



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

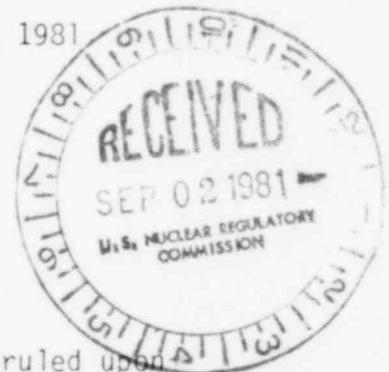
Before Administrative Judges
Sheldon J. Wolfe, Chairman
Dr. E. Leonard Cheatum
Gustave A. Linenberger, Jr.

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In the Matter of)
)
HOUSTON LIGHTING AND POWER COMPANY)
)
(Allens Creek Nuclear Generating)
Station, Unit 1))

Docket No. 50-466-CP

September 1, 1981



SECOND ORDER RULING UPON
MOTIONS FOR SUMMARY DISPOSITION

In an initial Order of November 13, 1980, we had ruled upon motions for summary disposition of certain environmental contentions. In the instant Order we rule upon a motion for summary disposition of an environmental contention (Cumings 9) filed by the NRC Staff and upon several motions for summary disposition filed by the Applicant, the Staff and by Intervenor TexPirg which address certain health and safety contentions. Written direct testimonies upon those contentions which are not dismissed herein will be filed at a later date to be set by the Board.

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McCorkle Contention 14

The fuel rods to be used are not safe because of clad failures and off gas activity caused by hydriding and the effects of fuel densification which increases power spikes and heat generation rate.

Applicant filed a Motion For Summary Disposition on August 4, 1980. Ms. McCorkle did not file an answer opposing the motion.

In support of its motion, Applicant appended the affidavit of Noel Shirley, a senior licensing engineer employed by the General Electric Company. In substance, Applicant asserts the following material facts as to which it contends there is no genuine issue to be heard:

1. Fuel hydriding is caused by moisture or other hydrogenous materials left inside the Zircaloy fuel rod during manufacture. (Shirley affid., pp. 1-2)

2. In order to prevent hydrogen contamination of the inside of the fuel rod, two major changes have been made in the manufacturing process during or since the early 1970's. These two changes consisted of installing a hot vacuum outgassing system to remove moisture from the fuel just prior to welding the end plug of the rod in place, and of installing a hydrogen getter in the form of zirconium alloy chips inside the fuel rod to preferentially combine with hydrogen present in the rod. (Shirley affid., p. 2)

3. No hydride induced failures have occurred in General Electric BWR fuel manufactured using the hydrogen getter and the outgassing techniques. (Shirley affid., pp. 2-3)

4. Knowledge of the causes of in-reactor fuel failures has led to quality control tests during manufacture which assure that the fuel is of such an initial density that further densification during irradiation does not affect the thermal-mechanical performance of the fuel. Further, conservative limits on the Linear Heat Generation Rate (LHGR) allowed in the reactor fuel assure that the actual LHGR will remain within design limits if maximum theoretically possible densification occurs. (Shirley affid., pp. 3-4)

5. No fuel cladding failures or collapses attributable to densification have ever occurred in BWR fuel. (Shirley affid., p. 5)

The motion is denied. In support of material facts 3 and 5, Applicant's affiant cited several references, the latest of which discussed experience with BWR fuel through December, 1976. Absent current updating, there remain the outstanding issues of material fact as to whether to date no hydride induced failures have ever occurred in BWR fuel manufactured using the hydrogen getter and the outgassing techniques, and as to whether to date no cladding failures or collapses attributable to densification have ever occurred.

McCorkle Contention 17 ^{1/}

The containment as designed will allow excessive leakage to bypass the filtration systems. The power company admits that 20 percent of the leakage would not even be filtered.

Applicant filed a Motion For Summary Disposition on August 4, 1980. Ms. McCorkle did not file an answer opposing the motion.

In support of the its motion, Applicant appended the joint affidavit of Guy Martin, Jr., the supervising radiological assessment engineer for ACNGS employed by Ebasco Services Incorporated, and of Walter Malec, the supervising mechanical nuclear engineer for ACNGS employed by Ebasco Services Incorporated. Applicant also appended Exhibits A and B, and a transcript portion of its deposition of Intervenor McCorkle. The statement of material facts as to which Applicant alleges that there is no litigable issue follows:

1. The Allens Creek containment design does not allow 20 percent of the containment leakage to bypass the filtration systems. (Jt. Affid., p. 7)

2. A complete list of all potential leakage paths through containment penetrations was compiled. (Exhibit A) From this list, six penetrations were identified that constitute potential unfiltered leakage paths. (Exhibit B)

^{1/} McCorkle Contention 17 consisted of two parts, the first of which is the subject of the instant motion for summary disposition. The second part related to possible self-ignition of charcoal filter adsorber material and was similar to TexPirg Additional Contention 36, as renumbered by the Board. The Order of May 23, 1980 consolidated these contentions.

3. Using the list of potential unfiltered leakage paths, the current best estimate of the maximum total unfiltered bypass leakage under LOCA accident conditions is 0.0195 percent per day of the containment volume. (Jt. Affid., p. 4) The containment will be designed in any event to limit leakage to 0.5 percent by weight of the containment atmosphere per day at calculated peak pressure. (Jt. Affid., p. 6)

4. Applicant will perform extensive pre-operational tests in accordance with 10 CFR Part 50, Appendix J, to assure that the containment will maintain its expected level of leak-tightness. (Jt. Affid., pp. 4-6)

Affiants state that the containment design will limit leakage to 0.5% by weight of the containment atmosphere per day at calculated peak pressure. They state "However, a value of 0.0195 percent/day of the containment volume is the present best estimate of the maximum total unfiltered bypass leakage based on preliminary LOCA dose calculations."

Assuming that the containment atmosphere is uniformly mixed, we find no basis for a difference between percent by weight and percent by volume, provided that the various available leakage paths do not selectively fractionate the leaking gas mixture. We note that the 0.0195% unfiltered leakage represents approximately 40% of the 0.5% total leakage, or twice as much unfiltered leakage as Ms. McCorkle alleges. Thus, it appears that Applicant has established that the situation is worse than that claimed by Intervenor. Further, the above quotation of affiants appears to assert that the 0.0195% unfiltered

leakage is an estimate based not on an estimate of hardware performance capability but upon what can be tolerated from a LOCA dose calculation and, presumably, upon the maximum allowable doses permitted by 10 CFR Part 100. In other words, it appears that affiants have backed into a permissible unfiltered leakage rate by starting with what the regulations will allow coupled with how much radioactivity a LOCA will deliver to the containment. This may be an acceptable way to proceed unless physical reality ultimately demonstrates that hardware performance is not good enough to accomplish it, a possibility not addressed in the affidavit. What affiants, as employees of Ebasco, in effect, do is commit Applicant to meet the testing requirements of 10 CFR Part 50, Appendix J, which they detail, and also commit Applicant not to exceed the limits of 10 CFR Part 100. At transcript page 28 of the undated deposition, Intervenor McCorkle states that she would be satisfied if Applicant meets NRC guidelines on leakage. Whether the statements of affiants constitute a bonafide commitment of Applicant is a question we do not address. There is sufficient uncertainty from the information before us about the amount of leakage that can escape unfiltered to cause us to inquire further. Applicant's motion is denied, and we will hear evidence upon McCorkle Contention 17. Applicant and Staff shall include in their evidentiary presentations those measures that they conclude will assure that containment leakage is appropriately controlled.

TexPirg Contention A-6

Petitioner contends that the drywell planned for Allens Creek Unit 1 will not withstand the pressure generated in a LOCA.

The water within the weir wall will not clear the first row of vents before the differential pressure exceeds 28 psi. This is due to failure to properly account for the Mannings roughness factor within the weir wall and the vent pipe. By delaying the time to clear the first row of vents by only 0.5 second the drywell will be damaged allowing the escape of high pressure steam into the containment without being condensed. This will lead to the containment vessel pressure exceeding 15 psig so that it will crack allowing the escape of radioactive gases above the limits allowed by 10 CFR 100.

On August 8, 1980, the Staff filed a motion for summary disposition; on October 2, 1980, TexPirg filed a response in opposition to said motion. Staff's motion is accompanied by a portion of the deposition of TexPirg's expert witness, Clarence Johnson, and by the affidavit of a technical member of the Staff, M. B. Fields.

Staff's motion sets forth a concise statement of the material facts as to which it contends there is no genuine issue to be heard. Affiant Fields' professional qualifications appear to establish that he is at least conversant with the problems raised by the contention but they do not help us to assess the analytical depth he may or may not bring to bear. His affidavit, supported by citations and figures from references, purports to (but fails to) refute all aspects of the contention. Mr. Johnson's deposition showed a definite lack of familiarity with the subject.

TexPirg's opposing response, addressing deficiencies in the Staff's analysis, is too sketchily drawn to be assessed. In short, we would need more information than is before us in order to be persuaded by either pleading. Staff's motion for summary disposition is denied and we will hear the evidence upon TexPirg's Contention A-6.

In order to assist the parties in their preparation of testimony, we offer the following comments:

The Mark III containment is characterized as being designed to withstand an internal pressure of 15 psig. The Board wishes to understand the margin of safety (expressed as an incremental pressure in excess of the 15 psig) between design pressure and that pressure at which the yield strength will be reached for the weakest components. If containment leakage is not expected to occur when an overpressure corresponding to yield strength is attained, then it is important to document at what excess pressure beyond yield strength containment leakage will begin to occur and at what excess pressure significant containment failure will occur.

The Board wishes to understand the basis for confidence in the conclusion that data from the General Electric Company's test in their Pressure Suppression Test Facility are applicable to the ACNGS. Figures A-12 and A-13 attached to Fields' affidavit offer no indication of reliability (uncertainty, accuracy or error band) associated with the experimental results.

Fields' affidavit refers to NEDO-10320, and represents that Figure 4.4 therefrom is attached. The Board's copy of this affidavit provides Figure 4.1 from NEDO-10320 and Figure 4.2 from an unidentified source, there being no Figure 4.4. Please explain, and again address uncertainty, accuracy or error band to be associated therewith.

Intervenor's response raises questions regarding, for example, smooth vent tubes versus rough concrete walls, drywell corner weakness, right-angle turns in fluid flow paths, and the necessity to clear two rather than one set of vents. Without more information than is currently before us, the Board cannot assess the importance of these considerations.

TexPirg Contention 10

Applicant has not adequately demonstrated compliance with 10 CFR Part 50, App. A, criterion 31, with regard to intergranular stress corrosion and cracking. Excessive oxygen levels, superposed loads, and residual stresses may result in ultimate failure of piping, despite altered metal content for the ACNGS design, the NRC investigation of stress corrosion, and cracking problems at similar BWR units was released in December 1975.

On August 4, 1980, Applicant filed a motion for summary disposition of this contention. On October 2, 1980, TexPirg filed a response in opposition to the motion.

