



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 50-295
(10 CFR 2.206)

6/20/85

Dr. Zinovy V. Reytlatt
Department of Applied Mathematics and
Computer Sciences
Warren Wilson College
Swannanoa, North Carolina 28778-2099

Dear Dr. Reytlatt:

Your letters to me dated March 6 and March 8, 1985 (Petition) requested pursuant to 10 CFR 2.206 an immediate postponement of containment leak rate tests performed for all light-water reactors in accordance with 10 CFR Part 50 Appendix J. You further alleged that certain computer software used in determining leak rates and developed by Volumetrics, Inc. was in error and required debugging and revalidation. On April 22, 1985, I acknowledged receipt of your letters and informed you that I would take appropriate action, within a reasonable time. For the reasons stated in the enclosed "Directors Decision Under 10 CFR §2.206," (DD-85-10), your Petition is denied.

Copies of this Decision will be filed in the Commission's Public Document Room at 1717 H Street, N.W. Washington, D.C. 20555, and in the local public document room at the Zion-Benton Library District 2600 Emmaus Avenue, Zion, Illinois 60099. A copy will also be filed with the Secretary for the Commission's review in accordance with 10 CFR 2.206 (c).

I have also enclosed a copy of a notice that will be filed for publication with the Office of the Federal Register.

Sincerely,

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSIONOFFICE OF NUCLEAR REACTOR REGULATION
Harold R. Denton, Director

In the Matter of)	
)	
COMMONWEALTH EDISON COMPANY)	
(Zion Nuclear Power Station,)	Docket No. 50-295
Unit 1))	
AND ALL LIGHT-WATER REACTORS)	(10 CFR § 2.206)

DIRECTOR'S DECISION UNDER 10 CFR § 2.206INTRODUCTION

On March 6, 1985, Zinovy V. Reytblatt (Petitioner) submitted a letter pursuant to 10 CFR § 2.206 to the Director of the Office of Nuclear Reactor Regulation seeking an immediate postponement of all containment leak rate tests performed for light-water reactors pursuant to the Commission's regulations in this area, specifically, 10 CFR Part 50, Appendix J. The primary concern raised by the Petitioner was the alleged use of incorrect weighting coefficients in the air mass equation used for determining actual containment leak rates. Specifically, Petitioner alleges that incorrect weighting coefficients were utilized in determining the containment leak rate for the Zion Station, Unit 1.

On March 8, 1985, Petitioner submitted a second letter to the Director of the Office of Nuclear Reactor Regulation alleging that certain computer software developed by Volumetrics, Inc. and utilized at a number of nuclear facilities, including the Zion Unit 1, to determine containment leak rates,

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does not function correctly and consequently may lead to incorrect determinations of containment leak rates. Petitioner requested that actions be taken to ban the use of the software in question until it has been "debugged" and revalidated.

On April 22, 1985, I acknowledged receipt of both the March 6 and March 8, 1985 letters from the Petitioner and informed the Petitioner that both letters would be considered together as a Petition pursuant to 10 CFR § 2.206 and that appropriate action would be taken on the issues raised in the Petition within a reasonable time. I also have considered a subsequent letter from the Petitioner dated April 30, 1985 in reaching my decision. My decision in this matter follows.

DISCUSSION

The Petitioner has been involved in the technical issues associated with containment leak rate testing methodologies for a number of years. Petitioner's activities have been focused upon (1) criticizing the current methods used to assure adequate containment leak rates and (2) suggesting what Petitioner would consider to be improved methods to perform containment leak rate tests. The NRC Staff has also been active in reviewing the adequacy of the Commission's regulations regarding containment leak rate testing. Leak rate testing of light-water reactor containments is a substantial undertaking. While the Commission's present requirements for leak rate testing continue to provide reasonable assurance that the public health and safety is adequately protected, these requirements are now over 11 years old and a substantial base of experience exists to apply in seeking improvements to the regulations. In fact, one modification to 10 CFR Part 50, Appendix J, in the area of Type B tests was made.

