degree in Mathematics in 1964 from the University of Pittsburgh, Pittsburgh, Pennsylvania .

From 1961 to 1967, I worked for PPG Industries as a Research Mathematician. During that period I developed analytical methods and computer programs for solving complex problems in heat transfer and thermal stress. I am the co-holder of a patent on the "Method and Apparatus for Controlling Temporary Stresses During the Formation of a Glass Ribbon From a Molten Pool".

My career at Westinghouse Electric Corporation began in 1967 as a Senior Engineer in the Atomic Power Division. In this position, I was responsible for developing techniques and computer programs related to nuclear safety. In 1973 I was promoted to Fellow Engineer with increased responsibilities of coordination and review.

During my career at Westinghouse, I have attended many educational and training courses inside the company and at other schools. I have also authored and co-authored numerous articles, internal reports, and technical papers. I am a member of the Society for Industrial and Applied Mathematics (SIAM).