Applicant's motion (accompanied by the affidavits of three affiants ^{2/}) lists the following material facts as to which it alleges there are no litigable issues:

1. Intergranular stress corrosion cracking [IGSCC] has occurred in light water reactors where "sensitized" stainless steels with a carbon content of between 0.05 to 0.08% were exposed to a particular combination of stress and dissolved oxygen in high temperature waters. This phenomenon has occurred in approximately 0.6% of the stainless steel pipe weld heat-affected zones within the RCPB of operating BWRs. (Gordon Affid., p. 3)

2. Two of the four lines where the bulk of the identified instances of IGSCC has occurred, the recirculation bypass line and the control rod drive hydraulic return line, have been eliminated from the ACNGS design. (Gordon Affid., p. 3)

3. The two remaining lines where the bulk of IGSCC has been identified and virtually all other RCPB lines within both General Electric's scope of supply and Ebasco Services Incorporated's design responsibility are comprised of either plain carbon steel, Type 316L stainless steel, or 316 nuclear grade stainless steel. (Gordon Affid., p. 4; Gunther and Malec Affid., p. 2)

^{2/} Dr. Gerald M. Gordon, metallurgical engineer, the General Electric Company; Louis A. Gunther, metallurgical engineer, Ebasco Services Incorporated; Walter F. Malec, mechanical-nuclear engineer, Ebasco Services Incorporated. Professional qualifications of these affiants were provided.

4. Feedwater spargers, collet cylinder tubes and recirculation pump housings at ACNGS will be made of low carbon stainless steel and the control rod drive housings will be fabricated from 316L stainless steel. (Gordon Affid., p. 4)

5. This low carbon content stainless steel and plain carbon steel utilized in the ACNGS is the type which does not experience intergranular stress corrosion cracking. The specific material utilized is the result of investigation and an extensive test program. The NRC has reviewed the substitution of IGSCC resistant materials at ACNGS and accepts this design measure as a resolution of the generic IGSCC problem, Generic Task No. A-42. (Gordon Affid. pp. 4-5; Gunther and Malec Affid., p. 2)

6. The NRC Staff has also approved the use of these materials as meeting the requirements of Regulatory Guide 1.44, which assures compliance with 10 CFR 50, Appendix A, criterion 31. (Gordon Affid., pp. 5-6)

Applicant's motion additionally appends a portion of its deposition of TexPirg's expert witness Clarence Johnson. The Board has satisfied itself that the professional qualifications of Applicant's three affiants are appropriate to the testimony offered, and that said testimony addresses the five alleged facts proffered by Applicant. The deposition of TexPirg's witness Johnson, whose metallurgical expertise has not been claimed or established, offers nothing that refutes Applicant's alleged facts.

In its opposing response, TexPirg's counsel argues ^{3/} in rebuttal to the Applicant's alleged facts, and in summary makes the following largely unsupported claims:

If the IGSCC problem had been solved, it would no longer be considered by the Staff as an unresolved generic safety issue, but it still is (Category A, Task A-42);

Use of stainless steel alloys having significantly reduced susceptibility to stress corrosion ^{4/} mitigates but does not eliminate the possibility of IGSCC and is not good enough, even if Reg. Guide 1.44 conditions are met; and

The nuclear steam supply vendor's test program (to demonstrate the acceptable resistance of RCPB component alloys to IGSCC) was of such short duration (4 years) compared with the operational life of a power plant as to make the validity of the results questionable.

In essence, while not contesting that improved alloys will be used in the ACNGS, TexPirg does question whether this constitutes an adequate remedy.

Applicant's motion fails to address the point raised by the contention concerning the impact of excessive oxygen levels and

^{3/} We note that the form and content of TexPirg's response do not satisfy the requirements of 10 CFR Section 2.749.

^{4/} Here TexPirg fails to drive home an element of its contention dealing with excessive oxygen levels and "superposed loads", which phrase we intuit to mean excess stress occasioned by temperature or pressure excursions.

superposed loads (see footnote 4, supra) upon improved alloys. Applicant's affiant Gordon cites NUREG-0531 ^{5/} as evidence of Staff's acceptance of the ACNGS proposed improved alloys as a solution to the IGSCC problem. However, we have reviewed a later document, NUREG-0313 Rev. 1, July 1980, ^{6/} subtitled "Resolution of Generic Technical Activity A-42," in which Staff's revised acceptance position is described, and in which Staff sets forth requirements upon applicants regarding acceptable methods to minimize crack susceptibility, material selection, testing and processing guidelines. ^{7/} Applicant neither addresses these matters nor the matter of whether the Staff has imposed the requirements of NUREG-0313, Rev. 1, upon Applicant. Affiants Gunther and Malec note that the PSAR, Section 5.2.7, describes a leak detection system as a backup for detecting unanticipated leakage from the RCPB. Although these affiants are respectively a metallurgist and a mechanical-nuclear engineer, we have trouble accepting their undocumented conclusion that:

"Since all IGSCC failures produce easily detectable leakage well before the presence of rapidly propagating cracks, this detection

^{5/} "Investigation and Evaluation of Stress-Corrosion Cracking in Piping of Light Water Reactor Plants" (February 1979).

^{6/} "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping".

^{7/} See Sections II and III of NUREG-0313, Rev. 1.

system provides the final conservative assurance that the safety of ACNGS will not be threatened." ^{8/}

Crack propagation is a sufficiently complex phenomenon that this undocumented opinion, albeit expert, does not suffice, especially if there is an opportunity for "superposed loads" to be imposed on alloys that have been exposed to "excessive oxygen levels", as claimed by the contention.

Despite the deficiency in form and content, TexPirg's response raises material questions involving the adequacy of the duration of the alloy test program cited by Applicant and the adequacy of Reg. Guide 1.44 in the face of NUREG-0313, Rev. 1.

We conclude that there are genuine issues of material fact remaining to be litigated and thus that Contention 10 shall be addressed during the health and safety phases of the evidentiary hearing. Accordingly, Applicant's motion is denied. The parties are requested to include in their direct testimony evidence that addresses the questions and deficiencies noted by this Board in the foregoing discussion.

TexPirg Contention 11

Applicant has not adequately assessed the effects of flow-induced vibration on jet pumps, spargers, fuel pins, core instrumentation, and fuel rods. Feedwater spargers failures

^{8/} Affidavit of Gunther and Malec, p. 2, accompanying Applicant's Motion.

occurred at five BWR units from 1975 to 1976, all due apparently to flow-induced vibration. Petitioner asks that a license be denied until an adequate assessment is presented by the Applicant.

On August 4, 1980, Applicant filed a motion for summary disposition directed to both this contention and a related contention of Intervenor Doherty (Contention 31). We address Doherty Contention 31 separately. The motion provides a portion of the deposition of TexPirg's expert witness, Clarence Johnson, who exhibited quite limited familiarity with the subject matter of the contention. The motion includes the affidavit of Martin R. Torres, a mechanical engineer with the General Electric Company with responsibility for flow-induced vibration problems associated with all G.E. plants. On October 2, 1980, counsel for TexPirg filed a response in opposition to the motion.

Applicant's motion presents the following facts as to which it contends there are no genuine litigable issues to be heard:

1. Flow-induced vibration of reactor components including jet pumps, spargers, fuel pins, fuel rods, in-core instrumentation and low range power monitors (LPRM's) has been studied extensively by General Electric. Information from the vibration tests and analyses and from experience at other plants has been used to improve the ACNGS design. (Affid., p. 2)

For example, vibration of LPRM tubes at the Duane Arnold and Cooper nuclear plants were traced to bypass flow holes in the design of those plants. Bypass flow holes have been eliminated

in the design of ACNGS. (Affid., pp. 6-7) Other design improvements of components will make them less likely to be damaged as a result of flow-induced vibration. (Affid., p. 7)

2. The potential for vibration of ACNGS reactor internals will be further specifically assessed and remedied, if necessary, through the following sets of analyses and tests:

- (a) A dynamic system analysis. This analysis, described in §3.9.1.3 of GESSAR 238, analyzed flow induced vibration during normal operations, and is used in designing and testing of components, and for establishing pre-operational testing criteria. (Affid., p. 2)
- (b) Flow tests, forced oscillation tests, and other physical tests of reactor internal components. These tests are used to verify design and are independent of the NRC testing requirements. (Affid., pp. 3-4)
- (c) Prototype plant pre-operational and operational tests. Extensive vibration testing on the prototype plant (now designated Perry Unit 1) in accordance with Regulatory Guide 1.20 will be made to detect evidence of undesirable effects due to flow-induced vibration. (Affid., p. 4)
- (d) Pre-operational testing at ACNGS. Testing of reactor internals of ACNGS in accordance with the provisions of Regulatory Guide 1.20. (Affid., p. 5)

3. The vibration testing requirement of Regulatory Guide 1.20 for prototype 238 BWR-6 plants is expected to occur prior to operation of ACNGS. If another plant is the prototype plant, ACNGS will show compliance with Regulatory Guide 1.20 through pre-operational, nonprototype confirmatory tests. (Affid., p. 5)

4. In the past, monitoring of reactor performance instrumentation has revealed vibration problems long before they are of concern. (Affid., p. 6)

5. ACNGS will have a loose parts monitoring system to detect any loose parts in the reactor. (Affid., p. 7)

6. In the past, neither a loss of plant safety nor the inability to safely shut down the plant has ever occurred because of flow-induced vibration. (Affid., p. 7)

Without addressing the details, we note in summary that affiant Torres discusses the test programs and design modifications that have been undertaken to mitigate or eliminate vibration problems. Additional tests to be performed upon a prototype predecessor to the ACNGS and upon the ACNGS itself are mentioned along with a commitment that the requirements of Regulatory Guide 1.20 will be met. Finally, apparently speaking from personal knowledge, the affiant states (without support) that flow-induced vibration has never resulted in a loss of plant safety nor an inability to safely shut down a plant. (Torres Affid., p. 7)

In its opposing response, TexPirg makes the following arguments:

- No results from past tests have been given;
- A promise of future tests is not relevant; and

-- The historical lack of safety problems due to flow-induced vibrations is unsubstantiated and is not a basis for confidence.

We do not weigh these arguments, for the language of the contention is controlling: irrespective of how comprehensive a program has been pursued to date, until or unless we are assured that these tests and analyses will be made, we cannot conclude that adequate assessments of the matters before us will be made. Accordingly, Applicant's motion for summary disposition is denied. We request that a cognizant Staff witness advise that the aforementioned tests and analyses will be performed.

TexPirg Contention A-38

Petitioner contends the ACNGS control rod drive system is a hazard to public (and its members) safety because General Electric designed control rod systems have had defective float switches which failed to function in their SCRAM discharge volume tanks (SDVT). These switches activate the outflow of these tanks. If they fail to float, the SDVT will not empty. In the event of SCRAM, while the SDVT is filled with water, water from the hydraulic CRD system cannot escape and permit the control rod to be driven into the core as designed, because the rod's progress is slowed. From 1972 to 1974 this failure was noted at Hatch I, Peach Bottom III, Duane Arnold Energy Center and Fermi 2.

On August 4, 1980, Applicant submitted a motion for summary disposition of this contention. On October 2, 1980, TexPirg filed a response opposing this motion.

Applicant's motion relied upon the affidavit of J. D. Heidt, a mechanical engineer with the General Electric Company, whose professional background includes experience with electromechanical equipment. Applicant listed the following material facts as to which it asserts there are no genuine issues to be tried:

1. The SCRAM discharge instrument volume (SDIV) is designed to receive the water displaced above a piston connected to the control rod at the time of a SCRAM. The venting of this water to the SDIV allows the rapid insertion of the control rods. If the SDIV is not drained at the time of a SCRAM, the control rods cannot be fully inserted. (Affid., pp. 1-2)

2. Problems were encountered in designs which used a float-type switch to indicate that the SDIV was drained. Incidents occurred where the float-type switch would sink indicating that the SDIV was drained when in fact it was not. The ACNGS design will not incorporate float-type level switches in the SDIV. (Affid., p. 5)

3. The ACNGS design will use a differential pressure level transmitter system which eliminates the possibility that the system will not perform its function because of a defective float. (Affid., p. 5)

Affiant Heidt described the ACNGS control rod drive system, the type of scram float system that had caused problems alluded to in the contention, and the modifications (eliminating the use of float level switches) to the Applicant's system that will eliminate the problems cited by TexPirg. A solid state differential pressure level transmitter system is said to have been chosen by the Applicant to effect this improvement. Its method of operation is briefly described, with the aid of an attached schematic drawing. However, no test information or operating experience is offered. Since the affidavit

lacks references and citations, we can only assume that Mr. Heidt speaks from personal expert knowledge of this subsystem.