See 45 Fed. Reg. 2330 (1980) and 45 Fed. Reg. 62,789 (1980). The NRC Staff has underway the review of leak rate testing requirements with a view to see whether other modifications to these requirements are appropriate. Petitioner is well aware of these activities and has participated in them over the years, including participation in the activities of Working Group AHS-56.8 of the Standards Committee of the American Nuclear Society, the entity carrying out a detailed review and examination of methodologies appropriate for adequate containment leak rate testing. The Petitioner has also presented his concerns with respect to containment leak rate testing directly to the NRC Staff on many occasions in the past in both written and oral form. Indeed, I have issued twice before Director's Decisions pursuant to 10 CFR § 2.206 dealing with Petitioner's concerns in this area.¹ Consequently, both the nuclear industry and the NRC Staff have long had the benefit of Petitioner's views with respect to containment leak rate testing.²

The current Petition raises essentially three issues. First, the Petition alleges that the equation used to calculate containment air mass at any given time is wrong. This issue has been raised by the Petitioner in the past and, in fact, was the subject of an earlier Director's Decision issued by this office.³ As noted in my earlier Decision, the equation used in the standard of the American Nuclear Society (ANS) and the American National Standards Institute (ANSI)⁴ for calculation of containment air mass is not

1 Commonwealth Edison Company (LaSalle County Station, Units 1 and 2) and All Light-Water Reactors, DD-84-6, 19 NRC 891 (1984); Commonwealth Edison Company (Zion Nuclear Power Station, Unit 1), DD-85-2, 21 NRC 270 (January 23, 1985.)

2 It should be noted that the Commission has placed leak rate testing for water-cooled power reactors on its Regulatory Agenda. See 50 Fed. Reg. 18154 et seq. (April 29, 1985).

3 See DD-84-6, supra, at 894.

4 ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements".

"wrong" as alleged by the Petitioner. The manner in which the mean containment temperature is calculated for use in the equation, however, is important. In this regard, ANSI-ANS 56.8-1981 does not prescribe how to calculate the mean containment temperature. Either a mass-weighted mean temperature or a volume-weighted mean temperature would be acceptable if the leak rate testing is properly conducted to assure stable conditions and the test data are properly evaluated. In essence, the equation is correct, but inadequately defines the temperature term by allowing the assumption of a uniform density throughout the containment. The density may not, however, be uniform because the temperature may not be uniform. Hence it is important to assure that the test is conducted under stable conditions. Within the range of temperature variations experienced at tests conducted at nuclear facilities, the difference in leak rates using the assumption of uniform density has no safety significance. Consequently, while this is an area where improvement may be made, such an improvement would be more correct technically but would produce no meaningful change in the conduct of containment leak rate tests.

The second issue raised by the Petitioner concerns the use of the so-called weighting coefficients in determining containment leak rates and the allegation that such weighting coefficients may be manipulated to reach an acceptable result. This issue is also the subject of my earlier Decision.⁵ As noted in my earlier Decision, a properly conducted leak rate test would not contain the types of deficiencies alleged by the Petitioner such as the use of unjustified weighting coefficients. Such manipulation of data

5 Ibid, at 894-895.

would be a violation of the Commission's regulations and would subject licensees to NRC enforcement action. In addition, to ensure compliance with the Commission's requirements regarding leak rate testing, NRC inspectors regularly observe the tests conducted by licensees and document the results of their observations in Inspection Reports.

The third issue raised by the Petitioner concerns alleged inadequacies in certain software used to conduct containment leak rate testing. The Petitioner alleges that the Volumetrics computer program for processing leak rate test data does not perform addition and/or division correctly which consequently may lead to underestimating leak rates to the degree that such leak rates would appear to be within normal limits. The Petitioner suggests that such may be the case with respect to Zion Unit 1 leak rate testing, and suggests that other facilities may be employing the same defective software. Petitioner further alleges that the Volumetrics computer program has a "fraudulent" option which permits doubling of the weighting coefficients and that this "fraudulent" option has been used during the November 1983 Zion test and possibly also in the July 1984 Zion test.