Applicant's motion also includes a portion of its deposition of TexPirg's expert witness, Clarence Johnson. Mr. Johnson implies that if the cause of float level switch malfunctions were eliminated, TexPirg's concerns would be alleviated, provided there were adequate test and operating experience to establish reliability. (Deposition of Clarence Lee Johnson, pp. 57-59, undated.)

TexPirg's opposing response presents an argumentative rebuttal to Applicant's motion. It asserts that functionally defective float level switches are not the only basis for its contention, an assertion we must dismiss in the face of the explicit wording of the contention. TexPirg further asserts that, since the earlier type of systems using float switches had been approved by G.E. and the Staff and they still failed, there is no basis, as yet, for believing that the improved version will be reliable. While this is a relevant and possibly material observation, it too is beyond the scope of TexPirg's contention.

We conclude that Applicant's list of material facts as to which there is no litigable issue is adequately supported by its affiant. Applicant's motion for summary disposition is granted and TexPirg's Contention A-38 is dismissed. However, the Board requests that the Applicant and Staff address the following questions during the health and safety portion of the evidentiary hearings:

What environmental qualification testing has been or will be conducted on the proposed solid state differential pressure level transmitter system, with what results, and on what schedule?

Will reliability and operational test information be required before final acceptance of this design departure from earlier systems? What will be the nature and scheduling of the testimony?

TexPirg Contention A-40

TexPirg contends that the Applicant monitoring of in containment building events during LOCA or similar events is not adequate to detect immediately the occurrences of hydrogen explosions. That the recent Three Mile Island incident shows that current approved containment building monitoring apparatus did not bring such an event to the attention of operators immediately, and that therefore the strong possibility existed that actions which would prevent a second hydrogen explosion were not taken. There is danger that hydrogen explosions will endanger TexPirg members because the containment building during a LOCA is likely to contain radioactive gases which would be released from the building damaged even lightly by the explosion and in excess of 40 CFR 190 or 10 CFR 20.

On August 8, 1980, the NRC Staff submitted a motion for summary disposition; on October 2, 1980, TexPirg filed an opposing response.

Staff's motion included the affidavit of one of its technical members, M. B. Fields, whose professional qualifications are such that he should be familiar with the hydrogen monitoring and recombination equipment proposed for the ACNGS. However, neither his statement of qualifications nor his affidavit indicate an in-depth understanding of how these systems should perform. Citing the PSAK, affiant highlights the design features of the ACNGS monitoring system and its advantages compared with the TMI-2 system. He establishes that the design philosophy is that of preventing the occurrence of a flammable or of an

explosive concentration of hydrogen, rather than providing equipment that can withstand an explosion and subsequently continue to function. Systems redundancy (for detection and recombination), an alarm system and a backup hydrogen purge system are mentioned, with little or no details as to functional characteristics.

TexPirg's response merely consists of argumentation -- it is devoid of references, citations, and affidavits. Despite the failings of its response, it asserts that Staff's motion is too lacking in specifics to be convincing. A particular concern of TexPirg is that Applicant's systems must be actuated from the control room after an accident, rather than being automatically actuated. Even absent this response from Intervenor, we are unconvinced by Staff's motion that the ACHGS will have adequate hydrogen monitoring and control systems. Staff's motion for summary disposition is denied. Accordingly, TexPirg's Contention A-40 will be litigated.

In order to offer guidance in the preparation of direct testimony, we set forth the following minimal list of topics to be addressed:

Test results supporting the adequacy of the type and size of thermal recombiners to be used;

Effects of poisoned recombiner surfaces and incomplete convective circulation in reducing recombiner effectiveness;

Sufficient recombiner dynamic analysis to demonstrate that 3% concentration of hydrogen is a conservative alarm set-point;

Relationship - functional and geometrical - between alarm sensor and the eight monitoring samplers;

Ability to periodically test the operability of the monitoring, alarm and recombiner systems; and,

Nature of the backup containment hydrogen purging system that may be required to function at a time when the containment atmosphere is radioactive.

TexPirg Contention A-50

TexPirg contends the ACNGS is a hazard to its members health and safety interests, because its radioactive emissions may confuse electronic guidance systems in airplanes in the general vicinity. A B-52 military plane crashed within two miles of a nuclear plant near Charlevoix, Michigan in January, 1971 (its cause was never released) and a light plane crashed in fog on August 25, 1972 at the Millstone Power Station. We have previously contended (TexPirg #6, accepted Feb. 1979) that airplane traffic will increase in the ACNGS area, and seek to add testimony on the guidance system "latching" phenomenon and the danger it imposes on public safety.

The following five submissions have been filed:

Applicant's Motion for Summary Disposition of TexPirg Additional Contention 50, August 4, 1980;

TexPirg's Motion for Summary Disposition, August 6, 1980;

NRC Staff Response In Opposition to TexPirg Motion for Summary Disposition of Additional Contention 50 and in Support of Applicant's Motion for Summary Disposition of TexPirg Additional Contention 50, October 2, 1980; ^{9/}

TexPirg's Response to Motions for Summary Disposition, October 2, 1980; ^{10/} and,

^{9/} Noting that 10 CFR 2.749(a) had been amended, our Order of July 28, 1981, notified TexPirg that it should advise by August 4, 1981 whether or not it wished to respond to the Staff's supporting response, and that, if it decided to file said response which should address only those new facts and arguments presented in the Staff's supporting response that had not been presented in Applicant's motion, it must do so by no later than August 12, 1981. The Board heard nothing from TexPirg.

^{10/} In this response, TexPirg requested that its Motion of August 6, 1980 be considered as part of this response.

Applicant's Response to TexPirg's Motion for Summary Disposition and Applicant's Cross-Motion for Summary Disposition of TexPirg Additional Contention 50 ("Latching"), October 2, 1980.

Applicant's motion lists the following five material facts as to which it alleges there is no genuine issue to be heard:

1. No aircraft is known to have crashed after passing near an operating nuclear power plant as a documented result of exposure to airborne radiation from the plant, which produced ions that purportedly "latched" onto the aircraft's guidance circuits and interfered with their proper functioning.

2. The scientific literature, including NRC publications, contains no support for the existence of the phenomenon of air crashes due to this so-called "latching".

3. Natural sources of ionization in the atmosphere are many times greater than the permitted emissions from ACNGS. Aircraft regularly fly in the presence of the resultant natural atmospheric ion concentrations without failure or degradation of the guidance circuitry.

4. The already low emissions from ACNGS will be dispersed by distance and radionuclides will decay with time. The ionizing effect of these emissions at flight altitudes will be negligible. Furthermore, aircraft exposure to these emissions will be quite brief.

5. Aircraft flying near ACNGS will not suffer failure or

degradation of guidance system circuits due to the so-called "latching" of ions produced by airborne radiological emissions from ACNGS.

Applicant's motion appends an affidavit of its Manager, Nuclear Department, Dr. J. R. Sumpter. The formal training and professional experience of this affiant do not establish to our satisfaction his expertise in matters such as aircraft electronic guidance systems and the interaction of radiation with solid state electronic circuitry. The affidavit is largely conclusional and does not dispositively support Applicant's five material facts as to which Applicant alleges that there are no litigable issues. In Applicant's response and cross-motion of October 2, 1980, by affidavit, the same affiant presents argumentative and conclusional replies to TexPirg's motion for summary disposition but does not advance Applicant's cause with respect to its list of material facts.

TexPirg's motion is unsupported by any affidavit and consists solely of a list of eight items characterized as material facts, a reading of which raises a question as to whether TexPirg seeks to establish these alleged facts as matters as to which there are litigable issues, or seeks to establish certain facts that would obviate the need for litigation. In its response of October 2, 1980, (which we consider, as requested by TexPirg, in conjunction with its motion), TexPirg seeks to rebut Applicant's list of alleged facts through argumentative, conclusional and very sparingly documented statements. Intervenor has failed to provide us with well supported reasons why its contention should or should not be litigated.

Staff's response, supported by an affidavit, sets forth the following nine material facts as to which there is no litigable issue:

1. A pulse dose rate of 10^5 rads/sec. is required to adversely affect semiconductor devices.
2. A total dose rate of 10^6 rads is required to produce changes in the operation of these components.
3. A maximum plume radiation level during normal plant operation at Big Rock Point nuclear reactor (the reactor referenced by TexPirg) is 9 to 11×10^{-6} r/hour.
4. Aircraft are designed to operate at cosmic radiation levels of 60 to 600×10^{-6} r/hour.
5. Aircraft are designed to operate at radiation levels approximately 3 to 30 times greater than those levels experienced during normal reactor operation.
6. The radiation field of a normally operating reactor is estimated to be about a factor of 10^{13} times less than the dose rates considered to produce electronic equipment malfunction.
7. If it is assumed that the entire end-of-life inventory of gaseous fission products of a reactor is dispersed after an accident, the maximum hypothetical radiation dose rate (pulse) of an aircraft entering the radioactive cloud is 0.69 r/sec. which is a factor of 140,000 below the dose rate required to cause electronic equipment malfunction.
8. The maximum total dose received by an aircraft flying through the radioactive cloud would be approximately 3.1 rads.

This is a factor of 3.2×10^5 below the total dose required to produce slight malfunctions in electronic components.

9. Aircraft flying near ACNGS will not suffer failure or degradation of guidance system circuits due to the so-called "latching" of ions produced by airborne radiological emissions from ACNGS.

The Staff's affidavit was executed by three of its technical personnel ^{11/} whose professional qualifications satisfy us as to their competency concerning nuclear plant emissions and interactions of radiation with solid state electronic components. Of commensurate importance, their affidavit establishes that the magnitude of all aspects of the ACNGS radioactivity source term, including that arising from a severe reactor accident, is smaller by orders of magnitude than the amount of radiation required to adversely alter the performance of solid state electronic components of the type employed in aircraft guidance systems.

Obviously, as our discussion indicates, supra, Applicant's motion, standing alone, would not be dispositive. However, because the Staff's response in support of Applicant's motion for summary disposition demonstrates that there is no genuine issue of disputed material fact, we grant Applicant's motion for summary disposition as

^{11/} C. M. Ferrell, J. B. J. Read and A. A. Sinisgalli.

supported by the Staff's response, deny TexPirg's motion for summary disposition, and dismiss the Contention.

TexPirg Contention A-31

The PID did not thoroughly review, nor has the Applicant adequately shown, that HL&P is technically qualified to construct ACNGS. The following forms a basis for concluding that the Applicant is not technically qualified to design and construct the proposed facility:

a. The Applicant has never designed an operating nuclear power plant with a record of safe operation;

b. In 1978, an internal study by the Applicant stated that HL&P had underestimated the amount of steel required for HL&P's South Texas Project by 122%, concrete by 63%, rebar by 125%, piping by 88%, wire and cables by 100%, terminations by 71%, cable trays by 116%, and conduit by 49%, at the time of application to build the South Texas Project in 1973. The report concluded that this underestimation was partially due to "development from the conceptual stage" which had occurred since the construction license proceedings there. This may indicate technical deficiencies in the Applicant's power plant construction planning;

c. NRC inspections indicate that the Applicant deviated in at least three instances from the PSAR submitted for its South Texas Project, all of which related to quality assurance, and this raises questions regarding the Applicant's ability to meet commitments in its ACNGS PSAR;

d. HL&P has reported to the NRC that it failed to meet a commitment that a gantry crane at the South Texas Project meet tornado stress levels due to providing inadequate bid specifications to contractors, and this directly relates to the technical performance of the Applicant in this docket;

e. In a 1977 NRC inspection report at HL&P's South Texas Project (Rpt. #50-498-08), HL&P was informed six of the ten quality control inspectors stated that they had experienced harassment (including an individual report of a death threat), and despite this notice, at least four other instances of quality control inspector-reported harassment were noted in later NRC inspections; and an August 22, 1978 NRC report states that QC inspectors at South Texas Project agreed "in majority" that they were not receiving adequate technical assistance from Project Quality Assurance Licensee personnel;

f. On Sept. 15, 1978, the NRC reported an investigation of an incident in which a quality control inspector alleged that HL&P's contractor at the South Texas Project fired him for strict

inspection behavior, while the contractor's employee alleged a conversation with the quality control inspector in which the inspector allegedly solicited a bribe and supposedly stated that HL&P would "stay out" of any quality control let-downs; and though intervenor does not know what in fact occurred in this incident, the matter is sufficiently serious to form the basis for the consideration of this contention in this docket;

g. HL&P is the Project Manager of South Texas Project and is ultimately responsible to the NRC for the 24 items of non-compliance reported in inspections there so far, and for the numerous construction problems such as building the mechanical auxiliary building one foot too narrow and installing understrength bolts, and that such performance as project manager there raises questions as to the technical qualifications of Applicant.

Because of the factors stated above, Intervenor contends that Applicant should be required to show that technical capabilities have been upgraded such that the problems encountered at its other nuclear project will not occur at ACNGS, with a finding that Applicant is not technically qualified if that is not shown.

On October 8, 1980, TexPirg filed a motion for summary disposition of its Contention A-31 (consolidated with Doggett Contention 3). This motion was opposed by Applicant and Staff in responses filed respectively on October 22, 1980 and November 3, 1980.

TexPirg's motion argues as follows:

"1. The Applicant has insufficient nuclear trained scientists in its employment to either do the necessary work or to see that the work done by its contracted consultants is correct. Only 6 Ph D.

2. For over three years the NRC has shown the Applicant deficiencies in its quality control and construction program at the South Texas plant. Still the NRC was forced to fine the

applicant \$100,000 (max. allowed under NRC regulations) for not correcting these problems. Either the Applicant did not try to correct the problems or it just did not have the technical qualifications to do so -- in neither case should they be allowed to build another nuclear plant until conclusive proof that the problems have been solved (promises alone have not been enough).

3. This same applicant misestimated the amounts of steel, rebar, concrete, wires, etc. by over 100% in some cases that it would need in its South Texas Plant. When asked to show what NRC regulations were changed to cause such gross errors, the applicant would not or could not specify them. There is no evidence to show that the applicant is not now making the same type errors for Allens Creek. In fact the large continuing intervenor interest in Allens Creek would tend to make such overruns even larger because of their noticing of construction errors, and proposing rule changes that would increase the protection given to the public health and safety.

4. No other utility has such a poor record with the NRC for construction problems, fines, items of noncompliance, etc.

The evidence to support the above facts are already in the record of this proceeding and in the NRC files."

As is readily apparent, TexPirg's motion consists of barren, conclusional, and unsupported allegations; it falls far short of meeting the requirements for a motion for summary disposition. Nor does Intervenor's final assertion that supporting evidence can be found

in the record and files of this proceeding overcome its grievous disregard for the requirements of 10 CFR §2.749. TexPirg's Motion for Summary Disposition of its Contention A-31 is denied, and we will hear testimony on this Contention.

Doherty Contention 5

In the event of blowdown, loss of coolant, reactivity initiated or other accident, the location of the Control Rod Drive Mechanism Hydraulic Unit as planned in ACONGS, as well as the Traversing In-Core Probe makes these two systems vulnerable to suppression pool uplift. There are no Mark-III containment systems in operation today, and no full-scale tests have been done to guard against this possibility. Petitioners contend plant is endangered in the event such accidents destroy these systems when they are needed.

The Applicant filed a Motion for Summary Disposition on August 4, 1980. Mr. Doherty's response in opposition on November 15, 1980, included eight exhibits and was supplemented by a filing on January 19, 1981, which allegedly quoted proprietary information from the G.E. Reed Report. On January 28, 1981, Applicant responded to this supplemental response, and urged that it be rejected. Attachments to Applicant's motion included the following:

1. A Statement of Material Facts as to Which There is no Genuine Issue;
2. Pages 175 through 193 of an undated portion of Applicant's deposition of Mr. Doherty;
3. The affidavit and professional qualifications of P. P. Stancavage, a nuclear and mechanical engineer employed by Applicant's NSSS vendor, containing one attached figure; and

4. The joint affidavit and professional qualifications of Messrs. R. A. Sullivan and R. C. Cheng, civil engineers employed by Applicant's architect-engineer.

In substance, Applicant attempts to establish, via the statements of its affiants based upon the results of numerous vendor tests, that the nature and behavior of the pool-swell phenomenon is such that the intended location, design and method of mounting of control rod drive hydraulic control units (HCU's) will obviate their being damaged, and that there is no safety significance to the loss of the traveling in-core probe (TIP). It appears that vibratory response loads on the HCU's, as of July, 1980 (the date of the affidavits), had yet to be calculated by Applicant's architect-engineer and verified as being acceptable by Applicant's NSSS vendor. (Affiant Stancavage; Affiants Sullivan and Cheng)

Intervenor's initial response is defective in that it does not set forth a concise statement of material facts as to which it is contended that there exists a genuine issue to be litigated. The bases for Intervenor's concerns, however, are explained via the numerous exhibits attached, and provide cause for inquiring further. We find that his supplemental response is argumentative and does not advance his cause.

Absent final results of the vibrational effects on the HCU's, and since Applicant's attached affidavits are conclusional, we conclude that Applicant has not adequately supported its list of issues as to which there are no remaining material facts to be heard. Accordingly, Applicant's motion for summary disposition of Doherty's Contention 5

is denied. We advise the parties that, in hearing testimony on this contention, we will be interested additionally in evidence that establishes whether a reasonably simultaneous actuation of safety relief valves with the pool-swell phenomenon will exaggerate the impacts of that phenomenon.

Doherty Contention 11

Applicant has not provided adequate design characteristics and operating safeguards to protect the integrity of stored spent fuel during unattended operation of the spent fuel pool. In addition, the Final Environmental Statement is inadequate in failing to consider the consequences of a spent fuel pool design basis accident.^{12/}

The Staff filed a Motion for Summary Disposition on August 8, 1980. Mr. Doherty filed a response on November 15, 1980.^{13/}

^{12/} Our Order of May 23, 1980, in granting Applicant's Motion To Confirm Agreements On Consolidation And To Consolidate Certain Contentions, consolidated Doherty Contention 11 (the first sentence of the consolidated contention) with Framsons' Contention 1 (the second sentence of the consolidated contention). Although our subsequent Order of July 29, 1980 granted the Framsons' motions to withdraw as an intervening party and dismissed their Contention 1, the Staff and thereafter Mr. Doherty proceeded to address Framsons' Contention 1. Since it is within our discretion to retain admitted contentions of a party that has withdrawn, we do so now and consider whether Framsons' Contention 1 should be dismissed pursuant to §2.749.

^{13/} In passing, we note that Mr. Doherty argues that the NRC Staff is not truly an adversary of either the Applicant or the Intervenors because the Staff may or may not support the Applicant or the Intervenors on any given issue and because it does not meet the standing requirements of §2.714. Accordingly, he challenges the right of the Staff to file a motion for summary disposition against an intervening party. The argument is a frivolous one. 10 CFR §2.749 expressly provides that "any party may move for summary disposition". Further, he is barred by §2.758(a) from attacking any rule or regulation of the Commission and he had not complied with the requirements of §2.758(b) in order to petition that the application of §2.749 be waived or an exception be made in the instant proceeding.

At mid-page 6 of his response Mr. Doherty abandoned the issue raised in the first sentence of the consolidated contention, stating that he did not wish to pursue the attended versus the unattended operation issue. Apparently Mr. Doherty was convinced by the statement of the Staff's affiant that "continuous attendance at the spent fuel pool is not required to monitor and maintain satisfactory pool water level and temperature (1) because of the monitoring and control capability for the spent fuel storage facility provided in the control room and (2) because operator action is not normally required to maintain facility operations". (Wermiel Affid., p. 2) Accordingly, the instant motion is granted in part with respect to the contention set forth in the first sentence of the consolidated contention, and that part of the contention is dismissed.

With respect to the contention set forth in the second sentence of the consolidated contention, the Staff's affiant deposed that the "consequences of the spent fuel pool design basis accident is considered in the Final Supplement to the Final Environmental Statement and in the Staff's Safety Evaluation Report". (Wermiel affid., p. 7) We have reviewed these documents (FSFES at S.7-2 and the SER at 15-7) and indeed they do consider the consequences of a spent fuel handling accident wherein a spent fuel assembly is dropped on a fuel rack. However, as Mr. Doherty points out, neither the SER nor the FSFES describe the consequences of a spent fuel assembly drop onto the spent fuel pool floor. Accordingly, the instant motion is denied in part with respect to the second sentence of the consolidated contention, and we will hear testimony on the consequences of a spent fuel handling

accident wherein a spent fuel assembly is dropped onto the spent fuel pool floor.

Doherty Contention 12

Intervenor contends the Rod Pattern Control System in the Instrument and Controls systems of the proposed ACNGS is not reliable. The operators of Dresden Unit 3 (a G.E. BWR) reported the system inoperable for 54% of start-ups in 1972. Quad Cities Units 1 and 2 were operable in but 74% of the start-ups, and Millstone Unit 1 reported this system failed in 172 of 245 start-ups in a 16 month period beginning in 1971. Further, 34.6% of "Reportable Occurrences" in BWR reactors in 1977 were in the Instrumentation and Controls area (NUREG-0483, page 4-7). The Average Power Range Monitor (APRM) used to detect surplus neutron flux in this system is not highly reliable. Power Range Instruments contributed to 36 "Reportable Occurrences" in BWR's in 1977, and 17 in 1976, (Nuclear Safety, volumes 19(1) and 20(1), 1978 and 1979, pp. 84 and 82, respectively). Most recently a rod block monitor was inoperative during start-up of the Brunswick-2 reactor (Sept. 4, 1978) due to a failed integrated circuit. Petitioners contend danger to their health and safety interest by a reactivity insertion accident during start-up unless Applicant installs a more reliable system than this one.

Applicant filed a Motion For Summary Disposition on August 4, 1980. On October 2, 1980, Mr. Doherty filed his reply.

In substance, supported by the affidavit of its expert affiant, Applicant asserted that there are no genuine issues of material fact to be heard inasmuch as significant design differences exist between the systems cited by Mr. Doherty and the ACNGS Rod Pattern Control System and thus that past problems which had occurred at older BWRs would not occur at ACNGS. In effect, in his reply, Mr. Doherty withdrew this contention because he "concluded . . ., that major changes to rod removal control system of BWRs have been so extensive as to end the basis in the Contention directly applicable to the proposed ACNGS".