The Volumetrics computer program (software) was used in conducting the November/December 1984 containment integrated leak rate test (CILRT) at the Detroit Edison Company's Fermi Unit 2 plant. NRC inspectors, as a matter of course, independently verify CILRT results. In the case of the Fermi Unit 2 test, the NRC inspectors found that the Volumetrics computer program produced acceptable results. There was no evidence of any manipulation of subvolume weighting coefficients to bias the data. Specific data sets from this test have also been checked for alleged inadequacies in the Volumetrics software, and it has been determined that the Volumetrics computer program correctly processes the data. Consequently, the staff has not found it necessary to review the Volumetric software itself. Also, contrary to statements made by

the Petitioner, the Volumetrics software has never been used for the integrated leak rate testing of the Zion containments. Again, the staff has independently verified that the computer program used in the Zion tests produced correct results.

While the Petition raises three general concerns, Petitioner makes a number of allegations which are specific to the Zion Unit 1 facility. Particularly, the Petitioner contends that the July 1984 containment leak rate test for Zion Unit 1 was performed in violation of regulatory requirements. The Petitioner argues that the July 1984 containment leak rate test at Zion Unit 1 may have used the Volumetrics software permitting doubling of weighting coefficients and incorrect addition and/or subtraction. Further, the Petitioner argues that meaningless "verification" tests were performed during the Zion Unit 1 test on July 29, 1984. The Petitioner alleges that a verification test failed and that, following the failure, the reasons for the failure were not analyzed. Instead, an "unlawfully short test" with the same incorrect weight coefficients used earlier was performed and "successfully" verified. Petitioner questions this approach as no repair was done between tests and containment conditions for both tests were identical. The Petitioner further argues that, based on his analysis of certain data sets for the Zion Unit 1 test of July 1984, and upon his use of supposedly more realistic weight coefficients, he has concluded that the Zion Unit 1 containment leak rates are in excess of regulatory limits.

As stated above, the Volumetrics software was not used in the Zion tests. Nevertheless, the Petitioner presented a data set of nine temperature readings for a particular subvolume to show that the Volumetrics computer program does not correctly calculate the average containment temperature. The Petitioner, however, mistakenly included the readings of two channels of temperature sensors (numbers 4 and 14) that had been declared "out-of-service" through the

course of the test. In fact, the computer program in use (not the Volumetrics program) was averaging, correctly, the readings of the seven "in-service" channels.

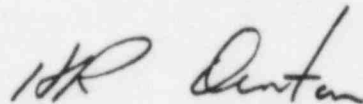
With regard to the Petitioner's allegations concerning the validity of the verification test for the July 1984 Zion CILRT test, the Petitioner alleges that no attempt was made to analyze the cause of the inability to initially meet the test acceptance criterion. In fact, after conducting the verification tests, the licensee did speculate on the cause and proceeded to take corrective action. It was thought that the verification test equipment may have been leaking during the CILRT (which would not have occurred during the subsequent verification test with the equipment in use) since the imposed leak rate was almost identical to the measured (composite) leak rate. The licensee made adjustments to the verification test equipment and proceeded to conduct a second CILRT. The test was discontinued after 10 hours since the results were substantially the same as those obtained during the first CILRT. A second verification test was then conducted using a larger imposed leak rate ($1.1 L_t$ versus $0.82 L_t$), which is permissible. This resulted in a composite leak rate greater than 0.1 weight percent per day. Since the accuracy of measuring leak rates much less than 0.1 weight percent per day is considered poor, conducting a verification test having a composite leak rate greater than 0.1 weight percent per day improves the accuracy of the test. The NRC's Inspection Report⁶ reviewed the circumstances of the verification

6 Letter to C. Reed, Vice President, Commonwealth Edison Company, from J. Keppler, Regional Administrator, Region III, U.S. Nuclear Regulatory Commission, dated September 7, 1984, transmitting Inspection Report No. 50-295/84-11; 50-304/84-11.

test related above. The report concludes that the test did confirm the acceptability of the CILRT.

CONCLUSION

Petitioner sought immediate suspension of all containment leak rate testing and immediate initiation of actions to bar the use of Volumetrics software until it is debugged and revalidated. For the reasons stated in this Decision, the Petitioner's request for relief is denied. As provided by 10 CFR § 2.206(c), a copy of this Decision will be filed with the Secretary for the Commission's review.



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland,
this 3rd day of July 1985.