Accordingly, the instant motion is granted, and the Contention is dismissed.

Doherty Contention 13

Intervenor contends Applicant's Containment Emergency Sump Pump will not function reliably because during a loss of coolant accident (LOCA) thermal shielding and insulation may be ripped off or otherwise released or separated from in-containment building piping where it would block off the drain of water, preventing it from being recirculated for cooling by the sump pump, and this would degrade the effectiveness of the Emergency Core Cooling System (ECCS). This would endanger Intervenor's health and safety. This issue has been part of Task #C-3 in the Office of Nuclear Reactor Regulation as "Insulation Usage Within Containment". Since issues have been raised by Staff on Applicant's ultimate Heat Sink, and ACNGS will be the largest BWR in the nation when completed, failure of ECCS function due to sump pump water blockage is of particular concern.

Applicant filed a Motion For Summary Disposition on August 4, 1980. Mr. Doherty filed a reply on September 22, 1980.

In substance, supported by the affidavit of its expert, Applicant asserted that there is no litigable issue of material fact because it is clear that each of the five ECCS pump suction lines will be provided with a strainer assembly; that the size (from 1/16th to 1/8th inch in diameter) and configuration of the strainer openings guarantee that the maximum particulate size that will pass through the strainer will also pass through the smallest restrictions in the pumps, piping, containment spray nozzles, and core channels which comprise the ECCS flow path; and that the insulation utilized in the drywell will be of the metallic reflective type which is the least likely of available insulation types to result in the blockage of the ECCS strainers. Apparently Mr. Doherty agrees that the possibility of insulation degrading the effectiveness of the ECCS does not present a genuine

issue of fact that must be heard. (Doherty Reply at p. 1)
Accordingly, the instant motion is granted, and the Contention is dismissed.

However, noting that Applicant ranges beyond the debris source mentioned in the contention (i.e., insulation), Mr. Doherty urges that there remains a triable issue of fact. He observes that while Applicant alleges that, by complying with Regulatory Guide 1.54 as described in the PSAR, Appendix C, it has greatly minimized the possibility that paintings and coatings used inside the containment could separate from pipes and cause ECCS blockage, the fact is that Applicant has set restrictions on its compliance with Regulatory Guide 1.54. Mr. Doherty cites Applicant's response to said Regulatory Guide at page C 1.54-1 of the PSAR which states that "Applicant will comply with the regulatory position of this guide only with respect to those significant areas that have a direct potential post-LOCA debris pathway to the Suppression Pool".

During the course of the health and safety phase of the hearing, Applicant is requested by the Board to clarify and specify what it means by this apparent exception to Regulatory Guide 1.54.

Doherty Contention 15

Intervenor contends his health and safety interests are inadequately protected because the industry standard power excursion theory (WIGLE) is inadequate to represent the increase in heat energy due to rapid increase in reactivity in a Design Based Power Excursion Accident (DB-PEA). Experiments reported in IN-1370 Large Core Dynamics, pp. 48-87, where a burst of neutrons was injected in the side of reactor, give results which when compared to WIGLE indicate this industry standard DB-PEA theory might underpredict the energy yield of a power excursion of 50%. This underprediction is not factored into the DB-PEA calculations, which is significant since power excursion theory

predicts the energy yield per gram of fuel in a PEA will be about 70% of the design safety limit (280 calories/gram) for fuel rods. (See, Regulatory Guide 1.77, May 1974, PSAR, Montague I & II, pp. 4.3-29, and 15.143-55.) Further, the National Reactor Testing Station (NRTS) recommended in 1970, a special research program to resolve this underprediction (IN-1370, p. 18).

Hence, Intervenor contends that Applicant's one-dimensional time code (described in Supp. No. 2 to the SER on p. 4-11) under generates the true SCRAM reactivity function for this system because the product generated is too small compared to data resulting from the neutron burst experiments reported in IN-1370 (supra), as is the data generated by WIGLE. (Note: This Intervenor does not contend Applicant's NSSS vendor uses WIGLE or relies upon it, but rather that Applicant's analytic method generates the SCRAM reactivity function for the DB-PEA theory as does WIGLE.)

Hence, Applicant or Applicant's NSSS provider should be required to provide data from power excursion tests from full-scale reactors as was recommended by the AEC's test laboratory in 1954 (see "International Report," PTR-730, "A Review of the Generalized Reactivity for Water-Cooled and Moderated UO₂ Fueled Power Reactor," G.O. Bright, et al.), and the BWR system be redesigned to reduce its reactivity potential.

The Applicant filed a Motion for Summary Disposition of this contention on August 4, 1980. Mr. Doherty filed a response in opposition on November 4, 1980, and subsequently filed a supplemental response on February 16, 1981, without leave of the Board. Applicant's motion was supplemented by the following:

1. Statement of Material Facts as to Which There is no Genuine Issue to be Heard;
2. An undated, nineteen page excerpt from Applicant's deposition of Intervenor;
3. An affidavit of John F. Schardt, mechanical engineer and Senior Licensing Engineer for Applicant's NSSS vendor, G.E., dated July 29, 1980; and

4. The professional experience and qualifications of the affiant, undated.

In summary, Applicant's affiant asserts that:

Instead of using the WIGLE code, G.E. uses an analogous one-dimensional space/time code to predict scram reactivity as a function of time, which in turn is used in analyzing the severity of abnormal transients;

The appropriateness of such a code has been verified by tests at a commercial nuclear power station and the results derived from the G.E. code are conservatively understated when used in transient analyses;

The overall conservatism of transient analyses has been demonstrated through comparisons with actual startup data obtained from numerous plants;

The fuel design safety limit of 280 cal/gm refers to a rod drop accident, for which G.E. uses a three dimensional code (shown to be conservative) rather than its analog of the WIGLE code;

The underprediction by the WIGLE code of the response to a positive reactivity insertion in a SPERT project core, at the (formerly) National Reactor Testing Station, in the "assessment" of the affiant, is not a basis for faulting either the WIGLE code or the G.E. code, due to vastly different experimental conditions not representative of typical BWR scram conditions.

Applicant's affiant is a mechanical engineer whose educational background and work experience provide little indication that he possesses expertise in areas such as reactor kinetics, neutronics, and off-normal transient behavior. His affidavit, however, draws conclusions from cited literature and makes certain assessments that seem to require such expertise in order to be supportive of G.E.'s analytical methods and results.

Mr. Doherty's responses do not identify specific material facts as to which there are claimed to be genuine issues to be heard. He refers to numerous exhibits excerpted from cited publications (including the proprietary Reed Report) to support his thesis that the techniques for reactivity calculations and transient analyses used by G.E. are inadequate to treat design basis power excursion accidents in the ACNGS. In particular, Intervenor alleges two shortcomings of the G.E. analyses: an incorrect assessment of both the SCRAM reactivity function and the amount of heat energy generated in the fuel. However, he does not explain how the information extracted from his exhibits is sufficiently applicable to the ACNGS to justify such an allegation.

We are unable to conclude from the foregoing that there are no genuine issues of material fact in dispute. Accordingly, Applicant's motion for summary disposition is denied and testimony regarding Doherty Contention 15 will be heard.

Doherty Contention 24

Applicant has not provided a basis for showing that the reactivity insertion from any dropped control rod will be

sufficiently small to prevent the peak energy yield from exceeding 280 calories per gram of fuel.

Applicant filed a Motion for Summary Disposition on August 4, 1980. Intervenor filed a response in opposition on November 4, 1980, and, without leave of the Board, supplemented this response by a filing on February 16, 1981. Applicant's motion was accompanied by the following:

1. A Statement of Material Facts as to Which There is no Genuine Issue to be Heard;
2. An undated, 13 page excerpt from Applicant's deposition of Mr. Doherty;
3. An affidavit of R. C. Stirn, Nuclear Engineer, Manager of Core and Fuel System Design and an employee of Applicant's NSSS vendor, dated June, 1980; and
4. A statement of the educational and professional qualifications of affiant, dated July, 1980.

Applicant asserts in substance that:

A dual channel, safety related rod pattern control system (RPCS) will limit the maximum incremental reactivity worth of any control rod to $0.8\% \Delta k/k$, as derived in NEDO-21231, a G.E. Report dated January, 1977;

A dropped rod will be limited in its fall velocity to less than 5 ft/sec; and

Under the above assumptions, the worst-case rod drop event^{14/} will result in a peak enthalpy of less than 135 calories per gram of fuel, as derived in NEDO-10527, a G.E. Report dated March, 1972.

Mr. Doherty's responses lack a statement of material facts remaining at issue, nor does he provide a supporting affidavit. He relies instead upon numerous exhibits excerpted from cited publications to support his assertion that a worst-case rod drop event may be more serious than has been represented by Applicant. Intervenor's concerns include the following:

A G.E. Report, APED 5756, dated March 1969, that derives a lower peak fuel enthalpy than NEDO-10,527;

The effects of residual reactivity and destructive pressure pulses that have not been accounted for in the Applicant's analysis; and

Lack of a commitment by Applicant to a control rod design that limits incremental rod worth to 0.8%Δk/k.

As evidenced above, Mr. Stirn's affidavit does not fully address and thus is not dispositive of Intervenor's concerns. Accordingly, there remain genuine issues of material fact in dispute, the motion for summary disposition is denied, and testimony on Doherty Contention 24 will be heard.

^{14/} We note that no core/moderator temperature is specified for the onset of such an event.

Doherty Contention 28 14a/

Applicant's PSAR is inadequate because it does not consider and calculate the consequence of a control rod ejection accident, and there is no protection for Intervenor's safety interest because applicant's control rod drive system has no protection against an accident where the control rod system breaks loose from the reactor vessel where it joins. Cracks have recently been found in these "partial penetration welds" at the Big Rock (BWR) Nuclear Station in Michigan. The pressure from the reactor vessel, plus the force of gravity would combine to cause an inserted control rod to be driven out more rapidly than would occur in a rod drop accident and would lead to a reactivity insertion. Applicant should be required to design its system such that in the event of a break at this junction the public would still be protected against a reactivity insertion. In addition the Applicant should be required to calculate the effects of a control rod ejection on the public safety, because it is a credible accident.

Applicant filed a Motion for Summary Disposition on August 4, 1980, based upon the original wording of the contention. Mr. Doherty responded in opposition on September 4, 1980, noting that the amended wording of the contention (as stated above) is the proper version to be discussed. We agree.

The issue is whether certain off-normal conditions might develop within and with regard to the reactor pressure vessel such that a control rod ejection can occur that would have consequences more serious than the rod drop accident addressed by Doherty Contention 24. Since Applicant's motion does not address the admitted version of Contention 28 and since Intervenor's response identifies causes for

14a/ As amended by Mr. Doherty on July 31, 1979 and admitted in the Order of March 10, 1980.

concern not assessed by Applicant's affidavit, we conclude that the issue has not been joined. Accordingly, the motion for summary disposition is denied and testimony regarding this contention will be heard.

Doherty Contention 31

Intervenor contends coolant flow-induced vibration of the fuel assemblies will lead to degradation of the Local Power Range Monitor's (LPRM's) signal due to wear or other damage, to the extent reactivity monitoring and control in several significant fuel rods will become unreliable, exceeding the $\pm 5.4\%$ error in Radiation Monitoring Systems and leading to administrative derating of the reactor. Intervenor contends Applicant should provide additional LPRMs to give additional information on the BWR core's power characteristics sufficient to prevent either administrative derating or accident hazards such as power excursions. Current plans for 33 LPRMs are not sufficient.

As indicated above, on August 4, 1980, Applicant filed a motion for summary disposition directed to both this contention and TexPirg Contention 11, which was supported by a common affidavit, and by portions of depositions of Messrs. Johnson and Doherty. We again address the same motion as it relates to the Doherty contention. Mr. Doherty, on September 6, 1980, filed an opposing response.

Applicant's list of facts as to which it is alleged there is no litigable issue is the same as presented above with respect to TexPirg 11. Applicant's affiant Torres emphasizes the extensive tests and analyses that have been performed and will be performed, prior to operating the ACNGS, directed toward eliminating or mitigating flow induced vibration (FIV) impacts on reactor internals. Although he

lists local power range monitors (LPRMs) as one of those internals that has been tested and will be further tested in the future, affiant gives no test results and provides a discussion of FIV impacts on LPRMs that is not dispositive of the allegations in the contention, i.e., the magnitude of error in an LPRM readout caused by FIV, and the sufficiency of the number of LPRMs planned for the ACNGS core.

Intervenor Doherty's opposing response presents a well-reasoned, documented rebuttal to the Torres affidavit.^{15/} We do not discuss it here, since we have already determined that the Torres affidavit is deficient. Having not met its burden, Applicant's motion for summary disposition is denied, and Doherty Contention 31, in the form stated above, will be litigated during the health and safety phase of the evidentiary hearings.

Doherty Contention 33

Applicant's reactivity control system relies excessively on the Doppler effect to mitigate the effects of transient-caused overpower of the system. Applicant's reactor manufacturer, General Electric, relies on experimental data that does not support this reliance as will be shown below. Applicant's referenced publication, NEDO-20,964, "Generation of Void and Doppler Reactivity Feedback for Application to BWR Design" (July, 1975), states: "The basic mathematical model in calculating void reactivity and reactivity coefficient for BWRs has been the same since 1961," (p. 15). This mathematical model has been relied upon because it produced data similar to the experimental data produced from experiments using the SPERT-I and SPERT-III reactors. But the experiments from SPERT-I, cited in

^{15/} Mr. Doherty proposes in this response a more succinct restatement of his contention. This is not a proper manner in which to amend a contention; the version stated above is retained.

NEDO-20,964, cannot be applied because that reactor used powered oxide or uranium which dispersed into the coolant during excursion testing, creating the appearance that Doppler feedback had decreased the reactivity when it was actually the dispersal of the powder through the failed cladding to the coolant which mitigated the transient effects. SPERT-III, referenced in NEDO-20,964, was an "...experimental program limited to nondestructive reactivity accident tests" (IDO-17281, March, 1969, p. 79), which did not include investigation into the mechanical behavior of the fuel (pellets of uranium dioxide). The National Reactor Testing Station planned and sought support for investigations with SPERT-III which would not be limited to nondestructive reactivity accident tests in an internal report, PTR-815 (see P. 17-9 and 30), but the tests were not performed.

Intervenor contends that since ACNGS is the most powerful BWR attempted (and has a higher power core density than any licensed BWR) that miscalculation of the Doppler reactivity feedback effect will produce greater consequences to his health and safety interests.

Applicant filed a Motion for Summary Disposition on August 4, 1980. Mr. Doherty responded in opposition on November 4, 1980, and supplemented this response (without leave of the Board) on January 26, 1981. Applicant's motion contained the following attachments:

1. Statement of Material Facts as to Which There is No Genuine Issue to be Heard;
2. An undated, twelve page excerpt from Applicant's deposition of Mr. Doherty;
3. The affidavit of R. C. Stirn, (including one attached figure), Professional Nuclear Engineer, employed by G.E., dated July, 1980; and
4. A statement of qualifications of the affiant, dated July, 1980.

Item 1., above, is reproduced here:

1. "Doppler broadening" is the term used to identify the increased range of energies at which neutrons will be absorbed by a target nucleus at higher reactor temperatures. This "broadening" has the effect of reducing reactivity. (Affid., p. 2)

2. In calculating the reactivity effect caused by Doppler broadening in a BWR-6, General Electric uses a mathematical model based upon the universally accepted fundamental principles and empirical values of Doppler broadening. (Affid., p. 3)

3. The General Electric model was compared primarily to the Hellestrand tests which measured the temperature dependence of resonance neutron absorption in clad uranium dioxide fuel rods. The Hellestrand test results corroborated General Electric's prediction of the effect of Doppler broadening. In addition, the General Electric model was secondarily compared to data derived from the appropriate SPERT tests; however, data from the SPERT tests were not relied upon to support the Doppler reactivity model. (Affid., pp. 3-4)

Applicant's affiant describes the phenomenon of Doppler broadening and its importance in limiting a reactivity excursion accident. (Affid., pp. 1-2) He explains what G.E. did to develop its mathematical model to take account of the phenomenon, and what comparisons were made to verify the accuracy of the results. (Affid., pp. 2-4) Finally, Mr. Stirn explained that a confirmatory comparison

was made with the results from appropriate and relevant SPERT tests that further supported the G.E. analysis. (Affid., p. 4 and Exhibit A) The affidavit is reasonably well documented, and is supportive of Applicant's statement of facts as to which there is no issue. We observe that affiant's education and professional experience seem to qualify him to address the matters at issue.

Mr. Doherty's responses are unsupported by affidavits. Instead, his initial response relies upon fifteen exhibits to support his assertion that G.E. has not properly dealt with the Doppler broadening phenomenon. His supplemental response provides selected quotations attributed to G.E.'s proprietary Reed Report to further support his case. Neither response placed in question the validity of Applicant's statement of facts not at issue. Moreover, many of Intervenor's concerns address considerations outside of the scope of his contention, namely, the effects of time response, temperature dependence, burnup dependence, and overlapping neutron absorption resonances. These considerations not only constitute an impermissible broadening of the scope of the contention, but, in advancing them, Intervenor fails to establish how they invalidate the G.E. analysis.

In conclusion, we find that Applicant's motion is dispositive of the issues raised by Doherty Contention 33 and, accordingly, the motion for summary disposition is granted, and the Contention is dismissed.

Doherty Contention 35

Applicant will be unable to provide safe welding of piping at ACNGS without costly repairs to such welding or danger to petitioners health and economic interests in the event of pipe break as a result of such welding not being rewelded when it should have been. There have been cadweld failures at STP which have been reported in NUREG-0030. Welding at Comanche Peak Nuclear Steam Station, Units 1 & 2 in Somerville County, Texas, has been done frequently by persons being trained to be welders prompting large frequency of rewelding and seven meetings between NRC officials and the utility representatives. This Intervenor says the same situation is likely to occur here due to a shortage of trained employees. Intervenor contends Applicant should be required to present a program for training persons before they weld at the ACNGS site.

The Staff filed a Motion for Summary Disposition on August 8, 1980. Mr. Doherty filed a reply on September 15, 1980.

In support of its motion, the Staff relies upon an affidavit of one of its senior materials engineers who attests that safe welding operations at ACNGS will be assured by (1) the requirements of 10 CFR Part 50, Appendix B which mandate appropriate welder qualifications, (2) the testing requirements of the ASME code and the Applicant, (3) the examination of production welds by the architect-engineer and Applicant to verify that they possess necessary mechanical properties, and (4) the audit of those tests by the Office of Inspection and Enforcement. Mr. Doherty acknowledges that the architect-engineer (Ebasco) will be different from the one employed at the Comanche and STP projects, that he does not know what procedures will be used by Applicant and by Ebasco, and that he has no basis for alleging that the welding to be accomplished by Ebasco will be inadequate. However, Mr. Doherty asserts that, despite Applicant's seeming adherence at STP to the requirements of various standards, codes and regulations, the

evidence shows that many welders at STP were unqualified and that there were many defective welds.

The Intervenor has raised an issue of material fact and we will hear evidence upon this matter. The Motion of Summary Disposition is denied.

Doherty Contention 38-B

Contrary to NUREG-0578, the ACNGS reactor cannot be brought to cold shutdown in 24 hours.

The Applicant filed a Motion For Summary Disposition on August 4, 1980, which was supplemented by four attachments:

1. A list of three material facts as to which there is no genuine issue to be heard;
2. A portion (pp. 13-18) of an undated deposition of Mr. Doherty taken by Applicant;
3. An affidavit of an employee of Applicant's NSSS vendor; and,
4. A statement of the qualifications of the affiant, dated July, 1980.

Mr. Doherty responded in opposition to this motion on September 4, 1980.

In substance, Applicant's motion asserts that three listed material facts as to which there is no genuine issue, as supported by the affidavit, establish that the reactor can be brought to cold shutdown within a total period of seven hours. Hence, Applicant claims to be entitled to summary disposition of this contention as a matter of law.

Mr. Doherty's opposing response, supplemented by three exhibits 16/, fails to identify any issues of controverted material facts which must be heard. Moreover, the portion of the deposition appended to Applicant's motion (but not referred to therein) raises serious question as to Intervenor's familiarity with the substance of the contention. Despite these deficiencies, however, we focus instead upon Applicant's affidavit, which alleges numerous technical, functional and design facts. Were they supported by references to evidentiary material, they might warrant our consideration vis-a-vis Intervenor's arguments. However, the affidavit is unsupported and conclusional in nature, and the affiant's statement of qualifications does not cause us to consider his statements as expert opinions. We conclude that Applicant has failed to demonstrate that there is no genuine issue of material fact in dispute. Accordingly, the instant motion is denied and evidence regarding the contention will be heard.

16/ Page A-3 of NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations", July, 1979;
Page 5-21 of NUREG-0152, "SER related to the preliminary design of the Gessar-238 NSSS" (undated);
Page 5-9 of Supplement 2 of the Allens Creek SER, dated March, 1979.

Doherty Contention 43

Intervenor contends Applicant's stainless steel components including safety system piping, and nuclear steam supply system piping will be coated and cleaned with compounds that could contribute to corrosion, intergranular cracking or stress corrosion cracking. These compounds contain chlorides, fluorides, lead, zinc, copper, sulfur, or mercury which are leachable or could be released by breakdown caused by radiation. Further, that Applicant's coating and cleaning program should conform to Regulatory Guide 1.54, because cracking of piping has been observed in several General Electric Units (i.e., Duane Arnold Energy Center, 1978) of similar construction to ACNGS. And, NUREG-0152, General Electric Standard Safety Analysis Report, p. A-5, indicate the General Electric position is to take exception to the provisions of Regulatory Guide 1.54 (Feb. 8, 1977).

Applicant filed a Motion for Summary Disposition on August 4, 1980. Intervenor Doherty filed his reply on September 22, 1980.

In substance, supported by an affidavit jointly executed by two employees from General Electric, Applicant asserts that there is no issue of material fact to be tried because (1) in compliance with Regulatory Guide 1.54, which is concerned primarily with preventing the release of coating materials inside the containment by radiation decomposition, chemical reaction or heat in a post-accident environment, G.E. will not coat the stainless steel piping and components of the several nuclear steam supply subsystems at ACNGS; and (2) as reflected in the PSAR, Applicant has committed itself to comply with Regulatory Guide 1.37, which precludes the use of chemical compounds upon austenitic stainless steel and nickel-base alloys that could contribute to intergranular cracking or stress-corrosion cracking.

In his reply, Mr. Doherty acknowledges Applicant's commitment in the PSAR to follow the stainless steel cleaning requirements in Regulatory Guide 1.37 and withdraws this portion of his contention. Further, in light of Applicant's motion and affidavit, Mr. Doherty withdraws that portion of his contention which alleges that all the nuclear steam supply system components and piping will be coated contrary to Regulatory Guide 1.54. Apparently, and it is by no means clear, the Intervenor contends that portions of the ACNGS emergency core cooling system components and piping will be coated. In support of this residual concern, Mr. Doherty relies upon correspondence between G.E. and the NRC Staff which was initiated by G.E.'s letter of July 13, 1976 that had proposed alternatives to the requirements of Regulatory Guide 1.54.

In light of Mr. Doherty's withdrawals of two portions of his contention, Applicant's motion is granted to that extent, and those two portions are dismissed. However, because of Mr. Doherty's residual concern, which raises a controverted issue of material fact, Applicant and Staff are requested to present evidence upon this single matter.

Doherty Contention 44

Intervenor contends the ACNGS design is unsafe against pipe break accidents at pipe cracks initiated by water hammer. Further, analysis of such an event is required to indicate what must be done to cope with accidents caused by large deep cracks in the recirculation pipes such as those discovered at the Duane Arnold Energy Center in 1978. According to the 1978 NRC Annual Report, 100 incidents involving water hammer have occurred in both PWR's and BWR's. A recent Advisory Committee on Reactor Safeguards (ACRS) report to the Commission (August 16, 1979),

indicates there is need for more adequate inservice inspection of piping including feedwater and steam supply piping, residual heat removal system, ECCS, containment spray system, and service water systems in nuclear plants such as ACNGS.

Intervenor contends:

a. Applicant should be required to analyze and determine what additional measures may be taken to mitigate the consequences of water hammer on system piping listed above, and

b. Applicant should be required to analyze and determine what additional measures may be taken to mitigate the consequences of water hammer on system piping listed above which has suffered the various types of cracking observed in NUREG-0531, and NUREG-75/067, and

c. Applicant should be required to analyze and determine what additional measures can reduce the probability of an event where water hammer causes a cracked pipe to break.

Applicant filed a Motion for Summary Disposition on August 4, 1980. Mr. Doherty filed an opposing response on October 19, 1980.

Applicant's motion was accompanied by the following items:

1. A Statement of Material Facts as to Which There is no Genuine Issue to be Heard;
2. An undated excerpt taken from Applicant's deposition of Mr. Doherty, consisting of pages 336-347;
3. The joint affidavit (dated July, 1980) of Messrs. L. A. Gunther and W. F. Malec employed by Ebasco Services Incorporated,

who are a Welding and Materials Engineer and the Supervising Mechanical Nuclear Engineer, respectively, assigned to the Allens Creek project; and,

4. Two exhibits comprising statements of professional qualifications of the affiants (Gunther statement dated May, 1980, Malec statement undated).

In substance, Applicant asserts that by two courses of action it will obviate the concerns of Intervenor. First, virtually all of the piping in the ACNGS - and specifically in the systems identified in the contention as being of concern - will be fabricated of "carbon steel, which has demonstrated a very high resistance to IGSCC."^{17/}

(Jt. Affid., p. 7) Affiants describe each of the systems mentioned in the contention and specify the piping alloy material to be used.^{18/}

(Jt. Affid., pp. 2-3) Second, Applicant asserts that by adopting standard industry practice and the guidance of NRC (e.g. NUREG-0582,

^{17/} We note that Applicant assumes that IGSCC (intergranular stress corrosion cracking) is the cause of the cracks that concern Mr. Doherty because of his reference to the Duane Arnold facility.

^{18/} We further note that the contention introduces the identity of each system of concern by the word "including", as though these may be examples rather than an all-inclusive list.

"Water Hammer in Nuclear Power Plants"), "[t]he ACNGS fluid systems are designed to eliminate water hammer wherever possible." (Jt. Affid., p. 4)

Mr. Doherty's response does not list the material facts as to which there are genuine issues to be heard; nor does it contain supporting affidavits. Instead, he attaches fifteen exhibits excerpted from cited documents to support his assertion that IGSCC and water hammer phenomena continue to be of concern with regard to plant safety. Representative of these exhibits is an ACRS letter to the NRC, of August 16, 1979, which expresses concerns about these phenomena and suggests the possible need for additional attention to them. Additionally, via certain of his exhibits, Intervenor points out seemingly contradictory positions regarding industrial codes and NRC guidance as to acceptable carbon content for IGSCC resistant steels.

We are unable, on the basis of the information presented, to conclude that there are no genuine issues of undisputed material facts. Accordingly, we deny the motion for summary disposition of Doherty Contention 44, and testimony on these matters will be heard.

Doherty Contention 45

Intervenor contends that the lateral support of the ACNGS reactor core is not sufficient to withstand lateral seismic forces combined with the lateral blowdown force that arises simultaneously during a LOCA transient.

The above statement of this contention constitutes the version as reworded by this Board and admitted in our Order of March 13, 1980. The Staff filed a Motion for Summary Disposition on August 8, 1980,

which addressed the original version that, as noted above, was altered by us when the contention was admitted. Mr. Doherty responded in opposition on September 22, 1980, in which he noted the above discrepancy; he supplemented his response (without leave of the Board) on January 26, 1981. Staff's motion is accompanied by the following items:

1. A Statement of Material Facts as to Which There is no Issue to be Heard;
2. Eighteen pages (undated) apparently excerpted from the Applicant's deposition of Mr. Doherty;
3. The undated, unsigned, unsworn "affidavit" of R. O. Meyer, employed by NRC; and
4. A statement of professional qualifications of the affiant, undated.

Staff's motion does not address the contention as reworded and admitted. Staff's statement of material facts not at issue addresses combined seismic and blowdown forces but the affidavit makes only an unsupported and conclusional assertion about the acceptability of the forces on the ACNGS core. The support for this conclusion by Staff's affiant is limited to a defense of the lack of lateral flashing loads in a BWR. Based upon affiant's statement of qualifications, we must question whether he possesses an appropriate background to discuss blowdown and seismic forces authoritatively.

We need not address Intervenor's responses because the issue raised by the contention has not been joined. Accordingly, Staff's motion for summary disposition is denied and testimony will be heard on Doherty Contention 45.

Doherty Contention 46

This Intervenor contends control rods capable of causing a five second period on being withdrawn one notch, if uncoupled from their drives and stuck in the core could, by falling several notches moments later cause a significantly shorter period leading to fuel damage. The core conditions necessary for fuel damaging short periods such as these are three:

1. When there is high xenon concentration in the reactor core (high xenon concentration magnifies the worth of certain central control rods until burned off),
2. Moderator temperatures are high (200°F - 480°F), and
3. The percentage of voids in the coolant was greatly reduced.

The Staff filed a motion for summary disposition on August 8, 1980. Mr. Doherty responded in opposition on October 23, 1980. The Staff's motion was accompanied by the following:

1. A Statement of Material Facts as to Which There is no Issue to be Heard;
2. Nineteen pages (undated) apparently excerpted from Applicant's deposition of Mr. Doherty;
3. The affidavit of W. L. Brooks, a nuclear engineer employed by the NRC, dated August, 1980; and,
4. A statement of affiant's professional qualifications, undated.

Item 1, above, is reproduced here:

1. The fuel enthalpy limit is 280 calories per gram at ACNGS.
2. A total rod worth greater than $0.013\Delta k/k$ must result from a control rod drop to result in a fuel enthalpy of 280 calories per gram.
3. The rod pattern control system at ACNGS will be designed to limit the maximum potential dropped rod worth to less than $0.010\Delta k/k$.
4. Analyses show that under a wide variety of core conditions and drop distances, the rod worth increments range from a low of $0.005\Delta k/k$ to a high of $0.0083\Delta k/k$.
5. If further analysis shows that $0.010 k/k$ will be exceeded, the Applicant is required to design the rod pattern control system to limit the maximum of worth to $0.01 k/k$.
6. Drastic patterns such as insertion of rods on the opposite side of the core from the most reactive rod cause an increase in worth of the maximum rod from 0.0083 to only $0.012\Delta k/k$ which is below the total rod worth of $0.013\Delta k/k$ allowable to not exceed the fuel enthalpy limit.
7. The presence of enhanced notch worths due to xenon in the core cause the total worth of the high-worth rods to decrease, thus reducing the consequences of the rod drop accident.
8. The postulated thermal hydraulic condition in the core during heatup where moderator temperatures are near saturated.

conditions (220°F to 480°F) has been analyzed and shown to reduce the consequences of the design basis rod drop accident.

9. The presence of voids in the core reduces the effect of a particular rod motion (i.e., reduces the rod worth) and makes the Doppler coefficient more negative relative to no voids in the core.

10. Reducing the rod worth and making the Doppler coefficient more negative will reduce the consequences of the design basis rod drop accident.

The Staff agrees with the first sentence of Mr. Doherty's contention. Staff's affiant then reviews and documents the reactivity behavior of the ACNGS following a design basis control rod drop accident ^{19/} and argues that such a scenario represents an upper bound on reactivity insertion and fuel enthalpy consequences. He concludes that each of the three core conditions postulated in the contention results in a less severe impact than that resulting from a design basis control rod drop accident. The bases for each of these conclusions are adequately developed and collectively the discussion supports Staff's list of undisputed material facts. Affiant Brooks

^{19/} A design basis rod drop accident is the subject of Doherty 24, regarding which Applicant's motion for summary disposition has been denied, supra.

seems to have the appropriate professional qualifications to enable him to speak authoritatively on the matters at issue.

Mr. Doherty's response, without benefit of an expert's supporting affidavit, relies upon six exhibits excerpted from cited documents to support three primary concerns:

- It is questionable whether Applicant can effectively restrict the maximum worth of any particular rod in order to prevent fuel enthalpy from exceeding 280 calories per gram;
- Even though the 280 calories per gram limit is not exceeded, there will be fuel damage; and
- The behavior of certain fission product isotopes of iodine and xenon following reactor shutdown may dangerously increase control rod worth.

Intervenor fails to show how or why these concerns can overturn the results reached by Staff's affidavit. We emphasize that here we are looking solely to the question of whether an event such as postulated by this contention can result in an accident having more serious consequences than the design basis control rod drop accident. We conclude that Staff's presentation is dispositive.

Accordingly, we grant Staff's motion for summary disposition of Mr. Doherty's Contention 46 and the Contention is dismissed. (However, we note that Doherty 24 remains to be litigated.) We further note our desire to be informed during the evidentiary hearing as to whether

there is an inconsistency between the value of rod worth limitation (0.01Δk/k) expressed herein by the Staff and that stated by Applicant (0.008Δk/k) in its motion for summary disposition of Doherty 24.

Cumings Contention 9 20/

The health effects* of low level radiation emitted during normal operation of the plant, even though meeting the "as low as is reasonably achievable" standards of Appendix I, if included in the NEPA balancing of costs and benefits, would alter this benefit to the extent that costs would outweigh benefits.

*Health effects include impacts upon humans, animals and plants.

The Staff filed a motion for summary disposition on November 26, 1980. In support of its motion, Staff appended the affidavit of Dr. Reginald L. Gotchy, Senior Radiobiologist, Radiological Assessment Branch, NRC. 21/ In substance, Staff asserts the following material facts as to which it contends there are no genuine issues to be heard:

1. In order for the NEPA balancing of costs and benefits to be altered by health effects considerations, the NRC models used to calculate potential somatic effects (cancer) and genetic effects would have to seriously underestimate the risks. (Gotchy 1, p. 5)

20/ Consolidated Contention (Cumings 9, Griffith 1, Johnston 1 and Lemmer 5) as reworded by the Board and admitted pursuant to its Order of September 26, 1980.

21/ The initial Gotchy affidavit is cited hereinafter as Gotchy 1.

2. The NRC health effects models have relied heavily on the BEIR I (1972) and BEIR III (1980) reports. ^{22/} The BEIR Committee is regarded as one of the most outstanding groups of experts on the medical and biological risks of radiation exposure. (Id. pp. 5-6)

3. The BEIR Committee has considered and discredited most of the studies that have criticized the conventional wisdom regarding radiation bioeffects and BEIR III can be considered the latest authoritative guidance or the best scientific evidence available respecting health effects from radiation exposure. (Id. pp. 6-12)

4. Comparing the risk values cited by BEIR III, and the risk values used by NRC, the Staff finds the BEIR values to be slightly lower for both cancer deaths and genetic effects. Thus the NRC models tend to overestimate radiation effects. (Id. p. 13)

5. 10 CFR Part 50, Appendix I design objective doses to individuals are 5 mrem/year (or less) to the total body, or 15 mrem/year (or less) to any organ, and health risks are proportional to the Appendix I doses. (Id. pp. 13-14)

^{22/} "The Effects on Population of Exposure to Low Levels of Ionizing Radiation," BEIR Committee, National Academy of Sciences.

6. Using the NRC health effects models, the lifetime cancer mortality risk per year of exposure to Appendix I dose levels is less than one chance in a million as compared to an average annual risk of mortality from other causes on the order of 14 chances in 1,000. (Id. p. 15)

7. People are exposed to normal background radiation varying from 80 to 200 mrems/yr or 1,000% or more in excess of the Appendix I design objective levels. Since most experts believe background radiation accounts for only a few percent of the lifetime risk of mortality from cancer of about 20%, the overall risk of cancer mortality would not be significantly changed by exposures at the Appendix I levels. (Id. pp. 15-16).

8. A reasonable estimate of the cumulative doses to the U.S. population from LWR's operating at Appendix I levels is about 100 person rem. Using current health effects models, there might be as much as one death in the years ahead for each year assuming there are 100 large LWR's operating in the U. S. (Id. p. 16)

9. The collective risk of a genetic defect occurring during the next five generations is about twice that of the risk of cancer mortality but would be relatively insignificant compared

to the current estimated risk of about 6% per generation from all other causes. (Id. pp. 16-17)

10. The de minimis nature of Appendix I health risks cannot significantly affect the NEPA cost benefit balance and result in an unfavorable NEPA conclusion regarding construction of the facility. (Id. p. 17)

11. Harm to plants and animals from the effects of radiation meeting the standards accepted as adequate for man are deemed to be highly unlikely. (Id. p. 5)

On December 18, 1980, Applicant filed an answer supporting Staff's motion and concurring in Staff's statement of material facts. Applicant attached to its answer the affidavit of Dr. Leonard Hamilton ^{23/} which set forth the bases for Applicant's concurrence, and supported the statement of Staff's affiant, Dr. Gotchy. On December 23, 1980, Counsel for the Intervenors, Stephen A. Doggett, Esq., filed an answer opposing Staff's motion to which was appended an unpublished paper by Dr. Irwin D. J. Bross titled, "A 1981 Reassessment of the Health Hazards of Low-Level Ionizing Radiation",

^{23/} Hereinafter cited as Hamilton 1.

dated October 9, 1980. ^{24/} Dr. Bross's accompanying affidavit merely attested that the facts in his unpublished paper were true and correct to the best of his knowledge, information and belief. Intervenor's answer set forth the following statement of material facts as to which they contend there are genuine issues to be heard:

1. The NRC models used to calculate potential somatic effects (cancer) and genetic effects seriously underestimate the risks.
2. Health risks from cancer and genetic effects from normal operations of large LWR's in the U.S. are not insignificant relative to naturally occurring events.
3. The underestimating of Appendix I health risks significantly affects the NEPA conclusion regarding construction of ACNGS.

While Mr. Doggett's covering letter noted that "Intervenors would show that Staff's motion in no way presents evidence of the issue of risk to plants and animals," this matter was neither set out as a genuine issue of material fact in Intervenor's statement of material facts nor discussed in their submissions. Whereas "genetic effects" are included in Issues 1 and 2 of Intervenor's above list of issues,

^{24/} Hereinafter cited as Bross 1.

genetic effects on future generations are not discussed in Bross 1 nor in subsequent submissions of Intervenors.

Intervenors did not respond to Applicant's answer which supported Staff's motion.^{25/} The Board invited comment from Applicant and Staff on the Bross paper (Bross 1) and stated that Mr. Doggett would have an opportunity to respond to both Applicant and Staff's comments. (Tr. 5775-78) Commenting affidavits from Dr. Hamilton on behalf of Applicant (Hamilton 2) and from Dr. Gotchy on behalf of Staff (Gotchy 2) were received, dated March 9, 1981, and March 13, 1981, respectively. Mr. Doggett filed Dr. Bross's affidavits responding to Hamilton 2, and Gotchy 2 on March 31 and April 14, 1981, respectively.^{26/} On April 27, 1981, Applicant filed a motion to strike the Affidavit of Dr. Bross, responding to Hamilton 2. Applicant asserts that the subject affidavit is 1) a scurrilous personal attack

^{25/} Board Order of January 5, 1981, gave Mr. Doggett until January 30 to file a response to Applicant's supporting answer, said response to address only those new facts and arguments presented by Applicant. On February 11, Mr. Doggett informed the Board he did not intend to respond. (Tr. 5528-29)

^{26/} Hereinafter referred to as Bross 2 (responding to Hamilton 2) and Bross 3 (responding to Gotchy 2).

upon Applicants' affiant, and 2) it does not respond to the substantive arguments raised by Dr. Hamilton. Intervenors have not responded to this motion. On review of the subject affidavit, we conclude that its characterization by Applicant is well taken, and, absent a reply from Intervenors, we can only assume that they concur. The motion to strike is granted and we make no further reference to this affidavit. (Bross 2)

In considering Intervenors' response to the Staff's motion for summary disposition, we first note that in preparing the paper from which Intervenors have drawn their statement of material facts at issue, Dr. Bross was addressing only generally the subject matter of the contention: he did not address specifically the Staff's statement of uncontroverted material facts in its motion for summary disposition. In essence, Dr. Bross's paper challenges the validity of estimating health risks from low level radiation by linear extrapolation from data on persons exposed to much higher levels. His argument boils down to a focus on the question of "What is the doubling dose for leukemia in men? -- If the doubling dose is around 5 rem, then NRC is permitting a dangerous exposure. No other carcinogen is permitted at levels close to a doubling dose for cancer in humans". (Bross 1, p. 3) After alleging to have discredited both the linear and the threshold forms of dose-response curves, and after providing data interpretations as to why his genetic degradation hypothesis is appropriate, Dr. Bross concludes his paper with a discussion of public health implications,

wherein he states:

1. "On the basis of present facts the best 1981 estimate for the doubling dose for leukemia (or for blood cancers) would seem to be about 5 rads or rems." (Id. p. 22)

2. "In cost-benefit evaluations for the deployment of new radiological technology the 5-rad estimate should be regarded as a minimum cost -- that the evidence on radiation risks indicates that these risks are more than 30 times greater than official estimates ^{27/} made in 1979." (Id. p. 23)

As the Board has previously observed, Dr. Bross did not comment upon the effects of radiation on plants and animals, nor upon the genetic effects on future generations. It is significant to note that his discussions of somatic effects include both cancerous and noncancerous impacts. He further concludes that if both categories of impacts are assessed, "the increased risk of cancer and other premature mortality is much greater than 0.2%". (Bross 3, p. 2)

Dr. Gotchy's submissions assert that the implications of the Bross conclusions lead to results not supported by scientifically accepted literature. Gotchy further asserts that one of the studies

^{27/} The official estimates noted here appear to refer to "Interagency Task Force on the Health Effects of Ionizing Radiation: Report of the Work Group on Science", June, 1979. (Bross 1, Ref. 2)

relied upon by Bross has been discredited. (Gotchy 2, pp. 4-5) Dr. Gotchy concludes that even if the risk of leukemia were low by a factor of 20, the incremental increase in cancer mortality risk would be less than 0.2% (from 30 years of whole body exposure to the Appendix I limit of 5 mrem/yr), which should not be a reasonable basis for challenging the NEPA cost-benefit balance for Allens Creek. (Gotchy 2, p. 5) Noncancerous somatic impacts are not discussed.

Dr. Hamilton's submissions allege that two of the studies relied upon by Dr. Bross do not yield the results claimed by Bross (Hamilton 1, pp. 7-13), and that the statistical methodology of Bross is unsound. (Hamilton 2, pp. 4-5) Hamilton also cites the BEIR III report as discrediting the conclusions of Bross. (Id. pp. 7-8)^{28/} Finally, Dr. Hamilton asserts that the discussion of Dr. Bross regarding the appropriate form of the dose-response curve to be used for low doses is seriously flawed. (Hamilton 2) Like Dr. Gotchy, Dr. Hamilton does not discuss noncancerous somatic effects.

Whereas the foregoing discussion only briefly summarizes the lengthy submissions of Drs. Bross, Gotchy and Hamilton, we have examined the proffered materials in detail, for the sole purpose of

^{28/} We note that the BEIR III report predates the Bross submissions.

determining whether there are genuine issues of material fact remaining in dispute. We conclude that the following controverted issue of material fact raised by Intervenors must be tried:

The increased risk of cancer and of noncancerous effects^{29/} from Appendix I levels of radiation is considerably greater than the 0.2% value reached by the NRC, thus invalidating its favorable cost-benefit balance assessment.^{30/}

This disputed issue cannot be decided under summary disposition procedures. Thus, the Board denies in part the Staff's motion for summary disposition and we will hear evidence upon this specific, controverted issue of material fact. However, we grant the instant motion to the extent that we dismiss that part of the consolidated contention which alleged that plants and animals would be harmed at Appendix I levels of radiation because, as observed above,

^{29/} We note that the corrected version of the 1980 BEIR III Report, at p. 478, states that noncancerous effects of radiation at low doses "cannot now be excluded" from consideration.

^{30/} Since, as noted above, Dr. Gross adverts only to somatic health effects, this issue does not encompass genetic effects as a contested issue.

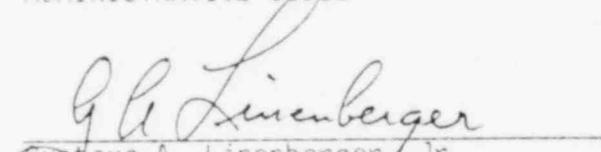
Intervenors did not set forth this matter in their statement of material facts and did not discuss the reasons why this was a genuine issue of disputed material fact which must be heard.

It is so ORDERED.

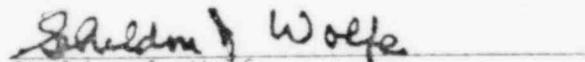
THE ATOMIC SAFETY AND LICENSING BOARD



E. Leonard Cheatum
ADMINISTRATIVE JUDGE



Gustave A. Linenberger, Jr.
ADMINISTRATIVE JUDGE



Sheldon J. Wolfe
ADMINISTRATIVE JUDGE

Dated at Bethesda, Maryland
this 1st day of September 1981.